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BEFORE THE IDAHO PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE APPLICATION OF AVISTA CORPORATION FOR THE AUTHORITY TO INCREASE ITS RATES AND CHARGES FOR ELECTRIC AND NATURAL GAS SERVICE TO ELECTRIC AND NATURAL GAS CUSTOMERS IN THE STATE OF IDAHO	)	CASE NO. AVU-E-21-01 EXHIBIT NO. 8 OF SCOTT J. KINNEY

FOR AVISTA CORPORATION

(ELECTRIC)

ENERGY IMBALANCE MARKET
ISO/AVISTA IMPLEMENTATION AGREEMENT

This Implementation Agreement ("Agreement") is entered into as of April 25, 2019, by and between Avista Corporation, a Washington corporation ("Avista"), and the California Independent System Operator Corporation, a California nonprofit public benefit corporation ("ISO"). Avista and the ISO are sometimes referred to in the Agreement individually as a "Party" and, collectively, as the "Parties."

RECITALS

A. WHEREAS, Avista has determined there is an opportunity to secure benefits for Avista's customers through improved dispatch and operation of Avista's generation fleet and through the efficient use and continued reliable operation of existing and future transmission facilities and desires to participate in the energy imbalance market operated by the ISO ("EIM");

B. WHEREAS, the ISO has determined there are benefits to ISO market participants through greater access to energy imbalance resources in real-time and through the efficient use and reliable operation of the transmission facilities and markets operated by the ISO, and desires to expand operation of the EIM to include Avista;

C. WHEREAS, Avista acknowledges that the rules and procedures governing the EIM are set forth in the provisions of the ISO tariff as filed with the Federal Energy Regulatory Commission ("FERC") and that participation in the EIM requires corresponding revisions to Avista's Open Access Transmission Tariff ("Avista Tariff") and the execution of associated service agreements; and

D. WHEREAS, the Parties are entering into this Agreement to set forth the terms upon which the ISO will timely configure its systems to incorporate Avista into the EIM ("Project") on or before April 1, 2022 (" Implementation Date").

NOW THEREFORE, in consideration of the mutual covenants contained herein, and of other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

AGREEMENT

1. Effective Date and Term.

(a) This Agreement shall become effective upon the date the Agreement is accepted, approved or otherwise permitted to take effect by FERC, without condition or modification unsatisfactory to either Party ("Effective Date").

(b) In the event FERC requires any modification to the Agreement or imposes any other condition upon its acceptance or approval of the Agreement, each Party shall

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have ten (10) business days to notify the other Party that any such modification or condition is unacceptable to that Party. If no Party provides such notice, then the Agreement, as modified or conditioned by FERC, shall take effect as of the date determined under Section 1(a). If either Party provides such notice to the other Party, the Parties shall take any one or more of the following actions: (i) meet and confer and agree to accept any modifications or conditions imposed by such FERC order; (ii) jointly seek further administrative or legal remedies with respect to such FERC order, including a request for rehearing or clarification; or (iii) enter into negotiations with respect to accommodation of such FERC order, provided however, if the Parties have not agreed to such an accommodation within thirty (30) days after the date on which such FERC order becomes a final and non-appealable order, such order shall be deemed an adverse order and the Parties shall have no further rights and obligations under the Agreement.

(c) The term of the Agreement ("Term") shall commence on the Effective Date and shall terminate upon the earliest to occur of (1) the date FERC permits all necessary revisions to the Avista Tariff to take effect and the service agreements under such tariff and the ISO tariff necessary for the commencement of Avista's participation in the EIM have taken effect; (2) termination in accordance with Section 2 of this Agreement; or (3) such other date as mutually agreed to by the Parties ("Termination Date").

(d) This Agreement shall automatically terminate on the Termination Date and shall have no further force or effect, provided that the rights and obligations set forth in Sections 5 and 6 shall survive the termination of this Agreement and remain in full force and effect as provided therein.

2. Termination.

(a) The Parties may mutually agree to terminate this Agreement in writing at any time. In addition, either Party may terminate this Agreement in its sole discretion after conclusion of the negotiation period in Section 2(b) or as provided in Section 2(d) or 2(e) as applicable.

(b) If either the ISO or Avista seeks to unilaterally terminate this Agreement, it must first notify the other Party in writing of its intent to do so ("Notice of Intent to Terminate") and engage in thirty (30) days of good faith negotiations in an effort to resolve its concerns. If the Parties successfully resolve the concerns of the Party issuing the Notice of Intent to Terminate, the Party that issued such notice shall notify the other Party in writing of the withdrawal of such Notice ("Notice of Resolution").

(c) At the time the Notice of Intent to Terminate is provided, or any time thereafter unless a Notice of Resolution is issued, Avista may provide written notice directing the ISO to suspend performance on any or all work on the Project for a specified period of time ("Notice to Suspend Work"). Upon receipt of a Notice to Suspend Work, the ISO shall: (1) discontinue work on the Project; (2) place no further orders with subcontractors related to the Project; (3) take commercially reasonable

actions to suspend all orders and subcontracts; (4) protect and maintain the work on the Project; and (5) otherwise mitigate Avista's costs and liabilities for the areas of work suspended. The ISO will not invoice Avista pursuant to Section 4(c) of this Agreement for any milestone payment following the issuance of a Notice to Suspend Work. To the extent a Notice of Resolution is issued pursuant to Section 2(b), the Notice to Suspend Work in effect at the time shall be deemed withdrawn and the ISO shall be entitled to invoice Avista for any milestone completed as specified in Section 4(c) of this Agreement and Avista shall pay such invoice pursuant to Section 4.

(d) Any time after thirty (30) days from the date of the Notice of Intent to Terminate under Section 2(b), issued by either Party, and prior to the date of a Notice of Resolution, the ISO may terminate this Agreement by providing written notice to Avista that it is terminating this Agreement ("Termination Notice") effective immediately. The ISO may terminate this Agreement under the terms of this Section 2(d) at its sole discretion for any reason.

(e) Any time after thirty (30) days from the date of the Notice of Intent to Terminate under Section 2(b), issued by either Party, and prior to the date of a Notice of Resolution, Avista may terminate this Agreement by providing written notice to the ISO that it is terminating this Agreement ("Termination Notice") effective immediately. Avista may terminate this Agreement under the terms of this Section 2(e) at its sole discretion for any reason.

(f) In the event this Agreement is terminated by either or both of the Parties pursuant to its terms, this Agreement will become wholly void and of no further force and effect, without further action by either Party, and the liabilities and obligations of the Parties hereunder will terminate, and each Party shall be fully released and discharged from any liability or obligation under or resulting from this Agreement as of the date of the Termination Notice provided in Section 2(d) or 2(e), as applicable, notwithstanding the requirement for the ISO to submit the filing specified in Section 2(g). Notwithstanding the foregoing, the rights and obligations set forth in Sections 5 and 6 shall survive the termination of this Agreement and remain in full force and effect as specified in Sections 5 and 6, and any milestone payment obligation pursuant to Section 4(c) that arose prior to the Termination Notice in accordance with Section 2(d) or 2(e) shall survive until satisfied or resolved in accordance with Section 11.

(g) The Parties acknowledge that the ISO is required to file a timely notice of termination with FERC. The Parties acknowledge and agree that the filing of the notice of termination by the ISO with FERC will be considered timely if the filing of the notice of termination is made after the preconditions for termination have been met, and the ISO files the notice of termination within ten (10) days after the Termination Notice has been provided by either the ISO in accordance with Section 2(d) or Avista in accordance with Section 2(e). This Agreement shall terminate upon acceptance by FERC of such a notice of termination.

3. Implementation Scope and Schedule.

(a) The Parties shall complete the Project as described in Exhibit A, subject to modification only as described in Section 4(e) below.

(b) The Parties shall undertake the activities described in Exhibit A with the objective of completing the Project and implementing the EIM no later than the Implementation Date, including all milestones listed under Exhibit A for the Implementation Date, subject to modification only as described in Section 3(c) below.

(c) Either Party may propose a change in Exhibit A or the Implementation Date to the other Party. If a Party proposes a change in Exhibit A or the Implementation Date, the Parties shall negotiate in good faith to attempt to reach agreement on the proposal and any necessary changes in Exhibit A and any other affected provision of this Agreement, provided that any change in Exhibit A, or any change to the Implementation Date, must be mutually agreed to by the Parties. The agreement of the Parties to a change in Exhibit A, or a change to the Implementation Date, shall be memorialized in a revision to Exhibit A, which will then be binding on the Parties and shall be posted on the internet web sites of the ISO and Avista, without the need for execution of an amendment to this Agreement. Changes that require revision of any provision of this Agreement other than Exhibit A shall be reflected in an executed amendment to this Agreement and filed with FERC for acceptance.

(d) At least once per calendar month during the Term, the Parties' Designated Executives, or their designees, will meet telephonically or in person (at a mutually agreed to location) to discuss the status of the performance of the tasks necessary to achieve the milestones in Exhibit A and the continued appropriateness of Exhibit A to ensure that the Project can meet the Implementation Date. For purposes of this section, "Designated Executive" shall mean the individual identified in Section 8(g), or her or his designee or successor.

4. Implementation Charges, Invoicing and Milestone Payments.

(a) As itemized in Section 4(c) below, Avista shall pay the ISO a fixed fee of $300,000 for costs incurred by the ISO to implement the Project ("Implementation Fee"), subject to completion of the milestones specified in Section 4(c) and subject to adjustment only as described in Section 4(b).

(b) The ISO will provide prompt written notice to Avista when the sum of its actual costs through the date of such notice and its projected costs to accomplish the balance of the Project exceed the Implementation Fee. The Implementation Fee shall be subject to adjustment only by mutual agreement of the Parties if the Parties agree to a change in Exhibit A, or a change to the Implementation Date, in accordance with Section 3(c) and the Parties agree that an adjustment to the Implementation Fee is warranted in light of such change.

(c) Upon completion of the milestones identified in Exhibit A, the ISO shall invoice Avista for the Implementation Fee as follows:

i. $50,000 upon the Effective Date as further described in Section 1 of this Agreement and Exhibit A as Milestone 1;

ii. $50,000 upon deployment into the ISO test environment of the full network model database that includes the topology of the Avista system as further described in Exhibit A as Milestone 2;

iii. $50,000 upon ISO promotion of market network model including Avista area to non-production system with Avista connection and data exchange data in advance of market simulation as further described in Exhibit A as Milestone 3;

iv. $50,000 upon commencement of EIM market simulation as further described in Exhibit A as Milestone 4;

v. $50,000 upon start of parallel operations as further described in Exhibit A as Milestone 5; and

vi. $50,000 upon the Implementation Date as further described in Exhibit A as Milestone 6.

(d) Following the completion of each milestone identified in Section 4(c)(i) through (vi), the ISO will deliver to Avista an invoice which will show the amount due, together with reasonable documentation supporting the completion of the milestone being invoiced. Avista shall pay the invoice no later than forty-five (45) days after the date of receipt. Any milestone payment past due will accrue interest, per annum, calculated in accordance with the methodology specified for interest in the FERC regulations at 18 C.F.R. § 35.19a(a)(2)(iii) (the "FERC Methodology").

(e) If a milestone has not been completed as described in Section 4(c)(i), (ii), (iii), (iv), or (v) and in Exhibit A, as Exhibit A may have been modified in accordance with Section 3(c), the Parties shall negotiate in good faith an agreed upon change to the Project Delivery Dates (as defined in Exhibit A) consistent with Section 3(c) such that the timing of milestone payments in Section 4(c) can be adjusted to correspond to the updated Exhibit A.

(f) If Avista disputes any portion of any amount specified in an invoice delivered by the ISO in accordance with Section 4(c), Avista shall pay its total amount of the invoice when due, and identify the disputed amount and state that the disputed amount is being paid under protest. Any disputed amount shall be resolved pursuant to the provisions of Section 11. If it is determined pursuant to Section 11 that an overpayment or underpayment has been made by Avista or any amount on an invoice is incorrect, then (i) in the case of any overpayment, the ISO shall promptly return the amount of the overpayment (or credit the amount of the overpayment on the next invoice) to Avista; and (ii) in the case of an underpayment, Avista shall promptly pay the amount of the underpayment to the ISO. Any overpayment or underpayment shall include interest for the period from the date of overpayment, underpayment, or incorrect

allocation, until such amount has been paid or credited against a future invoice calculated in the manner prescribed for calculating interest in Section 4(d).

(g) All costs necessary to implement the Project not provided for in this Agreement shall be borne separately by each Party, which in the case of the ISO will be recovered through rates as may be authorized by its regulatory authorities.

(h) All milestone payments required to be made under the terms of this Agreement shall be made to the account or accounts designated by the Party which the milestone payment is owed, by wire transfer (in immediately available funds in the lawful currency of the United States).

5. Confidentiality.

(a) All written or oral information received from the other Party in connection with this Agreement (but not this Agreement or any information in connection with this Agreement to the extent such Agreement and information is filed with FERC) necessary to complete the Project and marked or otherwise identified at the time of communication by such Party as containing information that Party considers commercially sensitive or confidential shall constitute "Confidential Information" subject to the terms and conditions herein.

(b) If Avista publicly releases Avista's Confidential Information in connection with a public process or a regulatory filing, or if the ISO publicly releases the ISO's Confidential Information in connection with a public process or a regulatory filing, then the information released shall no longer constitute Confidential Information; provided, however, that Confidential Information disclosed under seal (or in such other manner as to be treated confidentially) in connection with a regulatory filing shall retain its status as Confidential Information under this Agreement. In addition, Confidential Information does not include information that (i) is or becomes generally available to the public other than as a result of disclosure by either Party, its officers, directors, employees, agents, or representatives; (ii) is or becomes available to such Party on a non-confidential basis from other sources or their agents or representatives when such sources are not known by such Party to be prohibited from making the disclosure; (iii) is already known to such Party or has been independently acquired or developed by such Party without violating any of such Party's obligations under this Section 5; (iv) is the subject of a mutual written agreement between the Parties, including an agreement evidenced through an exchange of electronic or other communications, with regard to information for discussion at any stakeholder meetings or during the stakeholder process or with any regulatory authority; or (v) is the subject of a mutual written agreement between the Parties, including an agreement evidenced through an exchange of electronic or other communications, to allow for such disclosure and designation as non-confidential or public information on a case-by-case basis in accordance with Section 10 of this Agreement.

(c) The Confidential Information will be kept confidential by each Party and each Party agrees to protect the Confidential Information using the same degree of

care, but no less than a reasonable degree of care, as a Party uses to protect its own confidential information of a like nature. Notwithstanding the preceding sentence, a Party may disclose the Confidential Information or portions thereof to those of such Party's officers, employees, partners, representatives, attorneys, contractors, advisors, or agents who need to know such information for the purpose of analyzing or performing an obligation related to the Project. Notwithstanding the foregoing, a Party is not authorized to disclose such Confidential Information to any officers, employees, partners, representatives, attorneys, contractors, advisors, or agents without (i) informing such officer, employee, partner, representative, attorney, contractor, advisor, or agent of the confidential nature of the Confidential Information and (ii) ensuring that such officer, employee, partner, representative, attorney, contractor, advisor, or agent is subject to confidentiality duties or obligations to the applicable Party that are no less restrictive than the terms and conditions of this Agreement. Each Party agrees to be responsible for any breach of this Section 5 by such Party or a Party's officers, employees, partners, representatives, attorneys, contractors, advisors or agents, subject to the limitations set forth in Section 6 below.

(d) In the event that a Party is required by a court of competent jurisdiction or regulatory authority (by law, rule, regulation, order, deposition, interrogatory, request for documents, data request issuedas part of a regulatory process, subpoena, civil investigative demand or similar request or process) to disclose any of the Confidential Information, such Party shall (to the extent legally permitted) provide the other Party with prompt written notice of such requirement so that the other Party may seek a protective order or other appropriate remedy and/or waive compliance with the terms of this Section 5. In the event that such protective order or other remedy is not obtained, the disclosing Party hereby waives compliance with the provisions hereof with respect to such Confidential Information. In such event, the Party compelled to disclose shall (i) furnish only that portion of the Confidential Information which, in accordance with the advice of its own counsel (which may include internal counsel), is legally required to be furnished, and (ii) exercise reasonable efforts to obtain assurances that confidential treatment will be accorded the Confidential Information so furnished.

(e) Notwithstanding the foregoing, the Parties acknowledge that they are required by law or regulation to report certain information that could embody Confidential Information from time to time, and may do so from time to time without providing prior notice to the other Party. Such reports may include models, filings, and reports of costs, general rate case filings, cost adjustment mechanisms, FERC-required reporting, investigations, annual state reports that include resources and loads, integrated resource planning reports, reports to entities such as FERC, the North American Electric Reliability Council ("NERC"), Western Electricity Coordinating Council ("WECC"), or similar or successor organizations, or similar or successor forms, filings, or reports, the specific names of which may vary by jurisdiction, along with supporting documentation. Additionally, in regulatory proceedings or investigations in all state and federal jurisdictions in which they may do business, the Parties will from time to time be required to produce Confidential Information, and may do so without prior notice using its business judgment in compliance with all of the foregoing and including the appropriate level of confidentiality for such disclosures in the normal course of business.

(f) Each Party is entitled to seek equitable relief, by injunction or otherwise, to enforce its rights under this Section 5 to prevent the release of Confidential Information without bond or proof of damages, and may seek other remedies available at law or in equity for breach of this provision, subject to the limitations set forth in Section 6 below.

(g) Unless otherwise prevented by law, upon written request by a Party, the other Party shall promptly return to the requesting Party or destroy all Confidential Information it received, including all copies of its analyses, compilations, studies or other documents prepared by or for it, that contain the Confidential Information in a manner that would allow its extraction or that would allow the identification of the requesting Party as the source of the Confidential Information or inputs to the analysis. Notwithstanding the foregoing, neither Party shall be required to destroy or alter any computer archival and backup tapes or archival and backup files (collectively, "Computer Tapes"), provided that any Confidential Information of the other Party retained by a Party shall be kept confidential in accordance with the terms of this Agreement.

(h) Nothing in this Agreement shall be deemed to restrict either Party from engaging with third parties with respect to any matter and for any reason, specifically including the EIM, provided Confidential Information is treated in accordance with this Section 5.

(i) This Section 5, Confidentiality, applies for two years (24 months) after the Termination Date or the date of any expiration or termination of this Agreement.

6. Limitation of Liability; Indemnity.

(a) The Parties acknowledge and agree that, except as otherwise specified in Section 4(f) of this Agreement, neither Party shall be liable to the other Party for any claim, loss, cost, liability, damage or expense, including any direct damage or any special, indirect, exemplary, punitive, incidental or consequential loss or damage (including any loss of revenue, income, profits or investment opportunities or claims of third party customers), arising out of or directly or indirectly related to such other Party's decision to enter into this Agreement, such other Party's performance under this Agreement, or any other decision by such Party with respect to the Project.

(b) Each Party shall indemnify, defend and hold harmless each of the other Party and its officers, directors, employees, agents, contractors and sub-contractors, from and against all third-party claims, judgments, losses, liabilities, costs, expenses (including reasonable attorneys' fees) and damages for personal injury, death or property damage, to the extent caused by the negligence, willful misconduct, or breach of this Agreement of the indemnifying Party, its officers, directors, agents, employees, contractors or sub-contractors related to this Agreement; provided, that this indemnification shall be only to the extent such personal injury, death or property damage is not attributable to the negligence or willful misconduct related to this Agreement or breach of this Agreement of the Party seeking indemnification, its officers, directors, agents, employees, contractors or sub-contractors. The indemnified Party

shall give the other Party prompt notice of any such claim. The indemnifying Party, in consultation with the indemnified Party, shall have the right to choose competent counsel, control the conduct of any litigation or other proceeding, and settle any claim, provided that any such settlement shall not impose costs upon the indemnified Party. The indemnified Party shall provide all documents and assistance reasonably requested by the indemnifying Party.

(c) The rights and obligations under this Section 6 shall survive the Termination Date and any expiration or termination of this Agreement.

7. Representation and Warranties.

(a) Representations and Warranties of Avista. Avista represents and warrants to the ISO as of the Effective Date as follows:

(1) It is duly formed, validly existing and in good standing under the laws of the jurisdiction of its formation.

(2) It has all requisite corporate power necessary to own its assets and carry on its business as now being conducted or as proposed to be conducted under this Agreement.

(3) It has all necessary corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement, and the execution and delivery of this Agreement and the performance by it of this Agreement have been duly authorized by all necessary corporate action on its part.

(4) The execution and delivery of this Agreement and the performance by it of this Agreement do not: (i) violate its organizational documents; (ii) violate any governmental requirements applicable to it; or (iii) result in a breach of or constitute a default of any material agreement to which it is a party.

(5) This Agreement has been duly and validly executed and delivered by it and constitutes its legal, valid and binding obligation enforceable against it in accordance with its terms, except as the same may be limited by bankruptcy, insolvency or other similar laws affecting creditors' rights generally and by principles of equity regardless of whether such principles are considered in a proceeding at law or in equity.

(6) All material governmental authorizations in connection with the due execution and delivery of this Agreement, have been duly obtained or made prior to the date hereof and are in full force and effect.

(b) Representations and Warranties of the ISO. ISO represents and warrants to Avista as of the Effective Date as follows:

(1) It is duly formed, validly existing and in good standing under the laws of the jurisdiction of its formation.

(2) It has all requisite corporate power necessary to own its assets and carry on its business as now being conducted or as proposed to be conducted under this Agreement.

(3) It has all necessary corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement, and the execution and delivery of this Agreement and the performance by it of this Agreement have been duly authorized by all necessary corporate action on its part.

(4) The execution and delivery of this Agreement and the performance by it of this Agreement do not: (i) violate its organizational documents; (ii) violate any governmental requirements applicable to it; or (iii) result in a breach of or constitute a default of any material agreement to which it is a party.

(5) This Agreement has been duly and validly executed and delivered by it and constitutes its legal, valid and binding obligation enforceable against it in accordance with its terms, except as the same may be limited by bankruptcy, insolvency, regulatory authority, or other similar laws affecting creditors' rights generally and by principles of equity regardless of whether such principles are considered in a proceeding at law or in equity.

(6) All material governmental authorizations in connection with the due execution and delivery of, and performance by it of its obligations under this Agreement, have been duly obtained or made prior to the date hereof and are in full force and effect.

8. General Provisions.

(a) This Agreement, including Exhibit A to this Agreement, constitutes the entire agreement between the Parties, and supersedes any prior written or oral agreements or understandings between the Parties, relating to the subject matter of this Agreement; provided, that nothing in this Agreement shall limit, repeal, or in any manner modify the existing legal rights, privileges, and duties of each of the Parties as provided by any other agreement between the Parties, or by any statute or any other law or applicable court or regulatory decision by which such Party is bound.

(b) This Agreement may not be amended except in writing hereafter signed by both of the Parties; provided, however, the Parties may mutually agree to changes in Exhibit A in accordance with Section 4(e).

(c) Any waiver by a Party to this Agreement of any provision or condition of this Agreement must be in writing signed by the Party to be bound by such waiver, shall be effective only to the extent specifically set forth in such writing and shall not limit or affect any rights with respect to any other or future circumstance.

(d) This Agreement is for the sole and exclusive benefit of the Parties and shall not create a contractual relationship with, or cause of action in favor of, any third party.

(e) Neither Party shall have the right to voluntarily assign its interest in this Agreement, including its rights, duties, and obligations hereunder, without the prior written consent of the other Party, which consent may be withheld by the other Party in its sole and absolute discretion. Any assignment made in violation of the terms of this Section 8(e) shall be null and void and shall have no force and effect.

(f) In the event that any provision of this Agreement is determined to be invalid or unenforceable for any reason, in whole or part, the remaining provisions of this Agreement shall be unaffected thereby and shall remain in full force and effect to the fullest extent permitted by law, and such invalid or unenforceable provision shall be replaced by the Parties with a provision that is valid and enforceable and that comes closest to expressing the Parties' intention with respect to such invalid or unenforceable provision.

(g) Whenever this Agreement requires or provides that (i) a notice be given by a Party to the other Party or (ii) a Party's action requires the approval or consent of the other Party, such notice, consent or approval shall be given in writing and shall be given by personal delivery, by recognized overnight courier service, email or by certified mail (return receipt requested), postage prepaid, to the recipient thereof at the address given for such Party as set forth below, or to such other address as may be designated by notice given by any Party to the other Party in accordance with the provisions of this Section 8(g):

If to Avista:

Avista Corporation
PO Box 3727
Spokane, WA 99220
Attention: Jason Thackston, Senior Vice President, Energy Resources
E-mail: jason.thackston@avistacorp.com

If to the ISO:

California Independent System Operator Corporation
250 Outcropping Way
Folsom, CA 95630
Attention: Petar Ristanovic, Vice President, Technology
E-mail: PRistanovic@caiso.com

Each notice, consent or approval shall be conclusively deemed to have been given (i) on the day of the actual delivery thereof, if given by personal delivery, email sent by 5:00 p.m. Pacific Time, or overnight delivery, or (ii) date of delivery shown on the receipt, if given by certified mail (return receipt requested). It is the responsibility of each Party to provide, in accordance with this Section, notice to the other Party of any necessary change in the contact or address information herein.

(h) This Agreement may be executed in one or more counterparts (including by facsimile or a scanned image), each of which when so executed shall be deemed to be an original, and all of which shall together constitute one and the same instrument.

(i) Nothing contained in this Agreement shall be construed as creating a corporation, company, partnership, association, joint venture or other entity with the other Party, nor shall anything contained in this Agreement be construed as creating or requiring any fiduciary relationship between the Parties. No Party shall be responsible hereunder for the acts or omissions of the other Party.

(j) The decision to execute an EIM service agreement and participate in the EIM remains within the sole discretion of Avista and the decision whether to continue to offer EIM services (subject to Sections 1(c) and 2) remains within the sole discretion of the ISO.

(k) Nothing in this Agreement shall preclude a Party from exercising any rights or taking any action (or having its affiliates take any action) with respect to any other project.

(l) Unless otherwise expressly provided, for purposes of this Agreement, the following rules of interpretation shall apply: (i) any reference in this Agreement to gender includes all genders, and the meaning of defined terms applies to both the singular and the plural of those terms; (ii) the insertion of headings are for convenience of reference only and do not affect, and will not be utilized in construing or interpreting, this Agreement; (iii) all references in this Agreement to any "Section" are to the corresponding Section of this Agreement unless otherwise specified; (iv) words such as "herein," "hereinafter," "hereof," and "hereunder" refer to this Agreement (including Exhibit A to this Agreement) as a whole and not merely to a subdivision in which such words appear, unless the context otherwise requires; (v) the word "including" or any variation thereof means "including, without limitation" and does not limit any general statement that it follows to the specific or similar items or matters immediately following it; and (vi) the Parties have participated jointly in the negotiation and drafting of this Agreement and, in the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as jointly drafted by the Parties and no presumption or burden of proof favoring or disfavoring any Party will exist or arise by virtue of the authorship of any provision of this Agreement.

(m) The above-stated recitals are incorporated into and made a part of this Agreement by this reference to the same extent as if these recitals were set forth in full at this point.

9. Venue. Venue for any action hereunder shall be FERC, where subject to its jurisdiction, or otherwise any state or federal court with jurisdiction within the State of California.

10. Communication. The Parties shall develop a communication protocol for the dissemination of material information associated with the Project, which shall be

approved by Avista and the ISO. Pursuant to the communication protocol, the individual identified in Section 8(g), or their designee or successor, shall provide reasonable advance notice to the other Party of planned press releases, public statements, and meetings with the public or governmental authorities in which material information concerning the Project or Avista's involvement will be shared. The Parties shall mutually consult with each other as provided in the communication protocol prior to making such public statements or disclosures; provided that nothing herein shall prevent, limit, or delay either Party from making any disclosure required by applicable law or regulation, subject to the provisions of Section 5 hereof. In the event either Party engages in material unplanned communications about the Project that otherwise should have been subject to this Section and the communication protocol, such Party shall provide notice to the other Party as promptly as possible of the nature and content of such communication.

11. Dispute Resolution. Unless otherwise provided herein, each of the provisions of this Agreement shall be enforceable independently of any other provision of this Agreement and independent of any other claim or cause of action. In the event of any dispute arising under this Agreement, the Parties shall, to the extent practicable, first attempt to resolve the matter through direct good faith negotiation between the Parties, including a full opportunity for escalation to executive management within the Parties' respective organizations. If the Parties are unable to resolve the issue within thirty (30) days after such escalation of the dispute, then for matters subject to FERC jurisdiction either Party shall have the right to file a complaint under Section 206 of the Federal Power Act. For all other matters, then:

(a) To the fullest extent permitted by law, each of the Parties hereto waives any right it may have to a trial by jury in respect of litigation within the federal or state courts located within California as specified herein in Section 9, directly or indirectly arising out of, under or in connection with this Agreement. Each Party further waives any right to consolidate, or to request the consolidation of, any action in which a jury trial has been waived with any other action in which a jury trial cannot be or has not been waived.

(b) If a waiver of jury trial is deemed by any court of competent jurisdiction within the State of California as specified herein in Section 9 to not be enforceable for any reason, then to the fullest extent permitted by law, each of the Parties hereto agrees to attempt to settle amicably through non-binding arbitration. Notwithstanding the foregoing, either Party may seek provisional legal remedies if, in such Party's judgment, such action is necessary to avoid irreparable damage or preserve the status quo.

12. Third Party Agreements. The Parties may engage in discussions with third parties, either jointly or unilaterally, to facilitate the Project. Each Party may adopt or modify tariffs or enter into or modify binding agreements between such Party and third parties to implement the approved terms and conditions of the Project or EIM as necessary and appropriate.

13. Compliance. Each Party shall comply with all federal, state, local or municipal governmental authority; any governmental, quasi-governmental, regulatory or administrative agency, commission, body or other authority exercising or entitled to exercise any administrative, executive, judicial, legislative, policy, regulatory or taxing authority or power, including FERC, NERC, WECC; or any court or governmental tribunal; in each case, having jurisdiction over either Party in connection with the execution, delivery and performance of its obligations under this Agreement. This Agreement is not intended to modify, change or otherwise amend the Parties' current functional responsibilities associated with compliance with WECC and NERC Reliability Standards; provided, however, the Parties may enter into separate mutually agreed to arrangements to clarify roles and responsibilities associated with compliance with WECC and NERC Reliability Standards in respect of this Agreement.

IN WITNESS WHEREOF, each of the Parties has caused its duly authorized officer to execute this Implementation Agreement as of the date first above written.

AVISTA CORPORATION

By: _____
Name: Jason Thackston
Title: Senior Vice President, Energy Resources

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

By: _____
Name: Petar Ristanovic
Title: Vice President, Technology

EXHIBIT A: PROJECT SCOPE AND SCHEDULE

The Project consists of the activities and delivery dates identified in this Exhibit A, implemented in accordance with the Agreement. The Parties have included a schedule for the Implementation Date to coordinate their efforts required for completion of the Project on a milestone track.

The Parties understand that input received from stakeholders during the course of implementing the Project, conditions imposed or questions raised in the regulatory approval process, and the activities of the Parties in implementing the Project may cause the Parties to determine that changes in the Project are necessary or desirable. Accordingly, this Exhibit A may be modified in accordance with Section 3(c) of the Agreement.

Each Party is responsible for performing a variety of tasks necessary to achieve the milestones on the scheduled dates specified in the table below ("Project Delivery Dates") and shall plan accordingly. The Parties shall communicate and coordinate as provided in the Agreement to support the planning and execution to complete the Project.

Project Scope and Milestones	Project Delivery Dates supporting April, 2022
Detailed Project Management Plan – The Parties will develop and initiate a final project management plan that describes specific project tasks each Party must perform, delivery dates, project team members, meeting requirements, and a process for approving changes to support completion of the Project. This phase will include a detailed IT system review to assist Avista in development of a detailed metering plan, bid-to-bill system, and coordination with Avista EMS. Work will be initiated on the Avista staff training program using the foundational and detailed system computer-based training module, as well as on the resource data templates needed during Milestone 2.	May 2019-Decermber 2019
• **Milestone 1** – This milestone is completed when the Agreement has been made effective in accordance with Section 1 of the Agreement .	April 2020
Full Network Model Expansion – Full Network Model expansion for Avista and EMS/SCADA, including, proof of concept of export/import of EMS data; complete model into the ISO test environment; complete validation for all SCADA points from	November 2020

Avista; testing of the new market model; and validation of the Outage and State Estimator applications.	
• **Milestone 2** - This milestone is completed upon modeling Avista into the ISO Full Network Model through the EMS which will be deployed into a non-production test environment using the ISO's network and resource modeling process.	July 2021
System Implementation and Connectivity Testing – System requirements and software design, the execution of necessary software vendor contracts, development of Market network model including Avista, allow Avista to connect to a non-production test system.	August 2021
• **Milestone 3** - ISO to promote market network model including Avista area to non-production system, and allow Avista to connect and exchange data in advance of Market Simulation.	September 2021
Construction, Testing and Training in Preparation for Market Simulation - This task includes IT infrastructure upgrades, security testing, training, Day-in-life simulation, and functional testing.	September 2021
• **Milestone 4a** – Start of Joint Integration Testing with ISO, Interface testing with minimum data requirements and functional integration testing. ISO will make the test environment available for Avista connectivity testing prior to the delivery date assuming Avista has provided all requisite data and non-production system availability does not conflict with ISO production system Spring Release schedule.	September 2021
• **Milestone 4b –Begin 'Day in the Life' scenario testing**	November 2021
• **Milestone 4c – Begin Structured Market simulation (Milestone 4 payment due at this point)**	December 2021
Activate Parallel Operations – During January 2022, the ISO will activate a parallel operation environment to practice production grade systems integration as well as market processes and operating procedures in anticipation of the impending Avista	January 2022

activation as an EIM Entity and to confirm compliance with the EIM readiness criteria set forth in the ISO tariff.	
• **Milestone 5** – Start of parallel operations	February 2022
System Deployment and Go Live – Implementing the Project and going live will include resource registration, operating procedures and updates, execution of service agreements, completion of the Avista tariff process, applicable board approvals, the filing and acceptance of service agreements and tariff changes with FERC, and completion and filing of a readiness criteria certification in accordance with the ISO tariff.	March 2022
• **Milestone 6** – This milestone is complete upon the first production Avista energy imbalance market trade date.	April 1, 2022

December 11, 2019

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: California Independent System Operator Corporation
Filing of CAISO Rate Schedule No. 6037

Docket No. ER20-____-000

Dear Secretary Bose:

The California Independent System Operator Corporation ("CAISO") submits for filing and acceptance an agreement ("Implementation Agreement") dated April 25, 2019, between the CAISO and Avista Corporation ("Avista").[1] The Implementation Agreement sets forth the terms under which the CAISO will extend its existing real-time energy market systems to provide imbalance energy service to Avista, pursuant to the CAISO's Energy Imbalance Market ("EIM") tariff.[2] Under the Implementation Agreement, Avista will compensate the CAISO for its share of the costs of system changes, software costs, and other configuration activities. The CAISO requests that the Commission accept the Implementation Agreement effective April 1, 2020, so that the extension of the real-time energy market to include Avista may proceed towards implementation no later than April 1, 2022.[3]

I. Background

The EIM provides other balancing authority areas the opportunity to participate in the real-time market for imbalance energy that the CAISO operates in its own balancing authority area. PacifiCorp's balancing authority areas (PacifiCorp East and PacifiCorp West) were the first two to join the EIM. The EIM market rules went into effect on October 24, 2014, for the first trading day

[1] The CAISO submits the Implementation Agreement pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d.

[2] The EIM tariff provisions are set forth primarily in Section 29 of the CAISO Tariff.

[3] *See* Implementation Agreement, Section 1; *see also* CAISO Tariff, Section 29.2(b).

November 1, 2014.[4]

The EIM has continued to develop and attract the interest of a diverse array of participants throughout the Western Interconnection. NV Energy joined on December 1, 2015, Puget Sound Energy Inc. and Arizona Public Service Company began participation on October 1, 2016, Portland General Electric Company followed on October 1, 2017, and the Idaho Power Company joined concurrently with Powerex Corp. on April 4, 2018. The Balancing Authority of Northern California ("BANC") commenced phase 1 EIM participation in April 2019. Also, the Salt River Agricultural Improvement and Power District and the City of Seattle, by and through its City Light Department ("Seattle City Light") intend to commence EIM participation in April 2020. NorthWestern Energy, the City of Los Angeles Department of Water and Power, Public Service Company of New Mexico, and the Turlock Irrigation District intend to commence EIM participation in April 2021, concurrent with BANC phase 2. Other entities, including the Bonneville Power Administration, Tucson Electric Power, and Tacoma Power, will commence EIM participation along with Avista in the spring of 2022.[5]

II. The Implementation Agreement

The Implementation Agreement details the contractual terms, including the scope of work and the agreed-upon fee, under which the CAISO will take the steps necessary to incorporate Avista into the EIM consistent with the identified key milestones and associated payment provisions.[6] The Implementation Agreement is modeled after implementation agreements previously accepted by the Commission and, therefore, adopts provisions substantially similar to those which have been filed with and accepted by the Commission.[7]

Under the Implementation Agreement, the CAISO and Avista must complete a variety of project tasks necessary for implementation by April 1, 2022.

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4 *See Cal. Indep. Sys. Operator Corp.*, 149 FERC ¶ 61,005 (2014).

5 EIM participation materials are at https://www.westerneim.com/Pages/About/default.aspx.

6 *See* Implementation Agreement, Sections 3-4 and Exhibit A.

7 *See Cal. Indep. Sys. Operator Corp.*, 143 FERC ¶ 61,298 (2013); *Cal. Indep. Sys. Operator Corp.*, 147 FERC ¶ 61,200 (2014), *Cal. Indep. Sys. Operator Corp.*, 151 FERC ¶ 61,158 (2015), *Cal. Indep. Sys. Operator Corp.*, 152 FERC ¶ 61,090 (2015), *Cal. Indep. Sys. Operator Corp.*, 154 FERC ¶ 61,020 (2016); *Cal. Indep. Sys. Operator Corp.*, 155 FERC ¶ 61,311 (2016); Commission Letter Order, Docket No. ER17-868-000 (Mar. 14, 2017); Commission Letter Order, Docket No. ER17-1300-000 (May 18, 2017); Commission Letter Order, Docket No. ER17-2120-000 (Sept. 7, 2017); *Cal. Indep. Sys. Operator Corp.*, 160 FERC ¶ 61,058 (2017); Commission Letter Order, Docket No. ER17-2559-000 (Nov. 16, 2017); Commission Letter Order, Docket No. ER19-1080-000 (Apr. 5, 2019); Commission Letter Order, Docket No. ER20-95-000 (Dec. 4, 2019).

The parties chose this date to provide sufficient time for completion of all expected activities based on the size, complexity, and compatibility of Avista, including filing a certification of readiness with the Commission. The specific tasks may be modified by mutual agreement of the parties.[8]

The Implementation Agreement specifies that Avista will pay a fixed implementation fee of $300,000, subject to completion of six specific milestones for recovery of the portion of the costs attributable to the CAISO's effort to configure its real-time market systems and incorporate Avista into the EIM.[9] The methodology that the CAISO used to determine the implementation fee for Avista is the same methodology that the CAISO used to determine all of the previously accepted implementation fees for the other EIM participants described above.

The implementation fee is based on the CAISO's estimate of the costs it will incur to configure its real-time energy market to function as the EIM available to all balancing authority areas in the Western Electricity Coordinating Council ("WECC").[10] The components of that estimate are described in the Declaration of April D. Gordon, the CAISO's Director of Financial Planning and Procurement, which is included with this filing as Attachment B, and are summarized below.

Implementation Costs (in thousands of dollars)	
Licenses	12,150
Energy management system upgrades	1,000
Data storage	2,000
Hardware upgrades	500
Production software modifications	1,000
Network configuration and mapping	500
Integration	500
Testing	1,500
System performance tuning	250
Training and operations readiness	150
Project management	100
Total	**$19,650**

Using this estimate, the CAISO derived a rate that allocates the $19.65 million to potential entrants into the EIM according to their proportionate share of the total WECC load (excluding the CAISO's load), using updated data reported

8 Implementation Agreement, Section 3.

9 *Id.*, Section 4.

10 The total estimated cost is a projection assuming the total work effort remains stable. Implementations either completed or underway are not considered in this estimate.

to WECC. The CAISO then applied this fee to Avista's share of the updated WECC load (exclusive of the CAISO) to account for the Avista implementation fee.

The $300,000 implementation fee is just and reasonable because it allocates a portion of the overall cost to Avista in an amount proportionate to Avista's share of the benefits that will ensue from the EIM, as measured by usage. In addition, as explained in Ms. Gordon's declaration, the CAISO confirmed the reasonableness of the resulting allocation by comparing it with an estimate of the costs the CAISO projects it will incur to configure its real-time energy market to function as the EIM that serves both the CAISO and Avista. This comparison confirmed that the fee reasonably represents those costs, even though certain costs may not be triggered by the Avista implementation but may instead be incurred by the CAISO to incorporate other entrants. In future implementations, the CAISO will confirm that the rate is reasonable by conducting a similar comparison of the total implementation costs with the individual entity costs.

The Implementation Agreement also provides for adjustment of the fixed implementation fee by mutual agreement of the parties in the event that the CAISO's actual or expected costs exceed the estimate that forms the basis of the implementation fee.[11] This provision allows for appropriate consideration of the allocation of costs associated with incorporation of Avista into the EIM. At the same time, the requirement for Avista to agree to any increase in the implementation fee ensures that Avista's share of those costs remains reasonable. The Implementation Agreement therefore reflects a reasonable balance of the parties' interest in preserving a level of cost certainty for Avista, while appropriately allocating the costs of implementing the EIM.

The Implementation Agreement represents a binding commitment of the parties. As such, it provides a workable framework for the parties to resolve any differences and to make course corrections along the way. On the other hand, the Implementation Agreement recognizes that the parties are entering into the agreement on a voluntary basis and circumstances may arise that interfere with the incorporation of Avista into the EIM through the planned process. Accordingly, the Implementation Agreement allows either party to terminate the agreement for any or no reason, provided it has first entered into good-faith discussions for 30 days in an effort to resolve any differences.[12] This and other

[11] Implementation Agreement, Section 4. *See also* Commission Letter Order, Docket No. ER14-1350-000 (Apr. 8, 2014) (accepting amendment to EIM implementation agreement between the CAISO and PacifiCorp, to increase the PacifiCorp implementation fee to cover additional scope identified in the stakeholder process). PacifiCorp's request for additional scope is the only instance thus far where an amendment of the implementation fee has been necessary.

[12] Implementation Agreement, Section 2.

related provisions mean that the parties must work closely together to achieve the goal of implementing Avista into the EIM in a timely manner.

The Implementation Agreement also includes general provisions that round out the parties' commitments. These general provisions address confidentiality (Section 5), limitations of liability (Section 6), representations and warranties (Section 7), general provisions such as those regarding notices, amendments, *etc.* (Section 8), venue (Section 9), communication (Section 10), and dispute resolution (Section 11).

III. Next Steps

Following the Commission's acceptance of the Implementation Agreement, the CAISO will incorporate Avista into the EIM. Avista's implementation will be subject to the CAISO tariff readiness requirements and the filing of a certificate of readiness with the Commission.[13] The CAISO will also take into consideration lessons learned from the prior implementations, as the readiness criteria represent the baseline for measuring the readiness of each new EIM entity's processes and systems for EIM participation.

Avista will continue to engage with its customers prior to participation in the EIM. The CAISO expects that Avista will make any necessary modifications to its open access transmission tariff in advance of the implementation date. The CAISO recognizes that this effort will involve Avista working with interested parties to facilitate implementation of the EIM, and the CAISO will engage in that effort as Avista considers it appropriate.

IV. Effective Date

The CAISO requests that the Implementation Agreement be made effective on April 1, 2020.

V. Request for Waivers

The CAISO submits that the filing substantially complies with the requirements of section 35.13 of the Commission's rules applicable to filings of this type.[14] The CAISO respectfully requests waiver of any such requirement to the extent this filing does not satisfy that requirement. In particular, the CAISO requests waiver of the requirement to submit Period 1 and Period 2 schedules, because the implementation fee is a one-time fee that is not based on historical data in Period 1 schedules or on the projections in Period 2 schedules. In any event, good cause exists to waive filing requirements that are not material to the

[13] *See* CAISO Tariff, Section 29.2(b).

[14] 18 C.F.R. § 35.13.

Commission's consideration of the Implementation Agreement.

VI. Service

The CAISO has served copies of this filing upon all scheduling coordinators, Avista, the California Public Utilities Commission, and the California Energy Commission. In addition, the CAISO has posted the filing on the CAISO website.

VII. Contents of Filing

The following attachments, in addition to this transmittal letter, support the instant filing:

Attachment A	Implementation Agreement; and
Attachment B	Declaration of April D. Gordon, Director of Financial Planning and Procurement

VIII. Correspondence

Pursuant to Rule 203(b)(3) of the Commission's Rules of Practice and Procedure,[15] the CAISO requests that all correspondence, pleadings, and other communications concerning this filing be served upon the following:

John C. Anders
Assistant General Counsel
California Independent System
Operator Corporation
250 Outcropping Way
Folsom, CA 95630
Tel: (916) 608-7287
Fax: (916) 608-7222
E-mail: janders@caiso.com

[15] 18 C.F.R. § 385.203(b)(3).

IX. Conclusion

The CAISO respectfully requests that the Commission accept this filing and permit the Implementation Agreement, CAISO Rate Schedule No. 6037, to be effective April 1, 2020, as requested. If there are any questions concerning this filing, please contact the undersigned.

Respectfully submitted,

By: *<u>/s/ John C. Anders</u>*
Roger E. Collanton
General Counsel
Burton A. Gross
Deputy General Counsel
John C. Anders
Assistant General Counsel
California Independent System
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Attorneys for the California Independent System Operator Corporation

FEDERAL ENERGY REGULATORY COMMISSION
Washington, D.C. 20426

OFFICE OF ENERGY MARKET REGULATION

In Reply Refer To:
California Independent System Operator Corporation
Docket No. ER20-567-000

Issued: February 19, 2020

John C. Anders
California Independent System Operator Corporation
250 Outcropping Way
Folsom, CA 95630

Reference: Energy Imbalance Market Implementation Agreement

On December 11, 2019, the California Independent System Operator Corporation (CAISO) filed an Energy Imbalance Market (EIM) Implementation Agreement (Implementation Agreement) with Avista Corporation (Avista). The Implementation Agreement sets forth the terms under which CAISO will extend its real-time energy market systems to provide imbalance energy services to Avista pursuant to CAISO's EIM tariff provisions. Under the Implementation Agreement, Avista will compensate CAISO for its share of costs of related system changes, software licenses, and other configuration activities. The Implementation Agreement is accepted for filing, effective April 1, 2020, as requested.[1]

The filing was noticed on December 11, 2019, with comments, protests, or interventions due on or before January 2, 2020. No protests or adverse comments were filed. Notices of intervention and unopposed timely filed motions to intervene are granted pursuant to the operation of Rule 214 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.214). Any opposed or untimely filed motion to intervene is governed by the provisions of Rule 214.

This action does not constitute approval of any service, rate, charge, classification, or any rule, regulation, or practice affecting such rate or service provided for in the filed

[1] California Independent System Operator Corporation, FERC FPA Electric Tariff, CAISO Rate Schedules, Rate Schedule No. 6037, Avista EIM Implementation Agreement, 0.0.0.

documents; nor shall such action be deemed as recognition of any claimed contractual right or obligation affecting or relating to such service or rate; and such acceptance is without prejudice to any findings or orders which have been or may hereafter be made by the Commission in any proceeding now pending or hereafter instituted by or against CAISO.

This action is taken pursuant to the authority delegated to the Director, Division of Electric Power Regulation - West, under 18 C.F.R. § 375.307. This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R § 385.713.

Issued by: Steven T. Wellner, Director, Division of Electric Power Regulation - West

Utilicast

TECHNOLOGY ASSESSMENT SUMMARY REPORT

PROPRIETARY AND CONFIDENTIAL

PREPARED FOR:

AVISTA®

AUTHORS:

BRIAN HOLMES AND ZACH GILL SANFORD

DECEMBER 21, 2018

Table of Contents

1 Executive Summary

This report summarizes current cost estimates for Avista to join the Western Energy Imbalance Market (EIM). The focus is the technology solutions, including integration, required for effective EIM participation. During the analysis it was determined that Nucleus could not practically be enhanced to provide many of the required functions. Therefore, the analysis estimates the cost and effort to procure and implement Commercial, Off-the-Shelf (COTS) solutions and integrate those solutions. These cost estimates are detailed in the main body of the report and summarized on Line 1 through 5 of Table 1.

During the project, Avista requested other costs be estimated to create a more comprehensive cost picture. Additional cost estimates for system procurement, network modeling, communication infrastructure, generator upgrades and internal and consulting labor for EIM technology implementation and other Project functions are described in the Addendum and summarized on Line 6 through 20 of Table 1.

This report, the associated end-to-end technology overview diagram, the estimating model and schedule describes the assumptions, decisions and conclusions which underpin the values in Table 1. An Executive Summary of the considerations for each of the line items is included as Table 2.

This report provides Budgetary Cost estimates (+/- 25%) for the currently identified scope. The analysis focused on the planned incremental EIM technology components. Detailed requirements were not developed as part of this effort and full impact assessments to existing functionality were not in scope. Avista will need to proceed with this detailed analysis if a decision is made to pursue EIM membership. Following the development of detailed requirements, the estimates can be refined.

Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects

Line	Cost Estimate Category	Project & Procurement Solutions & Services (in $,000)	Project & Procurement Avista Internal Labor (in Hours)	Post-Project Recurring Services & Avista Labor (in $,000)
1	Vendor EIM Software Solutions	$2,100 - $4,500	9,000 - 21,900	$500 - $1,100
2	Avista ADSS Enhancement Effort	Included	9,600 - 14,400	
3	Avista Internal Integration Effort	Included	8,200 - 12,300	
4	Custom Reporting Allowance	Included	2,000	
5	Other Avista Software Enhancements	Included	8,000 - 12,000	
6	Dedicated Security & Architecture	$0	3,300 - 4,900	$50 - $100
7	Miscellaneous Software & Hardware Costs	$330 - $715	0	$25 - $100
8	Network for Vendor & CAISO	$150 - $420	2,400 - 1,750	$400 - $730
9	Program Leadership, Management & SMEs	$3,200 - $4,900	7,000 - 9,000	
10	System Selection & Procurement	$500 - $810	6,800 - 8,800	
11	Full Network Model for EIM	$40	800	$50
12	Generation Participation & Cost Modeling	Included	2,000 - 3,500	
13	OATT, MBR & ISO Agreements	$105 - $190	1,300 - 2,300	
14	Training & OCM	Included	4,800 - 8,500	
15	Transmission Meters & Data Collection	$340	5,200	$18
16	Network Improvements for Metering	$210 - $2,000	2,600	$15
17	Incremental Permanent Avista FTEs	$0	7,400	$2,500
18	EIM Membership & Ongoing Fees	$290	0	$120
19	Generation Metering from GPSS	$3,000 - $4,500		
20	Dispatch Integration from GPSS	$1,200 - $1,400		
	Total	**$11,500 - $20,100**	**80,000 - 120,000**	**$3,700 - $4,700**

Table 2 – Executive Summary of Included Cost Estimates

Line	Exec Summary
1	7 applications; Avista effort estimated two ways - prior project and simple WBS; less consulting, architecture and security shown separately.
2	Represents 18 estimated items; 9 additional uncertainty placeholders included; 50% contingency included in upper range.
3	Represents 25 estimated interfaces; 9 additional uncertainty placeholders included; 50% contingency included in upper range.
4	Placeholder for reporting not covered by vendors or vendor customizations to create required reports and analysis tools and an allowance for deprecation impacts on Nucleus.
5	Represents 6 estimated items including the Oracle MDM estimate from Avista; 50% contingency included in upper range.
6	Dedicated cloud architect and security engineer provided by IT; no contingency added to range.
7	Additional ADSS hardware; firewalls; unanticipated software and integration placeholder; no contingency added to range.
8	New dedicated CAISO, AWS and Azure connections; meter data collection costs; minor BUCC improvements; cost and effort low/high are inverted; no contingency.
9	Consulting SI services; Avista Leads for Merchant, Grid Ops, IT, GPSS and OCM plus Directors; adj to reflect "overhead" portion; no contingency added to range.
10	Consulting for Program initiation, requirements and system selection; estimated Avista participation based on simple WBS method in (1); no contingency added to range.
11	EIM share of FNM costs; additional costs for RC integration not included and are described in a separate report; 20% contingency added.
12	High level estimate for basic modeling, GPSS cost gathering (45%) and participation strategy definition (35%); includes 20% contingency on upper side of range.
13	Assumes only basic changes to prior EIM OATTs; full MBR cost but that may not be fully incremental; includes 20% contingency on upper side of range.
14	Time for the recipients; costs for creation is in consulting and vendor costs and Avista Leadership overhead; includes 20% contingency on upper side of range.
15	New meters; communications for sites other than Network / T1; backend MV90 work for both generation and transmission; 20% contingency.
16	New T1 communications for 67% of transmission locations and 36% of generation locations; HPV required at 35% of combined locations; no contingency added to range.
17	11-13 new FTEs in Power Supply, Ops, Accounting, Compliance and ET; incremental IT in (6); project costs include a portion of ramp in period; no contingency.
18	Integration fees and ongoing Grid Management Charges; no contingency.
19	High and Low side metering and transformer upgrades at 11 facilities.
20	EIM Master PLC at 6 locations and reprogramming of the existing unit level PLCs.

2 Technology Approach

As identified in the EIM Technology Inventory and End-to-End EIM flow diagram, Avista will need a mixture of procured and in-house developed applications for EIM participation. Additionally, Avista will need to participate in development of the interfaces to connect existing and new applications.

2.1 Assumptions

In developing the estimates presented in this report, Utilicast converted Avista Labor to costs based on the following assumptions.

Table 3 – Labor Rate Assumption

Category	Rate
ADSS Development	$80
Nucleus Development	$90
Integration Development	$100
Network Modeling	$100
All Other Avista Labor	$100
Consulting (Range based on Expertise)	$185 - $235

Contingency has been applied to some estimates based on a variety of factors – including the source of the estimate, the factors considered in establishing estimate ranges, the level of uncertainty and Avista requests. The contingency values in Table 4 are incorporated in the estimates:

Table 4 – Contingency Assumptions

Line	Category	Contingency
1	**Vendor EIM Software Solutions**	20%
2	**Avista ADSS Enhancement Effort**	50%
3	**Avista Internal Integration Effort**	50%
4	**Custom Reporting Allowance**	0%
5	**Other Avista Software Enhancements**	50%
6	**Dedicated Security & Architecture**	0%
7	**Miscellaneous Software & Hardware Costs**	0%
8	**Network for Vendor & CAISO**	0%
9	**Program Leadership, Management & SMEs**	0%
10	**System Selection & Procurement**	0%
11	**Full Network Model for EIM**	0%
12	**Generation Participation & Cost Modeling**	20%
13	**OATT, MBR & ISO Agreements**	20%

Line	Category	Contingency
14	**Training & OCM**	20%
15	**Transmission Meters & Data Collection**	20%
16	**Network Improvements for Metering**	20%
17	**Incremental Permanent Avista FTEs**	0%
18	**EIM Membership & Ongoing Fees**	0%
19	**Generation Metering from GPSS**	20%
20	**Dispatch Integration from GPSS**	0%

Many estimates are driven in part by project duration. As shown in more detail in Section 4, the EIM project is anticipated to begin with a Planning and Procurement phase in 2019. Avista's team will begin ramping up in early 2019 through mid-2019 with Consulting support generally beginning in mid-2019. The main implementation phase of the project is anticipated to begin in early 2020 and continue through an April 2022 implementation.

2.2 Recommended Continuation of Existing Solutions

2.2.1 Variable Energy Resource Forecast

Avista currently has two large Variable Energy Resources (VER) on the system, Palouse Wind and Solar Select, and is in active negotiations with one additional significant VER resource which would be online prior to the anticipated EIM membership in April 2022. Additionally, Avista has a significant amount of VER generation in the interconnection queue.

Avista's current forecasting for facilities anticipated to be online by April 2022 are:

1. Palouse: Avista currently receives Real-Time VER forecasts for the Palouse Wind resource from two forecast providers, Meteologica and Vaisala and imports the forecast to ADSS via API. The Meteologica forecast is provided by Palouse Wind and the Vaisala forecast is contracted for separately by Avista. The Real-Time Merchant operator has discretion to use either forecast in bilateral trading decisions.
2. Solar Select: Avista currently only receives Day-Ahead forecasts from Solar Select. Avista does not have an additional backstop forecast for this facility.
3. New Wind Resource R: Forecasting approach is To Be Determined.

Based on current EIM rules, the following are required for VER Resources:

1. An hourly Base Schedule with a target snapshot around T-60 to the beginning of hour T (this requirement may be updated to 15-minute granularity with the proposed Day-Ahead Market Enhancements project).
2. A 15-minute granularity forecast refreshed every 15 minutes with a target snapshot around T-40 to each Fifteen Minute Market (FMM) interval beginning T.

3. A 5-minute granularity forecast refreshed every 5 minutes with a target snapshot around T-10 to each Real-Time Dispatch (RTD) interval beginning T.

For Palouse, there are two simple options for meeting the EIM requirements:

Meteologica has existing functionality to produce 5-minute granular forecasts every 5-minutes. This can be used to meet all CAISO requirements. Meteologica has an existing real-time production input from the resource telemetry which can be incorporated in the forecasts but this is not provided by Avista. If an enterprise solution is implemented, a new interface to provide telemetry for all VER to the VER Forecast provider will be needed.

Based on the Vaisala website, it appears that Vaisala only offers 10-minute granularity and 10-minute refresh capability at this time, which could satisfy CAISO requirements for Base Scheduling and for the RTPD/FMM submission but does not meet CAISO requirements for RTD. However, CAISO is in the process of rolling out a short-term persistence VER Forecast offering. In this approach, CAISO will snapshot the CAISO State Estimator output (adjusted by a reference curve for solar resources) of the VER resource immediately prior to the RTD snapshot. Early CAISO analysis suggests that this simple persistence model, which eliminates all potential data transfer lag, is generally superior to other methods. In combination with the Visala produced forecast, this would meet EIM requirements. If Avista selects Vaisala, there may be some enhancement costs. Budget for an interface to supply Real-Time telemetry to Vaisala has been included.

CAISO currently only accepts a single VER forecast for each resource, so a single selection would be needed for CAISO submissions (Avista's bilateral trading decisions could continue to use either forecast). The chosen forecast provider could be provisioned with the necessary EIM Entity certificate and interface directly with CAISO, or the forecast sent to the EIM Entity Scheduling Coordinator (EESC) Scheduling System to then submit to CAISO. Utilicast recommends a direct to CAISO integration approach to eliminate the time lag and potential point of failure associated with routing the forecast through an additional system. The integration costs estimates do not include an estimate for integrating the VER forecast with the EIM Entity Scheduling System.

For Solar Select, changes will be needed and a solution for new Wind Resource R will also require a forecast that meets the requirements. Avista anticipates going forward that any new VER resources will have the obligation to provide a forecast that is compatible with market needs. However, depending on the number of new VER resources, a consistent enterprise solution may be needed at some point. Meteologica and Visala would be natural options to provide this service but Avista may wish to consider a Request For Proposal (RFP) process. A trial period to assess the accuracy of different providers during an RFP is recommended.

Since this effort was identified late in the process, will likely replace existing costs and is anticipated to be small relative to the work, a cost estimate has not been prepared.

2.2.2 Demand Forecast

Avista should utilize its existing Balancing Authority Area (BAA) demand forecast, produced in ADSS as a blend of Pattern Recognition Technologies (PRT) forecast vendor and internally produced forecasts for Merchant Balancing in Day-Ahead and for the T-75 and T-55 Sufficiency Tests.

For the binding balancing test at T-40, the EIM Entity should use the CAISO Demand Forecast due to the Under / Over Scheduling Penalty treatment defined in the CAISO Tariff. Any EIM Entity COTS application Avista might select will support obtaining the CAISO Demand forecast and balancing to that forecast.

While Avista should opt to use the CAISO forecast due to the Tariff provisions, the CAISO does accept Demand Forecast submissions from the EIM Entity and will evaluate them for accuracy. If Avista's forecast is more accurate than the CAISO forecast in a systematic way, the CAISO may adopt Avista's forecast as its own.

Per discussions during the project, Avista would like to supply its own BAA forecast to the CAISO for accuracy consideration. This will require an interface to submit 5-minute granular forecasts on a rolling 5-minute basis to the CAISO forecast application (ALFS - Automated Load Forecast System). Based on discussions, the cost estimate in this report is based on an ADSS interface with the EIM Entity Scheduling Coordinator (EESC) Scheduling System, which will then submit to CAISO. Any EIM Entity COTS application Avista might select will support submitting the BAA Demand forecast to CAISO. This will result in a submission lag and Avista may consider the effort to develop a direct to CAISO Demand Forecast submission interface but for this estimate we have assumed the data is routed through the EESC Scheduling System.

2.2.3 Nucleus for Deal Capture & Risk and Position Management

The existing Nucleus solution currently performs several functions which will be required for EIM. The following functions are recommended to continue through the EIM implementation:

- Record Bilateral Deals
- Manage Preschedule and Term positions
- Record CAISO Non-EIM Market Awards
- Monitor GHG Position & Mark to Market
- Electronic Quarterly Reporting (EQR) for Bilateral Transactions
- Report Net Scheduled Interchange

The Bilateral and CAISO Non-EIM Market Awards (which are essentially Bilateral Deals with CAISO which must be tagged) will continue to be captured in Nucleus as the system of record for Deal Capture. These transactions will continue to be tagged per WECC rules via webTag. Nucleus will then provide the Bilateral Deals (or a summarized obligation of the Bilateral Deals) to ADSS for Real-Time balancing.

Nucleus will also continue to provide the 7 Day-Ahead Load Forecast and Unit Commitment information the Reliability Coordinator (RC).[1]

ADSS will then schedule Avista generation to Balance against total obligations, including the Demand Forecast and the Bilateral Deals. ADSS will assume primary responsibility for Merchant Balancing responsibilities for CAISO Day-Ahead through T-55, though the Participating Resource Scheduling Coordinator (PRSC) Scheduling System will ultimately be the system of record, including manual adjustments and market impacts. The EESC Scheduling System will be the system of record for BAA Balancing at T-40. Nucleus will cease to perform balancing functions in Real-Time. An impact assessment of deprecating this functionality is needed to determine downstream impacts.

Nucleus will also continue to track Greenhouse Gas (GHG) obligations which are incurred due to Bilateral / Tagged transactions as well as credit purchased by Avista. EIM may also create GHG obligations. To maintain a complete view of the GHG position and mark that position to market, Nucleus will need to obtain the GHG obligations incurred as a result of EIM activities. A new interface to import EIM GHG obligations from the PRSC Settlement System is included in the integration estimate.

Nucleus will continue to perform EQR for Bilateral / Tagged transactions. EIM will create new transactions to include in EQR. These calculations will be performed by the PRSC Settlement System and exported in spreadsheet format. Avista will then manually merge the Bilateral EQR and EIM EQR data. No cost estimate for an API is included.

Nucleus also currently serves as a key integration point for ADSS. Based on the initial assessment, it does not appear that a change to this approach is required to support EIM. However, Avista is planning to implement a managed API to facilitate integration going forward for data that is a straight pass-through from Nucleus. Data that requires transformation in Nucleus may not make sense to migrate until a broader Nucleus replacement effort is scoped. Decoupling Nucleus and ADSS via a Managed API makes sense as a foundational project but is not an EIM specific project. Therefore, the costs are not included in the EIM estimates.

Nucleus also currently provides Risk Management and Mark to Market functionality. EIM is an imbalance market which should be responsible for a small percentage of Avista's purchases and sales. EIM transactions are Real-Time only and do not have a forward component. Additionally, EIM transactions are settled within three business days and invoiced on a weekly basis. At this time, EIM impacts to the overall measurement of Risk has not been identified. One aspect to note is that EIM settlements for third party Transmission Customers in the Avista BAA will be settled with Avista. As a result, Avista will be floating the EIM invoice obligations on behalf of these parties for some period of time. If Avista continues to invoice Transmission Customer monthly rather than weekly in line with CAISO invoicing, the float is larger.

Nucleus currently supports the determination and reporting of Net Scheduled Interchange (NSI) to the WECC (Western Electricity Coordinating Council) Interchange Tool (WIT) for the calculation of

[1] Note that there may be changes required as part of the RC change from Peak RC to CAISO, but those impacts are not EIM impacts.

Inadvertent Energy transfers. The EIM dispatch of Energy Transfer System Resources (ETSRs) is considered scheduled interchange and must now be included in this calculation. An interface to provide this value to Nucleus is included in the estimate.

2.2.4 Additional Nucleus Impacts

It may be possible to leverage the new tools to perform some other functions that Nucleus performs today. Avista should consider what functions it might want to remove from Nucleus and include them as optional requirements, to be priced separately, in the RFP for the new tools to evaluate vendor offerings. Functionality that is deprecated from Nucleus may have downstream impacts and an impact assessment should be conducted for any deprecated functions.

Given the central role of Nucleus in Avista's technology footprint it is likely that there will be some changes required to address functions that will no longer be performed in Nucleus, such as the impact from balancing no longer being performed in Nucleus, cited above. While a complete impact assessment is needed, a placeholder budget of $100,000 is included to address potential impacts.

2.2.5 ADSS for Generation Schedule Optimization

Avista should utilize existing Avista Decision Support System (ADSS) functionality for resource base schedule creation. ADSS currently models the complex hydro constraints and operating characteristics of Avista's generation fleet. Some updates will be required to produce the desired output for EIM, but these are much smaller than implementing a new COTS optimization solution. Therefore, ADSS is best positioned to produce generation resource base schedules based on its existing optimization functionality and the enhancements identified.

Once determined, the generation base schedules would be submitted to the PRSC Bidding and Scheduling System and the EESC Scheduling System, requiring interfaces to be developed between ADSS and these vendor solutions.

This approach relies on ADSS to produce the Base Schedules for all Avista-owned and contracted generation Resources and pass the Non-Participating Resources (NPRs) schedules to the EESC for submission. An alternative to this approach is to designate all Avista Resources as Participating Resources (PRs). In doing so, the Merchant would then be responsible for submitting all Avista Resource Base Schedules to CAISO and the EESC could obtain the Base Schedules directly from Base Schedule Aggregation Portal system (BSAP). This alternative can be explored during the design phase with the vendors and might reduce integration costs. In this report, Utilicast has included estimates for two interfaces, one to the PRSC Scheduling System and the other to the EESC Scheduling System.

2.2.6 New Instance of MV-90

Avista should implement a new instance of MV-90 to serve as a collection system for EIM meter data. This new MV-90 instance will serve as the head-end system for generation, interchange, and imbedded load meter data read by Avista for EIM meter submission. MV-90 will need to interface with the meter data communication systems polling these meters and with the EIM Meter Data Management (MDM) solution identified in the following section.

2.2.7 Oracle Utilities Enhancements

Avista should enhance and utilize its existing Oracle Utilities vendor solution for EIM Meter Data Management (MDM). The MDM will interface with Avista's OSISoft Process Information (PI) system, meter data downloaded from the BPA Customer Portal, Hourly Actual Interchange checkouts values from Nucleus, and the new instance of MV-90 described in the following section. Validation, Estimating, and Editing (VEE) will be performed on the EIM meter data, with the PI sourced data validated by shaping 5-minute average values to hourly meter values. The VEE meter data will be aggregated to the Resource ID level, as registered with CAISO, including the EIM Load Aggregation Point (ELAP) Avista BAA load calculation, which will be adjusted to account for transmission losses. The aggregated meter data will be sent to the EESC Settlement System for submission to CAISO, unless Avista determines the additional cost of this desired functionality in the EESC Settlement System is too expensive, in which case the EIM MDM will need to interface directly with CAISO systems.

2.3 Recommended Purchased COTS / Vendor Solutions

This section identifies solutions recommended for purchase through a competitive RFP process. These designations are also identified in the EIM Technology Inventory. The sub-sections identify some of the major considerations identified in establishing the proposed approach.

In general, the following criteria were important in the determination of a purchase recommendation:

- Required CAISO Expertise – Some applications and integrations require considerable expertise in the CAISO markets, technologies and integration standards. Avista has learned a considerable amount on this project, but, as the design and development would likely require considerable outside consulting resources, Avista is better off selecting from existing vendors. For some of the more complex components required for EIM, custom development is likely to entail major risks to scope, schedule and budget.
- Vendor Solution Maturity – A small set of vendors have been developing EIM solutions over the past four years and there are likely to be more than 10 EIM Entities which precede Avista. Some of the EIM vendor applications execute fairly standard functionality. Even when that functionality is complex, if Avista is likely to require minimal customized development from the standard solution, then there is greater benefit to choosing an established solution.
- Maintenance Burden – The CAISO markets are constantly changing. Major changes are released once a year in the Fall Release, with smaller changes about every quarter. There are dozens of planned market enhancements which will impact multiple CAISO applications – in particular, Bidding, Scheduling, Dispatch and Settlements. CAISO only supports two versions of interfaces (current and immediately prior). Sharing these upgrade costs with multiple participants sharing a common vendor solution will lower maintenance costs. Avista should be careful in the RFP process to clearly understand vendor offerings for complying with ongoing CAISO changes.
- Development Fit to Existing Avista Technology – Avista has some in-house applications and established vendor products. When EIM requirements were closer to the natural footprint of existing in-house solutions, in-house solution enhancements are recommended. When the

required EIM functionality is not similar to the natural footprint of an existing solution, vendor solutions were preferred.

The trend for the EIM applications listed below is to use a vendor-hosted / cloud-based delivery model in most cases. The vendor cost estimates in this report assume that all of the applications identified in this section, with the exception of the EMS integration which is an existing on-premise solution, are vendor-hosted / cloud-based. Of these solutions, the most commonly deployed on-premise solutions are the Outage Management solutions.

2.3.1 Generation Outage Management System

Avista should consider purchasing a Generation Outage Management System (GOMS) to replace Avista's in-house developed Generation Outage Coordinator (GOC). Generation outages in EIM are a bit different than the traditional outage definition; they are more akin to availability management. The ability to control resource availability in the market through outages is critical to success. Another key aspect of GOMS in EIM is keeping up with Ambient Derates. ADSS appears to be well positioned to supply this information. To do so ADSS modifications and integration to the GOMS is required.

Purchasing a COTS GOMS to manage outage scheduling / workflows, development of outage calendars and CAISO integration is preferred to updating / developing this functionality in GOC or ADSS. Additionally, a GOMS, which is integrated with CAISO, will facilitate submission of outages for RC purposes after Avista becomes an RC customer of CAISO, rather than continuing the manual process currently used for Peak Outage submission. Other scoped integration points with the GOMS are also discussed in Section 3.3.2.

Though there are distinct differences in the underlying data model, workflows and permission structure between GOMS and TOMS there are also many overlapping features. Every other EIM participant has selected the same vendor for both Generation and Transmission outage management. It is likely that Avista will want to select a single vendor for both GOMS and TOMS as well.

This system may be implemented prior to EIM to support Avista processes and RC functionality, depending on resource availability, but it is unlikely to be ready for RC Parallel Operations in Summer 2019. It is likely that Avista will need to rely on a modification to the current manual process for filing outages with Peak for some time before cutting over to the new GOMS. The definition of this manual process is beyond the scope of this assessment.

2.3.2 Transmission Outage Management System

Avista currently uses the Control Room Outage Window (CROW) outage management software for Operator Logging and managing Transmission Outages, along with spreadsheets. This application doesn't integrate directly with CAISO's outage management system so Avista needs to evaluate purchasing a third-party interface application or consider purchasing a new Transmission Outage Management System (TOMS) that currently integrates directly with CAISO. Integration with CAISO for outage management is critical for EIM participation, as providing timely and accurate transmission rating information is critical to success. A COTS TOMS will also support the outage scheduling and approval process and typically will have several reporting features to develop outage calendars.

The basis for all transmission information in EIM is the Full Network Model (FNM). A TOMS should use the EIM FNM as the data foundation of the FNM equipment identifiers, which will be required for outage submissions to CAISO.

Though there are distinct differences in the underlying data model, workflows and permission structure between GOMS and TOMS there are also many overlapping features. Every other EIM participant has selected the same vendor for both Generation and Transmission outage management. It is likely that Avista will want to select a single vendor for both GOMS and TOMS as well. If the Merchant team has access to the Outage Management system for Generation, a strong permission structure is required to ensure that Transmission information cannot be viewed by the Merchant team.

This system may be implemented prior to EIM to support Avista processes and RC functionality depending on resource availability, but it is unlikely to be ready for RC Parallel Operations in Summer 2019. It is likely that Avista will need to rely on a modification to the current manual process for filing outages with Peak for some time before cutting over to the new TOMS. The definition of this manual process is beyond the scope of this assessment.

2.3.3 Participating Resource Scheduling Coordinator Bidding & Scheduling System

Avista should purchase a PRSC Bidding & Scheduling System. The proposed approach includes retaining and extending the optimization functionality in ADSS and using the PRSC Bidding & Scheduling System primarily as an interface to CAISO. The functionality for Bid and Schedule exchange with CAISO is very similar to the full market functionality, so vendor solutions are more robust than just the EIM capabilities. This solution will likely also support the RC schedule submission requirements going forward. There are many Avista-CAISO interfaces required for this solution, so leveraging a vendor to insulate Avista from CAISO application changes is also beneficial.

Given Avista will be retaining ADSS, integration between ADSS and the PRSC Scheduling System will be required and is included in the estimates. An alternative would be to extend ADSS to perform the CAISO data exchange. However, the complexity of the BSAP and Scheduling Infrastructure Business Rules (SIBR) interfaces is substantial and it is best to use existing and vendor-maintained COTS interfaces to accomplish these tasks.

Additionally, the cost estimated in this report anticipate that PCI Gen Manager is retained as the CAISO full market intertie bidding solution. It is likely that PCI would seek to license the EIM module separately from the existing solution, but Avista should review the contract. Given the similarity between the bidding and results functionality between EIM and the full CAISO market, Avista should include specifications for CAISO full market intertie bidding in the RFP process to assess vendor offerings to provide a consolidated platform.

2.3.4 Dispatch Integration to EMS

Avista should purchase the GE EMS integration and processing capability for CAISO dispatch signals provided through the Automated Dispatch System (ADS) to EIM participants. Automated processing and centralized communication of the 5-minute dispatch signals from the market is critical for EIM participation, as timely relaying of dispatches to Participating Resources is critical to success.

Additionally, integration of the adjustment to Net Scheduled Interchange (NSI) due to the Dynamic ETSR transfers must be integrated to EMS to calculate Area Control Error (ACE).

2.3.5 EIM Entity Scheduling Coordinator Scheduling System

Avista should purchase an EESC Scheduling System. The process of aggregating tags to Resource IDs for Base Scheduling and Real-Time Interchange Scheduling and communicating this information with the ISO is both critical to EIM success and very complex. Three software vendors have provided this functionality – OATI, MCG and PCI. Each of these vendors had considerable experience developing solutions for the CAISO market and the first implementation of each of these solutions was challenging, expensive and had a number of defects discovered in production. These solutions have been refined through subsequent implementations. There are many Avista-CAISO interfaces required for this solution, so leveraging a vendor to insulate Avista from CAISO application changes is also beneficial.

2.3.6 Participating Resource Scheduling Coordinator Settlement System

Avista should purchase a PRSC Settlement System. The processing of the EIM settlements is complex. Avista has an existing vendor solution (PCI) for this functionality for the CAISO intertie business. The EIM system will have many and more complex charge codes to process, but the overall workflow is the same. It is likely that PCI would seek to license the EIM module separately from the existing solution, but Avista should review the contract.

The PRSC Settlement System will be an important data hub. The assessment also included an evaluation of the currently specified CAISO OASIS and Customer Market Results Interface (CMRI) reports. There is a considerable amount of data critical for evaluating market results contained in these reports and a settlement system vendor will typically consume this data and maintain the interfaces with the CAISO as they are updated. Avista should be specific in its expectations with vendors during the RFP regarding OASIS and CMRI functionality.

There are essentially three classes of Settlement Systems:

1. Solutions which support the basic parsing of the settlement data and basic verification of the settlement amounts with limited consumption of OASIS and CMRI data.
2. Solutions which also provide advance shadow settlements capabilities which allow users to analyze charges in more detail with more consumption of OASIS and CMRI data and some abilities to integrate settlement and market result data for analysis.
3. Solutions which also provide advance analytics capabilities to identify profitability and adjustments to strategy through robust integration of multiple data sources.

More robust solutions are typically more expensive. Avista should include requirements for each of these in the RFP and evaluate whether bundling the analytics capabilities with the settlement solution is cost effective, or if a more basic settlement system with database access would allow Avista to better or more cost effectively analyze results.

Aside from parsing the Settlement Data, performing Shadow Settlements and potentially providing analytics capability, a PRSC Settlement Solution should also include

- Approval Workflows
- Dispute Support and Lifecycle Management
- Invoice Processing and Reconciliation
- Meter Data Acquisition from CAISO's MRI-S
- EIM GHG obligation tracking
- EIM EQR calculations

2.3.7 EIM Entity Scheduling Coordinator Settlement & Allocations System

Avista should purchase an EESC Settlement System. The processing of the EIM Settlement charges is complex. Additionally, the EESC will be required to allocate CAISO charges to its Transmission Customers (TCs) – becoming in essence a mini-ISO settlement department in the process. This is complex functionality and requires integration with the EESC Scheduling System and the Tagging system. Depending on the whether Avista prefers a single vendor for these three functions or different vendors, Avista may need to play a role in the integration. Based on the analysis, Avista prefers to keep options open for vendor selection and therefore an estimate is included for this interface in Section 3.3.2.

For the EESC Settlement System, the analytical capabilities are not nearly as important as they are with the PRSC Settlement System. However, the system should still support

- Approval Workflows for CAISO and TC Calculated Amounts
- Dispute Support and Lifecycle Management, including on behalf of 3rd Parties
- CAISO Invoice Processing and Reconciliation
- Creation of EIM Invoices for Transmission Customers[2]
- Meter Data Acquisition from MRI-Ss

Avista should include requirements for the EESC Settlement System to submit and synchronize meter data with MRI-S in the RFP and evaluate whether routing the Meter Data through the EESC Settlement system is preferable to having the EIM MDM directly submit and sync meter data with CAISO.

The same vendors which offer EESC Settlement applications also offer PRSC Settlement applications and there may be benefits to choosing the same vendor for both solutions. However, this is not required and several EIM participants have selected different vendors for EESC and PRSC Settlements.

The emphasis of the EESC Settlement System is on transforming the CASIO settlements into TC Allocations and the related workflows to manage the creation of TC Settlement Statements and TC Invoices throughout the dispute and resettlement period. The PRSC Settlement System has a greater emphasis on analysis. If all Avista Generation Resources are treated as PRs, then Avista can get a complete picture of Generation performance in a single system, decreasing the need for a common

[2] It may be possible to consolidate EIM TC invoicing with settlement and invoicing for other Transmission Services. This consolidation has not been scoped in this assessment but Avista may wish to include this as an optional feature in the RFP for this solution or include it on a roadmap for future capabilities.

platform (Merchant tag settlements will still be determined by the EESC Settlement System and sent to the Merchant TC).

In some cases, EIM entities have seen the integration between the EESC Scheduling System and the EESC Settlement System as more important than a common platform with the PRSC Settlement System. This "bid-to-bill" connection can be especially helpful when validating tagged schedule submission / status / timing between the Market and Settlements to ensure that TC Allocations are accurate.

Another consideration is the alignment of the personnel that will be performing Merchant Analysis and TC Allocation functions. Despite the different focus of the applications, there is a considerable overlap in the data and processes. If there is a single team that is tasked with this work, a common platform will reduce training needs and ease the ability for team members to assist and backup each other. If these are distinct teams (e.g. if the Merchant Analyst sits on or near the Merchant Trade Floor) the need for a single vendor solution is lessened.

2.4 In-House or Contract Custom Development

In addition to the new applications described in Section 2.3, several in-house development efforts were identified and estimated. This section describes the functionality identified for in-house development.

2.4.1 ADSS Enhancements

Avista should enhance existing ADSS functionality for Base Schedule and Bid creation. ADSS currently models the complex hydro constraints and operating characteristics of Avista's generation fleet and Avista has extensively researched vendor solutions and has not found satisfactory alternatives. Therefore, ADSS is best positioned to produce pre-hour optimal Base Schedules and Bids based on its existing optimization functionality.

ADSS optimal schedule determination will be enhanced to include functionality to create Base Schedules anticipated to meet CAISO Demand Forecasts and Flex Ramp Requirements. However, the approach used for estimation is a simplification from the CAISO Flex Ramp approach in a number of ways to achieve a tradeoff between accuracy and cost (e.g. using an Ancillary Service (A/S) type product rather than a direct ramp rate evaluation, using prior period Base Schedules as the initial condition). This approach can be evaluated going forward.

ADSS will need to be enhanced to produce EIM compliant 4-part bids for each PR, specifically: the energy bid, minimum load cost, startup cost, and the GHG adder. This will be straightforward for thermal resources but will require additional development for the hydro resources. Once produced, the bids would be submitted to the PRSC Bidding and Scheduling System, requiring an interface to be developed between ADSS and this vendor solution. Based on the evaluation, ADSS also has the required information to calculate Ambient Derates for both gas and hydro resources. The Resource Level capabilities will be exported to the GOMS for submission to the CAISO. Synchronizing outages back from either the Avista GOMS or the CAISO OMS to allow validation and reporting in ADSS is desirable and has been included in the cost estimates but could be optional. Direct integration with the CAISO is generally intended to be avoided, if possible, so the initial preferred approach for discussion with the GOMS vendor is that this synchronization is with the GOMS.

Due to Market timelines, a full ADSS optimization may not be run for the T-75 and T-55 balancing submissions by the PRSC. Additionally, the EESC Scheduling System is responsible for the T-40 balancing. ADSS will be enhanced to create a simplified balancer screen and logic to economically zero imbalance. Estimates are included for these enhancements assuming that ADSS will then push the results directly to the EESC Scheduling System. This approach should be validated with the EESC Scheduling System vendor to evaluate whether off the shelf functionality might meet the EESC needs, potentially saving development of one interface.

During this evaluation, 18 enhancements were identified and estimated (see Table 8). For each enhancement, an effort estimate was identified for Requirements, Design, Development and Testing. Due to uncertainty in the Requirements, COTS vendor selections and the Managed API approach and in accordance with Avista estimating guidelines, 50% contingency has been added to the ADSS enhancement estimates. Additionally, it is likely that additional enhancements points will be identified as Avista defines the detailed functional requirements. Therefore, an additional nine enhancements (three hard, three medium and three easy) are included in the estimated effort.

2.4.2 Avista Integration

Avista procured COTS and in-house solutions will need to integrate, allowing for automated and timely communications of data between solutions to successfully participation in EIM. Some estimated integrations between various COTS solutions may be de-scoped if a single vendor is chosen, while other integrations will persist regardless of the chosen vendor solutions. For example, Avista EIM meter data in Oracle Utilities will need to be passed to the EESC Settlement System via an integration between these two solutions.

During this evaluation, 25 interfaces were identified and estimated (see Table 9). For each interface, an effort estimate was identified for Requirements, Design, Development and Testing. Due to uncertainty in the Requirements, COTS vendor selections and the Managed API approach and in accordance with Avista estimating guidelines, 50% contingency has been added to the interface estimates. Additionally, it is likely that additional integration points will be identified as Avista defines the detailed functional requirements and develops a greater understanding of the impacts to existing or deprecated Nucleus functionality, Real-Time situational awareness and reporting and analysis needs. Therefore, an additional nine interfaces (three hard, three medium and three easy) are included in the estimated effort.

2.4.3 Custom Reporting

To properly assess the EIM results and adjust behavior to optimize market results, Avista will need to update existing reporting capabilities, develop new reports and develop new situational awareness tools. Some of these functions are likely to be provided by the CAISO reporting applications and some by the vendor solutions. It is likely that Avista will need to augment those capabilities using PI, Tableau or other reporting solutions. The preferred location for the source data cannot be established until the reporting requirements are clearer, but it is likely not Nucleus. This custom reporting would be created by Avista in-house resources.

2.4.4 Other In-House Enhancements

Various Avista in-house solutions or existing COTS solutions will need to be enhanced in support of EIM participation. Some of these enhancements may be adequately covered by existing COTS functionality, for example meter data validation rules, but have been estimated for Avista internal work for now until detailed determinations can be made on the scope of such uses.

3 Estimated Costs

This section provides high-level estimated costs for the proposed solution.

3.1 Existing Application Cost Estimates

Effort estimates were prepared for some additional existing application and in-house development. Effort was broken down by project phase. The summary effort, including contingency, is presented in Table 5. Additional details are provided in the Requirements Inventory.

Table 5 – Estimated In-House Enhancement Budgetary Cost by Function

#	Name	Est Effort (in hours)
53	Track GHG Payments and Open Position	400
55	Process Generation Meter Data: Gather data and perform VEE	1,600
56	Process Generation Meter Data: Apply correction factors	500
57	Process Transmission Meter Data	800
60	Oracle MDM Setup	5,100
70	Oracle MDM Integration	1,700
78	Misc Meter Processor	500
54.3	Nucleus Impacts Placeholder	1,000
Estimated EIM Other In-House Effort		**12,000**

The approach to VER Forecasting is still to be determined. No cost estimate is included in this report. No changes to the Demand Forecast were identified.

The proposed solution for MV-90 to be the primary meter data acquisition will require incremental license and maintenance costs. Though these costs will support both Transmission and Generation meter data acquisition, these costs are accounted for in line 15 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Oracle MDM license and maintenance pricing is based on a per meter approach. Because the Oracle MDM is the solution for the AMI project and Avista has already acquired many licenses, there is no incremental cost anticipated for the small increase in EIM meters.

Table 6 – Estimated License & Maintenance for Existing Applications

#	Solution	License ($,000)	Maintenance ($,000)
	VER Forecast	$0	$0
	Demand Forecast	$0	$0
	MV-90 License & Maintenance	$115	$18
	Oracle MDM	$0	$0
	GE EMS	$0	$0
Estimated License & Maintenance for Existing Applications		**$115**	**$18**

3.2 COTS / Vendor Cost Estimates

Table 7 provides budgetary level costs for the identified COTS solutions. Detailed requirements were not in scope for this project and no vendor bids were solicited. The high-level ranges provided are based on prior EIM implementations and include license and vendor labor.

The range is quite wide for some of the solutions. Some of the main reasons for the range are:

- The vendor capabilities in some areas vary significantly. For example, for the PRSC Settlement Solution, a basic solution might be implemented for quite a bit less than one that incorporates a more robust analytics platform. For a settlements and analytics application, this may represent good value. In other cases, such as more robust bidding support, this may not provide value to Avista given the anticipated enhancements to ADSS.
- In some cases, the variation may also be explained partially by the upfront costs versus the recurring costs and how much ongoing change is covered by the recurring charges – the same vendor may not be at the top or bottom of both ranges.
- The level of support for configuration / customization during implementation assumed also can vary quite a bit. Some vendors implementation costs have been scaled to account for estimated Change Orders.

Avista business and technology team labor is also estimated for each of the solutions. Two methods were used for the estimate.

The first approach used is a top-down approach using a previous project as a reference.

- The Avista labor required for the recent PCI Settlement System implementation was compared to the vendor costs. The vendor license, vendor implementation and Avista internal labor costs were about one third each (after adding in an estimate for some labor which was not coded correctly in the time tracking system). Since the COTS estimates are inclusive of license and vendor implementation costs, a ratio of 0.5 was applied to estimate the base Avista labor.
- The PCI Settlement System implementation appears to be a simpler project in terms of the configuration required than the solutions identified for EIM. Based on the level of configuration

required for a given EIM solution, the Avista base labor was scaled up by an additional 10% to 50%, depending on the solution.

- Calculations were performed on the pre-contingency high and low license and implementation cost estimates.
- This approach includes Business Owner and Project Management effort to the extent that those individuals recorded time to the project.
- This approach estimates only the project labor and cannot be used for the procurement labor since the data does not exist.
- As described below in the second approach, the effort for the Security Engineer and Cloud Architect are deducted from the total. The following deductions are used:
    - Security – Project – 1,600 hours
    - Architecture – Project – 700 hours

The second approach used is a bottom up approach using a reference project.

- The PRSC Scheduling System project was broken down into 30 tasks. Ten tasks relate to the Avista and consultant efforts for procurement (e.g. requirements, system selection) and 20 tasks relate to the Avista and consultant effort for Implementation (e.g. design, testing, process definition).
- For each task, three roles were identified – a primary driver / doer, SME / workshop participant and reviewer / approver. For each role, the number of individuals and the anticipated effort was estimated.
- After a total was calculated for each phase, the other COTS implementations were scaled based on how difficult they appear to be relative to the PRSC Scheduling System using the same ratios as in the first method. An exception is the Dispatch Integration to EMS, for which a lower ratio was used since the effort is much simpler than the PRSC Scheduling effort.
- This approach incorporates both consultant and Avista effort. To isolate the Avista effort, the estimated consulting share was deducted from the total to determine the Avista share.
- This approach incorporates both Avista Security Engineer and Cloud Architecture effort. Avista has requested a dedicated line item for these efforts because the plan is to pursue a single / dedicate point of contact for the EIM Program. As effort estimate was identified for these roles in the reference PRSC Scheduling System project and scaled to the other projects using the same ratios described above.
    - Security – Procurement – 600 hours; Project – 1,600 hours
    - Architecture – Procurement – 600 hours; Project – 700 hours

The ranges in Table 1Table 7 are derived from the first method with the values from the second method landing about 80% of the way toward the high side of the range.

Table 7 – Estimated COTS Budgetary Cost Range by Solution

Solution	Estimated License & Implementation (in $,000)	Avista Internal Labor (in hours)	Estimated Annual Recurring Charges (in $,000)
Gen Outage Management (GOMS)	$300 - $450	800 - 2,500	$30 - $100
Trans Outage Management (TOMS)	$400 - $550	1,300 - 2,900	$50 - $150
PRSC Bidding & Scheduling System	$150 - $600	800 - 2,500	$75 - $175
EESC Scheduling System	$400 - $750	1,900 - 3,500	$100 - $175
PRSC Settlement System	$125 - $650	1,000 - 2,900	$50 - $175
EESC Settlement System	$300 - $575	1,400 - 3,500	$75 - $175
Dispatch Integration to EMS	$100 - $200	300 - 400	No Change
Sum of Lows & Sum of Highs	$1,775 - $3,725	7,500 - 18,200	$380 - $950
Contingency	20%	20%	20%
Range with Contingency	$2,100 - $4,500	9,000 - 21,900	$500 - $1,100

3.3 In-House or Custom Development Cost Estimates

3.3.1 ADSS Cost Estimates

Effort estimates were prepared for each of the ADSS enhancements identified. Effort was broken down by project phase. The summary effort, including contingency, by function is presented in Table 8. Given that detailed requirements have not been defined, it is likely that additional enhancements will be identified as the project progresses. A placeholder for nine additional enhancements – three hard, three medium and three easy – is included to account for the current uncertainty in the eventual solution. Additional details are provided in the Requirements Inventory.

Table 8 – Estimated ADSS Enhancement Budgetary Cost by Function

#	Name	Est Effort (in hours)
1.2	CAISO Master File Data Model	500
6.2	Ambient Derate Provision	500
6.4	Outage Synch	600
16.1	Determine Flex Ramp Requirements for Base Schedule Determination	1,000
16.4	Process Flex Ramp Uncertainty	400
16.5	Process BAA Demand Forecast	300
16.6	Compare BAA Demand Forecast to Internal Forecast	400
17.2	Create 4-Part Bids: Data Structure	500
17.3	Create 4-Part Bids: Fossil Cost to CAISO Bid Logic	800
17.4	Create 4-Part Bids: Hydro Cost to CAISO Bid Logic	1,600
17.5	Create 4-Part Bids: CAISO Bid Rule Pre-Checking	600
17.6	Create 4-Part Bids: CAISO Bid Creation UI	600
17.7	Create 4-Part Bids: CAISO Bid Creation Workflow	400
18.2	Create Balancing Stack: Data Structure	500
18.3	Create Balancing Stack: Create Stack Segments	800
18.4	Create Balancing Stack: Order Stack Segments	800
20	Provide Balancing Stack to Transmission Operations	300
23	Generation Auto Balancer	1,000
200s	Allocation for Scope Uncertainty	3,000
Estimated EIM ADSS Enhancement Effort		**14,400**

3.3.2 Integration Cost Estimates

Effort estimates were prepared for each of the integration points agreed for scoping. Effort was broken down by project phase and was conservatively estimated. The summary effort, including contingency, is presented in Table 9. Several more potential interfaces were identified during the analysis. Many of these are anticipated to be included in the "out of the box" vendor solutions.

Given that detailed requirements have not been defined, it is likely that additional interfaces will be identified as the project progresses. A placeholder for nine additional interfaces – three hard, three medium and three easy – is included to account for the current uncertainty in the eventual solution. Additional details are provided in the Requirements Inventory.

Table 9 – Estimated Integration Budgetary Cost by Interface

#	Name	To <> From	Est Effort (in hours)
3.2	Derate Transmission	EMS >> TOMS	600
5.2	Suggest Generation Outages	EMS >> GOMS	500
6.3	Outage Sync	GOMS >> ADSS	500
10	Obtain NPR Base Schedules	ADSS >> EESC Sched System	500
16.2	Obtain Flex Ramp Uncertainty	PRSC Sched System >> ADSS	400
16.3	Obtain BAA Demand Forecast	PRSC Sched System >> ADSS	500
21.1	Retrieve RT RS Results	EESC Sched System >> PRSC Sched System	400
25	Receive Balancing Stack	ADSS >> EESC Sched System	500
34	Tag Snapshot for TC Allocations	EESC Sched System >> EESC Settle System	500
35	Receive Gen and ETSR Dispatches	CAISO ADS >> EMS	100
52	Import GHG Settlement	PRSC Settlement >> Nucleus	400
58	Export Generation SQMD	MV-90 >> Oracle Utilities MDM	400
59	Export Transmission SQMD	PI >> Oracle Utilities MDM	400
61	Submit SQMD to CAISO	Oracle Utilities MDM >> CAISO MRI-S	500
64	Receive PR Invoice Amounts	PRSC Settle System >> Oracle Financials	100
65	Receive EE Invoice Amounts	EESC Settle System >> Oracle Financials	100
69	Obtain PR Base Schedules	ADSS >> PRSC Sched System	500
71	Send 4-Part Bids	ADSS >> PRSC Sched System	600
72	Send Load Forecast	ADSS >> EESC Sched System	500
75	Telemetry for VER	EMS or PI >> VER Forecast	400
76	VER Forecast Alternate Path	VER Forecast >> EESC Sched System	400
79	Hourly Checkout Value	Nucleus >> Oracle MDM	400
200s	Allocation for Scope Uncertainty	Overall implementation work	3,300
Estimated EIM Integration Effort			**12,300**

3.3.3 Custom Reporting

A placeholder budget is included to account for the development of new reports and new situational awareness tools to assess the EIM results and adjust behavior to optimize market results.

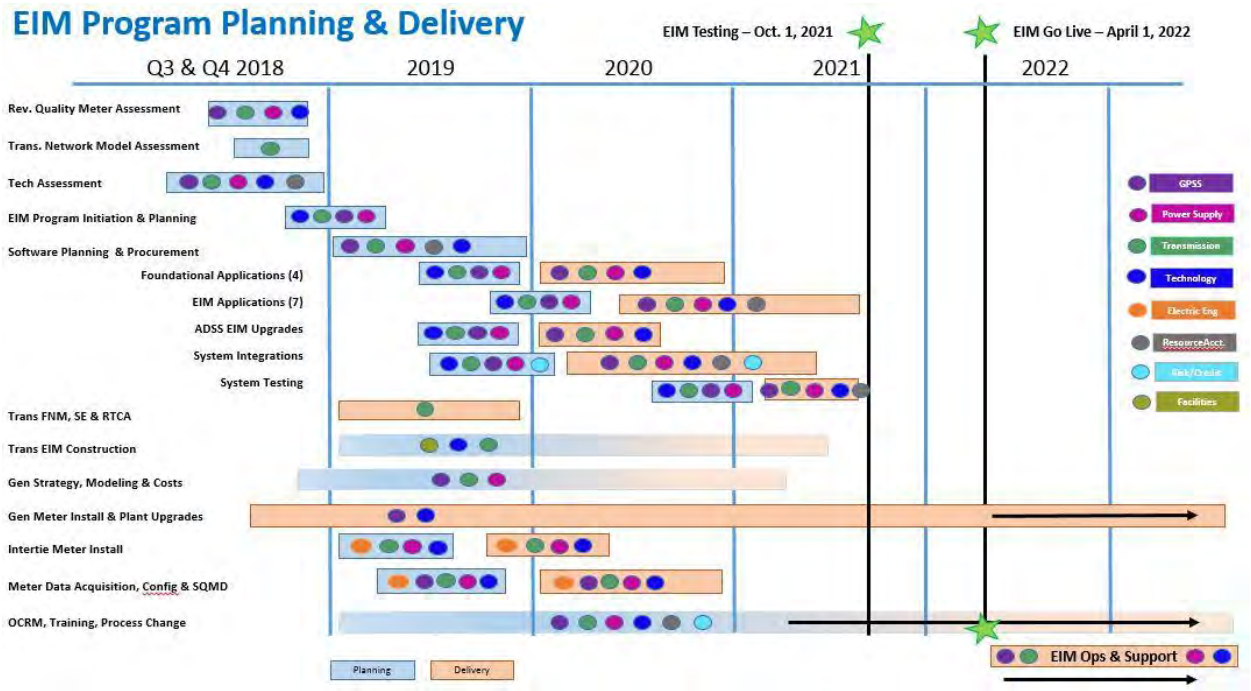
Table 10 – Estimated Custom Reporting Budgetary Cost Placeholder

#	Name	Est Effort (in hours)
54.1	Key Performance Indicator Placeholder	1,000
54.2	Situational Awareness Placeholder	1,000
Estimated EIM Other In-House Effort		**2,000**

4 Proposed High-Level Schedule

Based on the number of solutions which need to be implemented, Avista's resource availability, procurements timelines and the EIM implementation timeline, a preliminary high-level schedule has been developed to support technology prioritization discussions which is shown as Figure 1.

Figure 1 – High Level EIM Schedule



5 Conclusion

Several Avista in-house systems were evaluated for possible enhancements and integrations as alternative EIM solutions to vendor systems. Specifically, the existing functionality of Nucleus and ADSS were considered for EIM solutions.

Based on the required EIM functionality, complexity of that functionality and maintenance required for on-going EIM changes as the market is enhanced, Nucleus is not an option for the core EIM solutions. Nucleus will be enhanced, as identified in this report, to support EIM impacts to certain Energy Trading and Risk Management (ETRM) and other existing functions.

Based on the current EIM assessment efforts, and known requirements, it's anticipated that the new EIM solutions will have some overlap with existing Nucleus functions. Identifying the downstream impacts of retiring Nucleus functionality was not included in this assessment, and will require additional investigation during COTS products are reviewed and implemented. Avista may also choose to include optional functionality in the RFP for the EIM solutions to evaluate if the new tools can replace existing

Nucleus functions. Analysis of EIM impacts on existing Nucleus functions should be in-scope for the Requirements gathering process.

The project team determined that the existing functionality of ADSS and custom nature of hydro resource optimization made ADSS a prime candidate system for creating generation bids and schedules rather than vendor solutions, since the hydro optimization would be a custom vendor implementation largely duplicating existing ADSS functions.

Several of Avista's planned commercial software procurement are best leveraged for EIM solutions in addition to their original scope. Specifically, Avista's planned GOMS and TOMS vendor solutions should be aligned with EIM requirements to streamline their implementation and subsequent use for EIM participation.

6 Addendum – Supplemental Cost Analysis

Following the initial Technology Assessment, Avista requested the analysis be broadened to include Very Rough Order of Magnitude (VROM) estimates for a number of other efforts and costs which will be incurred either for EIM or contemporaneous with EIM. This Addendum attempts to summarize the additional effort and cost estimates, the source of the estimate and the level of confidence in the estimated value.

6.1 Planning, Requirement & Procurement Phase

Avista anticipates using 2019 to further plan the project and begin the procurement process for the required systems in anticipation of implementation work beginning in 2020.

To support this effort, additional consulting resources are anticipated. As a placeholder, budget for one resource from April 1, 2019 through December 31, 2019 is included.

Avista will also participate in the planning and procurement process. The bottom up approach to estimating the PRSC Scheduling System effort described in Section 3.2 was used to estimate Avista's labor. Using the 10 tasks related to procurement (e.g. requirements, system selection), an initial effort estimate was determined. The anticipated consulting effort applicable to system selection was deducted from the total to derive an Avista-specific estimate.

This estimate assumes that a single procurement and contracting specialist is assigned from Avista to support all the EIM related procurement since there will be a number of similarities across these procurement efforts. Further, it was assumed that all vendors would have existing Master Service Agreements (MSAs) with Avista. If new MSAs need to be negotiated, additional effort will be required.

These costs are summarized on line 10 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Please see Avista – Integration EIM Cost Summary tabs "1a, 10. Vendor Software" and "9b, 10. Consulting" for additional details.

6.2 Generation & Network Modeling

Separate from the Technology Assessment, an evaluation of updates and improvements to the Full Network Model (FNM) required for EIM participation was conducted. The analysis also included implementation of State Estimation (SE) and Real-Time Contingency Analysis (RTCA) and hardware to support these functions. Only the FNM upgrades are EIM-related. The other functions are necessary due to the RC Transition and other Avista objectives. These costs are summarized on line 11 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Please see Avista – Integration EIM Cost Summary tab "11. FNM" for additional details.

Implementation of EIM will also require generation performance and cost modeling. Avista has begun this effort through the supplemental EIM Planning project by beginning to develop a Resource Participation Strategy. For EIM, many aspects of the generation resources will need to be modeled for the CAISO Master File. Additionally, several kinds of costs will need to be determined or refined (Heat Rates, Maintenance Costs). A placeholder budget is included for this effort. These costs are summarized

on line 12 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Please see Avista – Integration EIM Cost Summary tab "12. Gen Cost Modeling" for additional details.

A major topic in EIM is the need to provide Settlement Quality Meter Data (SQMD). A separate project was undertaken to assess the current state of Avista's Generation and Intertie Metering equipment including Current Transformers (CT), Potential Transformers (PT) and Meters as well as the compliance with the EIM requirements. For the Generation meters, a separate modernization project has already been authorized. However, based on the assumptions in that business case, current progress and the EIM Requirements, GPSS has provided an updated estimate for generation metering as part of this effort. Additionally, Meter swaps are anticipated at several intertie locations. These costs are summarized on line 15 and 19 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Please see Avista – Integration EIM Cost Summary tabs "15. Transmission Meters" and "19, 20. Gen Controls and Meters" for additional details.

In the EIM, it is important to maximize the resources which can be offered to the Market and to be able to follow 5-minute dispatch instructions. Avista's current plant communications and infrastructure (PLC, RTU, SCADA) may not support the requirements at some locations. A placeholder budget provided by GPSS is included for these enhancements. These costs are summarized on line 20 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Please see Avista – Integration EIM Cost Summary tab "19, 20. Gen Controls and Meters" for additional details.

6.3 Network & IT Infrastructure for Applications

With the current direction of the Technology Assessment leveraging cloud-based deployments, network availability and performance will be key to the performance of the COTS applications. Additionally, connectivity to the CAISO is critical. Avista's IT team's estimated costs to support enhanced connectivity for the COTS solutions, communications with CAISO and an allowance for MV-90 capabilities at the Back Up Control Center (BUCC) in case MV90 is on the SCADA network. If MV90 is on the ET network, the backup will be in San Jose. AWS/Azure estimates were used for the COTS solutions; Avista already has a dedicated network connection to OATI's data center. These costs are divided into the following categories:

- Incremental Internet Connectivity and Dedicated Circuits – Additional networking for generation control, connectivity with CAISO and connectivity to the Azure and AWS clouds as well as BUCC improvements were budgeted. Budgetary costs for this upgrade were provided by Avista.
- ADSS Hardware – The current EIM vision includes ADSS becoming a central system in the hourly schedule and bid creation process and upgrading the Hardware at the San Jose location is recommended. Budgetary costs for this upgrade were provided by Avista.
- Dedicated Project Resources – A dedicated Security Engineer and a dedicated Cloud Architect were included by Avista.
- Miscellaneous Costs – A small placeholder for additional firewalls, integration services and unidentified software were included by Avista.

These costs are summarized on line 6, 7 and 8 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Please see Avista – Integration EIM Cost Summary tabs "6-7. IT VROMs" and "8, 16. Network VROMs".

6.4 Generation and Intertie Equipment Upgrades & Communications

EIM requires revenue metering at both generation and intertie locations. At this time, the preferred approach to retrieving the meter data for Avista owned meters at generation and intertie locations is to poll the revenue meter using MV-90 using IP. To date, 52 locations have been identified as potentially requiring communications upgrades.

- About half of the intertie locations currently use dial-up connections to communicate meter data to Mission. Continued use of the existing dial-up modems for certain locations (those with a Bulk Electric System (BES) Low Impact designation, as opposed to no BES impact designation) require that equipment to be isolated from control equipment under the new NERC CIP Standard 003-6.
- The current Avista Standard is to replace dial-up modems with T1 connections. If T1 connections are used, High Voltage Protection (HVP) may be required. If so, it would substantially increase the cost. A site by site assessment is needed to determine HPV requirements. In some locations, cellular modems might be feasible. This option has not been assessed.
- Some locations, including most of the generation locations, may not have a BES impact. If there is no BES impact, dial-up connections may still be feasible.
- Using a "backup meter" which is isolated from SCADA connectivity might be feasible. BPA has used this approach in some cases.
- For EIM it may be possible to use the existing SCADA data combined with the existing BAA hourly check-out values to calculate a settlement quality actual interchange value. This would not be possible for the generation locations. Idaho Power Company (IPC) has used this approach in some cases. However, significant data losses are possible with this approach and may not be acceptable.
- Avista may decide upgrading communications capabilities is advisable as part of a general modernization effort regardless of EIM requirements.

A site-by-site analysis is required to define the preferred approach. At this time, a placeholder VROM is included based on the following:

- Network and Communications for Generation Controls and Metering – Site by site analysis of the 28 identified generation locations has not been completed and the cost estimates in this report are approximates based on the share of locations that is likely to need a T1 connection (10) and the number of sites likely to require HVP for that connection (8). Other approaches are under consideration (e.g. cellular, separate circuits for dial-up capability). Aside from EIM requirements, CIP 3-6 standard will impose some communication requirements, which may indicate a T1 connection is the best option. Until Avista can complete a site by site analysis, or

decide to fund all upgrades to a corporate standard to achieve O&M savings, these costs estimates should be interpreted cautiously.

- Network & Communications for Transmission Metering – Site by site analysis of the 24 identified transmission locations has not been completed and the cost estimates in this report are approximates based on the share of locations that is likely to need a T1 connection (16) and the number of sites likely to require HVP for that connection (10). A higher proportion of Transmission locations was anticipated to require T1 and HPV than generation due to the higher likelihood that the locations are BES locations. Until Avista can complete a site by site analysis, or decide to fund all upgrades to a corporate standard to achieve O&M savings, these costs estimates should be interpreted cautiously.

These costs are summarized on line 16 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Please see Avista – Integration EIM Cost Summary tab "8, 16. Network VROMs".

6.5 Project Implementation

The EIM Program will also require daily management and coordination, strategy definitions, extensive training and Organizational Change Management (OCM). New sections of the Avista Open Access Transmission Tariff (OATT) must be filed with FERC and a Market Base Rate (MBR) study performed. Consulting resources are anticipated to provide Program Management support and Subject Matter Expertise across the project. Several new permanent FTEs will also be added during the project and become part of ongoing operations.

These costs are summarized on line 9, 13, 14 and 18 of Table 1 – Summary Budgetary Cost Estimate for EIM Technology Projects. Please see Avista – Integration EIM Cost Summary tabs "9a. Prog Management and Leader" and "9b, 10. Consulting" and "13. OATT and MBR" and "14. Training and OCM" and "18. CAISO Fees".

Utilicast

METERING ASSESSMENT SUMMARY REPORT

PROPRIETARY AND CONFIDENTIAL

PREPARED FOR:

AVISTA®

AUTHORS:

BRIAN HOLMES AND ZACH GILL SANFORD

DECEMBER 2018

Exhibit No. 8
Case No. AVU-E-21-01
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1 Executive Summary

Avista requested Utilicast perform an assessment of meters and associated equipment within the scope of California Independent System Operator (CAISO) requirements for Energy Imbalance Market (EIM) participation and adherence to those requirements. Initially, Avista was interested in assessing only the meters at its owned generation facilities. During the course of the project, Avista requested the original scope of assessed meters be expanded to include all generation and interchange meters related to EIM participation.

This project focused on inventorying the characteristics and configurations of existing meters, current transformers (CTs), potential transformers (PTs), and associated communications at generation and interchange sites in the Avista Balancing Authority Area (BAA). Avista made a business decision during this assessment to evaluate the equipment relative to the CAISO metering requirements rather than the various Local Regulatory Authority (LRA) metering requirements. Therefore, these equipment characteristics and configurations were compared to the CAISO metering requirements stated in the current version of the CAISO Metering Business Practice Manual[1] (BPM) at the time of the project. Any gaps in adherence to these requirements and unknown equipment ratings are identified in this report along with proposed steps to address these gaps and determine unknowns through metering projects, equipment tests, or requests to CAISO for requirement exemptions.

A high-level scope and cost estimate for metering projects, generation controls, and meter data communications were produced by Avista staff based on input from Utilicast. The budgetary level cost estimate for EIM related metering projects is presented in Table 1.

Table 1: Summary Budgetary Cost Estimate for EIM Metering Projects

Cost Estimate Category	Project (in $,000)	Post-Project Recurring Services and Avista Labor (in $,000)
Generation Meter Projects	$3,000 - $4,500	
Generation Control Projects	$1,200 - $1,400	
Transmission Meter Projects & Data Collection	$340	$18
Network Improvements for Metering	$210 - $2,000	$15
Total	**$5,490 – 7,280**	**$33**

Costs presented in this report are further described in the EIM Technology Assessment report delivered by Utilicast in a separate scope of work.

Avista has already budgeted $3.4M for the expected cost of generation meter projects in a separate Business Case and the costs in this report are not additive. By contrast, Avista has not yet budgeted for

[1] CAISO Metering Business Practice Manual Version 18, Revised May 24, 2018
https://bpmcm.caiso.com/BPM%20Document%20Library/Metering/BPM%20for%20Metering_v18_Clean.docx

the expected cost of interchange meter projects, plant controller upgrades or network enhancements, so those efforts represent new costs.

2 Requirements and Considerations

EIM participation will require Avista to certify to the accuracy of installed metering equipment at generation and interchange sites in its BAA, with the Avista EIM metering program subject to annual self-audits. Avista may establish the procedures of its annual self-audit plan at its own discretion, although CAISO must approve the audit plan. Additionally, CAISO retains the right to audit the Avista EIM metering program, including its self-audit records.

The CAISO metering requirements are stated in the CAISO Metering BPM. While many requirements are identified in this report, it is not intended to be exhaustive in listing all applicable requirements. In addition to these stated requirements, there are several considerations for metering configuration that are key to Avista's successful EIM participation, which are described in this section.

2.1 CAISO Metering Requirements

2.1.1 Metered Entity Registration

CAISO provides the option for EIM Entities to choose between two metered entity registration types, ISO Metered Entity (ISOME) and Scheduling Coordinator Metered Entity (SCME). Utilicast recommends Avista register as a SCME, as this allows Avista to continue engineering, installing, testing, and gathering data for meters in scope for EIM participation. Selecting the ISOME option would relinquish these roles to CAISO-certified personnel and require Avista to pay for the metering services and provide site access to these external personnel. It is also notable that all EIM Entities to date have registered as SCMEs, to Utilicast's knowledge. During the metering assessment, Avista indicated its intent to register as a SCME, so the metering assessment was performed with the assumption that Avista will be a SCME.

As part of this SCME registration, Avista will need to execute a registration agreement, requiring the Avista signee to attest to the accuracy of its submitted Settlement Quality Meter Data (SQMD) Plans.

2.1.2 Applicable Metering Requirements

CAISO allows EIM SCMEs to choose between adhering to CAISO metering requirements and LRA metering requirements. Avista's applicable LRAs are state utility commissions. Avista made a business decision during this assessment to evaluate the equipment relative to the CAISO metering requirements.

2.1.3 Generation Registration and Size Threshold

CAISO allows EIM participants some discretion on which generation capacity to be registered in the EIM. Very small resources may be excluded from all EIM involvement, including resource registration, the Full Network Model (FNM), base schedules, and meter submission. CAISO requires this threshold be set between 1 MW and 10 MWs.

During the metering assessment, Avista decided to set the minimum capacity threshold for resource registration at 3 MW. This threshold was chosen since it corresponds to the specified threshold for requiring Supervisory Control And Data Acquisition (SCADA) in the Avista Small Generator Interconnection Procedures (SGIP) and the excluded resources were deemed to have negligible impact on Avista operations since, at the time of this assessment, their total capacity is less than 7 MW.

The exclusion of these generators from resource registration will be appear as negative load in the Avista load forecast and real-time operations for the EIM. Therefore, Avista should subtract these resources' historical output from the Avista historical load actuals submitted to CAISO for its load forecast engine to ensure greater forecast accuracy.

All generation within the Avista BAA above the 3 MW capacity threshold must be registered with submitted and approved SQMD Plans, regardless of ownership and EIM participation.

2.1.4 SQMD Plan

To join EIM, the Entity must complete a SQMD Plan and receive CAISO approval for each registered Resource ID. Each Participating Resource (PR), Non-Participating Resource (NPR), and scheduling tie will be assigned a Resource ID, with scheduling ties being comprised of physical interchange points aggregated to Avista-defined locations. The Avista-completed SQMD Plans[2] will include information such as meter granularity, meter and instrumentation accuracy, loss compensation, meter audit and test plans, calculations, single line meter diagrams, and descriptions of data collection and Validation, Editing, and Estimating (VEE). The descriptions of data collection do not require detailed diagrams of the communication pathway, but should include a description of communication networks, meter data head-end and Meter Data Management (MDM) systems leading to daily SQMD data submission to CAISO systems for settlement.

As part of the SQMD plan submission, Avista will need to provide a Single Line Diagram (SLD) that shows the station configuration and specifically the locations of all relevant transformers, meters and station service. The SLD must either be stamped by a Professional Engineer (PE) or, if modifications have been made since the original construction, an Avista PE may attest to the accuracy of the SLDs.

As part of the EIM implementation project, Avista should prioritize the early submission of the first SQMD Plan to allow for sufficient review and revision time between CAISO and Avista staff, which may take several months of revision and discussion to finalize[3]. Furthermore, CAISO staff may request clarification or modification of the plans in a manner that could impact all SQMD Plans and the underlying EIM meter program, requiring substantial project work to address. Once one SQMD Plan has been approved, much of the content may be utilized for all other plans, as the description of the audit plan, data collection, and VEE should be common to the majority of meters, easing the submission of subsequent plans. Any expected exemptions should also be discussed early in the implementation project to ensure acceptance or a change in project work as necessary.

[2] CAISO's tutorial of SQMD Plan template is posted at https://www.caiso.com/Documents/SQMDResourceTemplateTutorial.pdf
The SQMD Plan template is posted at https://www.caiso.com/Documents/SQMDPlanTemplate.docx

[3] To begin the SQMD process, Avista must obtain a New Resource Implementation (NRI) number. To obtain this number, Avista must have an assigned Resource IDs. However, EIM Entities DO NOT have to follow the full NRI process if they are SCMEs.

2.1.5 Equipment Rating Data

The equipment ratings specified in the CAISO Metering BPM, such as accuracy and burden ratings, must be determined by Avista for EIM participation. The CAISO Metering BPM rating requirements are specified by accuracy and burden classes, as defined in the IEEE C57.13 Standard Requirements for Instrument Transformers. If the equipment ratings for any meters, CTs, or PTs used for EIM metering are unable to be found, then Avista must either replace the equipment having unknown attributes, or attest to the likely attributes based on known information, such as other installations of similar equipment having known attributes, test data, or other sources of engineering judgement.

Avista should undertake all reasonable measures to establish the accuracy of the equipment. At one time CAISO was aggressive in requiring nameplate information for all equipment. However, in more recent EIM implementations CAISO has been somewhat more willing to accept management attestation in a sworn affidavit that states the assumed accuracy "to the best of my knowledge" with a duty to update if new information becomes available. The assessment of validated equipment ratings and equipment lacking the necessary rating data are provided in section 3.

The core requirements for metering equipment are:

- Meter
  - 0.2 Accuracy class
  - 60 days storage for meter data
  - 5-minute interval granularity for Participating Resources and Interchange
- CT
  - +/- 0.3% accuracy at burden of 0.1 - 1.8 ohms, 10% - 100% rated current, or
  - Optional +/- 0.15% accuracy at burden of 0.1 - 1.8 ohms, 5% - 100% rated current
- PT
  - +/- 0.3% accuracy through burden rating ZZ (400 Volt-Amperes secondary at 0.85 power factor) at 90% through 110% of nominal voltage, or
  - Optional +/- 0.15% accuracy through burden rating Y (75 Volt-Amperes secondary at 0.85 power factor) at 90% through 110% of nominal voltage

Avista may use equipment which does not meet the requirements but doing so will require Avista to calculate a "correction factor" to apply to the meter data. The correction factor does not increase accuracy – it is a penalty which reduces the observed readings to ensure that the metered output is not overstated. See section 2.2.3 for more detail on correction factors.

2.1.6 Equipment Burden Ratings

Avista has identified several installed CTs and PTs with burden ratings less than the CAISO requirements of B1.8 and ZZ, respectively. However, this equipment may have sufficiently low burden connected to their circuits to retain their rated accuracy, pending further validation by Avista engineers. While the CAISO-stated burden ratings may exceed these installations, Avista should be able to utilize this

equipment with low connected burden in accordance with item b of the following excerpt from Attachment B Section A6 of the CAISO Metering BPM:

> Where the connected burden of a metering circuit exceeds the burden rating of a CT or [PT] or if an existing instrument transformer does not meet the minimum CAISO accuracy requirements, then one of the actions listed below must be taken:
>
> a. Replace the instrument transformer(s) with higher burden rated revenue class units; or
>
> b. Reduce the burden on the circuit to comply with the name plate of existing instrument transformer(s); or
>
> c. Apply correction factors to the meter to adjust the meter's registration to compensate for inaccuracies.

In accordance with item b of the above excerpt, if Avista can document in the SQMD plan that the connected burden of these CTs and PTs and demonstrate it is less than the equipment burden rating, then the installed equipment can be utilized without replacement or correction factors. See section 3 for lists of equipment with lower burden ratings that require validation of the connected burden.

2.1.7 Meter Memory Requirements

Avista has identified several installed meters with memory storage less than the CAISO requirement of 60 days storage. Avista should consider either replacing these meters, upgrading their memory, or maximizing the use of the existing memory and applying for an exemption from the CAISO requirement. In the latter case, Avista has identified the increased storage potential if the number of stored channels, see section 2.1.11 for detail on meter channels, are minimized to meet the CAISO requirements and dispense with any additional data. For example, if an interchange meter records the load at a substation, then only the single channel reading the import of energy for load need be recorded for EIM purposes.

If Avista chooses to retain these meters with insufficient memory, an exemption should be submitted for CAISO's review early in the implementation project, to ensure sufficient time to adjust project work if CAISO rejects the request. The exemption request should describe the rationale for the decision and proposed mitigation plan. For example, Avista could describe its plan to replace these meters as associated site work occurs, and in the meantime, a process for sending field technicians for a local meter read in a timely fashion prior to reaching the memory limitation, should communications fail to read the meter.

2.1.8 Metering Granularity

Generation registered as a Participating Resource (PR) and BAA Interchange metering must be submitted to CAISO at a 5-minute granularity, while Non-Participating Resource (NPR) metering may be recorded at a 5-minute, 15-minute, or 60-minute granularity. BAA load metering, termed EIM Load Aggregation Point (ELAP) load, is determined as the net summation of all generation and interchange meter values and cannot be submitted to CAISO at a more granular level than the least granular meter data. For example, if all PR, NPR, and interchange meters record at 5-minute granularity except one NPR meter that records at 15-minute granularity, then the CAISO would require the ELAP meter be

submitted at 15-minute granularity. See section 2.2.2 for a description of meter granularity impact on EIM participation.

In the EIM, the CAISO deems the Merchant largely responsible for PRs and the Transmission Operator, termed the EIM Entity, responsible for NPRs. One possible generation Resource registration strategy that simplifies scheduling and analysis is to register all Avista owned generation as Participating Resources. To do so would require Avista to satisfy the granularity requirements of Participating Resources for all generation.

In some cases, the CAISO has permitted profiling of a Revenue Quality value at a greater granularity to be profiled to a 5-minute granularity using other data (e.g. SCADA) but this is not typically permitted. The only cases we know of involve resources which have some other pre-existing revenue quality checkout process, such as Mid-Columbia (Mid-C) and Colstrip.

2.1.9 Meter Submission at Resource ID Level

CAISO requires meter data to be submitted at the registered Resource ID level.

To the extent Avista records multiple meters for one Resource ID, these values will need to be netted to a single meter data set for submission to CAISO. For example, if two physical generators are metered individually at their gross output, have a separately metered station service onsite, and are registered as a single Resource ID, then all three meters will be combined into a single meter value recording the two generators' output net of station service.[4]

Following are three examples to illustrate options for a station with a configuration similar to Noxon. These simplified examples and single line drawings are intended to provide an overview of the choices and tradeoffs and are not ready for SQMD submission. These examples assume that all equipment accuracy requirements are satisfied. If some of the equipment is not revenue quality, then the correction factors would also need to be applied.

If Noxon were to participate as an aggregate resource and utilize its existing unit-level metering, Avista would net the five generation meters and two station service meters, as depicted in Figure 1 with metered locations depicted by the letter "m" and described in the following equations[5]:

Noxon aggregate resource meter = G1 + G2 + G3 + G4 + G5 – SS1 – SS2

Where G# is the meter for unit # and SS# is the meter for station service #

[4] Netting of station service is permitted but only certain categories of use which are deemed "required" for the operation of the station are approved for this treatment (e.g. pumps, excitation). Other categories of use that might be tied to a generator (e.g. fish hatcheries at a hydro facility) do not qualify for station service netting and would need to be excluded from the netting, unless the generator is classified as behind-the-meter generation in its interconnection agreement. Onsite load for behind-the-meter generation may be netted from generation.

[5] Avista may also need to calculate station and transformer loss factors to "compensate" the observed values to simulate that "the meter" is on the high-side of "the GSU". This detail is not shown in these simplified examples.

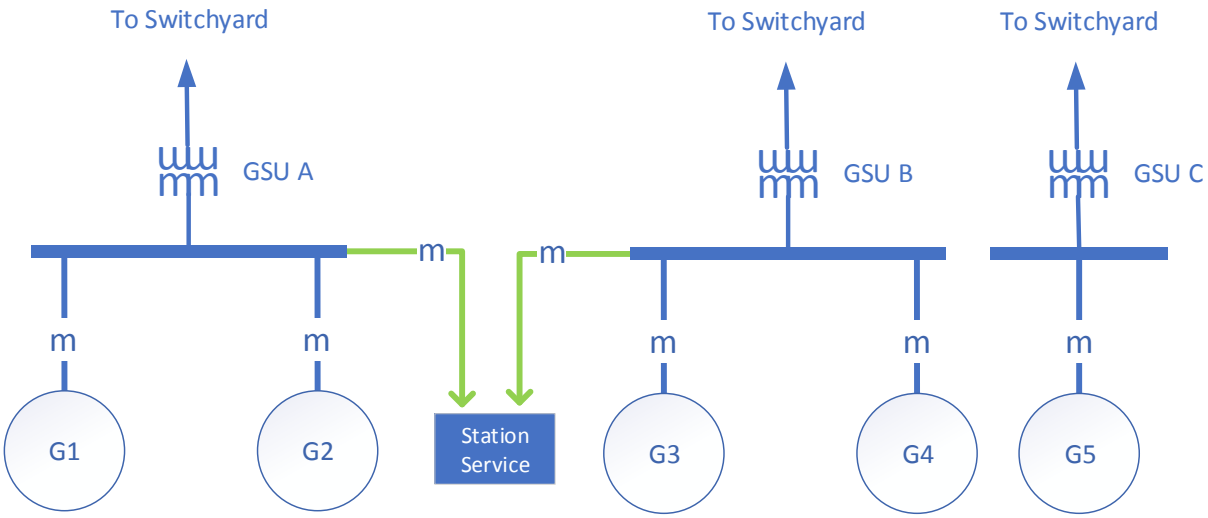


Figure 1 : Noxon Aggregate Registration with Unit Level Metering

More specifically, the channels would be netted as follows (see section 2.1.11 for detail on meter channels):

Noxon aggregate resource meter ch_4 = G1_ch_4 + G2_ch_4 + G3_ch_4 + G4_ch_4 + G5_ch_4 – G1_ch_1 – G2_ch_1 – G3_ch_1 – G4_ch_1 – G5_ch_1 – SS1_ch_1 – SS2_ch_1

Noxon aggregate resource meter ch_1 = 0

Where ch_# is the submitted channel number

By contrast, if Noxon were to participate as an aggregate resource and utilize high-side metering recording the output at each of its three Generator Step-Up transformers (GSUs) net of station service by virtue of the metering location, then Avista would net the three high-side meters, as depicted in Figure 2 and described in the following equations:

Noxon aggregate resource meter ch_4 = GSU_A_ch_4 + GSU_B_ch_4 + GSU_C_ch_4 – GSU_A_ch_1 – GSU_B_ch_1 – GSU_C_ch_1

Noxon aggregate resource meter ch_1 = 0

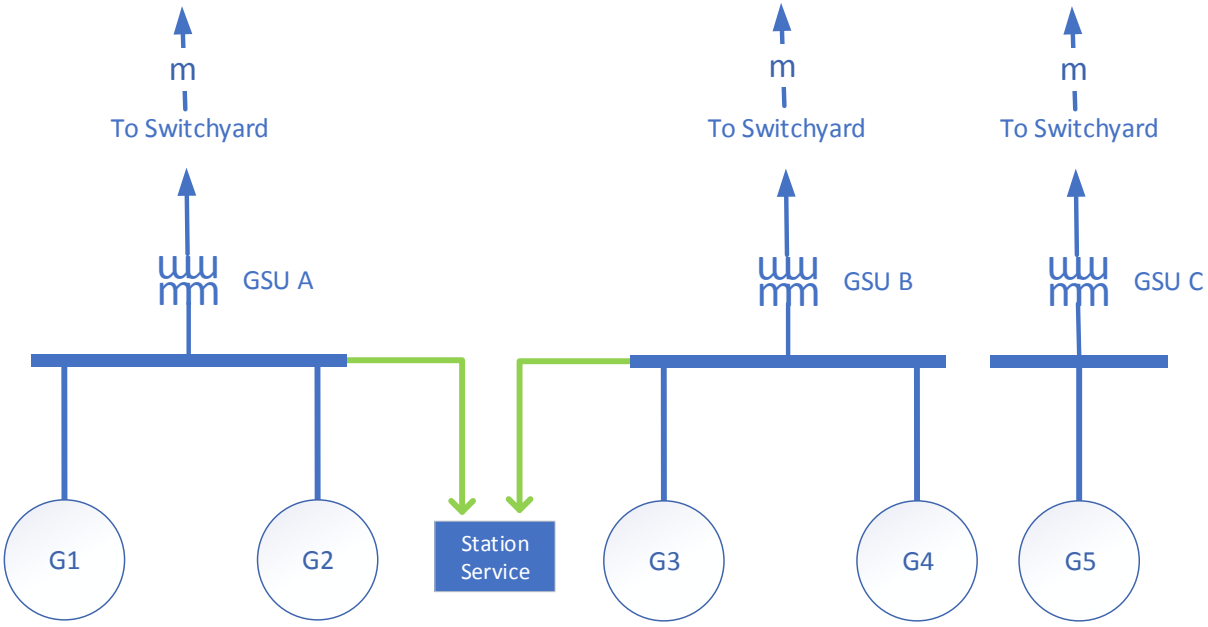


Figure 2: Noxon Aggregate Registration with High Side Metering

A revenue quality meter provides data to the VEE process. Once VEE has been performed, the data is deemed settlement quality, will be submitted to CAISO for settlement, and is subject to an approved SQMD plan. Other non-revenue quality meter reads may be used to allocate or distribute settlement quality data but are not provided to CAISO directly. If Avista records a single revenue quality meter for multiple Resource IDs, the data set will need to be allocated to the Resource ID level according to a documented process that is approved by CAISO. Such an allocation process could be based on non-revenue quality meter data recording at the unit level so long as the submitted meter data itself is collected from the single revenue quality meter. For example, if Noxon participates as individual units and the metering of units 1 and 2 is at the high side of GSU A, while each unit has an individual non-revenue quality meter recording gross output, as depicted in Figure 3 and described in the example equations below:

GSU A meter = 9.5 MWh; G1 meter = 4 MWh; G2 meter = 6 MWh, then

G1 “meter” allocation = GSU_A * G1 / (G1 + G2) = 9.5 * 4 / (4 + 6) = 3.8 MWh

G2 “meter” allocation = GSU_A * G2 / (G1 + G2) = 9.5 * 6 / (4 + 6) = 5.7 MWh

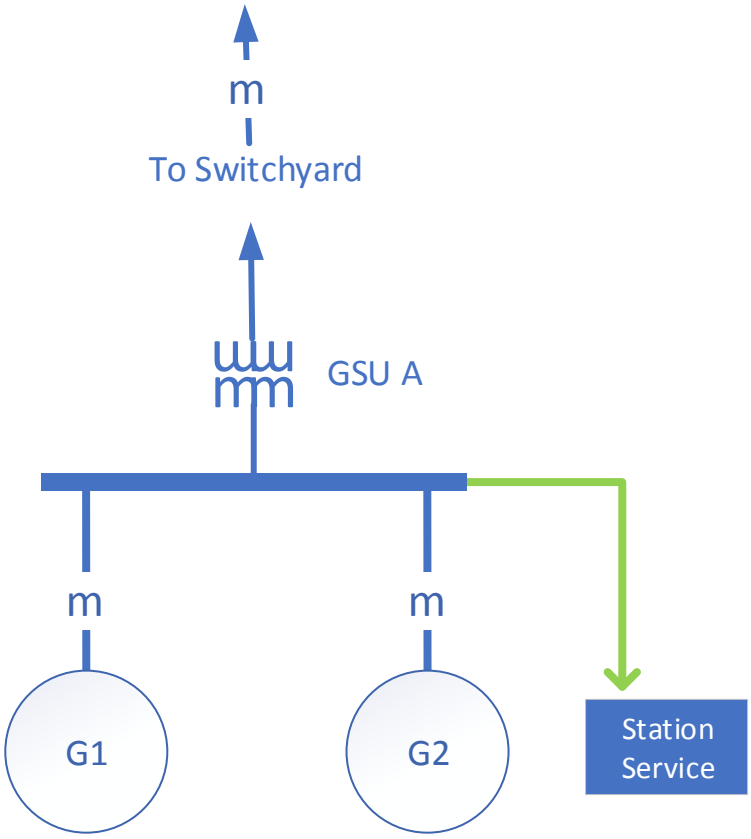


Figure 3: Noxon Individual Unit Registration with High Side Metering

Figure 4 depicts the decision tree for the metering configuration of a resource site, considering high-side versus low-side metering and aggregate versus unit level resource registration using Noxon as an example. Refer to the Noxon metering examples above for more detail on the metering configurations for various resource registrations. Refer to section 2.2.1 for detail on compensation factors accounting GSU losses for low-side metering installations.

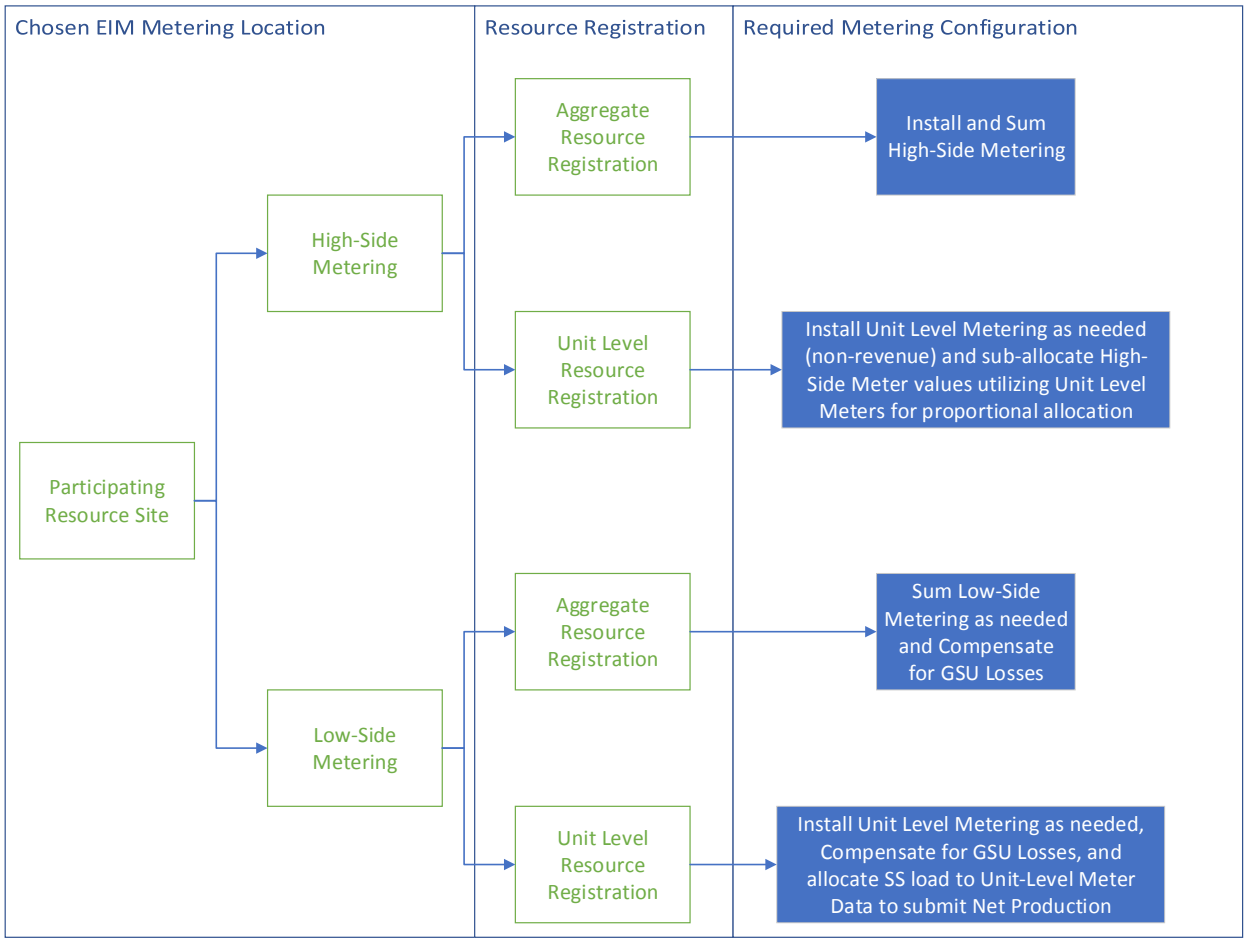


Figure 4: Metering Configuration Decision Tree

Similar to the requirement to submit generation meter data by Resource ID, Avista interchange metering must be aggregated to a scheduling tie. These scheduling ties will be registered with CAISO as a System Resource ID, typically corresponding to Avista's OASIS posted paths[6]. Careful review of these scheduling tie aggregations should be performed to ensure the net of submitted interchange metering for EIM includes all Avista points of interchange and equals Net Actual Interchange energy accounting records.

2.1.10 Pseudo-Tie Meters and Load Meter Calculation

Pseudo-tie generators modeled in the FNM will be registered as type Gen, whereas any generators not modeled, typically those electrically distant from the CAISO FNM footprint, will be registered as type Tie Gen (TG). Currently, EIM participant shares of Colstrip are registered as TGs since the CAISO FNM does not extend into Eastern Montana. However, with the expected EIM participation of NorthWestern

[6] Avista's OASIS posted paths, Effective January 1, 2018 are depicted in https://www.oasis.oati.com/woa/docs/AVAT/AVATdocs/AVA_OASIS_POR_POD_Effective_01-01-18.pdf

Energy, the Montana footprint will be added to the FNM and Colstrip likely re-registered as type Gen. Thus, it is likely that all Avista BAA generators will be registered as type Gen.

Any pseudo-tie generators registered as type Gen, as opposed to type TG, require a corresponding scheduling tie registration to submit a counterflow to the physical interchange meter. Pseudo-tie generation meters will be submitted twice, once for the generator resource ID and again as a counterflow for the scheduling tie ID. As depicted in Figure 5, internal generation and pseudo-tie generation will be metered and the generation production values submitted to CAISO. Additionally, pseudo-tie meters function as interchange meters, measuring the generation production as a BAA export, as the generation physically wheels through external BAAs before returning to the Avista BAA as a metered import at the contiguous boundary.

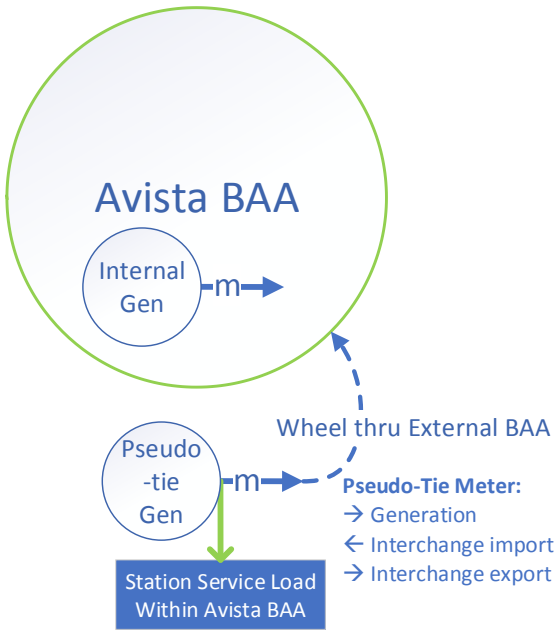


Figure 5: Pseudo-Tie Meter

For example, given CAISO's definition of BAA load as generation minus exports plus imports, a pseudo-tie generator value of 5 MW is accounted in load as 5 MW generation plus 5 MW metered import at the contiguous boundary minus 5 MW pseudo-tie meter export (counterflow), equaling 5 MW once this netting in the load calculation occurs. CAISO recalculates BAA load independent of the EIM Entity load meter submission, and thus requires the submission of pseudo-tie meters as both generation and interchange to net correctly.

Finally, Avista BAA load must be calculated as the net of all generation and interchange metering, equal to generation plus imports minus exports. CAISO defines this BAA load meter as the ELAP and requires its submission in two forms, once as the net of generation and interchange without any loss factor applied and again as the net of generation and interchange divided by the number one plus a transmission system loss factor, likely defined as the 3% loss factor stated in Avista's OATT[7]. Existing EIM participants have also utilized their respective OATT-stated loss factor for this calculation.

2.1.11 Meter Channels

CAISO does not require the submission of Volt Ampere Reactive (VARs) for EIM participation, only active power, measured as kilowatt hours (kWh) or megawatt hours (MWh). Meters record these values on separate registers, termed channels, to distinguish between produced and consumed energy. These values may be recorded on any meter channel, but must be submitted on the following meter channels:

- Channel 1 for consumed or exported active power

[7] Avista Open Access Transmission Tariff (OATT), Effective August 1, 2018, sections 15.7 and 28.5 https://www.oasis.oati.com/woa/docs/AVAT/AVATdocs/OATT_Effective_8-1-2018.pdf

- Channel 4 for generated or imported active power

Therefore, Avista's MDM solution will need to transpose the received channels to match CAISO's required designations if they differ.

CAISO does not accept non-zero meter values on channel 4 for the load meter submission, therefore all channel 4 values for the ELAP meter should always be submitted as zero values.

CAISO does not accept non-zero meter values on channel 1 for generation meters, even if station service consumption exceeds generation production for a given interval. Therefore, channel 1 for all generation meters should always be submitted as zero values.

For intervals where station service exceeds generation, the station service load of internal generation is already metered by interchange imports and other internal generation, and thus does not need to be submitted from the generation meter read. By contrast, the station service for pseudo-tie generation should be submitted on channel 1 for the corresponding interchange metering, to include the station service as Avista BAA load. As depicted in Figure 5, station service for a pseudo-tie generator is measured as an import by the interchange meter at the generation site, while an internal generator only has the generation meter on therefore does not need to submit load values for its station service when it exceeds generation.

2.2 Key Metering Considerations

2.2.1 Expected Point of Measurement and Compensation Factors

CAISO expects Base Schedules, Dispatch Operating Targets (DOTs) and meter data to all correspond to the high side, transmission voltage level of a Resource ID. Furthermore, any station service load fed from a similar electrical location, such as a generator bus or high side of the same substation, may be netted from the data (as if the metering point was physically on the high side of the GSU). To the extent the point of scheduling, dispatch, generator control and metering differ from this expected point of measurement, calculations should be performed to account for these differences to prevent dispatch and settlement error.

For example, if the CTs and PTs for a generator meter are measuring output at the low voltage side of the GSU, the meter values should be adjusted to compensate for the calculated losses through the GSU, which are typically determined from GSU manufacturer data or GSU test data. Transformer losses are typically calculated as the sum of no-load losses and load-losses, expressed as:

$NLL + I^2R$

No-Load Losses + Current-squared * Resistance

No-load losses are set at a constant value of watts and load-losses as a function of resistance, a constant ohm value, multiplied by current squared. This resulting equation would be programmed in the associated meter as the compensation factor.

Several Avista generation sites meter Station Service (SS) load at the low-side of the SS transformer, with the high-side of the SS transformer connected to a generator bus. If these existing meter installations are utilized for SQMD submission, compensation factors should be applied to the metered values accounting for both the SS transformer and GSU losses. An accurate calculation would program the SS meter to add the SS transformer losses compensation, increasing the effective SS load, and subtract the SS load from GSU load-losses for the associated generator meters, since SS load nets generator production flowing through the GSU, reducing GSU load-losses. This calculation of compensation factors with interaction between multiple meters may be practicably difficult, instead requiring approximations to account for the contribution of multiple generators and SS load to GSU load-losses. The following equations are example calculations to accurately compensate for SS transformer and GSU losses utilizing a low-side SS meter and two low-side generator meters, similar to the Noxon unit 1 & 2 and SS depiction in Figure 3.

For unit-level Resource IDs, allocating transformer losses and SS load half-and-half to each resource[8]:

SS_meter_data (SS transformer compensated) = SS_load + $NLL_{SS\_transformer}$ + I_{SS}^2R

GSU current (I_{GSU}) = G1_current + G2_current – SS_transformer_compensated_SS_current

GSU_losses = NLL_{GSU} + I_{GSU}^2R

G1 compensated meter data = G1_meter – GSU_losses/2 – SS_meter_data/2

G2 compensated meter data = G2_meter – GSU_losses/2 – SS_meter_data/2

For an aggregate Resource ID:

SS_meter_data (SS transformer compensated) = SS_meter + $NLL_{SS\_transformer}$ + I_{SS}^2R

GSU current (I_{GSU}) = G1_current + G2_current – SS_transformer_compensated_SS_current

GSU_losses = NLL_{GSU} + I_{GSU}^2R

Aggregate Resource ID meter data = G1_meter + G2_meter – GSU_losses – SS_meter_data

Alternatively, CTs and PTs could be installed at the high voltage side of the GSU to avoid the need for loss compensation factors. Furthermore, if station service load for the generator is fed from a separate station service transformer located at the same substation, and therefore electrically similar to the resource, the station service should be metered and netted from the generator meter value, as described in section 2.1.9. By contrast, if the metering location reads generation net of station service, such as high side metering, then station service does not need to be metered separately.

Any compensation factors applied to EIM meter data should be documented, including the calculating device or software, source document for compensation factor, and rationale for applying the

[8] The allocation logic for GSU losses and SS load to unit-level Resource IDs should be more sophisticated than half-and-half to address operation with one generation online and the other offline, as a half-and-half allocation would result in half of the GSU losses and SS being unaccounted for due to allocation to an offline generator

compensation. This documentation will be included in the SQMD Plan and self-audited EIM meter program. The CAISO Metering BPM Attachment B Section C describes the loss compensation methodologies.

2.2.2 Metering Granularity Impact

CAISO allows for NPR metering to be recorded at a 5, 15, or 60-minute granularity. However, the ELAP meter must be submitted at the least granular level of the underlying meters that sum to the load value. The majority of CAISO charge codes settle at a 5-minute granularity, so any load or NPR meters submitted at 15-minute or 60-minute granularity is distributed evenly to the corresponding 5-minute intervals for settlements, resulting in accumulation of extra revenues or deficits in CAISO neutrality accounts due to price differences between 5-minute intervals that do not tie out to corresponding changes in submitted meter values. These neutrality accounts are largely settled with the EIM Entity and therefore do not result in a material financial risk. However, load meter submission that is less granular than 5-minutes greatly complicates shadow settlement and issue spotting, as the lack of data granularity masks underlying causes of settlement or metering errors that are crucial to resolve in a timely fashion. Finally, Avista has determined it is relatively inexpensive to re-program or change out a meter to enable 5-minute granularity meter data. Therefore, Utilicast recommends Avista proceed with its plan to submit 5-minute granular meter data for all NPRs so it may submit 5-minute granular ELAP meter data.

2.2.3 Insufficient Accuracy and Correction Factors

If any meters, CTs, or PTs used for EIM metering lack a sufficient accuracy rating to meet CAISO metering requirements, the equipment will either need to be replaced with compliant equipment or a correction factor applied. A correction factor for insufficiently accurate metering equipment is effectively a penalty on metered production to account for the gap in accuracy between the installed equipment and CAISO requirements.

The CAISO Metering BPM Attachment B Sections D3-D6 describe the calculation of correction factors to adjust for deficiencies in CT and PT accuracy. Whatever the deficiency in accuracy, an accuracy rating must be determined in order to apply the appropriate correction factor and utilize the deficient equipment for EIM metering. If the accuracy or burden rating of equipment is unknown, correction factor field tests should be performed to establish the accuracy at the connected burden. Any total meter equipment error equal to or less than 0.6%, as calculated according the referenced CAISO sections, does not require a correction factor to be applied, while any calculated error greater than 0.6% must be applied as a correction factor to the recorded meter data, reducing the submitted quantities by the correction factor percentage.

The financial impact of correction factors being applied to PRs may be substantial, as this production could be exported on EIM transfers, resulting in a reduction in market revenues due to the required penalty in submitted production compared to the scheduled exported EIM energy received by other EIM participants.

By contrast, the financial impact of correction factors applied to NPRs is small, as any MWh deficit in submitted NPR production would result in a corresponding decrease in the Avista ELAP meter.

Therefore, any lost revenues on the NPR settlement would be largely regained in the load-related settlements. To the extent the NPR Locational Marginal Prices (LMPs) are lower than the ELAP LMPs due to congestion, there is some risk that a portion of the transmission congestion revenue rebates in settlement would be allocated to an EIM participant other than Avista due to EIM transfers. Collectively, these risks appear small.

2.2.4 Insufficient Granularity of non-Avista owned Interchange Meters

While interchange metering is required to be recorded with 5-minute granularity, CAISO has consistently allowed EIM participants to exempt interchange meters owned by other parties from this requirement. Non-EIM participants typically record interchange metering at 60-minute granularity to align with NERC standard requirements for hourly interchange meter check-out.

In lieu of meeting this EIM requirement, the alternate approach taken by most EIM participants to submit 5-minute granular interchange metering is to calculate average 5-minute meter values in PI from the instantaneous MW telemetry reads, compare the sum of the 5-minute averages to the settlement quality hourly check-out values, and adjust the 5-minute averages as necessary to align with hourly values in the MDM. For most recent EIM implementations, this exemption has only been allowed for interchange meters not owned by the EIM entrant, so Avista-owned interchange meters would need to comply with the standard 5-minute granularity requirements.

2.2.5 Metering of Jointly-Owned Generation

Avista is a joint-owner of Colstrip generation and joint offtaker of Mid-C generation. Existing EIM participants, namely PacifiCorp, Puget Sound Energy, and Portland General Electric, are also joint participants in these generation projects and have successfully exempted the associated generator meters from CAISO's metering requirements. In each case, the metering is not owned by any current EIM participant and the metered offtake of individual participants is not determined directly by physical meters. Rather, Colstrip and Mid-C metered offtakes are determined by logical meters calculated by allocation computers. These allocation computers dynamically apportion the metered generation based on each participant's approved dispatch such that the physical meters are not indicative of the individual participant's generation.

The typical meter calculation for Colstrip and Mid-C projects has been similar to the suggested approach for non-Avista owned interchange meters described in section 2.2.4. CAISO has requested single line metering diagrams for these facilities and a description of the determination and validation of the participant's metered share for existing EIM participants. Based on Avista's research, it appears that the standard for Mid-C SLD submission established by PGE is not high and Avista should be able to satisfy the Mid-C SQMD relatively easily.

Given NorthWestern Energy's planned EIM participation, slated for April 2021, and their ownership of the Colstrip generation meters, it is possible that the metering configuration and allowed exemption for Colstrip may change prior to Avista's EIM implementation. Avista should discuss these impacts to Colstrip metering with Northwestern Energy as their implementation progresses.

3 Metering Approach

This section summarizes the current metering configuration for each generator and point of interchange, identifies gaps in compliance with CAISO requirements and proposes methods to address the identified gaps. The following four sub-sections group together Avista-owned and 3rd Party-owned generation and interchange, as these grouped facilities tend to share common statuses and proposed solutions.

3.1 Generation, Avista-Owned

While most of the Avista-owned generation meter equipment was inventoried during this project, much of the equipment nameplate data was insufficient. The equipment with insufficient information or yet to be inventoried is marked unknown in the following table, with suggested next steps indicated in the "Determine Unknown" column. Table 6 in section 4 summarizes proposed generator metering projects. Post Falls generation has no proposed metering projects, due to its planned NPR status it should have its meters replaced or upgraded to be 5-minute capable, with compensation factors and correction factors applied as necessary.

The listed meters are a subset of the inventoried meters, selected to record net generation for EIM purposes. For example, Post Falls units 1-5 each have gross unit-level metering, which are also metered net of station service. Only the Post Falls 1-5 net metering is listed, as it could record net generation for EIM purposes without the use of the unit-level 1-5 gross meters. Station Service (SS) metering voltage is noted in parenthesis to indicate whether the metering is on the generator bus or SS bus. If the SS metering is on the SS bus, then the metered values should be compensated for losses across both the SS transformer and GSU. See section 2.2.1 for more detail on SS transformer and GSU loss compensation.

Equipment attributes marked "Y" under EIM Compliance Status indicates the attribute meets or exceeds CAISO metering requirements, while "Unk" indicates the attribute is unknown due to either insufficient nameplate information or yet to be inventoried.

Table 2: Generation Metering Status, Avista-Owned

Generator Meter	EIM Compliance Status					Proposed Next Steps	
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden
Post Falls 1-5 Net Meter	Unk	Unk	Unk	Unk	5-min capable with memory upgrade	Test CTs and PTs	
Post Falls Unit 6	Y	Y	Unk	Unk	Not 5-min capable	Test PTs	
Noxon Unit 1	Y	Y	Unk	Unk	Not 5-min capable	Test PTs	
Noxon Unit 2	Y	Y	Unk	Unk	Not 5-min capable	Test PTs	
Noxon Unit 3	Y	Y	Unk	Unk	Not 5-min capable	Test PTs	
Noxon Unit 4	Y	Y	Unk	Unk	Not 5-min capable	Test PTs	
Noxon Unit 5	Unk	Unk	Y	N, Y < ZZ	5-min capable with memory upgrade	Test CTs	PTs
Noxon SS A (480 V)	Y	Y	N, 0.6 < 0.3 class	N, W < ZZ	5-min capable		PTs
Noxon SS B (480 V)	Y	Y	N, 0.6 < 0.3 class	N, W < ZZ	5-min capable		PTs
Cabinet Unit 1	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Cabinet Unit 2	Unk	Unk	Unk	Unk	Not 5-min capable	Test CTs and PTs	
Cabinet Unit 3	Unk	Unk	Unk	Unk	Not 5-min capable	Test CTs and PTs	
Cabinet Unit 4	Unk	Unk	Unk	Unk	Not 5-min capable	Test CTs and PTs	
Cabinet SS A (480 V)	Unk	Unk	Unk	Unk	Not 5-min capable	Test CTs and PTs (if CT & PT nameplate incomplete)	
Cabinet SS B (480 V)	Unk	Unk	Unk	Unk	Not 5-min capable	Test CTs and PTs (if CT & PT nameplate incomplete)	
Nine Mile Unit 1	Y	N, 0.5 < 1.8	Y	N, Z < ZZ	5-min capable		CTs & PTs

Generator Meter	EIM Compliance Status					Proposed Next Steps	
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden
Nine Mile Unit 2	Y	N, 0.5 < 1.8	Y	N, Z < ZZ	5-min capable		CTs & PTs
Nine Mile Unit 3	Y	N, 0.5 < 1.8	Y	N, Y < ZZ	Not 5-min capable		CTs & PTs
Nine Mile Unit 4	Y	N, 0.5 < 1.8	Y	N, Y < ZZ	Not 5-min capable		CTs & PTs
Nine Mile SS 1 (480 V)	Unk	Unk	Unk	Unk	5-min capable	Include changeout in SS 2 project if possible, test if not	
Nine Mile SS 2 *Future*	N/A, future installation, suggest the scope include revenue quality equipment as alternative to high-side metering project						
Upper Falls Unit	Y	Y	Y	N, Y < ZZ	5-min capable with memory upgrade		PTs
Upper Falls SS (240 V)	Unk	Unk	N/A	N/A	5-min capable with memory upgrade	Suggest only utilizing gross meter, as SS metering equipment is unknown and SS load is negligible	
Long Lake Unit 1	Y	Y	Unk	Unk	Not 5-min capable	Test PTs	
Long Lake Unit 2	Y	Y	Y	N, Y < ZZ	Not 5-min capable		PTs
Long Lake Unit 3	Y	Y	Unk	Unk	Not 5-min capable	Test PTs	
Long Lake Unit 4	Y	Y	Unk	Unk	Not 5-min capable	Test PTs	
Long Lake SS A (4 kV)	Unk	Unk	Unk	Unk	Not 5-min capable	Include changeout in SS project if possible, test if not	
Long Lake SS B (4 kV)	Unk	Unk	Y	N, Y < ZZ	Not 5-min capable		PTs
Little Falls Unit 1	Y	Y	Y	N, Y < ZZ	5-min capable		PTs
Little Falls Unit 2	Y	Y	Y	N, Y < ZZ	5-min capable		PTs
Little Falls Unit 3	Y	Y	Y	N, Y < ZZ	5-min capable		PTs

Generator Meter	EIM Compliance Status					Proposed Next Steps	
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden
Little Falls Unit 4	Y	Y	Y	N, Y < ZZ	5-min capable following planned project		PTs
Little Falls SS 1 (480 V)	N	N, 0.9 < 1.8	N	N, W < ZZ	5-min capable		CTs & PTs
Little Falls SS 2 (480 V)	N	N, 0.9 < 1.8	N	N, W < ZZ	5-min capable		CTs & PTs
Monroe Street Unit	Y	N, 0.1 < 1.8	Y	N, Z < ZZ	5-min capable		CTs & PTs
Monroe Street SS (14.4 kV)	Unk	Unk	Y	N, Z < ZZ	5-min capable		PTs
Kettle Falls Biomass	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Kettle Falls CT	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Kettle Falls SS 1A1 (13.8 kV)	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Kettle Falls SS 1A2 (13.8 kV)	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Kettle Falls SS 1A3 (13.8 kV)	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Kettle Falls SS 1B2 (13.8 kV)	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Kettle Falls SS 1B3 (13.8 kV)	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Kettle Falls SS 1B4 (13.8 kV)	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	

Generator Meter	EIM Compliance Status					Proposed Next Steps	
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden
Boulder Park Net Meter	Unk	Unk	Y	N, Y < ZZ	5-min capable with memory upgrade	Test CTs (if GSU nameplate incomplete)	PTs
Northeast Gross Meter	Y	Y	Y	N, Y < ZZ	5-min capable with memory upgrade		PTs
Northeast SS (480 V)	Unk	Unk	Unk	Unk	5-min capable with memory upgrade	Test CTs and PTs	
Rathdrum Unit 1	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Rathdrum Unit 2	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Rathdrum SS 1 (13.8 kV)	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	
Rathdrum SS 2 (13.8 kV)	Unk	Unk	Unk	Unk	5-min capable	Test CTs and PTs	

Unk = Unknown; SS = Station Service

3.2 Generation, 3rd Party-Owned

While most of the 3rd Party-owned generation meter equipment was inventoried during this project, much of the equipment nameplate data was insufficient. The equipment with insufficient information or yet to be inventoried is marked unknown in the following table, with suggested next steps indicated in the following table. Table 6 in section 4 summarizes proposed generator metering projects. Planned NPRs have no proposed metering projects, and should have their meters replaced or upgraded to be 5-minute capable, with compensation factors and correction factors applied as necessary.

Table 3: Generation Metering Status, 3rd Party-Owned

Generator Meter	EIM Compliance Status					Proposed Next Steps and Solutions				
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden	Re-program Meter	Replace Meter or Upgrade Memory	Compensate to hi-side
Coyote Springs High-Side	Y	Y	Y	Y	Not 5-min capable				X	
Lancaster Net Meter	Y	Unk	Y	Unk	5-min capable	CTs & PTs nameplate burden	CTs & PTs	X		
Palouse Wind	Y	Y	Y	Y	5-min capable with memory upgrade				X	
Solar Select	Y	N, 0.5 < 1.8	Y	N, Z < ZZ	5-min capable		CTs & PTs	X		X
Spokane Waste to Energy Net Meter	Y	Y	Y	Y	5-min capable with memory upgrade				X	
Plummer Saw Mill	Y	Y	Y	N, Z < ZZ	5-min capable with memory upgrade		PTs		X	X
Upriver Net Meter	Y	Y	Y	N, Z < ZZ	5-min capable with memory upgrade		PTs		X	X
Clearwater Net Meter 1	Y	Y	Y	Y	Not 5-min capable				X	X

Generator Meter	EIM Compliance Status					Proposed Next Steps and Solutions				
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden	Re-program Meter	Replace Meter or Upgrade Memory	Compensate to hi-side
Clearwater Net Meter 2	Y	Y	Y	Y	Not 5-min capable				X	X
Clearwater Gross Meter 1	Relay class < Metering class	Unk	Relay class < Metering class	Unk	Not 5-min capable	Test CTs and PTs			X	X
Clearwater Gross Meter 2	Relay class < Metering class	Unk	Relay class < Metering class	Unk	Not 5-min capable	Test CTs and PTs			X	X
Fighting Creek	Y	Y	Y	Unk	5-min capable with memory upgrade	PTs nameplate burden	PTs		X	X
Colstrip	N/A, 5-minute average of instantaneous MW telemetry sufficient, see section 2.2.5 for details									
Mid-C CHPD	N/A, 5-minute average of instantaneous MW telemetry sufficient, see section 2.2.5 for details									
Mid-C DOPD	N/A, 5-minute average of instantaneous MW telemetry sufficient, see section 2.2.5 for details									
Mid-C GCPD	N/A, 5-minute average of instantaneous MW telemetry sufficient, see section 2.2.5 for details									
Saddle Mountain Wind *Future*	N/A, future installation will be EIM compliant based on Avista standards									

Generator Meter	EIM Compliance Status					Proposed Next Steps and Solutions				
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden	Re-program Meter	Replace Meter or Upgrade Memory	Compensate to hi-side
Rattlesnake Wind *Future*	N/A, future installation will be EIM compliant based on Avista standards									
Box Canyon	Out of scope, POPD expected to exit Avista BAA prior to EIM entrance, see section 3.4 for details									

Unk = Unknown

3.3 Interchange, Avista-Owned

Some points of interchange have two meters, a primary and backup. However, the attributes of both metering sets are identical across Avista-owned interchange meter equipment, so each set is listed as one row for conciseness in the table below.

Table 4: Interchange Metering Status, Avista-Owned

Point of Interchange	EIM Compliance Status					Proposed Next Steps and Solutions			
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden	Re-program Meter	Replace Meter or Upgrade Memory
BPAT @ Colbert	Y	Y	Y	N, Z < ZZ	5-min capable		PTs	X	
BPAT @ DeerPark 12F1	Y	Y	Y	N, Z < ZZ	5-min capable		PTs	X	
BPAT @ DeerPark 12F2	Y	Y	Y	N, Z < ZZ	5-min capable		PTs	X	

Point of Interchange	EIM Compliance Status					Proposed Next Steps and Solutions			
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden	Re-program Meter	Replace Meter or Upgrade Memory
BPAT @ Kettle Falls A621	Y	Unk	Y	Y	5-min capable		CTs	X	
BPAT @ Loon Lake	Y	Y	Y	N, Z < ZZ	5-min capable		PTs	X	
BPAT @ Mead	Y	Y	Y	N, Z < ZZ	5-min capable		PTs	X	
BPAT @ North Lewiston	Y	Unk	Y	Unk	5-min capable		CTs & PTs	X	
BPAT @ Noxon 13kV Construction Sub	Y	N, 0.5 < 1.8	Y	N, Z < ZZ	5-min capable		CTs & PTs	X	
BPAT @ Noxon R316 (Libby Line)	Y	Unk	Y	Y	5-min capable		CTs	X	
BPAT @ Noxon R336 Lancaster Line)	Y	Unk	Y	Y	5-min capable		CTs	X	
BPAT @ Noxon R337 (Hot Springs Line)	Y	Unk	Y	Y	5-min capable		CTs	X	
BPAT @ Orofino	Y	Y, pending verification	Y	Unk	5-min capable	Verify CT Accuracy	PTs	X	
BPAT @ Priest River	Y	N, 0.5 < 1.8	Y	N, Y < ZZ	5-min capable		CTs & PTs	X	

Point of Interchange	EIM Compliance Status					Proposed Next Steps and Solutions			
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden	Re-program Meter	Replace Meter or Upgrade Memory
BPAT @ Sagle	Y	N, 0.9 < 1.8	Y	N, Y < ZZ	5-min capable		CTs & PTs	X	
BPAT @ Spirit	Y	Y	Y	N, Z < ZZ	5-min capable		PTs	X	
BPAT @ Westside (R380)	Y	Unk	Y	Unk	5-min capable	N/A, future installation will replace existing equipment and be EIM compliant based on Avista standards			
BPAT @ Westside (R382)	Y	Unk	Y	Unk	5-min capable	N/A, future installation will replace existing equipment and be EIM compliant based on Avista standards			
BPAT @ Wilbur	Y	Unk	Y	Unk	5-min capable		CTs & PTs	X	
BPAT @Milan	Y	N, 0.5 < 1.8	Y	N, Z < ZZ	5-min capable		CTs & PTs	X	
GCPD @ Stratford	Y	N, 1.0 < 1.8	Y	Y	Insufficient memory		CTs	X	X
GCPD @ Warden A254	Y	Unk	Y	Unk	Insufficient memory		CTs & PTs	X	X
GCPD @ Warden A310	Y	Unk	Y	Unk	Insufficient memory		CTs & PTs	X	X
IPCO @ Lolo	Y	Unk	Y	Unk	Insufficient memory		CTs & PTs	X	X
NWMT @ Burke	Y	Unk	Y	N, Z < ZZ	Insufficient memory		CTs & PTs	X	X
PACW @ Dry Creek	Y	Unk	Y	Y	Insufficient memory		CTs	X	X
PACW @ Dry Gulch	Y	Unk	Y	Y	Insufficient memory	N/A, future installation will replace existing equipment and be EIM compliant based on Avista standards			

Point of Interchange	EIM Compliance Status					Proposed Next Steps and Solutions			
	CT Accuracy	CT Burden	PT Accuracy	PT Burden	Meter	Determine Unknown	Determine Connected Burden	Re-program Meter	Replace Meter or Upgrade Memory
BPAT @ Opportunity (Valley tap) ***Future***	N/A, future installation will be EIM compliant based on Avista standards								
GCPD @ Wanapum - Saddle Mt backup ***Future***	N/A, future installation will be EIM compliant based on Avista standards								
PACW @ Saddle Mountain Sub ***Future***	N/A, future installation will be EIM compliant based on Avista standards								

Unk = Unknown

3.4 Interchange, 3rd Party-Owned

The proposed solution for all 3rd Party-owned interchange metering is to utilize 5-minute averaged instantaneous telemetry MW reads, validated with hourly check-out meter values, as described in section 2.2.4. Once validated, the equipment ratings of 3rd Party-owned interchange metering are acceptable for EIM participation, since the equipment owner utilizes it for revenue purposes. BPA typically nets the interchange metering at each substation to a combined SCADA value, so these combined points of interchange are listed as a single row.

The Seattle City Light (SCL) points of interchange at Main Canal and Summer Falls should be discussed in further detail with SCL to determine a consistent modeling of these points of interchange. In light of SCL's planned EIM participation and the current setup with SCL dividing the interchange in half between its BAA and the Tacoma Power BAA, while Avista only interchanges with SCL, Avista and SCL should coordinate to ensure consistent EIM modeling and metering of interchange at these points to mitigate any adverse EIM operational or settlement impacts.

Pend Oreille Public Utility District (POPD) is currently in the Avista BAA, with several meters measuring the interchange between Avista and BPA in the POPD service territory. However, POPD has communicated its intent to exit the Avista BAA in October 2020, prior to Avista's EIM entrance.

With the planned exit of POPD from the Avista, a new point of interchange would be metered at Pine Street substation. Therefore, Avista is not including these current interchange meters in its EIM metering scope, noted in the table below, and will include the future Pine Street interchange metering in its EIM metering scope. Avista should track the POPD planned BAA exit and adjust the list of interchange and generation meters in scope for EIM participation if the POPD BAA exit changes in schedule or scope.

Table 5 : Interchange Metering Staus, 3rd Party-Owned

Point of Interchange	EIM Compliance Status	Proposed Next Steps and Solutions	
	Equipment Validated	Determine Unknowns	Calculate 5-minute MW Averages
BPAT @ Addy	Y		X
BPAT @ Bell	Y		X
BPAT @ Benton	Y		X
BPAT @ Hatwai	Y		X
BPAT @ Hot Springs	Y		X
BPAT @ Kaiser-Trentwood Load	Y		X
BPAT @ Lancaster – Boulder	Y		X
BPAT @ Lancaster – Rathdrum	Y		X
BPAT @ Sandcreek	Y		X
BPAT @ Usk	Y		X
CHPD @ Chelan	Y		X
NWMT @ Hot Springs	Y		X
SCL @ Main Canal	N	X	X
SCL @ Summer Falls	N	X	X

Point of Interchange	EIM Compliance Status	Proposed Next Steps and Solutions	
	Equipment Validated	Determine Unknowns	Calculate 5-minute MW Averages
BPAT @ Coyote Springs Pseudo-Tie	See section 3.2 regarding Coyote Springs, utilize generation metering for EIM interchange metering		
BPAT @ Lancaster Gen	See section 3.2 regarding Lancaster, utilize generation metering for EIM interchange metering		
CHPD @ Mid-C Pseudo-Tie	See section 3.2 regarding CHPD Mid-C, utilize generation metering for EIM interchange metering		
DOPD @ Mid-C Pseudo-Tie	See section 3.2 regarding DOPD Mid-C, utilize generation metering for EIM interchange metering		
GCPD @ Mid-C Pseudo-Tie	See section 3.2 regarding GCPD Mid-C, utilize generation metering for EIM interchange metering		
NWMT @ Colstrip Pseudo-Tie	See section 3.2 regarding Colstrip, utilize generation metering for EIM interchange metering		
GCPD @ Wanapum *Future*	N/A, future installation that will be owned by GCPD		
BPAT @ Pine Street *Future*	N/A, future installation for POPD BAA exit that will be owned by BPA		
BPAT @ Box Canyon	Out of scope, POPD expected to exit Avista BAA prior to EIM entrance		
BPAT @ Diamond Lake	Out of scope, POPD expected to exit Avista BAA prior to EIM entrance		
BPAT @ Metaline Falls	Out of scope, POPD expected to exit Avista BAA prior to EIM entrance		
BPAT @ Newport	Out of scope, POPD expected to exit Avista BAA prior to EIM entrance		

4 Estimated Costs

This section provides high-level descriptions and cost estimates for the proposed metering projects, generation controls projects, meter-related network projects, and meter head-end solution.

4.1 Avista Participating Resources

The following table summarizes the proposed generation controls and metering projects. Merged rows in the high side metering column indicate a shared GSU between multiple generator units with a common proposed high-side metering set. The projects are listed in priority order, with the latter projects subject to further discussion or testing of existing metering equipment prior to proceeding with a project.

Table 6: Generation Controls and Metering Project Cost Estimates

Generation	PLC (in $,000)	Low Side Metering (in $,000)	High Side Metering (in $,000)	Total Metering by Site (in $,000)
Noxon	$200			$750
- Noxon Unit 1		$30	$200	
- Noxon Unit 2		$30		
- Noxon Unit 3		$30	$200	
- Noxon Unit 4		$30		
- Noxon Unit 5		$30	$200	
Cabinet	$200			$520
- Cabinet Unit 1			$200	
- Cabinet Unit 2				
- Cabinet Unit 3		$60	$200	
- Cabinet Unit 4		$60		
Coyote Springs			$200	$200
Long Lake	$200			$140
- Long Lake Unit 1		$35	Utilize existing SS project to install high-side metering	
- Long Lake Unit 2		$35		
- Long Lake Unit 3		$35		
- Long Lake Unit 4		$35		
Little Falls	$200			$0
Rathdrum	$200			$400
- Rathdrum Unit 1			$200	
- Rathdrum Unit 2			$200	

Generation	PLC (in $,000)	Low Side Metering (in $,000)	High Side Metering (in $,000)	Total Metering by Site (in $,000)
Lancaster	$150		$100	$100
Kettle Falls			$200	$200
Boulder Park		$160	$200	$360
Nine Mile				$520
- Nine Mile Unit 1			$200	
- Nine Mile Unit 2				
- Nine Mile Unit 3		$60	$200	
- Nine Mile Unit 4		$60		
Monroe Street		$100	$200	$300
Upper Falls		$100	$200	$300
Total	$1,150			$3,790
Low Estimate, rounded (+0% PLC, -20% Metering)	$1,200			$3,000
High Estimate, rounded (+20% PLC & Metering)	$1,400			$4,500

PLC = Programmable Logic Controller

4.2 Other Metering & Network Costs

In addition to the costs summarized in Section 4.1, this report mentions costs and effort associated with some additional items which were include in the overall project cost estimates and described in greater detail in the Technology Assessment Summary Report.

- Transmission Meters – Costs for transmission meter swaps are included in Line 15.
- Meter Data Collection and Processing – License costs for MV90 work and hardware to collect meter data reads, costs and effort for Oracle MDM setup, and costs for non-fiber meter data acquisition are included in Line 15.
- Network Improvements – Cost and effort to create T1 connections, including High Voltage Protection (HVP), are included in Line 16.

Table 7: Summary Budgetary Cost Estimate for EIM Technology Projects

Line	Cost Estimate Category	Project & Procurement Solutions & Services (in $,000)	Project & Procurement Avista Internal Labor (in Hours)
15	**Transmission Meters & Data Collection**	$340	5,200
16	**Network Improvements for Metering**	$210 - $2,000	2,600

Note that costs are not estimated for the proposed meter memory upgrades at the following generation sites due to a lack of available cost estimates and preliminary scopes of work at the time of this assessment:

- Palouse Wind (2 meters)
- Spokane Waste to Energy Net Meter
- Plummer Saw Mill
- Upriver Net Meter
- Clearwater Net Meter 1
- Clearwater Net Meter 2
- Clearwater Gross Meter 1
- Clearwater Gross Meter 2
- Fighting Creek

See section 2.1.7 for detail on meter memory requirements and recommended next steps.

Program Initiation Charter

Program Name: Energy Imbalance Market
Program Manager: Kelly Dengel
Business Case Name: Energy Imbalance Market
Expenditure Request (ER): 7141 – Energy Imbalance Market
Submit Date: 05/17/2019

1 Key Roles & Program Information

Program Sponsor(s):	Scott Kinney/ Mike Magruder	**Business Case Owner(s):**	Kelly Dengel
Business Program Manager:	Kelly Dengel	**Executive Steering Committee Members:**	Jason Thackston, Heather Rosentrater, Jim Kensok, Ryan Krasselt, Kevin Christie
Director Steering Committee Members:	Scott Kinney, Andy Vickers, Josh DiLuciano, Mike Magruder, Jim Corder, Hossein Nikdel, Adam Munson, Pat Ehrbar, Todd Colton	**Other Stakeholders:**	James Dykes, Robert Follini, Annette Brandon, Jacob Reidt, Kit Parker, Bob Weisbeck, Tom Dempsey, Alexis Alexander, Kristina Newhouse, Glen Farmer, Jeff Schlect, Brad Calbick, Craig Figart, Garth Brandon, Rip Divis, Rich Hydzik, Kenny Dillon, Jeff Schlect, Mike Andrea, Glenn Madden, Randy Spacek, Calvin Howard, Sheena Byerly, Ethan Jelinek, Elizabeth Arnold, Jason Pegg, Shanna Pagniano, Tim Davey, Nolan Steiner

2 Program Overview

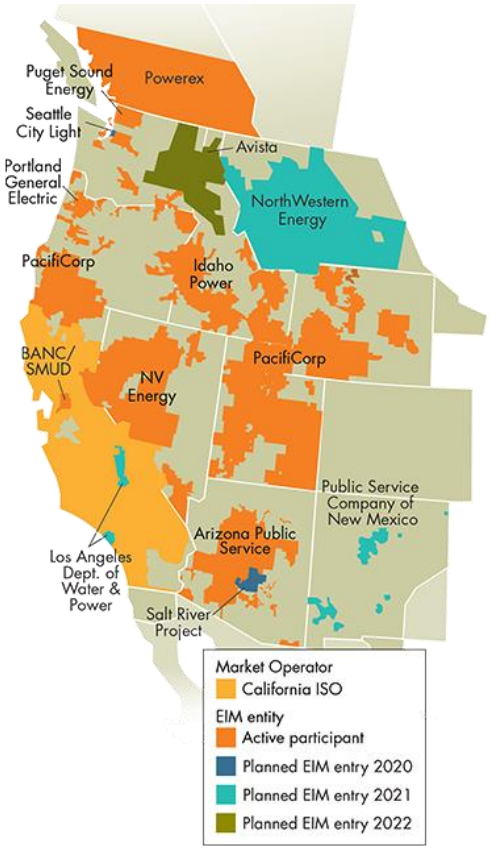
2.1 Business Need

As of 2014, Avista has progressively monitored the formation and expansion of the Western Energy Imbalance Market (EIM) administered by the California Independent System Operator (CAISO). The Western EIM, a real-time energy market producing substantial cost savings for renewable integration and system optimization, has grown to include over 75% of the load in the Western Interconnection. As western states promote and mandate increasing renewable portfolio standards and de-carbonization of the electric grid, Balancing Authorities Areas (BAA) will require interconnection-wide assimilation of available resources to maintain reliability and manage renewable integration costs. Avista has made substantial commitments to decarbonize its generation fleet, and along with recent Washington State de-carbonization legislation, will require new approaches to maintain its current optimization objectives, while containing the rising integration costs of renewable resources. On April 25, 2019, Avista signed the EIM Implementation Agreement with the CAISO and will officially join the market in April of 2022 in an effort to support its leadership as a low cost, customer-focused, energy service provider.

The Western EIM is an in-hour economic based regional resource dispatch program that allows participants to lower

energy costs by either dispatching less expensive resources to meet load obligations, or increase revenue through the bidding of excess energy into the market. The EIM dispatches the most economic resource across its entire market footprint based on bid prices to balance in-hour load and generation, resulting in lower overall dispatch cost for each individual participant. The EIM also lowers the amount of on-line regulation that each utility holds in excess every hour to make up the error between the forecasted load and resource plans, and what actually occurs during the operating hour. The reduced regulation can then be monetized creating additional revenue.

Several northwest utilities, (PacifiCorp, Portland General Electric, Puget Sound Energy, Idaho Power, Northwestern, and Seattle City Light) along with other western utilities, have either already joined the CAISO EIM or announced they will join in the near future. The Bonneville Power Administration (BPA) is conducting a customer stakeholder process and is expected to issue a formal Record of Decision in September of 2019 with the intention to join the Western EIM in April, 2022. If BPA joins the Western EIM over 75 percent of the load in the Western Interconnection will be participating in the market. This shift in market participation will impact daily market liquidity by reducing the number of available bi-lateral trading partners to conduct near term daily energy transactions. The risk of limited trading partners could drive daily market prices higher and/or cause reliability issues for Avista if energy can't be procured from the bi-lateral market during stressed conditions such as the loss of an Avista generating facility.



The factors influencing Avista's decision to join the Western EIM include a reduction in bi-lateral market liquidity, increased integration of third-party renewable resources and likely changes within state legislation that would drive additional renewable resources to be built within Avista's BAA. The EIM will allow Avista to reduce costs associated with integrating renewable resources, while maintaining the flexibility and optimization of its hydro generation, and ensuring Avista continues to serves its customers with reliable and cost-effective energy. In April of 2019, Avista announced its own clean energy goals that will transition resource mix to 100 percent clean by 2045.

Renewable generation requires additional regulation and load following to back up the intermittency of the resource. There is a tipping point where Avista's existing hydro flexibility can't sufficiently or economically supply the required load following for the amount of renewable resources integrated into the Avista BAA. Any additional renewable resource integrated in Avista's service territory results in a reduction of hydro flexibility to follow these variable resources, and the EIM is the most efficient and cost effective way to provide the required flexible ramping capability.

Currently Avista has only a single 100 MW wind facility and limited solar facilities within its BAA so there is adequate hydro flexibility to follow these plants. However, there are several third-party independent power producers that are in the Avista transmission interconnection queue that are exploring integration. In addition, Avista initiated a Request for Proposal for 150 MW of renewable resources in June of 2018 and if pricing is favorable, Avista may sign a 20-year power purchase agreement for up to 150 MW of renewable resources starting in 2020. Future Washington State emissions legislation could drive additional renewable resources to be built in our BAA. Finally, Avista continuously receives requests from smaller solar and wind resources that are seeking Public Utility Regulatory Policies Act contracts. Any additional renewable resource integrated in Avista's service territory may result in a reduction of hydro flexibility to follow the resource.

Utilities typically announce their formal decision to join the Western EIM two or three years prior to entry, and use that time to comply with CAISO and FERC requirements. The CAISO has historically allowed two utilities to join the market in April of each year. After a formal agreement is signed between Avista and the CAISO, a CAISO

provided project schedule with milestones and financial obligations will be finalized and followed. In order to prepare Avista for entry by April 1 of 2022, there is a substantial body of technical work, physical construction work and business process design for Avista to complete for the implementation. The implementation effort includes multiple new software applications, upgrades to existing software, generation metering and control upgrades, interconnection metering upgrades at substations and network infrastructure upgrades.

2.2 Who Benefits?

Joining the Western EIM would allow Avista to reduce costs associated with integrating renewable resources, while maintaining the flexibility and optimization of its hydro generation, and ensuring Avista continues to serve its customers with reliable and cost-effective energy. Once Avista is an active Western EIM participant, Avista intends for the costs and benefits of participation to be treated in a similar manner as other Avista Power Supply revenues and expenses. This includes some level of EIM costs and benefits included in the authorized Power Supply (once more financials are known), and the tracking of actual to authorized costs through the existing Idaho Power Cost Adjustment (PCA) mechanism in Idaho and the Washington Energy Recovery Mechanism (ERM) in Washington.[1]

2.3 Strategic Focus Area

Avista aims to tie everything we do back to our corporate Vision, Mission, Values and Areas of Focus. The EIM program focuses on the strategic areas of Our Customer, Our People, Perform and Invent.

Our Customers – We must hold our customers' interests at the forefront of all our decisions, operating our business by showing that we are transparent, genuinely care, and are easy to do business with. Joining the Western EIM will allow Avista to reduce costs associated with integrating renewable resources, while maintaining the flexibility and optimization of its hydro generation, and ensuring Avista continues to serve its customers with reliable and cost-effective energy.

Our People – Our employees are essential: Through them we deliver value to our customers and the communities we serve. Joining the Western EIM has a tremendous impact on the employees at Avista with day-to-day operational changes and the re-engineering of business processes to conform with market standards.

Perform – Our focus on performance today is critical to serving our customers well and unlocking pathways to growth. In order to join the Western EIM, Avista has to commit to three solid years of planning and delivery of generation, substation and technology projects, and continue to prioritize the effort in order for on-time market entry.

Invent – The activities that yielded yesterday's successes will not be sufficient to meet the challenges of tomorrow. The way Avista has historically operated in a bi-lateral market won't be sufficient for cost-effective operations in the future – joining the Western EIM will help Avista balance renewable energy integration, while providing reliable and cost-effective energy.

Areas of Focus:	
Our Customers	X
Our People	X
Perform	X
Invent	X

[1] For initial setup costs incurred prior to the go-live date in 2022, it is Avista's intention that capital costs would be recovered in general rate proceedings, just like all other utility capital additions. If allowed in Idaho, any incremental expense related to initial EIM setup may be included in the PCA (Avista has requested such treatment in the 2019 Idaho General Rate Case). The treatment for incremental setup expense in Washington is under evaluation by Avista.

2.4 Program Tracks

The following outlines the planned tracks for this Program. In keeping with the CAISO's project management expectations, the Program will be structured through various tracks, with multiple efforts/projects under each track. Progress reporting to the CAISO will be in terms of these tracks. The CAISO track schedule will be in place about 18-22 months prior to go-live initiation. Between Q1 2019 and that time, Avista will prepare for the EIM entry with program planning, design, requirements gathering, the selection of a third party organized market System Integrator and the procurement of EIM-related software. See Appendix A for the CAISO Track Timeline.

- **Avista Track 0 – Avista EIM Program Preparation:** This track represents the body of work Avista must complete to be ready to join the CAISO schedule. It includes program planning, requirements gathering and design, System Integrator selection and software procurement.
- **CAISO Track 1 – Planning and Project Management:** This track will ensure project management and oversite coordination between CAISO and Avista. It includes developing planning documents, project schedule, status reports, issue and risk tracking, overall readiness checklists and any other planning and controlling documents, process and activities to support a successful implementation of the program.
- **CAISO Track 2 – Policy, Legal and Support Track:** This track will ensure Avista reviews and signs the appropriate CAISO entity agreements – a combination of EIM Entity (Transmission System Operations) and EIM Participating Resource (Merchant) – based on a joint Avista-CAISO schedule. Changes to Avista's Open Access Transmission Tariff (OATT) will be accommodated within this track.
- **CAISO Track 3 – Modeling of Transmission and Generation Assets:** This track ensures Avista's transmission and generation assets are integrated with several CAISO systems, specifically Avista's Transmission Full Network Model with the CAISO's Energy Management System (EMS) and the Master File. The Master File specifies many generation and intertie resources for the purposes of scheduling, bidding and settlements.
- **CAISO Track 4 – System Integration and Testing:** This track ensures the required Avista's EIM-related software integrates with the CAISO systems and are functioning as designed to ensure the EIM runs successfully for existing and new participants. Prior to, and concurrent to this track, Avista will need to implement the various EIM-related software solutions, enhance in-house applications and build integrations. This currently includes implementing several new software solutions that impact Enterprise Technology, Generation Production and Substation Support, Transmission System Operations, Power Supply and Resource Accounting.
- **CAISO Track 5 – Metering and Settlements:** This track ensures various Avista metering activities are successful in the EIM for physical metering and meter data accuracy. Physical metering, associated with a market resource like a generation facility or an interconnection point, and the identification and classification of relevant metering components must meet existing CAISO metering standards and accuracy ratings. Meter data accuracy speaks to the validation of market resource configurations and related metering components in alignment with the market resources' physical characteristics and participation level within EIM.
- **CAISO Track 6 – Operations Training and Readiness:** This track provides a series for training events throughout the EIM implementation time. This includes computer-based training, in-person training, EIM workshops, trainer visits to the CAISO and training support for phased steps to production: Day in the Life, Parallel Operations and Go-Live initiation.

2.4.1 Program Requirements by Track

Track	Scope
Track 0 Avista EIM Program Preparation	Avista program structure, leadership, documentation, change management plan, internal project schedule, software procurement and contracting

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Program Initiation Charter

Track 1 Planning & Project Management	Joint Avista-CAISO project plan and schedule
	Joint impact assessment document
	Avista go-live support plan document
	Joint checkpoint, next step, progress evaluation meetings, etc.
	Joint monthly project leadership meetings
	Joint quarterly executive meetings
Track 2 Policy, Legal, Support	EIM Entity Implementation Agreement
	EIM Entity Agreement
	EIM Entity Scheduling Coordinator (EESC) Agreement
	EIM Participating Resource Scheduling Coordinator (PRSC) Agreement
	EIM Participating Resource Agreement
	Avista Open Access Transmission Tariff (OATT)
Track 3 Transmission & Generation Modeling	Transmission Full Network Model (FNM) creation & maintenance
	Master File creation
	EIM Transmission System Operations desk & remodel
Track 4 System Integration & Testing	Acquire & configure Generation Outage Management software
	Acquire & configure Transmission Outage Management software
	Acquire & configure Participating Resource Scheduling Coordinator (PRSC) bidding & scheduling software (merchant)
	Acquire & configure EIM Entity Scheduling Coordinator (EESC) scheduling software (transmission)
	Acquire & configure PRSC settlement software (merchant)
	Acquire & configure EESC settlement software (transmission)
	Acquire & configure reporting software
	Enhance Avista Decision Support System (ADSS) functionality
	Enhance Nucleus functionality
	Integrate EIM software systems
	Integrate EIM software with CAISO systems
	Integrate Avista Energy Management System (EMS) to CAISO EMS
	Pre-production testing with CAISO – Day in the Life phase
	Pre-production testing with CAISO – Market Simulation phase
	Pre-production testing with CAISO – Parallel Operations phase
Track 5 Metering & Settlements	Low-Side Metering (LSM) /unit level metering at some generation plants
	High-Side Metering (HSM) installation at some generation plants
	Current Transformer (CT) / Potential Transformer (PT) testing and applicable upgrades
	Installation of a Schweitzer Engineering Laboratories SEL-735 revenue quality meter at generation and substation/interconnection locations
	Interconnection meter upgrades at some substations
	Network and communications installations/upgrades
	Install new instance of Itron's MV90 xi for meter data collection
	Generation plant Programmable Logic Control (PLC) upgrades
	Modify Oracle Meter Data Management system for EIM meters
	Submission & approval of Settlement Quality Meter Data (SQMD) plans and metering portfolio to CAISO
Track 6 Operations Readiness & Training	Create internal EIM training plan
	Complete CAISO EIM computer-based training modules

	CAISO conducts hands-on training for Avista
	Develop internal operational EIM procedures
	File internal operational EIM procedures with CAISO
	Complete CAISO market readiness criteria worksheet
	CAISO provides planned go-live operations procedure documents
	Avista files market readiness certificate with FERC prior to go-live
	CAISO files market readiness certificate with FERC prior to go-live
	Develop & implement EIM operations & support model

2.4.2 Generation Production & Substation Support Requirements

In accordance with CAISO Track 5 Metering and Settlements, there are various High Side Metering (HSM) and Low Side Metering (LSM) metering improvements, PLC installations or upgrades, and accuracy testing of CTs/PTs that Avista must perform. This also requires the installation and upgrade of network communications. How Avista decided to register their generation plants with the CAISO will influence what metering and controls work is actually performed. There are various resource registration options, but the most common represent registering at the unit level or at the aggregate plant level. Avista will progressively work through resource registration decisions as market knowledge and generation asset details are known. In addition, a discussion with the CAISO about Avista's current metering and generation portfolio will also influence the resource registration and bidding strategy. Based on current plant capabilities and EIM understanding, the following body of work is planned for the Energy Production business line, specifically Generation Production and Substation Support (GPSS), with support from Enterprise Technology and Energy Delivery. The following sites are Electric Allocated North jurisdiction.

High Side Meters Projects	**EIM PLC Projects**
Noxon	Noxon
Cabinet	Cabinet
Rathdrum	Rathdrum
Coyote Springs	Coyote Springs
Lancaster	Lancaster
Boulder Park	Boulder Park
Kettle Falls	Kettle Falls
Long Lake	Long Lake
Little Falls	Little Falls

Low Side Meters Projects	**CT/PT Testing Expense**
North East	North East
Post Falls	Post Falls
Nine Mile	Nine Mile
Monroe St (only add MV90)	Monroe St
	Kettle Falls
	Long Lake
Little Falls (only add MV90)	Little Falls
Upper Falls	Upper Falls

2.4.3 Substation Interconnection & Third-Party Generation Requirements

In accordance with CAISO Track 5 Metering and Settlements, the upgrade to revenue-quality metering with the installation of an SEL-735 meter and the associated network communications is required. Based on the current capabilities at these sites and Avista's EIM understanding, the following sites are planned for the Energy Delivery business line, with support from Enterprise Technology and Energy Production. The following sites are Electric Allocated North jurisdiction.

Substation Interconnection Sites	Third-Party Generation Sites
Burke	Fighting Creek
Colbert	Spokane Waste-to-Energy
Dry Creek	Clearwater Paper Company
Deer Park	Plummer Saw Mill
Dry Gulch	Upriver
Kettle Falls	Palouse Wind (Thorton)
Lolo	Solar Select (Lind)
Loon Lake	
Mead	
Milan	
North Lewiston	
Noxon 13kV	
Noxon Switch	
Opportunity	
Orofino	
Priest River	
Sagle	
Spirit	
Stratford	
Warden	
Westside	
Wilbur	

2.5 Where will assets or technology be deployed?

The EIM Program has a range of physical assets that will be installed and a variety of technology applications that will be deployed. Physical assets, such as meters, and technology assets, such as networking and communications equipment, will be deployed at various locations, including Avista generation plants, third-party generation locations and substation facilities. Technology application assets will primarily be deployed at Mission campus, Avista's disaster recovery center in San Jose, CA, and through various cloud-based providers utilizing the Software as a Service or SaaS model.

3 EIM Program Milestones

The below milestones represent internal dates Avista must meet to coincide with the CAISO-driven milestone schedule in Section 4. All installation and development work must be complete in production by September 2021 in order to start a multiple phase 6-month testing obligation with the CAISO. Individual project schedules will be created and managed to drive internal and external resources to meet the September 2021 date.

Description	Target date for completion/approval
Program Initiation	
• CAISO implementation agreement signed	04/19
• System Integrator selected	05/19
Program Planning	
• EIM software requirements gathered	09/2019
• EIM software vendor RFPs & selections	12/2019
• Vendor agreements & SOWs signed	02/2020
Program Execution	

• EIM software installations	09/2021
• ADSS & Nucleus enhancements	09/2021
• EIM software integrations	09/2021
• GPSS meter installations	09/2021
• Substation meter installations	09/2021
• Network communication installations	09/2021
• GPSS generation controls installations	09/2021
• SCADA upgrades	09/2021
System Integration & Testing with CAISO	09/2021 to 03/2022
All EIM Systems Go-Live with CAISO	04/2022
All EIM Technology Systems Warranty	07/2022
Program Closing	
• Program level Lessons Learned	09/2022
• Program Level Approval to Close	10/2022

3.1.1 CAISO Project Milestones

The below schedule represents the CAISO driven project schedule for EIM entry by April 2022. The milestones listed reflect payment to the CAISO of $50k per milestone, for a total, one-time fee of $300k to join the EIM market. In order to meet these milestone dates, Avista must perform the work listed in the Section 2.5.

CAISO-Avista Project Scope and Milestones	Project Delivery Dates supporting April, 2022
Detailed Project Management Plan The Parties will develop and initiate a final project management plan that describes specific project tasks each Party must perform, delivery dates, project team members, meeting requirements, and a process for approving changes to support completion of the Project. This phase will include a detailed IT system review to assist Avista in development of a detailed metering plan, bid-to-bill system and coordination with Avista EMS. Work will be initiated on the Avista staff training program using the foundational and detailed system computer-based training module, as well as on the resource data templates needed during Milestone 2.	March 2019- December 2019
• **Milestone 1** – This milestone is completed when the Agreement has been made effective in accordance with Section 1 of the Agreement.	April 2020
Full Network Model Expansion Full Network Model expansion for Avista and EMS/SCADA including: proof of concept of export/import of EMS data, complete model into the CAISO test environment, complete validation for all SCADA points from Avista, testing of the new market model and validation of the Outage and State Estimator applications.	November 2020
• **Milestone 2** – This milestone is completed upon modeling Avista into the CAISO Full Network Model through the EMS which will be	July 2021

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deployed into a non-production test environment using the CAISO's network and resource modeling process.	
System Implementation and Connectivity Testing System requirements and software design, the execution of necessary software vendor contracts, development of Market network model including Avista, allow Avista to connect to a non-production test system.	August 2021
• **Milestone 3** CAISO to promote market network model including Avista area to non-production system, and allow Avista to connect and exchange data in advance of Market Simulation.	September 2021
Construction, Testing and Training in Preparation for Market Simulation - This task includes IT infrastructure upgrades, security testing, training, Day-in-life simulation and functional testing.	September 2021
• **Milestone 4a** Start of Joint Integration Testing with CAISO, Interface testing with minimum data requirements and functional integration testing. CAISO will make the test environment available for Avista connectivity testing prior to the delivery date assuming Avista has provided all prerequisite data and non-production system availability does not conflict with CAISO production system Spring Release schedule.	September 2021
• **Milestone 4b –** Begin 'Day in the Life' scenario testing	November 2021
• **Milestone 4c –** Begin Structured Market simulation (Milestone 4 payment due at this point)	December 2021
Activate Parallel Operations During January 2022**,** the CAISO will activate a parallel operation environment to practice production grade systems integration as well as market processes and operating procedures in anticipation of the impending Avista activation as an EIM Entity and to confirm compliance with the EIM readiness criteria set forth in the CAISO tariff.	January 2022
• **Milestone 5** – Start of parallel operations	February 2022
System Deployment and Go Live Implementing the Project and going live will include resource registration, operating procedures and updates, execution of service agreements, completion of the Avista tariff process, applicable board approvals, the filing	March 2022

and acceptance of service agreements and tariff changes with FERC, and completion and filing of a readiness criteria certification in accordance with the CAISO tariff.	
• **Milestone 6** – This milestone is complete upon the first production Avista EIM trade date.	April 1, 2022

4 Assumptions, Risks, Constraints & Dependencies

4.1 Assumptions

The following assumptions have been made:

a) All Avista required program/project resources will be available for the duration of the program.
b) All the necessary funding to complete the program will be available.
c) All Avista business users will be available for application and system User Acceptance Testing (UAT).
d) Avista will hire a third-party System Integrator to provide EIM subject matter expertise.
e) For EIM systems that must integrate directly with the CAISO systems, Avista will select software solutions under a SaaS model. It's anticipated Avista will chose on premise solutions for Itron's MV90 xi software for metering and General Electric software needed for the Full Network Model. Under the SaaS model, Avista will pay for vendor services, but not purchase software application licenses.
f) The technology system selection and procurement process will have priority within the Supply Chain and Legal departments.
g) The Avista Decision Support System (ADSS) will be enhanced for EIM functions.
h) The Nucleus application will have minor modifications for EIM functions.
i) The existing customer Oracle Meter Data Management (MDM) application will be enhanced for EIM meters and functions.
j) A new instance of MV-90 xi will be installed for EIM meters, with the intent that a consolidation effort will be conducted in three to five years to transfer non-Advanced Metering Infrastructure (AMI) meters from the existing MV-90 instance to the new EIM MV-90 instance.
k) The MDM EIM-related enhancements and the proposed Oracle Customer Care and Billing (CCB)/MDM upgrade should not present priority or development conflicts with EIM.
l) After Avista has signed the CAISO implementation agreement, a discussion with the CAISO will occur about the state of Avista's generation/interchange metering portfolio. It's assumed this meeting will occur within two months of signing the agreement and the some level of negotiation will occur regarding metering upgrades prior to go-live.
m) For EIM purposes and funding, if Avista registers generation facilities at the aggregate level, each facility will either have HSM or LSM improvement work, but not both funded by EIM. Directionally speaking, and for the purpose of GPSS outlined work, the metering approach assumes aggregate resource registration.
n) Avista will receive the needed permissions from various third-party generation and metering entities to perform EIM-related upgrades. Avista will fund EIM-related upgrades at various third-party sites.
o) Avista will procure an Energy Management System (EMS) plug-in for EIM market dispatch integration, but a complete EMS upgrade will not be required.
p) Avista has plans to fund a 24-hour operations center within the next three-five years, and house various operational business units, including Transmission System Operations. As such, the construction effort and costs for the EIM transmission operations desk at Mission campus and the Backup Control Center (BuCC) should be kept minimal.

q) The in-flight GPSS funded Human Machine Interface (HMI) project and the EIM-related PLC projects, have independent scope. The HMI project's goal is to standardize plant control screen display for plant operators, and the EIM PLC projects will capitalize on that standardization to display EIM data. If the HMI project is complete at the site where an EIM PLC project is needed, the new HMI screens will be updated to incorporate EIM data. If the HMI project has not begun at a site where an EIM PLC project is needed, the existing HMI screens will be updated with EIM data until the HMI project is available to update that site.

r) The Outage Management software projects for transmission and generation will start Q1 2020 and finish in Q3 2020, as the features/software is used and useful in today's business environment regardless of EIM participation.

4.2 Risks

Program level risks will be managed through a spreadsheet and posted to a common work space accessible by EIM project team members. Program risk will be discussed at steering committee meetings for mitigation recommendations and decisions. A Risk Management plan will be documented as necessary to identify mitigation plans the Director and Executive Steering Committee members may take action on. The following are potential risks for this program:

a) Interdependencies and integrations between EIM software projects will add complexity and may delay completion.

b) Competing priorities amongst other Avista programs/projects may constrain funds and resource availability. Resource areas that are likely to be constrained include network engineers, substation engineering and design, and generation engineers.

c) This program requires multiple, concurrent projects to be in flight at the same time, while competing for the same business resources and possibly technology resources.

d) The CCB/MDM application upgrade is scheduled to begin in 2019 and will likely take 14 months to complete. The complexity and timing of the upgrade may adversely affect EIM-related enhancements.

e) Avista may not be able to meet all the meter upgrades across all generation facilities by the given April 2022 go-live date.

f) If all the software Request for Proposal documents aren't issued by Q4 2019, the software implementation timeline will be at risk.

g) If resources across multiple business units aren't available for EIM planning and implementation, the April 2022 date will be a risk.

h) Delays in business processes re-engineering based on EIM requirements and complexities will impact the program/project schedule.

i) Joining the Western EIM presents a large amount of organizational business change that will require an Organizational Change Management (OCM) plan. Avista doesn't have a dedicated OCM champion and this role is critical to the program's success and employee adoption of the EIM practices.

j) Third-party generation sites don't have clear business ownership – a business owner must be identified to ensure these projects are completed.

k) It's unknown as to who will perform EIM-related work at third-party generation sites – Avista contracted, external contract or the generation owner.

l) The in-flight HMI project utilizes the same ET resources needed for EIM-related projects that could cause delays in completing work.

4.3 Constraints

The program schedule is the hard constraint. Avista has signed the CAISO implementation agreement with an EIM entry date of April 1, 2022. As such, we will conform to the CAISO implementation schedule and dates. In order to meet that date, Avista will chose to adjust scope and budget as necessary.

- Given a fixed schedule, we will choose a scope and adjust resources as necessary.

Place one "X" in each column (one per row) to provide a visual queue as to this project's Flexibility Matrix.

Flexibility Matrix	Low Flexibility	Medium Flexibility	High Flexibility
Scope		X	
Schedule	X		
Budget			X

- *Note: Quality is always expected to be high*

4.4 Dependencies

Given the vast business impact of the EIM program, there are multiple and concurrent projects that rely on other portions of a project being complete, or must be satisfied in order for EIM work to be completed.

4.4.1 GPSS Dependencies

a) The EIM dispatch of Little Falls depends on Long Lake EIM dispatch, however does not depend on Long Lake for HSM or PLC projects.
b) The Long Lake LSM, HSM and PLC projects all depend on the Long Lake Overhaul project. The schedule for this project is TBD.
c) The Cabinet Gorge LSM, HSH and PLC projects all depend on the Cabinet Gorge Automation Project for Unit 2, 3 and 4.
d) Network assessments are required for LSM projects at Cabinet, Coyote Sprints, Lancaster, Boulder Park, Northeast, Post Falls, Nine Mile and Upper Falls.
e) All LSM, HSM and PLC projects have some level of dependency on each other across the plants
f) Both LSM and HSM projects will require outages.
g) The CT/PT accuracy testing efforts will require outages and must be started by Q3 2019.
h) The needed transformer repairs must be complete at Coyote Sprints 2 before HSM can be started.
i) Coyote Springs 2 and Lancaster both rely on third-party PTs and will Avista will need permission prior to performing EIM-related work.
j) The completion of HSM projects will require completion of the PLC and network projects.

4.4.2 Network Dependencies

a) Wide Area Network (WAN) Performance Improvement Project – improve routing integration of Avista Private Transport network and Carrier Transport network. This project is not within the EIM Program.
b) SIP Project– Session Initiation Protocol – increase network bandwidth to Backup Control Center (BUCC). This project is not within the EIM Program.

4.4.3 Transmission System Operations/SCADA Dependencies

a) The Avista management and operation of the Transmission Full Network Model (FNM) should be complete and operational prior to deployment of Transmission Outage Management software

4.4.4 Substation Dependencies

a) The substation metering site projects must be conducted in the following sequence – integration design, substation design, circuit delivered to site and construction.
b) All substation project scheduling is dependent on the network team delivering Internet Provider (IP) circuits.
c) The Colbert substation Critical Infrastructure Protection (CIP) project must be complete before EIM-related work can begin.

5 Compliance and Controls

Each individual project under the EIM Program will conform to the Avista compliance and control standards.

Area	Required (Y/N)

Compliance Impact Assessment (contact: James McDougall)	Y
Business Continuity Plan (contact: Erin Swearingen)	Y
Reliability Compliance (NERC) (contact: Erin McClatchey)	Y
SOX Business Controls Impact Assessment (contact: Stacey Wenz)	Y
SOX Computer Controls Impact Assessment (contact: Matt Williams)	Y
PCI (Payment Card Industry) Compliance Assessment (contact: Matt Williams)	Y

6 Program Financial Structure & Cost Estimates

6.1 Program Financial Structure

The EIM Program will follow one Expenditure Request (ER), with multiple Budget Items (BI) grouped by business area and vice president. The Expenditure Request (ER) organization E55 is Power Supply. Multiple projects will be established under each Budget Item (BI). For financial tracking, each EIM project will reference the Parent Project ID of EIM422.

Energy Imbalance Market / Parent Project ID – EIM422									
ER	ER 7141 – Energy Imbalance Market / ER Sponsor ORG E55								
VP	**Heather Rosentrater**			**Jim Kensok**		**Heather Rosentrater**	**Jason Thackston**		
BI	Transmission Substation Engineering	System Ops SCADA Upgrades	Transmission High Side Metering	Network	Hardware/ Software	Transmission Remodel	Low Side Metering	High Side Metering	Generation Controls
BI	XS907/M08	YS908/D56	XS909/M08	19N09 / N09	20N09 / N09	19N07/H07	AG19/A07	AG020/A07	AG021/A07

6.2 Total Program Cost Estimates

The EIM Program costs have been estimated and refined with input from engineers, developers and subject matter experts from Generation Production and Substation Support, Transmission Substation Engineering, Enterprise Technology, Transmission System Operations and Power Supply. In addition, our estimates have been refined with input from Utilicast, a third-party EIM System Implementer Avista has engaged with. The estimating effort resulted in a range, and the numbers below represent the low side of the range with a 25% contingency assigned.

EIM Program Estimates	**Implementation**	**Contingency**	**Totals**	**Annual O&M Expense**
Capital	$18,129,000	$4,532,250	$22,661,250	
Expense	$2,380,000	$595,000	$2,975,000	$3,534,000
Pre-Paid Expense	$840,000	$210,000	$1,050,000	
Total Costs	**$21,349,000**	**$5,337,250**	**$26,686,250**	**$3,534,000**

6.3 Program Cost Estimates by Business Area

The below estimates represent EIM cost estimates by business area and excludes contingency.

Business Area	**Implementation Capital**	**Pre-Paid Expense***	**Implementation Expense**	**Annual O&M Expense**
ET Applications	$4,640,000	$840,000		$593,000
Application Procurement			$1,180,000	
ET Network	$2,465,000			$271,000
GPSS	$5,164,000			
Transmission & Substation	$1,760,000		$420,000	

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EIM Program	$4,100,000		$780,000	$120,000
New Avista FTEs**				$2,550,000
Total Costs	**$18,129,000**	**$840,000**	**$2,380,000**	**$3,534,000**

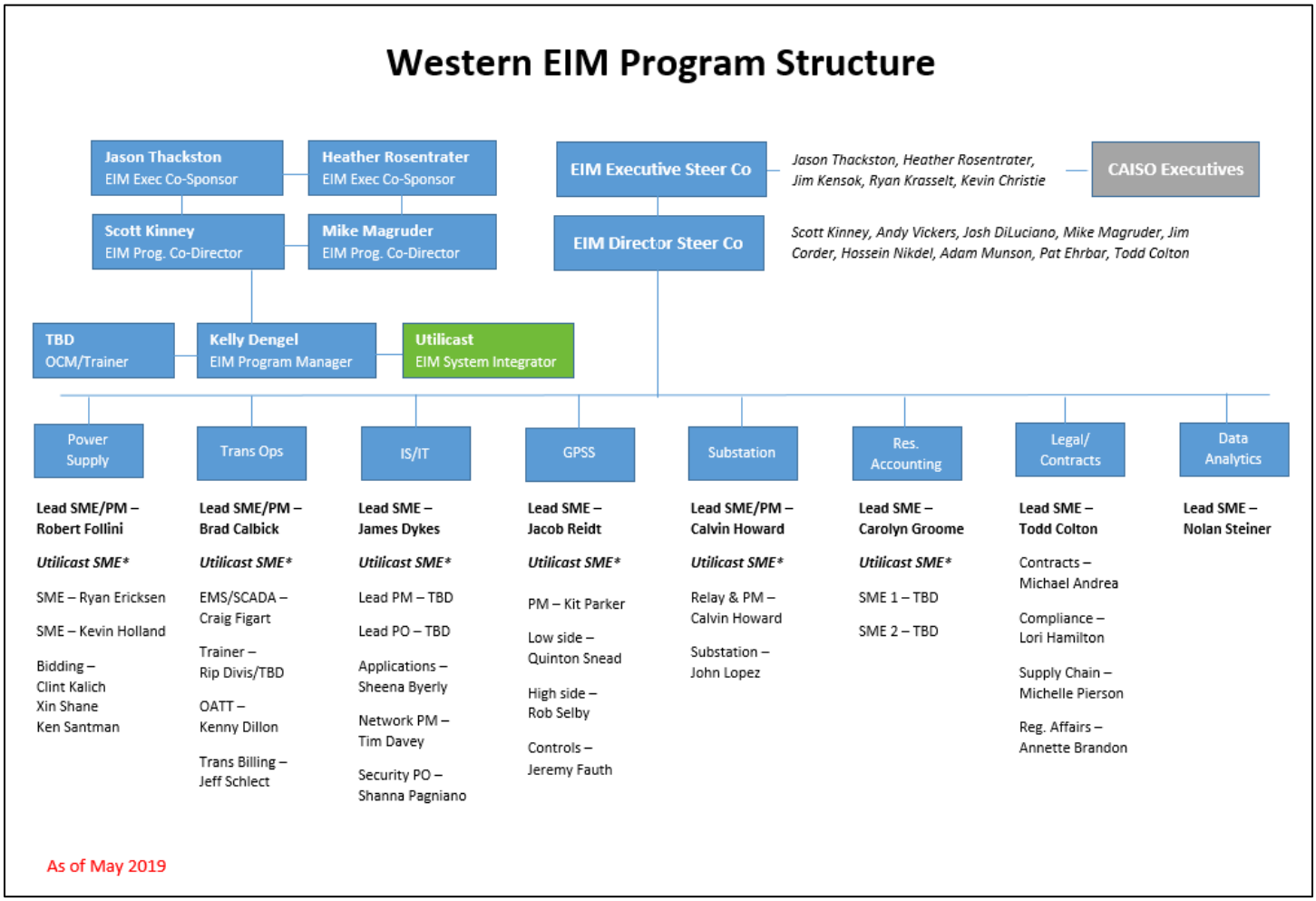
*The desired EIM software solutions will be purchased under a SaaS model, with the exception of the Itron's MV90 xi software for metering and the General Electric software needed for the Full Network Model. Under the SaaS model, Avista will pay for vendor services, but not purchase software application licenses. The Pre-Paid Expense estimate was based on 40% of the estimated software licensing costs of $2.1M.

**The above chart estimates 11-13 additional Avista FTEs amongst Power Supply, Transmission System Operations, Resource Accounting, Risk, Compliance and Enterprise Technology. These estimates, along with additional departmental impacts, are not final and will be reevaluated throughout the program.

7 Roles and Responsibilities

7.1 Program Organization Chart

The below program organization chart represents information known at the time of document submission. The organization chart will be a living document with updates and additions throughout the duration of the program. The organization chart(s) will be made available on an internal common work space.



7.2 Executive Sponsor(s)

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The Executive Sponsors are ultimately accountable for the success of the EIM Program, but have delegated accountability for day to day activities to Program Sponsors. The Executive Sponsors will finalize fundamental program philosophies, provide a platform for decision making for the program, as required, and facilitate communication with executive leadership, as necessary. In accordance with the CAISO implementation plan, Avista executives will meet with CAISO executives about program schedule and performance on a monthly to quarterly basis throughout the implementation period. The Executive Sponsors for this program are Jason Thackston and Heather Rosentrater.

7.3 Program Sponsor(s)

The Program Sponsors have been designated as an accountable resource for the EIM Program. The Sponsors will provide support related to fundamental program philosophies, monitor overall progress of the program, provide guidance to the program manager, and facilitate communication with senior leadership and project sponsors. The Program Sponsors for this program are Scott Kinney and Mike Magruder.

The Program Sponsors have the following responsibilities:

- Championing the project and raising awareness at the senior level
- Approving strategies, implementation plan, project scope and milestones
- Approving key organization/business decisions for the program
- Resolving certain issues, policies, and change management
- Driving and managing change throughout the organization
- Meet regularly with CAISO management to ensure project is proceeding on schedule
- Manage the contract with the System Integrator

7.4 EIM System Integrator

To ensure a successful implementation, Avista must establish a detailed integration plan to implement the software, hardware, processes and strategies required to participate in the market. To support this effort, Avista sought a CAISO EIM knowledgeable third party System Integrator to assist with the End-to-End Program Implementation including Program Management, overseeing all aspects of the six CAISO integration tracks, software selection and integration for all business units, business process and strategy development and training.

Avista has chosen Utilicast as their Western EIM System Integrator. They will provide the professional services required to evaluate, design, implement and integrate EIM-related Commercial Off the Shelf (COTS) systems with current Avista systems. In addition, they will assist with evaluating business processes and providing recommended modifications to maximize efficiencies necessary to compile, analyze and deliver the necessary information effectively. Utilicast will provide Subject Matter Experts related to the CAISO tracks to work with Avista personnel.

Avista intends to sign two separate statements of work (SOW) with Utilicast for the EIM integration effort. The first SOW will cover EIM planning and project design initiatives in 2019 that will further determine and define actual integration efforts in 2020 through go-live in April of 2022. The 2019 focus will be on metering and generation control requirements and design, generation bidding strategies, development of technology application Request For Proposal (RFP) documents and selection of application vendors. After completion of the first SOW, Avista intends to sign a second SOW with Utilicast for actual EIM implementation efforts, which would include a 3-6 month warranty period. If Utilicast doesn't adequately perform and meet the System Integrator requirements in 2019, then Avista will have an opportunity to re-evaluate its relationship with Utilicast and potentially hire a new consultant to perform EIM integration efforts starting in 2020.

In terms of vendor management, performance and expectations, Utilicast be managed by Scott Kinney, EIM Program Sponsor.

7.5 Program Manager

The Program Manager (PgM) is responsible for managing the overall progress of the EIM Program and ensuring Avista adheres to the CAISO-set project schedule. The Program Manager will work with the program sponsors and

cross-department stakeholders to create a Program schedule that conforms with the CAISO schedule. The Program Manager works with the various business unit project managers to maintain project schedule and provide support, as needed, for the duration of the program. The PgM will make budget and scope decisions that will not impact fundamental EIM Program philosophies or the EIM business case. The Program manager is accountable to the EIM Program Sponsors and to both the Director and Executive Steering Committee. The Program Manager for this program is Kelly Dengel.

The Program Manager is responsible for:

- Championing the program and raising awareness at the senior level
- Driving and managing change throughout the organization
- Ensuring program priority is established and resources are allocated to the various projects.
- Ensuring the timely and effective cooperation of all departments in providing information, and other required assistance, to the project teams
- Helping to remove obstacles and solve problems that are beyond the control of the Project Managers
- Ensuring the various project are delivered on time within the CAISO project management plan

7.6 Lead Subject Matter Expert

The Lead Subject Matter Expert (SME) is responsible for learning EIM business requirements and processes, and relating them to their various business areas to assess impact and influence change management. The SME should have an overarching view of processes and functionality within their given business area, and know where to incorporate EIM impacts. They will represent their given business area's interests at EIM meetings, communicate EIM changes within their organization, be the main contact for the PgM, and help facilitate and develop EIM processes and business change for their areas.

7.7 Project Managers

The primary responsibility of the Project Manager (PM) is the complete and satisfactory execution of projects within the EIM program for their business units. The Project Manager works closely with all stakeholders to ensure risk is mitigated and contingency plans are created and delivered. The Project Manager will report monthly, and on an as-needed basis, to the Program Manager on all-project related activities such as schedule, scope, budget and risks. The Project Managers are accountable to their Departments and to the Program Manager. All stakeholders can identify a risk and offer a solution(s) for mitigation, with meetings held by the Project Manager to discuss recommendations. Delivery of risk assessment and contingency planning within the project is a responsibility of the PM, with input from the Delivery Managers and the Program Manager. Based on the severity of the risk, the contingency plan can be approved by the PM or the Program Manager, with ultimate approval, if needed, from the Director Steering Committee. The Project Manager has the following responsibilities:

- Project planning and execution
- Facilitate issue resolution
- Resolve scheduling issues
- Provide written plans and schedules templates
- Define, track and maintain project schedule and budget
- Ensure project follows project management principles
- Manage communication between stakeholders
- Ensure project is delivered to schedule and budget (report on deviations)
- Manage project execution
- Coordinate resource requirements

8 Steering Committee(s)

8.1.1 Executive Steering Committee

The primary function of the Executive Steering Committee is to ensure the EIM Program is given adequate priority throughout the organization to ensure the success of Avista joining the Western EIM by the scheduled April 1, 2022 date. The Executive Steering Committee will meet on a quarterly basis internally, and on an as-needed basis. In accordance with the CAISO implementation plan, Avista executives will meet with CAISO executives about program schedule and Avista performance on a monthly to quarterly basis throughout the implementation period. The Executive Steering Committee is responsible for taking recommendations from the Director Steering Committee and ultimately making Program level decisions for use of contingency funding. In the unforeseen event that the EIM Program schedule is at risk, the Executive Steering Committee has the right to review and adjust the EIM go-live date. The Executive Steering Committee would be responsible for this decision. Members of the Executive Steering Committee and the Program Sponsors would be responsible for this re-negotiation with CAISO.

8.1.2 Director Steering Committee

The primary function of the Director Steering Committee is to provide guidance and approval on key program issues such as program objectives, budgetary control, resource allocation, cross business unit decisions and decisions involving large expenditures. The Director Steering Committee will monitor and review the program status, as well as provide oversight of the program deliverable rollout. The Director Steering Committee will meet monthly.

The Director Steering Committee ensures program concepts and guidelines are established and maintained with a holistic view. They ensure business objectives are being adequately addressed and the program remains under control. In practice these responsibilities are carried out by performing the following functions:

- Monitoring and review of the project at regular Steering Committee meetings
- Providing assistance to the project when required
- Controlling project scope as issues force changes to be considered, ensuring that scope aligns with the agreed business requirements of project sponsor and key stakeholder groups
- Resolving project priorities and conflicts; reconciling differences of opinion and approach
- Address cross-functional issues
- Formal acceptance of project deliverables

8.1.3 Director Steering Committee Approval Responsibilities

The Director Steering committee members will be informed on Program and project level decisions, and will provide approval on Program documents. They are responsible for approving major program elements such as:

- Prioritization of Program objectives and outcomes as identified in the EIM Program Business Case;
- Deliverables as identified in the Program Charter
- Budget, ensuring that effort, expenditures and changes are appropriate to stakeholder expectations;
- Schedule adherence;
- Risk management strategies, ensuring that strategies to address potential threats to the project's success have been identified, estimated and approved, and that the threats are regularly re-assessed;
- Project management and quality assurance practices.

9 Program Governance and Reporting

9.1 Reporting

The purpose of these procedures is to provide effective mechanisms to control the scope of the program, manage issues and risks and monitor progress. Program level management of decisions and documents will be managed through Clarity Project and Portfolio Management System. Enterprise Technology projects, and their associated processes, will be managed within Clarity. Generation, transmission operations and substation projects will be managed through their established project management processes and procedures. Each project artifact will reference the EIM program with narrative related to EIM scope, CAISO track, requirements, and the financial

structure with the EIM Parent Project ID of EIM422 and the associated Expenditure Request (ER) and Budget Item (BI).

9.2 Financial Control

Financial Controls will be managed at the program level with monthly financial reporting through Oracle reports, with assistance from Financial Planning and Analysis team. The Program finances and forecasted spend will be reviewed monthly with the Director Steering Committee and quarterly with the Executive Steering Committee. The Capital Planning Group will also be kept informed of the Program Finances. The monthly financial reporting documents will be posted to Clarity.

9.3 Change Control / Approval Authority

Program level authority sits with the EIM Director Steering Committee, and the Executive Steering Committee. Ultimate approval authority sits with the Executive Steering Committee. The Executive Steering Committee is responsible for taking recommendations from the Director Steering Committee and ultimately making Program level decisions for use of contingency funding. In the unforeseen event that the EIM Program schedule is at risk, the Executive Steering Committee has the right to review and adjust the EIM go-live date. The Executive Steering Committee would be responsible for this decision. Members of the Executive Steering Committee and the Program Sponsors would be responsible for this re-negotiation of the EIM Implementation Agreement with the CAISO.

Exhibit No. 8
Case No. AVU-E-21-01
S. Kinney, Avista
Schedule 6, Page 18 of 21

Program Initiation Charter

Approval Signatures

Approve EIM Program Charter Approval - Due May 22 - UPDATE - Scott Kinney - 05.21.19.msg

_____

Scott Kinney, Director of Power Supply

Approve EIM Program Charter Approval - Due May 22 - UPDATE - Andy Vickers 05.17.19.msg

_____

Andy Vickers, Director of Generation Production and Substation Support

Approve EIM Program Charter Approval - Due May 22 - UPDATE - Josh DiLuciano 06.03.19.msg

_____

Josh DiLuciano, Director of Electrical Engineering

Approve EIM Program Charter Approval - Due May 22 - UPDATE - Mike Magruder - 05.29.19.msg

_____

Mike Magruder, Director of Transmission Operations and System Planning

Approve EIM Program Charter Approval - Due May 22 - UPDATE - Jim Corder - 05.23.19.msg

_____

Jim Corder, Director of Information Technology and Secruity

RE EIM Program Charter Approval - Due May 22 - UPDATE - Hossein Nikdel - 05.22.19.msg

_____

Hossein Nikdel, Director of Applications and System Planning

Approve EIM Program Charter Approval - Due May 22 - UPDATE - Adam Munson - 05.29.19.msg

_____

Adam Munson, Director of Accounting

Approve EIM Program Charter Approval - Due May 22 - UPDATE - Pat Ehrbar - 05.22.19.msg

_____

Pat Ehrbar, Director of Regulatory Affairs

RE EIM Program Charter Approval - Due May 22 - UPDATE - Todd Colton - 05.29.19.msg

_____

Todd Colton, Senior Legal Counsel

Approve EIM Program Charter Approval - Due May 22 - UPDATE - Heather Rosentrater - 05.29.19.msg

_____

Heather Rosentrater, VP of Energy Delivery

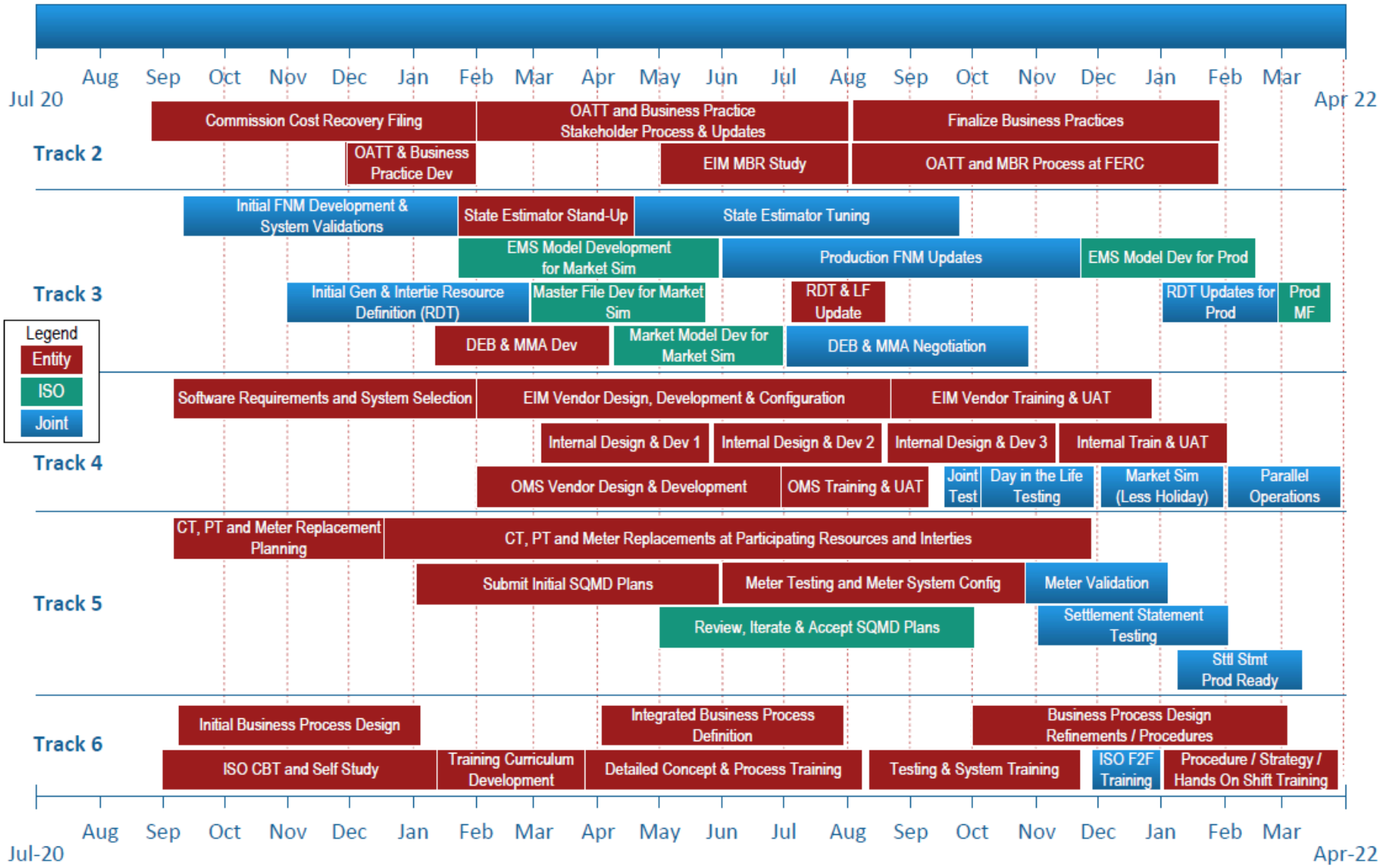
Approve EIM Program Charter Approval - Due May 22 - UPDATE - Jason Thackston - 05.29.19.msg

_____

Jason Thackston, Senior VP of Energy Resoruces

Appendix A

The following CAISO provided timeline provides a generic overview of track activity between July 2020 through April 2022. In the legend, Avista is the Entity and CAISO is the Independent System Operator (ISO).



Program Scope Summary

Program Name: Energy Imbalance Market
Program Manager: Kelly Dengel
Business Case Name: Energy Imbalance Market
Expenditure Request (ER): 7141 – Energy Imbalance Market
Submit Date: TBD

1 Key Roles & Program Information

Program Sponsor(s):	Scott Kinney/ Mike Magruder	**Business Case Owner(s):**	Kelly Dengel
Business Program Manager:	Kelly Dengel	**Executive Steering Committee Members:**	Jason Thackston, Heather Rosentrater, Jim Kensok, Ryan Krasselt, Kevin Christie
Director Steering Committee Members:	Scott Kinney, Andy Vickers, Mike Magruder, Jim Corder, Hossein Nikdel, Adam Munson, Pat Ehrbar, Todd Colton	**Other Stakeholders:**	James Dykes, Robert Follini, Annette Brandon, Jacob Reidt, Kit Parker, Bob Weisbeck, Tom Dempsey, Alexis Alexander, Kristina Newhouse, Glen Farmer, Brad Calbick, Craig Figart, Rip Divis, Kenny Dillon, Mike Andrea, Glenn Madden, Randy Spacek, Lamont Miles, Brian Hoerner, Xin Shane, Jason Pegg, Carolyn Groome

2 Contents

3 Executive Summary

In May 2019, Avista leadership approved the EIM Program Charter outlining the total estimated costs associated with joining the Western Energy Imbalance Market (EIM) operated by the California Independent System Operator (CAISO). The Charter estimated $26.6 million in integration costs and $3.5-$4 million in on-going annual expense, and were considered preliminary.

The Charter costs estimates drew from the 2018 Utilicast assessment results for technology and the metering/controls upgrades, and provided an initial picture of the work required by Avista to integrate into the market, along with estimates for on-going operations. For the remainder of 2019, Avista focused on high-level scope decisions, an initial integrated project schedule and completing the Request for Proposal (RFP) phase for EIM software. In October 2019, Avista also selected their System Integrator, Utilicast, and signed an Implementation Agreement for 2020-2022. Throughout 2019 and into 2020, Avista continually acquired more market operations knowledge and gained a better understanding of how Avista can meet market requirements, while balancing operational needs and financial constraints.

After a year into the EIM integration effort and acquiring a better understanding of the market operation support needs, Avista created a preferred employee resource plan (EIM Human Resource Plan) and the EIM Program Scope document. Together, the documents represent updates to Avista's EIM Program, incorporating updated software, metering and network project designs and schedules, the resources needed for integration and operations, and the overall cost estimates based on actual spend through August 2020 and remaining integration work. The updated EIM integration cost estimate is $32.1 million, and the on-going annual cost estimate is $3.9 million. Based on this information, an annual revenue of $7.8 million is needed to break even after 10 years of market operations. This annual revenue estimate is within the range of benefits determined by analysis performed by Energy and Environmental Economics (E3) in 2017. If Avista's actual EIM system benefits are closer to the potential upper bound of the $12 million as determined by E3 and experienced by other similarly situated EIM entities, then Avista customers will see positive revenue in a much shorter time period.

4 Program Charter vs. Scope Financial Estimates

When Avista created its Charter estimates, an attempt was made to provide a total cost of ownership to join the EIM. This included cost estimates for capital projects, expense for implementing the Program, including existing and incremental labor, non-labor and on-going incremental costs associated with new hires and software maintenance. The Charter estimates provided costs associated with a particular effort in multiple line items, rather than a single line item, representing a total anticipated cost. The Scope document presents the estimates for the particular effort, as a single line item, inclusive of all known costs. Where possible, a comparison of costs from the Charter to the Scope document have been made with references to the Charter line item estimates. In some cases, cost estimates have been re-assigned from one cost area to another, and a direct comparison is not available.

In terms of implementation, the effort to join the EIM requires both capital and expense activities. Specific to expense, the Charter estimates identified expense deliverables and provided a cost estimate by assuming a number of man hours needed to perform the task and multiplied it by $100 labor rate. It was primarily assumed these expense deliverables would be completed by existing employees across multiple business units. As of July 1, 2019, Avista began charging specific EIM expense projects across six business units. However, Avista did not create an individual expense project for each expense deliverable. Although Avista has worked on many expense efforts, such as completing the CAISO implementation agreements or documenting plant operation details for the Resource Data Template, the level of expense reporting by individual item (deliverable) is not tracked to this level of detail within Company financial records.

5 CAISO & Avista Program Scope Overview

The CAISO has developed an implementation structure for market participants that includes six program tracks. A description and the associated requirements of each of these six tracks is provided below along with an Avista preparation track shown as track zero.

Program Scope Summary

CAISO EIM Track	Avista Scope
Track 0 Avista EIM Program Preparation	
This track represents the body of work Avista must complete to be ready to join the CAISO schedule. It includes program planning, requirements gathering and design, System Integrator selection and software procurement.	Avista program structure, leadership, documentation, change management plan, internal project schedule, software procurement and contracting
	Select System Integrator
Track 1 Planning & Project Management	
This track will ensure project management and oversite coordination between CAISO and Avista. It includes developing planning documents, project schedule, status reports, issue and risk tracking, overall readiness checklists and any other planning and controlling documents, process and activities to support a successful implementation of the program.	Joint Avista-CAISO project plan and schedule
	Joint impact assessment document
	Avista go-live support plan document
	Joint checkpoint, next step, progress evaluation meetings, etc.
	Joint monthly project leadership meetings
	Joint quarterly executive meetings
Track 2 Policy, Legal, Support	
This track will ensure Avista reviews and signs the appropriate CAISO entity agreements – a combination of EIM Entity (Transmission System Operations) and EIM Participating Resource (Merchant) – based on a joint Avista-CAISO schedule. Changes to Avista's Open Access Transmission Tariff (OATT) will be accommodated within this track.	EIM Entity Implementation Agreement
	EIM Entity Agreement
	EIM Entity Scheduling Coordinator (EESC) Agreement
	EIM Participating Resource Scheduling Coordinator (PRSC) Agreement
	EIM Participating Resource Agreement
	Department of Market Monitor Filings
	Market Base Rate Study
	CAISO Implementation Milestone Payments
	CASIO Grid Management Charge
	Avista Open Access Transmission Tariff (OATT)
Track 3 Transmission & Generation Modeling	
This track ensures Avista's transmission and generation assets are integrated with several CAISO systems, specifically Avista's Transmission Full Network Model with the CAISO's Energy Management System (EMS) and the Master File. The Master File specifies many generation and intertie resources for the purposes of scheduling, bidding and settlements.	Transmission Full Network Model (FNM) creation & maintenance
	Integrate Avista Energy Management System (EMS) to CAISO EMS
	Master File / Generation Participation & Cost Modeling
	Major Maintenance Adders & Default Energy Bid logic
	Energy Transfer System Resource (ETSRs)
Track 4 System Integration & Testing	
	Acquire & configure Generation Outage Management software
	Acquire & configure Transmission Outage Management software

Program Scope Summary

This track ensures the required Avista's EIM-related software integrates with the CAISO systems and are functioning as designed to ensure the EIM runs successfully for existing and new participants. Prior to, and concurrent to this track, Avista will need to implement the various EIM-related software solutions, enhance in-house applications and build integrations. This currently includes implementing several new software solutions that impact Enterprise Technology, Generation Production and Substation Support, Transmission System Operations, Power Supply and Resource Accounting.	Acquire & configure Participating Resource Scheduling Coordinator (PRSC) bidding & scheduling software (merchant)
	Acquire & configure EIM Entity Scheduling Coordinator (EESC) scheduling software (transmission)
	Acquire & configure PRSC settlement software (merchant)
	Acquire & configure EESC settlement software (transmission)
	Acquire & configure reporting & analytics software
	Enhance & integrate Avista Decision Support System (ADSS)
	Acquire & configure Energy Accounting software
	Acquire & configure a E-Tagging solution
	Enhance Nucleus functionality
	Integrate EIM software systems
	Integrate EIM software with CAISO systems
	Pre-production testing with CAISO – Day in the Life phase
	Pre-production testing with CAISO – Market Simulation phase
	Pre-production testing with CAISO – Parallel Operations phase
Track 5 Metering & Settlements	
This track ensures various Avista metering activities are successful in the EIM for physical metering and meter data accuracy. Physical metering, associated with a market resource like a generation facility or an interconnection point, and the identification and classification of relevant metering components must meet existing CAISO metering standards and accuracy ratings. Meter data accuracy speaks to the validation of market resource configurations and related metering components in alignment with the market resources' physical characteristics and participation level within EIM.	Low-Side Metering (LSM) /unit level metering at generation plants
	High-Side Metering (HSM) installation at generation plants
	Current Transformer (CT) / Potential Transformer (PT) testing and applicable upgrades
	Installation of a Schweitzer Engineering Laboratories SEL-735 revenue quality meter at generation and substation/interconnection locations
	Interconnection meter upgrades at some substations
	Network and communications installations/upgrades
	Install new instance of Itron's MV90 xi for meter data collection
	Generation plant Programmable Logic Control (PLC) upgrades
	Creation, submission & approval of Settlement Quality Meter Data (SQMD) plans and metering portfolio to CAISO
Track 6 Operations Readiness & Training	
This track provides a series for training events throughout the EIM implementation time. This includes computer-based training, in-person training, EIM workshops, trainer visits to the CAISO and training support for phased steps to production: Day in the Life, Parallel Operations and Go-Live initiation.	Create internal EIM training plan
	Complete CAISO EIM computer-based training modules
	CAISO conducts hands-on training for Avista
	Develop internal operational EIM procedures
	File internal operational EIM procedures with CAISO
	Complete CAISO market readiness criteria worksheet
	CAISO provides planned go-live operations procedure documents
	Avista files market readiness certificate with FERC prior to go-live
	CAISO files market readiness certificate with FERC prior to go-live
	Develop & implement EIM operations & support model
	EIM Human Resource Plan
	EIM Transmission System Operations desk & remodel at BuCC
	EIM Transmission System Operations desk & remodel at Mission
	Noxon 230kV Switchyard CIP Compliance

6 Avista Scope by CAISO EIM Track

6.1 Track 0/Track 1 – Avista EIM Program / Planning & Project Management

System Integrator – Utilicast

6.1.1 EIM Program & Project Management Establishment

After announcing EIM entry and signing the Implementation Agreement, Avista began to organize the Program integration team across the impacted business units and established core team members who would be charged with implementing and managing the work. In February 2019, Avista hired the EIM Program Manager to establish the program structure and governance, gather financial estimates and identify work streams across the impacted business units. This also included identifying leadership roles, subject matter experts, project managers and engineers. The Program was also tasked with educating Avista teams about the organized market structure and what requirements Avista would need to fulfil in order to participate.

The Program Manager began communication with the CAISO project management office to aligning internal Avista milestones with CAISO-driven milestone dates. Monthly track calls have been established with the appropriate CAISO, Utilicast and Avista Subject Matter Expert representatives to understand deliverables and milestones, which have been progressively discussed and incorporated into Avista's overall Program schedule.

The Director Steering Committee began meeting in March of 2019, and the Executive Steering Committee met quarterly in 2019 and moved to monthly meetings in 2020. In December 2019, the first joint Avista/CAISO Executive meeting was held and are subsequently planned for quarterly updates through go-live. See Section 12 for information on the project governance structure.

6.1.2 Utilicast – System Integrator

Avista engaged with Utilicast in three phases, with the intent to progressively evaluate performance and value before signing additional EIM integration support agreements. Phase 1 in 2018 focused on the technology, metering and network model assessment, helping Avista understand the CAISO requirements and processes, and identifying the gaps to be filled. After soliciting responses for a System Integrator via a Request for Information (RFI) proposal, Avista agreed to a sole sourcing engagement with Utilicast in an effort to continue the partnership as their System Integrator. This led to a phase two agreement in 2019 that focused on metering and generation control requirements and design, generation bidding strategies, development of technology application requirements and RFPs and the evaluation/selection of EIM software vendors. The phase three engagement was signed in December 2019 and focused on the program implementation efforts through go-live of 2022.

Under this program implementation agreement, Utilicast will provide Subject Matter Experts to evaluate, design, implement and integrate EIM-related Commercial Off the Shelf (COTS) systems with current Avista systems. In addition, they will assist with evaluating business processes and providing recommended modifications to maximize efficiencies necessary to compile, analyze and deliver the necessary information effectively. Utilicast will also engage in all aspects of the EIM Program, provide project management expertise and are uniquely positioned to assist Avista with a successful market entry.

6.1.2.1 Utilicast Financial Summary Estimate

The 2018 Utilicast Assessments were completed in 2018 and were not included in the Program Charter estimates. The 2019 Technology RFP was reflected under Charter Line Item 10 "System Selection & Procurement" with a $500k expense estimate for Utlicast and $680k for Avista labor. Utilicast actuals for the Technology RFP are listed in Table 1 and Table 9. Estimates for Avista labor are listed in Table 9. The Utilicast agreement was signed with a do not exceed amount of $600k and we completed the SOW with an actual spend of $508k.

The 2020-22 Utlicast Implementation Agreement costs were included under Charter Line Item 9 "Program Leadership, Management & SMEs" at $3.2 million in capital. After further evaluation of market integration requirements, project management support, and subject matter expertise, the final Utilicast Implementation Agreement included estimated contract costs of $3.7 million capital and $1.6 million Operations and Maintenance (O&M) expense to support market integration efforts. Some of the increased Utilicast costs offset internal Avista labor.

Table 1 – Utilicast Agreements

Utilicast		Charter Estimates (as of 05/2019)		Scope Estimates (as of 08/2020)	
Agreement	**Year**	**Capital**	**Expense**	**Capital**	**Expense**
Technology RFP (Line 10)	2019	$ -	$ 500,000	$ -	$ 508,435
Implementation (Line 9)	2020-22	$ 3,200,000	$ -	$ 3,700,000	$ 1,150,000
	Totals	**$ 3,200,000**	**$ 500,000**	**$ 3,700,000**	**$ 1,658,435**
Actuals					

When the 2020-22 Implementation agreement with Utilicast was signed, each deliverable was assigned an expense or capital indicator, which allowed for an estimate of annual expense and capital charges by year. These estimates were not known at the writing of the Program Charter, as the Implementation Agreement was not signed until October 2019. In September 2020, the expense forecast associated with the Implementation Agreement was reduced by $450k based on the 2020 actual spend and a review of scheduled deliverables. The primary drivers for the Utlicast expense are associated with training, business process design and generation/interchange modeling.

6.1.2.2 Utilicast Implementation Agreement 2020-2022

At the time of the Charter, Avista estimated $3.2M of Utilicast capital labor to support the EIM implementation under the Charter capital Line Item 9 "Program Leadership, Management & SMEs." This line also contained $700k in Avista labor for capital efforts that have been included in the EIM software estimates. This Utilicast estimate did not include an estimate for O&M expense. The assignment of deliverables also corresponded with a CASIO project track and an Avista business unit. By grouping these deliverables, an estimate of capital spend by business unit and a total estimate of expense was projected. Although the Utilicast expense items may align with a specific business unit, the expense costs will be charged to the Power Supply business unit. The Charter estimates did not assign Utilicast labor to individual business unit estimates. In addition, Utilicast labor to support Avista's Decision Support System (ADSS) enhancements was included in the total Utilicast Implementation Agreement costs, but not be included in the EIM Program totals, as ADSS EIM enhancements were planned for funding under a different business case.

Table 2 – Utilicast 2020-2022 Implementation Agreement Estimates by Business Unit

Utilicast Implementation Agreement (signed 10/2019)		Implementation Agreement (as of 10/2019)		Scope Estimates (as of 08/2020)	
Business Units	**CAISO Track**	**Capital**	**Expense**	**Capital**	**Expense**
ET Applications	Track 4	$ 2,986,181		$ 2,986,181	
ET Network	Track 4 & 5	$ 67,060		$ 67,060	
GPSS	Track 5	$ 67,060		$ 67,060	
Substation	Track 5	$ 67,060		$ 67,060	
Transmission	Track 4	$ 40,000		$ 40,000	
Facilities	Track 6	$ -		$ -	
ADSS	Track 4	$ 472,639		$ 472,639	
EIM Program	All	$ -	$ 1,600,000	$ -	$ 1,150,000
	Utilicast Totals	**$ 3,700,000**	**$ 1,600,000**	**$ 3,700,000**	**$ 1,150,000**

6.2 Track 2 – Policy, Legal, Support

This track ensures Avista reviews and signs the appropriate CAISO entity agreements – a combination of EIM Entity (Transmission System Operations) and EIM Participating Resource (Merchant/Power Supply), conducts changes to the OATT, and completes the necessary studies and filings for market participation.

6.2.1 Summary

- **EIM Agreements:** In order to transact in the market, Avista needs to sign various CAISO Agreements to conduct operations as a Merchant Scheduling Coordinator and Entity Scheduling Coordinator. These agreements allow the Merchant and the Entity to transact in the market, while preventing the inappropriate sharing of information and adhering to FERC Standards of Conduct. This agreement submission also includes items such as financial forms, certifications, risk policies, and user and contact lists. A joint Avista-CAISO schedule for completing the agreements has been made. These items were planned under the Charter implementation Charter Line Item 13 "OATT, MBR & ISO Agreements" at $130k as Avista labor expense.

- **Open Access Transmission Tariff (OATT):** Avista must make significant changes to its OATT to accommodate transmission utilization in the EIM, change ancillary service charges and incorporate EIM financial settlement obligations due to operating in the EIM. These OATT changes are also affected by the need to conduct a new Market Base Rate analysis and submit the study findings to FERC for approval. These items were forecasted in Charter Line Item 13 "OATT, MBR & ISO Agreements" at $130k as expense.

- **Market Base Rate Study:** Market Based Rate (MBR) Authority represents permission granted by FERC to allow power to be sold at market rates, as opposed to a traditional cost of service rate (aka cost-plus). Sellers seeking market-based rate authority must prove to FERC that they have no ability to set market prices, or that there are proper mitigations in place if there is an opportunity to set the price. A new MBR study is required to be conducted and approved by FERC as part of the EIM registration process to ensure Avista doesn't have the ability to set the market price within the EIM. These items were planned under the Charter implementation Charter Line Item 13 "OATT, MBR & ISO Agreements" at $130k as Avista labor expense.

- **Professional Services:** The Program Charter provided an estimate for outside services to conduct the MBR study and legal review of OATT changes. These items were planned under the Charter implementation Charter Line Item 13 "OATT, MBR & ISO Agreements" at $105k of expense under the Solutions & Services column.

- **Department of Market Monitoring Filings:** Although the business logic and collection of operational inputs required to complete these documents are in Track 3 – Generation and Transmission Modeling, the negotiation and filing of the documentation is under Track 2. Avista will submit filings for Major Maintenance Adders (MMAs) and Default Energy Bids (DEB) by generation resource. The MMAs are one of the cost components in the CAISO's proxy cost calculation for start-up and minimum run hour load costs. The negotiated DEB is CAISO's process to mirror competitive market outcomes in the event that Avista is found to have an ability to unjustifiably increase electricity prices during certain time frames at certain locations. The Program Charter did not provide an estimate for this work, but it's assumed the filing procedures can be included in the estimates for the EIM Agreements, OATT, and MBR activities.

- **CAISO Milestone Payments:** As part of the EIM Implementation Agreement, CAISO outlined six milestone payments that align with CAISO's set implementation schedule. Each payment is $50k and payable upon meeting the milestone, for a one-time total implementation fee of $300k. Details of the milestone descriptions can be found in Section 7. This item was planned as implementation expense in the Charter under expense Line Item 18 "EIM Membership & Ongoing Fees" at $300k.

- **CAISO Grid Management Charge:** The CAISO charges EIM participants a Grid Management charge based on the amount of MWh transacted in the market. This estimate ($120k) was mislabeled in the Charter as CAISO Annual

Fee. This item was planned as expense in the Charter under on-going, annual expense Line Item 18 "EIM Membership & Ongoing Fees" at $120k.

6.2.2 Track 2 Policy, Legal, Support Financial Estimate Summary

With the exception of payment to CAISO for the filing of the scheduling coordinator agreements, a majority of the items estimated in the Program Charter have not changed. Although the Charter did not provide an estimate for the ISO Department of Market Monitoring filings, it's assumed these filings can be accommodated under the expense estimates for the EIM Agreements, OATT, and MBR activities. With the exception of the CAISO Grid Management Fee, the items represented as expense are a one-time O&M charge. Although there isn't a specific expense estimate for Utilicast under this track, the support effort is represented in the EIM Program line in cost estimate tables.

Table 3 – Policy, Legal, Support Financial Estimates

Track 2 - Policy & Legal	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
	Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
EIM Agreements (Line 13)	$ -	$ 130,000	$ -	$ -	$ 130,000	$ -
OATT (Line 13)	$ -		$ -	$ -		$ -
MBR (Line 13)	$ -		$ -	$ -		$ -
DMM Filings	$ -	$ -	$ -	$ -		$ -
Professional Services (Line 13)	$ -	$ 105,000	$ -	$ -	$ 105,000	$ -
CAISO Payments (Line 18)	$ -	$ 300,000	$ -	$ -	$ 300,000	$ -
CAISO Grid Management Fee (Line 18)	$ -	$ -	$ 120,000	$ -	$ -	$ 120,000
Totals	**$ -**	**$ 535,000**	**$ 120,000**	**$ -**	**$ 535,000**	**$ 120,000**
Utilicast	$ -	$ -	$ -	$ -	$ -	$ -
Grand Totals	**$ -**	**$ 535,000**	**$ 120,000**	**$ -**	**$ 535,000**	**$ 120,000**

6.3 Track 3 – Transmission & Generation Modeling

6.3.1 Existing State Prior to EIM

A vital step in every EIM implementation, is the integration the entity's detailed electrical system model into CAISO's region-wide model; this electric system model is called the Full Network Model (FNM). It's accompanied by the development of the Resource Data Templates (RDT). This information is critical, as it allows the market to accurately optimize resource dispatch, while respecting transmission reliability and contractual limits. It is each entity's responsibility to maintain a detailed model of their own system, and to provide timely updates to CAISO, including planned construction and outage activities. Failure to provide and maintain an accurate representation of Avista's electrical system within CAISO's model will lead to non-optimal market dispatches, which negatively impact market settlements.

Prior to EIM entry, Avista used off-line models and hosted third-party solutions to perform the necessary analysis for real-time operation of the electrical system. This was reasonable at the time, as maintenance of these real-time models was very labor and time intensive. Modern systems now enable entities to more easily exchange model information, thus reducing the labor and time required to manage the model. Avista will add the additional staffing and tools necessary to build, manage, and maintain its own network model for real-time operations.

6.3.2 Transmission & Generation Modeling Scope Summary

6.3.2.1 *Transmission Full Network Model Scope*

During the EIM Program planning stages, Avista was in the process of transitioning providers for the Reliability Coordinator (RC) function from Peak Reliability to RC West, operated by the CAISO. Avista began operations under RC West on November 1, 2019. While operating under Peak Reliability, Avista contracted with Peak to

provide hosted service and maintenance of the transmission network model, real-time state estimation, and real-time contingency analysis. Under RC West, the same services have been provided.

During this RC transition period, Avista started a project to bring these crucial reliability functions in-house – not only for RC purposes, but also for EIM. The development and integration of these tools into Avista's Supervisory Control and Data Acquisition Energy Management System (SCADA/EMS) is in flight and funded by the SCADA/SOO/BuCC BC. The Program Charter provided a capital estimate for Utilicast support of the FNM implementation under the Line Item 11 "Full Network Model for EIM" at $40k, which is still planned. Line Item 11 also had Avista FNM capital labor at $80k. The on-going labor expense associated with Line 11 is for a portion of a new FTE to support the FNM at $50k (the other funding is from SCADA). The new FTE planned to support the FNM implementation, and the associated on-going labor expense costs, are represented in Table 4 and also in Table 17.

6.3.2.2 *Integration with CAISO Automated Dispatch System*

In the Program Charter, costs were estimated for integration of Avista's EMS SCADA with CAISO's Automated Dispatch System (ADS). The ADS provides the market Dispatch Operating Targets (DOTs) which the EIM entity uses to control its generation plants. In order to accommodate this, Avista will procure an add-in dispatch module from its SCADA software provider. This dispatch module will retrieve the dispatch targets in real-time from CAISO, and present them to the Avista EIM operator. Generation resources which are on full EIM control, will automatically be sent these operating targets. Plant control systems will follow the dispatch targets to achieve the targeted energy output. The dispatch module implementation estimate was included in Charter Line Item 1 "Vendor EIM Software Solution" with a capital estimate of $156k. This has been transferred to the Track 3, Table 4 financial estimates with an updated estimate of $160k.

6.3.2.3 *Master File / Generation Participation & Cost Modeling*

In the Charter, Avista provided estimates for an item labeled "Generation Participation & Cost Modeling," which included estimates for multiple items. One of these critical items is the RDT, which are inputs into the CAISO Master File (MF) for both generation and interconnection resources. The RDTs for generation describe to the market all the base physical and operational properties of each generation resource, which the market then uses for optimization and constraints. The RDTs for interconnection resources represent interchange schedules and market dispatch limits between Balancing Authorities Areas – for those in the EIM and those not participating. Separate RDTs must be prepared for PRs (Participating Resources) and NPRs (Non-Participating Resources). The decisions on what to include in the RDT will have impacts on the market solution. Some of the choices will be made based on tradeoffs, or with a plan about how manual dispatches or outages will be used to manage some condition that cannot be expressed in the RDT. The RDT also functions as an interface to the CAISO Master File, which then supplies the data to the market system. The other two items involved the collection of information and business logic to inform the DEB and MMA. These items need to be coordinated and aligned with the FNM and the engineering teams conducting the metering upgrades. This collective work was labeled under the Charter under Line Item 12 "Generation Participation & Cost Modeling" at $200k in capital. As there is no asset planned for installation, this work has been reclassified as expense.

6.3.2.4 *Energy Transfer System Resource (ETSR)*

An Energy Transfer System Resource (ETSR) is the representation of how the market facilitates the transfer of energy from one EIM Balancing Authority (BA) to another EIM BA for the purposes of tracking, tagging and settlements. As part of the implementation, Avista must define the physical location of the ETSR and negotiate ETSR limits with neighboring EIM Entities. Although the ETSR values will be configured in the EIM software, the business process definition and discussion are considered expense. The Charter did not include estimates for this work; however it's believed the effort will be accommodated within the existing expense estimate.

6.3.3 Track 3 Financial Estimate Summary

The estimates below include the following updates and additional costs:

- The Charter provided a capital estimate for Utilicast support of the FNM implementation under the Line Item 11 "Full Network Model for EIM" at $40k and a portion of the Avista FNM capital labor at $80k. The portion of the

on-going labor expense at $50k associated with Line 11 is for a new the FTE to support the FNM. The new FTE planned to support the FNM implementation, and the associated on-going labor expense costs, are represented in Table 4 and also in Track 6.

- The dispatch module implementation estimate was included in Charter Line Item 1 "Vendor EIM Software Solution" with a capital estimate of $120k. This has been transferred to the Track 3 financial estimates with an updated estimate of $160k.
- The Charter Line Item 12 "Generation Participation & Cost Modeling" had estimates for the creation of the Master File through RDT collection, the MMA and the DEB, and was planned as capital ($200k). As there is no asset planned for installation, so this work has been reassigned as one-time expense cost.
- With the exception of the Utilicast support for the FNM, there isn't a specific expense estimate for Utilicast under this track, as the support effort is represented in the EIM Program line in cost estimate tables.

Table 4 – Transmission & Generation Modeling Estimates

Track 3 - Transmission & Generation Modeling	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
	Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
FNM Creation*	$ -	$ -	$ -	$ -	$ -	$ -
FNM EIM Support (Line 11)	$ 80,000	$ -	$ 50,000	$ 80,000	$ -	$ 50,000
EIM Dispatch Module (Line 1)	$ 156,000	$ -	$ -	$ 160,000	$ -	$ -
Master File / Gen Cost Modeling (Line 12)	$ 200,000	$ -	$ -	$ -	$ 200,000	$ -
Totals	**$ 436,000**	**$ -**	**$ 50,000**	**$ 240,000**	**$ 200,000**	**$ 50,000**
Utilicast	$ 40,000	$ -	$ -	$ 40,000	$ -	$ -
Grand Totals	**$ 476,000**	**$ -**	**$ 50,000**	**$ 280,000**	**$ 200,000**	**$ 50,000**

* Funded by SCADA business case

6.4 Track 4 – System Integration & Testing

Enterprise Technology Software Selection

6.4.1 Existing State Prior to EIM

Avista has primarily relied on Nucleus, an in-house application, to perform a myriad of business functions that are typically satisfied with multiple, independent systems supporting Risk, Gas Supply, Power Supply, Resource Accounting and System Operations. At one point, Nucleus was a commercial application and Avista purchased the source code – thus customizing the application over many years to meet different business needs. Although Nucleus was briefly considered for EIM use, the plan quickly shifted to understanding what functions would be impacted or duplicated in the new systems needed for EIM operations. Where possible, Avista intended to avoid further integration with Nucleus and allow the application to support existing operations.

In terms of outage management for generation and transmission, Avista knew their existing internally developed Generation Outage Coordinator (GOC) application and manual submission processes would not be acceptable for market use. Avista planned to implement an Outage Management System (OMS) that would satisfy both the Transmission and Generation outage management processes internally for Avista and externally for EIM.

Avista has developed an internal generation optimization application called Avista Decision Support System (ADSS) and believe it will be integral for EIM operations, as there isn't a commercial application that specializes in hydro optimization. Avista chose to enhance the ADSS application for EIM use and integrate with the purchased OMS and Scheduling applications.

In June 2017, Avista implemented a Power Costs, Inc. (PCI) application for participation in CAISO's Market Redesign and Technology Upgrade (MRTU). The MRTU is a market operated by the CAISO, with governance provided by the California Public Utilities Commission (PCUC). The market's intent is to improve energy efficiency, transparency, reliability and prevent market manipulation within CAISO. Avista used the application to submit market bids and perform settlements calculations at the CAISO tie lines – locations that intersect Avista's contracted transmission path with CAISO

transmission grid. This was a limited installation of PCI's GenManager application, as prior to EIM, Avista did not have a business need for an extensive scheduling, bidding or settlement application.

6.4.1.1 EIM Software – RFP & Selection

In June of 2019, Avista engaged with Utilicast to define the system requirements for various EIM software applications, while assuming some internal applications would be modified for EIM. During requirements gathering, it was determined that Avista's Oracle Meter Data Management (MDM) application for residential meters would not be suitable for EIM metering activity. The assumption in the original charter assumed the MDM could be used for this functionality. Avista issued two technology-based RFPs. The first RFP was issued in August 2019 for a Generation and Transmission Outage Management System. The second RFP was issued October 2019 for the Bid to Bill EIM suite, including the PRSC and EESC for scheduling, the PRSC and EESC for settlements, Energy Accounting and an Analytics/Reporting application. A common scoring matrix and logic was used for both RFPs. The scoring matrix was based on a combination of the vendors scoring themselves and Avista's scoring. The vendors provided a self-score based on their ability to meet the functional and non-functional requirements. During the product demonstrations, Avista reviewed and adjusted the vendor provided score based on the product performance. Avista also scored on the areas of industry expertise, references, demonstration scenarios and customer service. A total score of 100 was achievable. The evaluation of software costs were not included in the scoring matrix, but were considered in the overall evaluation process, as some vendors provided pricing for standalone systems, while others provided bundled suite pricing. The primary drivers for software selection were centered on functionality and vendor relationships, as Avista knew the financial aspect would be influenced by software bundling options and contract negotiations.

The OMS RFP was issued to, and responses received from, Sunnet, Open Access Technologies, Inc. (OATI), PCI and MCG Energy Solutions. On-site demonstrations of each OMS product were held in mid-September 2019 with a cross-section of business and technology users, as well as Utilicast members. Excluding the Sunnet product, which focuses primarily on transmission outages, the OMS scoring was competitive. Knowing there was a desire to select a vendor who could fulfill multiple software needs, Avista delayed their OMS decision in favor of selection after the Bid to Bill software evaluation process. Table 5 below provides the scoring for each vendor.

Table 5 – OMS Vendor Scoring

Vendor	OMS Score
MCG Energy	87.7
PCI	87.1
OATI	83.3
SUNNET	74.0

The Bid to Bill Suite was issued to OATI, PCI, Power Settlements and MCG Energy Solutions. Although MCG Energy provides organized energy market solutions, their EIM Market-share representation is minimal and Avista did not believe their product would meet EIM needs. The on-site software demonstrations were held in the month of November 2019 with representation from PCI, OATI and Power Settlements. PCI and OATI bid the entire suite, while Power Settlements did not bid for Energy Accounting and did not have a fully developed scheduling solution (PRSC & EESC). Although a common scoring matrix was used, a different group of business users were engaged in the evaluation process. Each of the solutions within the Bid to Bill suite was scored individually, with a roll up score for each vendor listed in Table 6 below.

Table 6 – Bid to Bill Vendor Scoring

Vendor	Bid to Bill Score
PCI	77.3
OATI	71.1
Power Settlements	70.0

After all scores were collected, meetings were held with all the evaluation team members to discuss the merits of choosing a single vendor versus integrating a "best of breed" model with various multiple vendors. Trade-offs would be present as no single vendor could fully excel in each functional requirement area across eight software solutions. The evaluation team made a recommendation to choose PCI for PRSC/EESC scheduling, Energy Accounting, Transmission OMS and Generation OMS, and Power Settlements for PRSC/EESC settlements and Reporting/Analytics. Even though Power Settlements had a lower overall score for Bid to Bill because of not having a mature scheduling solution, the evaluation team felt they had a superior settlement and reporting/analytics solution.

After the EIM Director Steering Committee approved the recommendation in November 2019, the recommendation was reviewed and approved by the Executive Steering Committee in December 2019. Although the cost estimates presented to the leadership team exceeded the original Program Charter estimates, they reflected a baseline negotiation point and Avista believed additional savings could be negotiated with PCI and Power Settlements.

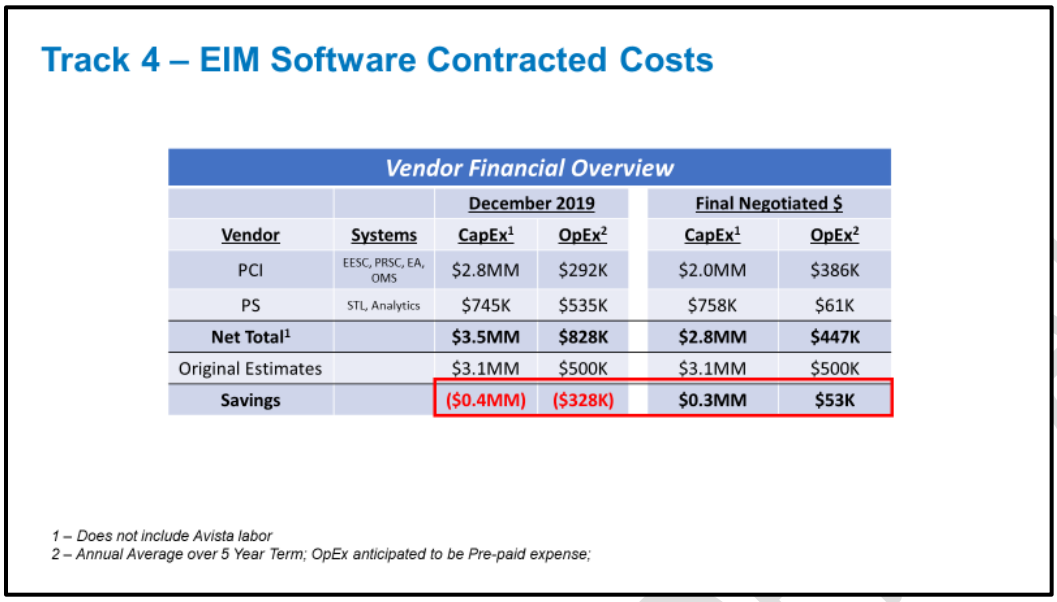
6.4.1.2 EIM Software – Negotiated Contract Costs

After the Executive Steering Committee approval, Avista engaged with PCI and Power Settlements to negotiate the terms and conditions of the agreements, as well as the implementation costs (capital) and on-going operating expense (expense), for the following EIM systems:

- **Power Costs, Inc.**
  - **Asset Operations**
    - Generation Outage Management System (GOMS) – Performs functions to submit planned and unplanned outages to CAISO for the generation units.
    - Transmission Outage Management System (TOMS) – Performs functions to submit planned and unplanned outages to CAISO for the transmission lines.
  - **GenManager Front Office**
    - PRSC Bidding & Scheduling System – Performs Merchant functions to submit bids and base schedules to CAISO for participating resources.
    - EESC Scheduling System – Performs Entity (Balancing Authority) functions to submit base schedules for both participating resources and non-participating resources.
  - **Energy Accounting**
    - Energy Accounting System – Performs meter verification, estimation and editing (VEE) for generation and interchange metering to produce and share Settlement Quality Meter Data (SQMD) with CAISO.
- **Power Settlements**
  - **SettleCore**
    - PRSC Settlement System – Performs Merchant settlement functions for the participating resources and activities.
    - EESC Settlement System – Performs Entity settlement functions for non-participating resources and transmission resources.
  - **Visual Analytics**
    - Performance & Analytics System– Performs a near real-time market analytic functions in a visual display.

In March 2020, Avista concluded the negotiations with PCI and executed an amendment to the existing Master Service Agreement (MSA). In May 2020, Avista concluded the negotiations with Power Settlements. The slide below, shown at the May 2020 Director and Executive Steering Committee meetings, summarizes the initial vendor costs presented in December 2019 and the vendor costs after negotiations, which resulted in a savings of $300k in implementation capital costs and annual average savings of $53k in expense costs over the five-year contracted agreement compared to the original vendor costs. These savings were attributed to Avista choosing an on premise deployment of Power Settlements, thus removing the hosting services.

Slide 1 – Negotiated Software Costs



Track 4 – EIM Software Contracted Costs

Vendor Financial Overview					
		December 2019		Final Negotiated $	
Vendor	Systems	CapEx[1]	OpEx[2]	CapEx[1]	OpEx[2]
PCI	EESC, PRSC, EA, OMS	$2.8MM	$292K	$2.0MM	$386K
PS	STL, Analytics	$745K	$535K	$758K	$61K
Net Total[1]		**$3.5MM**	**$828K**	**$2.8MM**	**$447K**
Original Estimates		$3.1MM	$500K	$3.1MM	$500K
Savings		**($0.4MM)**	**($328K)**	**$0.3MM**	**$53K**

1 – Does not include Avista labor
2 – Annual Average over 5 Year Term; OpEx anticipated to be Pre-paid expense;

6.4.1.3 EIM Software – Vendor Financial Estimate Summary

The Charter estimates for the software vendor costs were considered preliminary and included a financial range for each EIM system, and the estimates assumed the low range of the costs. They included software license costs, professional services and travel expenses for vendors. They were reflected under Charter Line Items 1 and 1a "Vendor EIM Software Solutions" at $1.26 million in capital, $840k in working expense and $500k in re-occurring annual maintenance expense. The capital and working expense estimates should have been combined into one capital estimate at $2.1 million. The Charter estimates assumed a hosted SaaS solution for all EIM applications, with internal Avista labor estimates for Oracle MDM customizations and reporting.

The Scope estimates in Table 7 include the following changes and combined allocations of funds:

- When the decision was made to purchase a COTS solution for Energy Accounting, instead of enhancing Avista's existing MDD application, the funds were reallocated. Charter Line Item 5 "Other Avista Software Enhancements – MDM" at $800k was reassigned with $400k allocated to software licensing and $400k allocated to Avista labor for software projects.
- The removal of the SaaS hosting costs for the PRSC/EESC Settlement system.
- The EMS Dispatch Module estimates at $120k under the Charter Line Items 1 and 1a "Vendor EIM Software Solutions" reassigned to Track 3, Table 4.
- The Charter estimates did not account for software hosting and maintenance fees that could be capitalized during project delivery, which lead to an additional $454k in capital.

Avista signed agreements with PCI and PS to implement the software and five years of application support after market entry. The Scope expense estimates in Table 7 include a capital cost assignment by EIM application, implementation expense for vendor software training and an on-going annual expense estimate over a five-year term. The Charter estimates did not specifically include an assumption for the software support term.

Table 7 – EIM Vendor Software & Licensing Estimates

Vendor	Track 4 - EIM Vendor Software	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
		Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
	Vendor EIM Software Solutions (Line 1)	$ 1,260,000	$ -	$ 500,000	$ -	$ -	$ -
	Vendor EIM Software Solutions (Line 1a)	$ 840,000	$ -		$ -	$ -	$ -
	Software Enhancements MDM (Line 5)	$ 400,000	$ -	$ -	$ -	$ -	$ -
	EMS Dispatch Model to Track 3 (Line 1)	$ (120,000)	$ -	$ -	$ -	$ -	$ -
	EIM Software Vendor Allocation	**$ 2,380,000**	**$ -**	**$ 500,000**	**$ -**	**$ -**	**$ -**
PCI	EESC Scheduling	$ -	$ -	$ -	$ 355,297	$ 10,152	$ 100,395
PCI	PRSC Bidding & Scheduling	$ -	$ -	$ -	$ 355,297	$ 10,152	$ 100,395
PCI	OMS (Gen / Trans) Phase 1 & 2	$ -	$ -	$ -	$ 513,307	$ 13,699	$ 84,961
PCI	Energy Accounting	$ -	$ -	$ -	$ 322,380	$ 8,122	$ 100,395
PS	PRSC & EESC Settlement	$ -	$ -	$ -	$ 725,500	$ 22,500	$ 64,637
PCI	Hosting & Maintenance	$ -	$ -	$ -	$ 444,117	$ -	$ -
PS	Maintenance	$ -	$ -	$ -	$ 10,000	$ -	$ -
	Totals	**$ 2,380,000**	**$ -**	**$ 500,000**	**$ 2,725,898**	**$ 64,625**	**$ 450,783**

6.4.1.4 EIM Software – Avista Labor Summary

The Charter estimates detailed various technology labor items to support the EIM software implementations. Table 8 outlines the Charter estimates by line item and presents a total Avista labor allocation that was applied to the EIM software projects. These estimates also include half of Charter Line Item 5 "Other Avista Software Enhancements – MDM" at $400k for Avista software project labor. This estimate assumed existing labor for project delivery and did not include estimated costs associated with the new EIM FTEs contributing to the capital software projects.

Table 8 – EIM Software Internal Labor

Track 4 - EIM Software Internal Labor	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
	Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
Vendor EIM Software Solutions (Line 1)	$ 900,000	$ -	$ -	$ -	$ -	$ -
Internal Integration Effort (Line 3)	$ 820,000	$ -	$ -	$ -	$ -	$ -
Custom Reporting Allowance (Line 4)	$ 200,000	$ -	$ -	$ -	$ -	$ -
Avista Software Enhancements MDM (Line 5)	$ 400,000	$ -	$ -	$ -	$ -	$ -
Dedicate Security & Architecture (Line 6)	$ 330,000	$ -	$ -	$ -	$ -	$ -
PgM Leadership Labor (Line 9)	$ 350,000	$ -	$ -	$ -	$ -	$ -
EMS Dispatch Model to Track 3 (Line 1)	$ (36,000)	$ -	$ -	$ -	$ -	$ -
EIM Software Internal Labor	$ -	$ -	$ -	$ 2,964,000	$ -	$ -
Totals	**$ 2,964,000**	**$ -**	**$ -**	**$ 2,964,000**	**$ -**	**$ -**

6.4.1.5 EIM Software – Total Project Financial Estimate Summary

The Program Charter estimates included the vendor estimates, estimates for internal labor, and professional services associated with a System Integrator. However, they were shown in different line items and not consolidated. The updated total project capital estimates in Table 9 represented total estimated costs for the EIM software implementation, with the following details:

- Avista's RFP software selection and procurement effort with Utlicast and internal Avista labor. The 2019 Technology RFP with Utilicast was reflected under Charter Line Item 10 "System Selection & Procurement" with a $500k expense estimate for Utilicast and $680k for Avista labor. Utilicast actuals for the Technology RFP are listed in Table 1 and Table 9.
- Summarized vendor software allocation from Table 7
- Summarized internal labor allocation from Table 8
- The OMS project separated into two phases – Phase 1 for pre-EIM entry and Phase 2 for EIM go-live
- Utilicast labor allocated based on deliverables included in 2020-2022 Implementation Agreement (Table 2)
- The removal of SaaS hosting costs for the PRSC/EESC Settlement system

- The addition of hardware costs associated with the on premise deployment of the EESC & PRSC Settlement system at $77k.
- Nucleus enhancements estimates for EA and Settlements
- The PRSC Settlements & EESC Settlements applications combined into a single project, with the inclusion of the Advanced Analytics module.
- The addition of training expense as provided by the EIM software vendor.

Table 9 – EIM Software Projects Costs

Vendor	Track 4 - Software Projects Total	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
		Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
	System Selection & Procurement	$ -	$ 680,000	$ -	$ -	$ 680,000	$ -
	EIM Software Vendor Alloc. (Table 7)	$ 2,380,000		$ 500,000	$ -	$ -	$ -
	EIM Software Internal Labor (Table 8)	$ 2,964,000	$ -	$ -	$ -	$ -	$ -
PCI	EESC Scheduling	$ -	$ -	$ -	$ 973,816	$ 10,152	$ 100,395
PCI	PRSC Bidding & Scheduling	$ -	$ -	$ -	$ 1,105,816	$ 10,152	$ 100,395
PCI	OMS (Gen / Trans)	$ -	$ -	$ -	$ 880,774	$ 13,699	$ 84,961
PCI	OMS (Gen / Trans) Phase 2				$ 234,094		
PCI	Energy Accounting	$ -	$ -	$ -	$ 1,212,899	$ 8,122	$ 100,395
PS	PRSC & EESC Settlement	$ -	$ -	$ -	$ 1,660,400	$ 22,500	$ 64,637
PS	Visual Analytics	$ -	$ -	$ -			
	Totals	$ 5,344,000	$ 680,000	$ 500,000	$ 6,067,799	$ 744,625	$ 450,783
	Utilicast	$ -	$ 500,000	$ -	$ 2,986,181	$ 508,435	$ -
	Grand Totals	**$ 5,344,000**	**$ 1,180,000**	**$ 500,000**	**$ 9,053,980**	**$ 1,253,060**	**$ 450,783**

Table 9 provides an estimate of software costs without Utilicast costs assigned to individual projects.
Table 10 provides an estimate of software costs by project with Utilicast costs included.

Table 10 – EIM Software Projects Costs with Utilicast*

Vendor	Track 4 - Software Projects Total with Utilicast	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
		Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
PCI	EESC Scheduling	$ -	$ -	$ -	$ 1,599,004	$ 10,152	$ 100,395
PCI	PRSC Bidding & Scheduling	$ -	$ -	$ -	$ 1,731,003	$ 10,152	$ 100,395
PCI	OMS (Gen / Trans)	$ -	$ -	$ -	$ 1,421,499	$ 13,699	$ 84,961
PCI	OMS (Gen / Trans) Phase 2				$ 459,591		
PCI	Energy Accounting	$ -	$ -	$ -	$ 1,586,342	$ 8,122	$ 100,395
PS	PRSC & EESC Settlement	$ -	$ -	$ -	$ 2,256,541	$ 22,500	$ 64,637
PS	Visual Analytics	$ -	$ -	$ -			
	Totals	**$ -**	**$ -**	**$ -**	**$ 9,053,980**	**$ 64,625**	**$ 450,783**
	Utilicast	$ -	$ -	$ -	$ -	$ 508,435	$ -
	Grand Totals	**$ -**	**$ -**	**$ -**	**$ 9,053,980**	**$ 573,060**	**$ 450,783**

**Excludes System & Software Selection Utilicast implementation costs*

6.4.1.6 EIM Software – Miscellaneous

- **EIM MV90:** Beyond the EIM Bid to Bill software provided by PCI and PS, Avista also needed a meter head-end system to collect interval meter data for market submission. Avista had a choice to use an existing MV90 installation used for commercial customers or install a new MV90 specifically for EIM meter collection. Avista decided to install a new instance of MV90, as the existing installation is out of maintenance and support warranty and the existing meters are on a long-term transition to another enterprise customer billing system.

Any meters that can't be transitioned to the enterprise billing system, will be migrated to the new instance of MV90 and the existing installation will be retired.

The project to install the EIM MV90 xi application offered by Itron started in Q2 2019 and the project completed in Q1 2020. As revenue quality SEL-735 meters are installed or reconfigured to support market entry, they'll send daily meter data to this collection system. The Charter did not include a single line item for the MV90 project, but instead provided estimates for bodies of work associated with network improvements, continuation of third-party meter data access, and hardware and software licensing costs. These estimates were presented in various line items in the Charter, which were later consolidated or reassigned to the EIM MV90 project. The EIM MV90 project had a total spend of $438,166, with on-going O&M expense estimated at $20k.

- **Miscellaneous Hardware and Software:** Although the Charter planned for a SaaS EIM solution, not all EIM-related applications would follow this deployment method. This estimate accommodated hardware and software costs for associated EIM applications that would be on premise at Avista, such as the MV90 meter headend application. The estimate in Charter Line Item 7 "Miscellaneous Software & Hardware Costs" at $330k for capital and $25k of on-going annual maintenance expense were assigned to the MV90 project.

- **MV90 Network:** As a component of the EIM MV90 installation project, the Charter provided a financial estimate to route MV90 data securely through the SCADA network, and allow secure third-party interchange access to the meter data. The estimate in Charter Line Item 23 "Network – MV90 (2, 7)" at $55k for capital was originally labeled as a service, but should have been labeled as Avista labor. These labor estimates were assigned to the MV90 project.

- **MV90 / Migrate BPA Meters:** At 12 interconnection locations, BPA requires Avista provide MV90 access for energy scheduling and accounting purposes. The meters are accessed both through Avista's MV90 and BPA's MV90. With the decision to replace interchange meters at these locations and the NERC Critical Infrastructure Protection (CIP-003) requirement to provide secure communications, a secure Virtual Private Network (VPN) connection was established for BPA's MV90. The scope to develop the BPA to Avista VPN connection has been accommodated under the interchange substation projects, and the scope to commission the individual communications to each meter will be included in each project. The estimates in Charter Line Item 25 "Stand Up MV90 & Migrate Existing BPA Meters" at $215k for capital and $18k of on-going services expense were reallocated to Avista's EIM MV90 project.

Table 11 – MV90 Project

Track 4 - MV90	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
	Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
Misc. Hardware / Software (Line7)	$ 330,000	$ -	$ 25,000	$ -	$ -	$ -
MV90 Network (Line 23)	$ 55,000	$ -	$ -	$ -	$ -	$ -
MV90 / Migrate BPA Meters (Line 25)	$ 215,000	$ -	$ 18,000	$ -	$ -	$ -
MV90 EIM Project				$ 438,166	$ -	$ 20,000
Total	**$ 600,000**	**$ -**	**$ 43,000**	**$ 438,166**	**$ -**	**$ 20,000**

- **Variable Energy Resources (VER) Forecast:** In order to adequately forecast Variable Energy Resources (VER) generation output, Avista needs to acquire a single VER forecast solution that will provide a five-minute generation forecast based on weather conditions for all VER facilities in Avista's BA. Avista currently has two (Meteologica and Vaisala) forecast providers that provide hourly values. Avista needs a singular forecast to integrate into EIM software and a service that can expand as additional VER resources are brought online in the BA. Avista intends to operate a pilot trial period with forecast providers before selecting and implementing the

service for EIM. These costs were not planned in the Charter. A capital estimate ($200k) and on-going expense estimate ($15k) have been updated.

- **Current Transformer (CT) Analyzer:** In order to support the transformer accuracy testing efforts at substation and generation locations, Avista purchased software called "CT Analyzer" offer by Omicron. These costs were not planned in the Charter, but the application was required to test the accuracy of CTs to verify they met CAISO market requirements. If the CT accuracy did not meet the CAISO standard then they were either replaced, or a correction factor was calculated which may result in market penalties. These costs were not planned in the Charter and the actual cost was $11k.

- **OATI Tag Forwarding:** In order to adequately support the EESC Settlement solution, tag data is to accurately analyze the billing determinates provided by CAISO. Additionally, the tag data is required for the EESC Scheduling solution. Avista originally planned to leverage OATI's webData solution to provide the tag data to the EESC Scheduling solution. However, during the planning phase of the project, it was determined that the software vendors preferred methodology was to receive the tag data via OATI's Tag Forwarding service. This service is required to meet the tag data requirements for both the EESC Settlement and EESC Scheduling solutions. These costs were not planned in the Charter and the capital estimate ($27k) and on-going expense estimate ($27k) have been updated.

- **PCI E-Tag Forwarding:** In order to adequately support the EESC Settlement solution and the EESC Scheduling solution, tag data is required (see above). Given the fact that the tag data is needed for two EIM systems, and OATI's Tag Forwarding service can only provide tag data to one system, a "pass through" tag data solution was devised. PCI's E-Tag Forwarding solution was surfaced for this "pass through" and Avista will pursue this solution. These costs were not planned in the Charter and the capital estimate ($30k) and on-going expense estimate ($19k) have been updated.

- **Avista Decision Support System (ADSS) Enhancements**: When Avista conducted the EIM software RFP, it was planned that Avista's internal optimization application – ADSS – would perform EIM bid calculation and other EIM requirements. Avista estimated $1 million in internal Avista labor to perform the ADSS enhancements, but that estimate did not include estimates for professional services related to development or implementing the functionality, or full data integration with other EIM applications because the specific interfaces were not known at the time the original estimate was created. The estimated $1 million was not included in the EIM Program BC or Charter, but rather in the 2020 ADSS enhancement BC under productivity funding.

  The ADSS EIM enhancement effort began in Q1 2020 and has led to greater understanding of the business functions needed to support EIM operations and integration with the EIM software. Enhancements for EIM include bidding configuration, changes to the scratch pad feature, a market dashboard and the creation of an economic balancing stack of Avista's resources. Integration of these features is planned for PCI's Outage Management software and the PRSC/EESC software. The new estimate to complete the ADSS enhancements was increased by $2.0 million to $3.46 million total including Utilicast support.

  The updated ADSS forecast of $3.46 million is inclusive of updated labor estimates, professional services, Utilicast costs and full integration costs. Avista's Project Accounting Department recommended that all ADSS EIM enhancement costs be moved to the EIM project and removed from productivity funding based on the new scope and performed work. In July 2020, the Executive EIM Steering Committee approved the transfer of the EIM ADSS effort to the EIM BC, with funding covered by the Program contingency. The labor estimate below includes Avista and contract labor (non-labor), while the professional services estimate includes support from Sixth Man for user experience design and Abermod for bidding calculation logic.

Table 12 – ADSS EIM Estimates

Track 4 - ADSS EIM	Scope Capital Estimates (as of 08/2020)			
	2020	2021	2022	Total
Labor	$ 1,332,312	$ 1,174,795	$ 315,421	$ 2,822,528
Professional Services	$ 128,966	$ 36,000	$ -	$ 164,966
Utilicast	$ 163,484	$ 154,117	$ 155,035	$ 472,636
Totals	**$ 1,624,762**	**$ 1,364,912**	**$ 470,456**	**$ 3,460,130**

6.4.1.7 EIM Software – Miscellaneous Software Financial Summary

The Charter did not include a single line item for the EIM MV90 project, but instead provided estimates for bodies of work associated with network improvements, continuation of third-party meter data access, and hardware and software licensing costs. These have been summarized in the below chart. In addition, the Charter estimates did not include funding for ADSS EIM enhancements and integration, a new VER forecast provider or the purchase of CT testing software. The Utilicast charges reflected below are only associated with the ADSS EIM effort. The software maintenance expense estimates below include an on-going annual estimated amount.

Table 13 – Miscellaneous Software Estimate Update

Track 4 - Miscellaneous Software	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
	Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
MV90 (Table 11)	$ 600,000	$ -	$ 43,000	$ 438,166	$ -	$ 20,000
VER Forecast	$ -	$ -	$ -	$ 200,000	$ -	$ 15,000
CT Analyzer	$ -	$ -	$ -	$ 11,004	$ -	$ -
OATi Tag Forwarding	$ -	$ -	$ -	$ 27,600	$ -	$ 27,600
PCI eTag Forwarding	$ -	$ -	$ -	$ 29,850	$ -	$ 18,750
ADSS Enhancements	$ -	$ -	$ -	$ 2,987,494	$ -	$ -
Totals	$ 600,000	$ -	$ 43,000	$ 3,694,114	$ -	$ 81,350
Utilicast	$ -	$ -	$ -	$ 472,639	$ -	$ -
Grand Totals	**$ 600,000**	**$ -**	**$ 43,000**	**$ 4,166,753**	**$ -**	**$ 81,350**

6.4.1.8 EIM Software – Annual Upgrades & Enhancements

Avista has forecasted costs to implement the solutions and on-going vendor costs associated with maintenance and licensing. Avista also recognizes the need to forecast costs for future annual upgrades and enhancements to expand capabilities and increase efficiencies. Additionally, the CAISO releases annual market enhancements which affect EIM software and may cause subsequent internal integration changes. Avista has forecasted $500k annually for EIM upgrades and enhancements to support operations. These estimates are preliminary and will be refined as Avista gains operational market experience.

6.5 Track 5 – Metering & Settlements

Generation Production & Substation Support, Interchange & Network Infrastructure

6.5.1 Existing State Prior to EIM

Within the Metering & Settlements Track, Avista grouped upgrades for generation and substation interchange metering, generation controls and network infrastructure. In order to appreciate why Avista pursued a specific scope path, it's important to understand Avista's existing state prior to EIM. Across a majority of the generation and substation sites, Avista has relied on non-revenue quality meters with no ability to securely retrieve 5-minute revenue quality interval meter data required for market participation. The most extreme unsuitable EIM meter is at the Post Falls Hydro Electric Dam, which has antiquated electro-mechanical meters with a manual hourly meter collection process. Most of Avista's

generation sites did not have revenue class Current Transformers (CTs) or Potential Transformers (PTs) that allow for accurately measuring generation output. Avista also has very limited Automated Generation Control (AGC) systems and associated Programmable Logic Control (PLC) at its generation plants – both of which are required for a resource to receive and follow a Market dispatch signal. Although there is a network presence at most of these generation sites, not all generation meters are capable of connecting to the network for retrieval of 5-minute interval data. However, the current state of Avista's meters, generation controls and associated network connectivity was acceptable, as Avista traditionally operated in a bi-lateral hourly market.

Throughout the substation interconnection sites, Avista does meet the revenue quality meter requirement with JEMStar meters and accurate CTs/PTs. Although Avista considered reprograming these meters to collect 5-minute interval data with an associated memory upgrade, these meters are at least 12 years old, require dial up communications to retrieve this interval data and are unable to connect via Internet Protocol (IP) communications. Considering the age of the meters and the fact that Avista should not rely on dial up communications alone, the decision was made to replace the meters with a SEL-735 meter capable of 5-minute interval data and multiple connectivity options.

Due to limited field support of dial up communications and lack of monitoring capabilities, Avista decided to replace dial up communications in favor of IP communications installations wherever cellular installations are feasible – this aligns with Avista's preferred communication protocol and long-term operational plan. For the purposes of EIM, the IP communications migration will be limited to MV-90, engineering access, and metering communications, but eventually could include migration of SCADA as part of a future project if the new IP communications circuits are deemed reliable. Migration to IP communications for SCADA and metering has been a long-term evolution for Avista, and one without a strong business need prior to EIM.

Avista does collect hourly interchange meter data, but it's done at most substations by non-revenue meters with varying capabilities, with various network protocols, manual processes and supplemented with information from PI (Plant Information) and SCADA averages. This process and the associated data are not scalable or reliable for accurate 5-minute interval EIM metering and settlements.

6.5.2 Generation Production & Substation Support – Scope Summary

In 2018, Utilicast and Avista partnered to conduct a site by site metering assessment to document Avista's metering and controls infrastructure, highlighting where existing assets were insufficient for EIM entry. Sites were divided into two categories: market dispatch and non-dispatch. Initially, it was determined that all market dispatch resources would need to be equipped to bid at the unit-resource and at the plant aggregate-resource levels. Components at dispatch plant sites would be revenue grade, and all controls would need to be upgraded to accommodate both Avista internal dispatch and market dispatch requests. While non-dispatch sites would also adhere to CAISO requirements, flexibility, redundancy, and accuracy were of lesser priority for resources that would not be bid into the market. Avista intended to retain existing CTs and PTs at non-dispatch sites. These sites were planned for correction factors, thereby minimizing project scope and cost. With these general guidelines in mind, the Metering Assessment Summary Report was developed, project scope was identified for each site, and costs were assigned at a very rough order of magnitude.

In the first quarter of 2019, Generation Production & Substation Support (GPSS) was asked to review and refine estimated EIM metering and controls costs. Because Avista was still gathering participation requirements and market strategy information, scope was not yet highly defined. Thus, project cost refinements conducted in early 2019 were considered preliminary and assigned plus or minus 50% accuracy, per the standards of the Association for the Advancement of Cost Engineering (AACE). As a starting point, each market dispatch location was assigned new high-side meters (HSM) and EIM PLC. In order to provide an initial HSM cost assessment, the Noxon Rapids, Cabinet Gorge, Coyote Springs 2, and Little Falls locations were individually assessed. Then, Rathdrum, Lancaster, Boulder Park, Kettle Falls, and Long Lake HSM projects were assigned HSM cost estimates based on which assessed location they most resembled. A single EIM PLC project cost was estimated and applied to all dispatch locations. At non-dispatch locations, the goal was to achieve CAISO metering requirements while minimizing project costs. Low-side generation meters (LSM) needed to be compliant SEL-375s, but CTs and PTs

did not need to be revenue grade. Instead, an estimated cost for transformer accuracy testing was applied to all CTs and PTs in order to account for the cost of accuracy measurements and correction factor calculations. In March of 2019, teams completed new estimates for HSM and PLC dispatch sites, and LSM and CT/PT measurement costs for non-dispatchable sites.

Since March 2019, Avista's market understanding and participation strategy for each site has matured. Pilot HSM, LSM and PLC projects began at Noxon Rapids in the summer of 2019. In January of 2020, GPSS conducted Resource Participation Strategy Workshops by plant to finalize detailed project scope at each generation site. Avista leaned on Utilicast's expertise, interdepartmental meetings, and economic studies to further understand the best strategy for preparing Avista's assets for EIM entry. Because of these additional learnings, scope changed and project costs increased beyond the estimates developed in March 2019. Scope changes included transferring third-party generation metering and control upgrades to Substation projects, changing some locations from dispatch to non-dispatch or high-side metering to low-side metering based on the detailed field assessments and additional design work. Many of the planned dispatch sites no longer required PLC projects and most non-dispatch projects ultimately required new transformers. Contractors were hired to support project management, electrical design, and drafting services. All deviations from preliminary estimates have been governed by the Advisory Committee and the Director Steering Committee for approvals, and changes have been documented, approved and filed for record.

6.5.2.1 *High Side Meter Scope*

High-side meter (HSM) projects planned to install SEL-735 meters on the substation-side of the Generation Step-up Units (GSU) in accordance with Avista's most current *SEL-735 Combined (interchange and generation) Meter Setting Standard*. These meters validate market resource configurations, and related metering components in alignment with the physical characteristics and EIM participation level with all generation resources feeding the metered GSU (for example, multiple units and station service). When a HSM is installed at a participating resource, revenue class CTs/PTs are often installed as part of the project. HSM projects involve SCADA and network communication improvements, as well as MV-90 configuration.

6.5.2.2 *Low Side Meter Scope*

Low-side meter (LSM) projects planned to install SEL-735 meters at plant-side of the GSU in accordance with Avista's most current *SEL-735 Combined Meter Setting Standard*. One LSM meter validates market resource configurations and related metering components in alignment with the physical characteristics and the EIM participation level within one generating unit or station service. When a LSM is installed, revenue class CTs/PTs are added or existing non-revenue class CTs/PTs are utilized with an appropriate compensation factor applied. LSM projects involve SCADA and network communication improvements, as well as MV-90 configuration.

6.5.2.3 *Programmable Logic Control Scope*

EIM Programmable Logic Control projects (PLC) planned to install a PLC system to act as an interface point between Avista's Supervisory Control and Data Acquisition (SCADA) system, plant high-side meters, low-side meters and plant unit controllers. The PLC receives plant MW set points from SCADA, from Avista operators or the market, and delivers the unit MW set point to the unit PLC. It also receives HSM, unit, and station service metering MW signal inputs, as well as meter position switch inputs. It blocks unit rough zone and non-compliant emission operating set points and connects to the plant Human Machine Interface (HMI), which allows plant operations to start and stop units. Finally, the EIM PLC possess a switch input for EIM participation and non-EIM participation modes.

6.5.2.4 *Low Side Meter Reconfiguration Scope*

At some generation sites, the unit and/or station service meters were already upgraded to SEL-735 meters as part of a previous project. These meters required reconfiguration in accordance with Avista's most current *SEL-735 Combined Meter Setting Standard.* These new settings integrate with MV-90 billing recorders and contain EIM information in the SCADA and Generation Distributed Network Protocol (DNP) Maps. The transformer compensation is applied to meter settings so SCADA has a backup MV-90 signal to create redundancies with the new HSMs. No new assets are planned for installation; therefore this work is classified as expense.

6.5.2.5 *Metering & Transformer Research Scope*

The CAISO Metering Business Process Manual outlines acceptable equipment ratings such as transformer accuracy and burden ratings needed for EIM participation. This scope includes researching meter details, and conducting field tests where the accuracy of the equipment burden rating was unknown and correction factors would be applied. EIM entities can use equipment which does not meet the ratings requirements and apply a correction factor, which reduces the observed readings to ensure that the metered output is not overstated – it doesn't increase accuracy. With field test data, Avista can calculate the appropriate correction factor to adjust for deficiencies in CT and PT accuracy. No new assets are planned for installation; therefore this work is classified as expense.

6.5.3 GPSS Financial Estimate Summary

The Charter estimates were considered preliminary and assigned a plus or minus 50% accuracy, per AACE standards. In the Charter, they were represented as capital only items in the Solutions & Services column, but should have be represented in the Avista Labor column under the following:

- Charter Line Item 19 "Generation Metering from GPSS – Low Side" at $764k
- Charter Line Item 20 "Generation Metering from GPSS – High Side" at $2.3 million
- Charter Line Item 21 "Generation Metering from GPSS – EIM PLC" at $2.1 million

The estimates in the Charter did not include a potential 50% increase in costs and assumed internal engineering design for all aspects of the projects and internal field labor. The original estimates included labor, materials, and travel time, but failed to include drafting labor (internal or contracted), project management labor (contracted), labor for planning costs, professional services for engineering (Northwest Power Engineering), Utilicast, AFUDC and overheads. The updated estimates below include these additions. They also reflect:

- Elimination of EIM PLC projects at six generation locations
    - Rathdrum, Lancaster, Boulder Park, Kettle Falls, Long Lake and Little Falls
- Transfer of Lancaster efforts to Substation for management and execution for the installation of Automated Generation Control (AGC) at the plant and HSM configuration at the BPA-owned Lancaster interchange.
- Transfer of Coyote Springs HSM efforts to ET Network, as there is a BPA-owned interchange and revenue quality meter that can be leveraged
- Transfer of costs at two locations to Substation based on project accounting rules, while the management and execution of the work stayed with GPSS.
    - Noxon 230 kV, Northeast CT
- Scope change as strategies changed from high-side to low-side metering, dispatch to non-dispatch, and the use of correction factors to control costs. This was the case at Boulder Park, which switched from a HSM to a LSM project. The decision to make Long Lake a non-dispatchable resource resulted in a scope from a HSM to a LSM project.
- Change of scope and/or accounting clarification of scope resulted in a transfer of capital to expense costs
    - Monroe, Kettle Falls and Little Falls
- Discovery of open-delta transformer complications at two locations
    - Post Falls (LMS to HSM) and Long Lake
- Non-Participating Resource (NPR) metering research conducted by Northwest Power Engineering to support meter settings and configuration
- Utilicast metering and controls support labor estimated for GPSS projects open as of August 2020.
- The O&M expense estimates represent a single time charge.

Table 14 – GPSS Financial Estimate Updates

Track 5 - GPSS	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
Project Type	*Capital*	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
HSM (Line 20)	$ 2,336,696	$ -	$ -	$ 2,137,536	$ -	$ -
PLC (Line 21)	$ 2,131,353	$ -	$ -	$ 1,594,331	$ -	$ -
LSM (Line 19)	$ 607,615	$ -	$ -	$ 663,490	$ -	$ -
LSM Reconfiguration	$ -	$ -	$ -	$ -	$ 222,326	$ -
Metering Research	$ -	$ -	$ -	$ -	$ 62,250	$ -
Totals	**$ 5,075,664**	**$ -**	**$ -**	**$ 4,395,356**	**$ 284,576**	**$ -**
Utilicast	$ -	$ -	$ -	$ 67,060	$ -	$ -
Grand Totals	**$ 5,075,664**	**$ -**	**$ -**	**$ 4,462,416**	**$ 284,576**	**$ -**

6.5.4 Substation Interconnection & Third-Party Generation – Scope Summary

As outlined in the 2018 Utilicast metering assessment, Avista and Utilicast provided an initial assessment of what substation interconnection and third-party generation locations would need metering upgrades, which led to the initial cost estimate in the Charter. Since that time, the forecasted scope of work for substation interchange and third party generation metering is nearly equivalent to what was originally estimated, with some differences:

- The original scope of work assumed meter replacement at all sites, but further research determined that three sites required meter reconfiguration because a SEL-735 meter had been installed under a previous substation project.
  - Substation Interchange Locations: Deer Park, Orofino and Colbert
  - Third-Party Generation Locations: Lind Solar
- Six sites were removed from this body of work because planned substation projects already addressed EIM needs, were scheduled to complete prior to the EIM deadline and funded through other business cases.
  - Substation Interchange Locations: Spirit, North Lewiston, Westside, Dry Gulch, Opportunity
  - Third-Party Generation Locations: Clearwater Paper Company
- The metering and controls work at the Lancaster generation site was originally included in the GPSS upgrade work and has been transferred to third-party generation work because Avista does not own the plant. The controls work to install Automated Generation Control (AGC) at Lancaster, and the associated communication upgrades, are planned to be funded by Avista but installed by Tyr, the plan owner. The substation interconnection meter reconfiguration, which will serve as a high-side meter for Lancaster generation, will be funded by Bonneville Power Administration (BPA).

The original substation estimates did not include project costs for meter upgrades at Saddle Mountain interchange or the Rattlesnake Flats third-party wind generation site and are not reflected in the updated estimates. Those locations will accommodate EIM metering standards and MV90 configuration under existing substation projects and are funded through other business cases.

- Pend Oreille Public Utility District: At the time of the Charter estimates, Avista assumed metering upgrades for Pend Oreille Public Utility District (POPUD), would not be funded by Avista. Although Avista owns these interchange and generation meters, the upgrade costs would be funded by POPUD and updated prior to EIM entry per the existing Metering Agreement between the entities.
  - POPUD Substation Interchange Locations: Newport, Diamond Lake, Metaline Falls, Pine Street, Box Canyon.
  - POPUD Generation: Box Canyon

  Based on current discussions with POPUD leadership and Avista, Avista may need to fund the upgrades as POPUD does not have the resources to complete the work within the timeframe required to meet CAISO milestones. The upgrades are estimated at $200k for design and installation.

6.5.4.1 *Meter Replacement Scope*

At some interconnection locations, a meter replacement project was planned to install one or more SEL-735 meters in accordance with Avista's most current *SEL-735 Combined Meter Setting Standard*. These new settings integrate with MV-90 billing recorders and contain EIM information in the SCADA and Generation Distributed Network Protocol (DNP) Maps. In some cases, accompanying integration equipment was also planned for installation, such as a Remote Terminal Unit (RTU), GPS clock, SEL-3620 or SEL-3622 security appliance, and/or RuggedCom Ethernet switch.

6.5.4.2 *Meter Reconfiguration Scope*

At some interconnection locations, one or more SEL-735 meters had been installed as part of a previous project. These meters required reconfiguration in accordance with Avista's most current *SEL-735 Combined Meter Setting Standard.* These new settings integrate with MV-90 billing recorders and contain EIM information in the SCADA and Generation Distributed Network Protocol (DNP) Maps. No new assets are planned for installation, therefore this work is classified as expense.

6.5.5 Substation & Third-Party Financial Estimate Summary

The Charter estimates for substation and third-party generator work assumed internal engineering design for all aspects of the projects and field labor. This work was represented under Charter Line Item 15 "Transmission Meters & Data Collection – SS & 3rd Party" at $852k for capital, without any expense estimates. They were represented as capital only items in the Solutions & Services column, but should have been represented in the Avista Labor column. The original estimates included some internal labor, materials, and travel time, but failed to include drafting labor (internal and external), project management labor, labor for planning costs, AFUDC, overheads, professional services for engineering design (POWER Engineers) and Utilicast. The updated estimates below include these additions. They also reflect:

- Change in the scope at three locations from meter replacement to meter reconfiguration.
- The removal of costs associated with six locations where other substation projects will address EIM needs.
- Inclusion of Lancaster efforts for the installation of Automated Generation Control (AGC) and HSM configuration at the BPA-owned Lancaster interchange.
- Inclusion of two generation projects that were managed by the GPSS business unit, but the project accounting details were recorded under the substation business unit based on FERC accounting rules.
    - Noxon 230 kV, Northeast CT
- Inclusion of POPUD meter replacements
- Utilicast metering support labor estimated for all substation and third-party generation meter projects open as of July 2020.
- The O&M expense estimates represent a single one-time charge.

Table 15 – Substation & Third-Party Generation Financial Estimate Updates

Track 5 - Substation	Charter Estimates (as of 2019)			Scope Estimates (as of 08/2020)		
Project Type	*Capital*	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
Substation Interchange						
Meter Replace (Line 15)	$ 610,200	$ -	$ -	$ 1,312,291	$ -	$ -
Meter Reconfiguration	$ -	$ -	$ -	$ -	$ 18,720	$ -
Third-Party Gen						
Meter Replace (Line 15)	$ 242,000	$ -	$ -	$ 315,515	$ -	$ -
Meter Reconfiguration	$ -	$ -	$ -	$ -	$ 36,100	$ -
AGC	$ -	$ -	$ -	$ 157,724	$ -	$ -
Totals	**$ 852,200**	**$ -**	**$ -**	**$ 1,785,530**	**$ 54,820**	**$ -**
Utilicast	**$ -**	**$ -**	**$ -**	$ 67,060	$ -	$ -
Grand Totals	**$ 852,200**	**$ -**	**$ -**	**$ 1,852,590**	**$ 54,820**	**$ -**

6.5.6 Network Infrastructure Support – Scope Summary

At the time of Program Charter estimates, every controls and meter upgrade project assumed a parallel network communications capital project to support asset implementation. The network scope was divided into "packages" as detailed below and each site was assigned a package. With the exception of Package 6, each package assumed on-going expense estimates for maintenance and support. The Charter financial estimates assumed Avista would remove existing dial-up communications and install secure third-party Internet Provider (IP) communications via a reliable wired circuit at many, if not all, locations. Internet Protocol communications can either be physical wires, such as Ethernet or a T1 line that provides high-speed data transport services, or wireless options such as private microwave or commercial cellular. Avista has a mixture of communication options in production, including a mixture of contracted carrier services and Avista-owned private services.

As the metering or controls projects began, network site surveys were conducted to evaluate communication options with the goal of implementing an economic, reliable and secure network path. Sometimes, this meant retaining existing dial-up communications at a location or changing the body of work from capital to expense. Throughout the middle of 2019 and into 2020, these site surveys led to an updated scope of work for network infrastructure as reflected in the following changes:

- At eight substation interconnection locations, the original scope assumed delivery of wired T1 communications with High Voltage Protection outlined in Package 2, but upon conducting site surveys that scope has been reduced to one location – Burke.
    - Three sites were removed because planned network projects already addressed IP communication needs, were scheduled to complete prior to the EIM deadline and funded through other business cases: Orofino, Sagle & Colbert
    - Three sites originally planned for wired IP communications will now deliver a wireless option:
        - Cellular Wireless: Milan & Priest River under Package 5
        - Microwave: Kettle Falls under a modified Package 2
    - One site planned for wired IP communications will retain dial-up communications: Spirit
- Two substation interconnection locations identified to receive IP communications under Package 1 were already delivered under a previous project: Lolo & Dry Creek
- Four substation interconnection locations were planned for IP communications under Package 3, but will deliver a wireless cellular option under Package 5: Noxon 13kV, Deer Park, Wilbur & Loon Lake
- At the Northeast CT generation site, it was determined that no network hardware was needed based on the GPSS design.
- At two generation sites, it was determined that network hardware would be delivered and funded through other business cases:
    - Boulder Park & Rathdrum
- At three generation sites, the meters had already been upgraded and only needed network reconfiguration. These sites have been transferred to Package 6 scope as expense:

- Monroe Street, Little Falls & Kettle Falls

6.5.6.1 *Package 1 – Standard Substation Communication Package Scope*

Some locations do not have IP communications delivered to the site. Those locations were planned to receive IP communication services from a Network Service Provider. The Standard Substation Communication Package includes contracting IP services from a third-party Local Exchange Carrier (LEC) and the installation of communication hardware: Cisco Connected Grid Router 2010 (CGR2010), a Cisco Industrial Ethernet 4010 Switch (IE4010), and a NetGuardian Remote Terminal Unit (RTU) for monitoring the communications system and physical elements of the substation. Fiber-optic transceivers, fiber jumpers and other cabling equipment were also included.

6.5.6.2 *Package 2 – Standard Substation Communication Package + High Voltage Protection Scope*

This scope assumed the base installation of Package 1 and equipment to protect against Ground Potential Rise. At some locations, a LEC wired communication service was required to protect from Ground Potential Rise – a phenomenon that occurs when large amounts of electricity enter the ground and have a high potential to harm people or equipment. To provide this High Voltage Protection (HVP), fiber-optic cabling is used between the substation panel house and the Copper-Fiber Junction box (CFJ) where services from the provider are transferred to Avista. The distance between these two points is determined by the LEC and provides protection for the LEC if an electrical disturbance were to happen in the substation.

6.5.6.3 *Package 3 – Standard Substation Communication Package + Modified High Voltage Protection Scope*

This scope assumed the installation of Packages 1 & 2, with a modification for the CFJ. At some locations, a power over fiber (PoF) solution was installed, which provides electrical isolation between the device and the power supply. This eliminates the need to supply power to the CFJ outside of the substation, however that PoF solution will not support T1/Ethernet services required for IP communications. Therefore, a power source and enclosure were required at the CFJ.

6.5.6.4 *Package 4 – Network Capacity Increase and Extension Package Scope*

At some locations, IP communications were already available, but required an extension of the Local Area Network (LAN) to provide connectivity to new meters. This package was identified for the generation facilities due to the location of the meters and distance from the existing network cabinet. It also included additional metering connectivity that could be required to support low and high side metering, along with small industrial Ethernet switches currently, fiber-optic transceivers, and cabling.

6.5.6.5 *Package 5 – Commercial Cellular Communications Scope*

At some locations, IP communications could be attained via a wireless cellular option leveraging the standard IP package of a Cisco Connected Grid Router 2010 (CGR2010), a Cisco Industrial Ethernet 4010 Switch (IE4010), and a NetGuardian RTU for monitoring the communications system and physical elements of the substation plus an LTE interface module in the Connected Grid Router.

6.5.6.6 *Package 6 – Network Communications Expense Scope*

At some generation or substation sites, IP communications already existed, but network configurations were required to support metering work. This configuration could include opening a network port or updating an existing drawing. No new assets were planned for installation; therefore this work is classified as a one-time expense.

6.5.7 Network Infrastructure Financial Estimate Summary

The Charter estimates for network infrastructure assumed internal engineering design and field labor for all aspects of the metering and control projects. They were represented under Charter Line Item 16 “Network Improvements for Metering (1)” at $1.719 million in capital, $15k in re-occurring annual expense. Charter Line Item 26 “Network Maintenance” at $256k represented a summary of on-going network expense, with the components of $215k for the network packages and $39k for the dedicated network connections.

Charter Line Item 24 "Network PM" reflected estimates for project management of the network projects, as the package estimates did not include project management labor. The project management costs have been incorporated in the Scope capital estimates for the projects. The original estimates failed to include labor for planning costs, AFUDC, overheads and professional services (Utilicast). The updated estimates below include these additions. New estimates also include scope changes for 13 substation locations and the elimination of six generation projects as listed in Section 5.5.6. With the exception of Package 6, all other expense estimates in the Scope column represent on-going O&M costs.

Table 16 – Network Financial Estimates Updates

Track 5 - Network	Charter Estimates (as of 2019)			Scope Estimates (as of 08/2020)		
Project Type	*Capital*	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
Package 1 (Line 16)	$ 270,000	$ -	$ 91,000	$ -	$ -	$ 1,000
Package 2 (Line 16)	$ 1,016,000	$ -	$ 72,800	$ 457,200	$ -	$ 18,200
Package 3 (Line 16)	$ 208,000	$ -	$ 36,400	$ -	$ -	$ -
Package 4 (Line 16)	$ 225,000	$ -	$ 15,000	$ 323,255	$ -	$ 15,100
Package 5	$ -	$ -	$ -	$ 751,796	$ -	$ 35,200
Package 6	$ -	$ -	$ -	$ -	$ 10,000	$ -
Network PM (Line 24)	$ 416,000	$ -	$ -	$ -	$ -	$ -
Totals	**$ 2,135,000**	**$ -**	**$ 215,200**	**$ 1,532,251**	**$ 10,000**	**$ 69,500**
Utilicast	$ -	$ -	$ -	$ 67,060	$ -	$ -
Grand Totals	**$ 2,135,000**	**$ -**	**$ 215,200**	**$ 1,599,311**	**$ 10,000**	**$ 69,500**

6.5.8 Network – Miscellaneous Improvements

Beyond the network upgrades identified for the various generation and substation integration sites, Avista also identified the potential need for network upgrades associated with EIM software, connection to CAISO's Automated Dispatch System (ADS) and meter access for BPA. These two items were represented under Charter Line Item 8 "Network for Vendor & CAISO" at $60k in capital, while the on-going expense was represented under Charter Line Item 26 "Network Maintenance" at $39k as a component of the total $256k.

- **Dedicated CAISO Connection:** At the time of Program Charter estimates, Avista assumed a dedicated communications network between CAISO and Avista would be needed to support dispatch operational targets (DOTs) from CAISO's ADS system. It was Avista's preference to integrate with CAISO via a private leased solution instead of a VPN connection over the Internet. Since that time, Avista has determined that a private leased connection to CAISO is not required and this scope has been removed. This was represented under Charter Line Item 8 "Network for Vendor & CAISO" with capital estimate was $35k, while on-going operations and maintenance support expense was not included.

- **Dedicated SaaS Connection:** At the time of Program Charter estimates, Avista assumed approximately seven software solutions would be purchased with a SaaS deployment. It was unknown what Cloud Service Provider (CSP) network would be used, but one of the three major CSP networks was assumed: Amazon AWS, Microsoft Azure or Google Cloud. Avista's preference was to utilize a leased private connection between Avista premises and the CSP, with AT&T MPLS serving as the preferred conduit. Since that time, Avista has determined a leased private connection to the CSP is not required and this scope has been removed. This was represented under Charter Line Item 8 "Network for Vendor & CAISO" with capital estimate was $14k, while on-going operations and maintenance support expense was not included.

6.5.9 Network Miscellaneous Financial Estimate Summary

The planned dedicated network connections have been removed from the Program scope and reflected below.

Table 17 – Miscellaneous Network Financial Estimate Updates

Track 5 - Miscellaneous Network	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
	Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
Dedicated CAISO Connection (Line 8)	$ 35,000	$ -	$ 25,000	$ -	$ -	$ -
Dedicated SAS Connection (Line 8)	$ 25,000	$ -	$ 14,000	$ -	$ -	$ -
Totals	**$ 60,000**	**$ -**	**$ 39,000**	**$ -**	**$ -**	**$ -**
Utilicast	$ -	$ -		$ -	$ -	$ -
Grand Totals	**$ 60,000**	**$ -**	**$ 39,000**	**$ -**	**$ -**	**$ -**

6.6 Track 6 – Operations Readiness & Training

In order to prepare Avista for the EIM, there is a significant body of work for market training and understanding, adopting software and navigating organizational change management. Joining the EIM has far-reaching effects across System Operations, Power Supply, Generation, Substation, SCADA, and Technology, with each business unit gaining understanding of how the market changes their day-to-day operations. This track accommodates training, items Avista needs to prepare to accommodate new personnel and or compliance with joining the market, and the hiring of new FTEs to support EIM market operations.

6.6.1 Operations Readiness & Training Scope Summary

6.6.1.1 *Training*

The CASIO provides computer-based training, in-person training, EIM workshops, train-the-trainer workshops and training support for phased testing: Day in the Life, Market Simulation, Parallel Operations and Go-Live initiation. In addition, Avista will need to develop their training plan, with specific emphasis given to developing the internal operations readiness criteria for those operating in the market and training new FTEs hired to support market settlements and analysis. This effort was represented under Charter Line Item 14 "Training & OCM" at $480k in Avista labor expense. This estimate provided for hiring a temporary Organizational Change Management Specialist for the EIM Program and labor associated with training.

6.6.1.2 *EIM Human Resource Plan*

At the time of the Charter, Avista assumed additional temporary resources would be needed for the Program implementation and incremental resources would be needed to support on-going EIM operations. Avista planned for two additional resources to support the Program implementation – the EIM Program Manager and the Organization Change Management Specialist. Costs associated with the EIM Program Manager were primarily captured in Charter Line Item 9 "Program Leadership, Management & SMEs" at $700k.

Avista assumed 11-13 incremental FTEs would be needed to support EIM post go-live, with the positions hired 9-18 months prior to market entry and approximately one third of their time would be allocated to the EIM project for market education and software training. Throughout Q1/Q2 2020, in partnership with Utilicast and input from other EIM Entities, Avista conducted further analysis of what resources would be needed to prepare for market entry during the implementation phase, and those that would be needed for effective and efficient market operations. In June 2020, the EIM Human Resource Plan was signed by the Executive Steering Committee members, approving 17 incremental EIM FTE hires throughout 2020-2021 in preparation for market operations, however each individual position would be further evaluated prior to hiring to ensure need and timing. In August 2020, hiring date revisions were made and are reflected in Table 18.

The need for the additional 5 FTEs (17 vs. 12), was determined through staffing conversations with other EIM Entities, who indicated lean staffing levels at the time of market entry have hindered operational performance. Avista believes the 17 FTEs represents a mature workforce needed to fully support EIM operations at market entry. There were two primary areas that drove the FTE increase and associated costs – System Operations and Settlements. Although System Operations planned for a team of five EIM Operators, they identified an

additional relief operator and adjusted the timing of each hire to allow for NERC certification. It was originally assumed the existing accounting team could accommodate EIM settlements, with the addition of a Settlement Analyst and Data Management Operator for meter data submission to the CAISO. After discussions with Utilicast and other EIM entities, the need for a separate Settlements team was identified with a staff of up to five.

- **EIM Operators:** Within System Operations, a common approach to EIM operations includes adjusting existing desk processes/responsibilities and adding an EIM Operator desk to focus solely on pre-operating hour EIM operations. Through discussions with Utilicast, Avista identified which tasks would reside with the Merchant and which tasks would reside with the Entity (Balancing Authority). The results included shared generation management tasks between the Merchant and Reliability Operators, new EIM tasks for the Reliability & Transmission Operators, and a full set of EIM tasks for the new EIM Operator role.

  In order to provide continuity amongst all the operators and an environment for cross-functional desk/role qualifications, the EIM Operator role will need to be NERC certified. This assumption requires all System Operators to obtain NERC certification and qualify on their respective desks, with the Reliability Operators and EIM Operators qualified for both desks. This would allow greater flexibility for covering shifts during emergency conditions, training, vacations and unexpected absences. The NERC certification process will require the EIM Operators to be hired at least 12-16 months in advance to allow for NERC certification and learning the EIM job functions.

- **Settlements Team:** When the original EIM FTE estimates were identified, Avista assumed the existing MRTU settlements process would be similar to EIM settlements and assumed two additional FTEs would cover Avista's needs. In MRTU settlements, a member of Power Supply reconciles the charges for accuracy and a member of the Resource Accounting team ensures CAISO payment and financial recording to the financial system. As conversations with Utilicast and other EIM Entities, occurred, the complexity of the EIM settlements and the need for dedicated team became clear. At the time of market entry, some Entities underestimated settlement complexity and staff needed to perform the daily settlements processes and have added staff to ensure adequate support. Avista plans to avoid this risk by proposing a settlement team of up to five at the time of market entry, with imbedded analysts in the Merchant and Entity to coordinate with the Settlements team and conduct deeper market analysis. While the Merchant Analyst was included in the original FTE proposal, the Entity Analyst is an addition. The Entity Analyst role is vital to understanding what impact the EIM BA Operator's actions have on Avista's overall performance and financial position in the market.

  The centralized Settlements team will support Merchant and Entity settlements, promotes expansion of settlement specific skill sets and ensures the timely analysis and appropriate priority is given to settlements. The team will have visibility to the financial results for both the Merchant and Entity, so cost benefit studies and overall market performance will be more easily evaluated and assembled.

Table 18 – EIM Human Resource FTE Comparison

EIM FTE Estimates	Charter Estimates (as of 05/2019)		Scope Estimates (as of 08/2020)		
	Quantity	*Hire Date*	*Quantity*	*Org. Hire Date (as of 06/2020)*	*Rev. Hire Date (as of 08/2020)*
Implementation Resources					
EIM Program Manager	1	Jan-19	1	Jan-19	
Org. Change Management Specialist	1		1	Sep-20	
Substation Engineer			1	Jan-20	
Total	**2**		**3**		
Incremental EIM FTEs					
Power Supply Analyst	1	Oct-20	1	Jul-21	Sep-21
Network Model Tech	1	Oct-20	1	Jun-20	
SCADA Tech	1	Oct-20	0		
EIM BA Desk	1	Jul-21	1	Feb-20	
EIM BA Desk	1	Jul-21	1	Sep-20	Oct-20
EIM BA Desk	1	Jul-21	1	Sep-20	Oct-20
EIM BA Desk	1	Jul-21	1	Jan-21	
EIM BA Desk	1	Jul-21	1	Jan-21	
EIM BA Desk	0		1	Mar-21	Mar-22
Training Admin	0		1	Mar-22	
EIM BA Analyst	0		1	Jul-21	Sep-21
Settlements Manager	0		1	Sep-20	Oct-20
Data Management Operator	1	Oct-20	1	Apr-21	
Settlement Analyst	1	Apr-21	1	Apr-21	
Settlement Analyst	0		1	Jul-21	Jun-21
Settlement Analyst	0		1	Jul-21	Aug-22
Compliance	0 or 1	Apr-21	0		
IT Analyst	1 or 2	Oct-20	1	Jun-20	Oct-20
IT Analyst	0		1	Jun-20	Jan-21
Total	**11 to 13**		**17**		

In the EIM HR Plan document, a financial estimate during the implementation and post-implementation phases was established. Each FTE was assigned an estimated hire date, an annual salary (assumed 78.05% loaded rate) and a breakout of efforts between capital and O&M. These resources were further assigned an estimated annual 3% annual merit increase, and where applicable, incremental step increases based on achieving certain experience levels. This framework provided an estimate of annual capital and O&M FTE costs across 2020-2023, with 2022 representing a shift to primarily O&M expenses based on a market go-live date of March 2022 and 2023 representing a fully burdened O&M year. With the increased incremental FTE count needed to support market operations, a better understanding of when the new FTE needs to be hired and a robust financial estimating framework, the Program saw an increase of capital, implementation expense and on-going O&M costs. Of the Charter's $3.5-$4 million annual estimated on-going expense impact, $2.5 million was estimated for labor (assumed 60% loading rate). The revised estimate of 17 EIM FTEs increased the annual labor estimate to $3.2 million (system loaded).

As shown in Table 19, an estimate for the EIM incremental FTEs was accommodated under Charter Line 17 and 17a "Incremental Permanent Avista FTEs": $550k in capital, $185k in implementation expense and $2.5 million in on-going annual expense. The original new employee estimate included only four months of labor costs to support parallel testing and employee training. The Charter estimate significantly underestimated the

incremental integration labor. In addition to the specific incremental labor in Charter Line Item 17, other incremental labor estimates included in the Charter. In order to provide a net incremental estimate based on the EIM HR Plan, Table 19 identifies other Charter incremental labor estimates and removes them from the EIM HR Plan estimates. In August 2020, prior to incorporating the updated EIM FTE incremental costs in the Scope forecast, the EIM FTE cost estimates were reviewed and further reductions were made to reflect 2020 hiring delays and the postponement of two positions – the Training Admin and one of the Settlement Analysts. These positions will be hired approximately six months after market go-live. Those August reductions are presented in the August 2020 HR Plan Reductions line in Table. 19.

Table 19 – EIM Human Resource FTE Estimates

Track 6 - EIM HR FTEs	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
	Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
Incremental Avista FTEs (Line 17, 17a)	$ 550,000	$ 185,000	$ 2,500,000	$ -	$ -	$ -
EIM Human Resource Plan	$ -	$ -	$ -	$ 2,878,954	$ 2,285,070	$ 3,227,467
Program Leadership & SMEs (Line 9)	$ -	$ -	$ -	$ (350,000)	$ -	$ -
Full Network Model (Line 11)	$ -	$ -	$ -	$ (80,000)	$ -	$ (50,000)
Training & OCM (Line 14)	$ -	$ -	$ -	$ -	$ (480,000)	$ -
System Selection (Line 10) @ 25%	$ -	$ -	$ -	$ -	$ (170,000)	$ -
August 2020 HR Plan Reductions	$ -	$ -	$ -	$ (193,735)	$ (601,500)	$ -
Totals	**$ 550,000**	**$ 185,000**	**$ 2,500,000**	**$ 2,255,219**	**$ 1,033,570**	**$ 3,177,467**
Utilicast	$ -	$ -	$ -	$ -	$ -	$ -
Grand Totals	**$ 550,000**	**$ 185,000**	**$ 2,500,000**	**$ 2,255,219**	**$ 1,033,570**	**$ 3,177,467**

6.6.1.3 *Go-live Procedures and Support Model*

In partnership with the CAISO, Avista will determine the planned go-live procedures that must be followed across all business units to ensure a smooth transition into the market. In order to support market operations post go-live, Avista has been discussing options for a 24-hour technology support model with a combination of vendor and internal labor support. This level of technology support is not present in current operations, and the limited availability of support is not scalable. Avista will continue discussions to ensure the appropriate support model is in place at the time of market entry. Avista has planned for two technology resources dedicated to EIM software operations. Details and cost estimates can be found in the EIM Human Resource Plan.

6.6.1.4 *Transmission System Operations EIM Desk Scope – Mission*

To prepare for EIM entry, Transmission System Operations needs to hire additional personnel to staff a 24x7 EIM Operator desk/workstation. The existing System Operations area has the Reliability System Operator desk, the Training/Storm Recovery desk and the Transmission System Operator desk. The original scope planned to modify the System Operations area to accommodate an additional workstation to perform the necessary EIM activities, while maintaining sight lines to necessary displays/monitors and not hindering the necessary activities and functions performed by the existing desks. This scope planned to deliver two new computers, a phone console, new monitors, ergonomic chairs and a projector and screen for the Mission Campus. This was represented under Charter Line Item 22 “Transmission Desk” at $233k in capital, while no expense was estimated.

6.6.1.5 *Transmission System Operations EIM Desk Scope – BuCC*

The establishment of an EIM BA desk/workstation at the Backup Control Center (BuCC) was not planned under the EIM Program Charter. The establishment of a secondary control center is mandated by NERC and the EIM BA workstation needs to be operational by market entry. After reviewing the available space at the BuCC, the Program will deliver a modified workstation with two new computers, new monitors and a new phone console. This project was not planned in the Program Charter and must be complete prior to market go-live in accordance with FERC standards that require a functional back up control center where all functions of the BA

and Transmission Operators can be performed and meet all compliance standards. The capital estimate for this project is $86k.

6.6.1.6 *Noxon 230kV Switchyard CIP PSP Project*

As part of the metering and network upgrade projects at the Noxon Hydro Eclectic Dam (HED) and the Noxon 230kV Switchyard, external routable communications have been introduced, thus classifying the Noxon 230kV Switchyard as a Medium Impact BES Cyber System. Due to this new classification, additional requirements must be met to remain compliant with all relevant Critical Infrastructure Protection (CIP) requirements. This project will implement new processes, cyber security and physical security infrastructure at the Noxon 230kV Switchyard. The CIP standards that will be addressed in this project include:

- CIP-004-6 Cyber Security – Personnel & Training
- CIP-005-5 Cyber Security – Electronic Security Perimeters
- CIP-006-6 Cyber Security – Physical Security of BES Cyber Systems w/ (ERC)
- CIP-007-6 Cyber Security – System Security Management
- CIP-008-5 Cyber Security – Incident Reporting and Response Planning
- CIP-009-6 Cyber Security – Recovery Plans for BES Systems
- CIP-010-2 Cyber Security – Configuration Change Management & Vulnerability
- CIP-011-2 Cyber Security – Information Protection

This project was not planned in the Program Charter and must be complete in order to implement the metering and control projects at Noxon HED. The capital estimate for this project is $95k and $25k for implementation expense.

6.6.2 Track 6 Financial Summary

The primary cost driver in Track 6 is the EIM HR Resource Plan, documenting the incremental FTEs needed for market operations. The Charter estimates did not sufficiently account for the capital and expense costs associated with the EIM FTEs during project implementation. Updates have been made to remove duplicate incremental labor costs represented in other areas of the Charter (Table 19) and represent the net additional costs to the Program. The estimates also include the following:

- An updated FTE capital allocation across 2019-2022 and an updated annual O&M expense estimate (including the August 2020 revisions).
- A capital estimate for the additional EIM desk at the BuCC
- A capital and expense estimate for the Noxon 230kV Switchyard CIP compliance project.

Table 20 – Operations Readiness & Training Financial Updates

Track 6 - Operation Readiness & Training	Charter Estimates (as of 05/2019)			Scope Estimates (as of 08/2020)		
	Capital	*Implementation Expense*	*Ongoing Expense*	*Capital*	*Implementation Expense*	*Ongoing Expense*
Training & OCM (Line 14)	$ -	$ 480,000	$ -	$ -	$ 480,000	$ -
EIM Human Resource Plan (Line 17, 17a)	$ 550,000	$ 185,000	$ 2,500,000	$ 2,255,219	$ 1,033,570	$ 3,177,467
EIM System Ops Desk - Mission (Line 22)	$ 233,000	$ -		$ 225,071	$ -	$ 4,000
EIM System Ops Desk - BuCC	$ -	$ -		$ 86,000	$ -	$ 4,000
Noxon 230kV CIP PSP	$ -	$ -		$ 110,624	$ 10,000	$ -
Totals	**$ 783,000**	**$ 665,000**	**$ 2,500,000**	**$ 2,676,914**	**$ 1,523,570**	**$ 3,185,467**
Utilicast	$ -	$ -	$ -	$ -	$ -	$ -
Grand Totals	**$ 783,000**	**$ 665,000**	**$ 2,500,000**	**$ 2,676,914**	**$ 1,523,570**	**$ 3,185,467**

6.7 Where will assets or technology be deployed?

The EIM Program has a range of physical assets that will be installed and a variety of technology applications that will be deployed. Physical assets such as meters and control systems and network and communications equipment, will be deployed at generation plants, third-party generation locations and substation interconnection facilities. EIM technology application assets for Power Costs, Inc. will be deployed in the Amazon Web Services (AWS) cloud environment, while the Power Settlements EIM application will be deployed at Mission Campus and Avista's disaster recovery center in San Jose, CA.

7 EIM Program Milestones

Avista originally signed the EIM Implementation Agreement with an April 1, 2022 entry date. Since that time, other entities have announced entry for the 2022 class: BPA, Tacoma Power, Tucson Electric and Xcel Energy (parent company of Public Service Company of Colorado). Due to BPA operational and environmental requirements, they were able to negotiate a March entry date. In early 2020, BPA leadership approached Tacoma and Avista EIM leadership about changing their entry date to March 2, 2022. This request was driven by a desire to align testing cycles and operational data, as there are numerous transmission interconnection points BPA shares with Tacoma and Avista. Discussions with BPA, Tacoma and CAISO leadership, and internal review amongst the Avista EIM Program team and Steering Committees, occurred in Q1/Q2 2020. After seeking approval from the Director and Executive EIM Steering Committees in July 2020, Avista formally changed their market entry date to March 2, 2022.

In order the meet the March entry date, the internal Avista schedule needed to align with the adjusted March-driven CAISO milestones. In addition, Avista set an internal deadline date of June 2021 for the completion of all metering, controls and software projects for a successful entry into the testing phases. The below table reflects the adjusted milestone schedule.

Major Milestone Descriptions	Target Completion Dates (MM/YY)	
	Planned Date	Revised Date
Program Initiation		
• CAISO implementation agreement signed	04/2019	04/2019
• System Integrator selected	05/2019	12/2019
Program Planning		
• Vendor agreements & SOWs signed	02/2020	05/2019
• EIM software requirements gathered	12/2019	12/2019
• EIM software vendor RFPs & selections	09/2019	10/2019
Program Execution		
• SCADA EMS Upgrades	NA	03/2021
• CAISO EIM Agreements Executed	NA	03/2021
• Network Model Integrated with CAISO	NA	06/2021
• ADSS & Nucleus Enhancements Complete	06/2021	06/2021
• GPSS Meter/Control Installations Complete	09/2021	06/2021
• Substation Meter Installations Complete	09/2021	06/2021
• Network Comm Installations Complete	09/2021	06/2021
• Internal Avista Readiness Deadline	NA	06/2021
• EIM Software Ready for Testing with CAISO	09/2021	06/2021
• SQMD Portfolio Approved	NA	09/2021
• MBR Authorization Granted	NA	10/2021
• EIM Software Integrations Verified	09/2021	11/2021
• OATT Revisions Approved	NA	12/2021
System Integration & Testing with CAISO	09/2021 to 03/2022	

• Connectivity & Integration	NA	08/2021
• Day-in-the-Life	NA	09/2021
• Market Simulation	NA	11/2021
• Parallel Operations	NA	02/2022
All EIM Systems Go-Live with CAISO	03/2022	03/2022
All EIM Technology Systems Warranty	07/2022	06/2022
Program Closing		
• Program Level Approval to Close	12/2022	12/2022

7.1.1 CAISO Project Milestones

The below schedule represents the CAISO driven project schedule for EIM entry on March 2, 2022. The milestones listed reflect payment to the CAISO of $50k per milestone, for a total, implementation fee of $300k to join the EIM market. Unless otherwise stated, the milestone dates below represent a month-end deadline.

Activity	Project Delivery Dates supporting March 2, 2022 Go-Live
Detailed Project Management Plan The Parties will develop and initiate a final project management plan that describes specific project tasks each Party must perform, including delivery dates, project team members, meeting requirements, and a process for approving changes to support completion of the Project. This phase will include a detailed IT system review to assist Avista in development of a detailed metering plan, bid-to-bill system and coordination with Avista EMS. Work will be initiated on the Avista staff training program using the foundational and detailed system computer-based training module, as well as on the resource data templates needed during Milestone 2.	March 2019-December 2019
• **Milestone 1** – This milestone is completed when the Agreement has been made effective in accordance with Section 1 of the Agreement.	April 2020
Full Network Model Expansion Full Network Model expansion for Avista and EMS/SCADA including: proof of concept of export/import of EMS data, complete model into the CAISO test environment, complete validation for all SCADA points from Avista, testing of the new market model and validation of the Outage and State Estimator applications.	November 2020
• **Milestone 2** – This milestone is completed upon modeling Avista into the CAISO Full Network Model through the EMS which will be deployed into a non-production test environment using the CAISO's network and resource modeling process.	June 30, 2021

System Implementation and Connectivity Testing System requirements and software design, the execution of necessary software vendor contracts, development of Market network model including Avista, allow Avista to connect to a non-production test system.	August 2021
• **Milestone 3** CAISO to promote market network model including Avista area to non-production system, and allow Avista to connect and exchange data in advance of Market Simulation.	July 15, 2021
Construction, Testing and Training in Preparation for Market Simulation - This task includes IT infrastructure upgrades, security testing, training, Day-in-life simulation and functional testing.	July 15, 2021
• **Milestone 4a** Start of Joint Integration Testing with CAISO, Interface testing with minimum data requirements and functional integration testing. CAISO will make the test environment available for Avista connectivity testing prior to the delivery date assuming Avista has provided all prerequisite data and non-production system availability does not conflict with CAISO production system Spring Release schedule.	Mid-July 2021
• **Milestone 4b –** Begin 'Day in the Life' scenario testing	September 2021
• **Milestone 4c –** Begin Structured Market simulation (Milestone 4 payment due at this point)	October 1, 2021
Activate Parallel Operations During December 2021**,** the CAISO will activate a parallel operation environment to practice production grade systems integration as well as market processes and operating procedures in anticipation of the impending Avista activation as an EIM Entity and to confirm compliance with the EIM readiness criteria set forth in the CAISO tariff.	December 2021
• **Milestone 5** – Start of parallel operations	December 2021
System Deployment and Go Live Implementing the Project and going live will include resource registration, operating procedures and updates, execution of service agreements, completion of the Avista tariff process, applicable board approvals, the filing and acceptance of service agreements and tariff changes with FERC, and	March 2, 2022

completion and filing of a readiness criteria certification in accordance with the CAISO tariff.	
• **Milestone 6** – This milestone is complete upon the first production Avista EIM trade date.	March 2, 2022

8 Program Assumptions, Risks, Constraints & Dependencies

This section has been updated to reflect changes at the Program level since the time of the Charter. Items resolved or no longer applicable have been removed, while open items or new additions have been listed below.

8.1 Assumptions

The following assumptions have been made:

a) All Avista required program/project resources will be available for the duration of the program.
b) All the necessary funding to complete the program will be available.
c) All Avista business users will be available for all application and system testing phases within the independent projects and the program as a whole.
d) The in-house Avista Decision Support System (ADSS) application will be enhanced for EIM functions.
e) The in-house Nucleus application will have minor modifications for EIM functions.
f) Avista will receive the needed permissions from various third-party generation and metering entities to perform EIM-related upgrades. Avista will fund EIM-related upgrades at various third-party sites.
g) Avista will procure an Energy Management System (EMS) plug-in for EIM market dispatch integration.
h) Avista plans to conduct an EMS upgrade prior to market entry funded by the SCADA BC. Although the upgrade is planned to be complete in March of 2021, prior to the internal Avista deadline of June 2021, any delays for this project would significantly impact Avista's ability to conduct the CAISO testing phases and market go-live as planned.
i) Avista has plans to fund a 24-hour operations center within the next three-five years, to house various operational business units, including Transmission System Operations. As such, the construction effort and costs for the EIM transmission operations desk at Mission campus and the Backup Control Center (BuCC) should be kept minimal.
j) The in-flight GPSS funded Human Machine Interface (HMI) project and the EIM-related PLC projects, have independent scope. The HMI project's goal is to standardize plant control screen display for plant operators, and the EIM PLC projects will capitalize on that standardization to display EIM data. If the HMI project is complete at the site where an EIM PLC project is needed, the new HMI screens will be updated to incorporate EIM data. If the HMI project has not begun at a site where an EIM PLC project is needed, the existing HMI screens will be updated with EIM data until the HMI project is available to update that site.
k) The Long Lake EIM LSM project will be completed independent of a future-planned Long Lake Overhaul project.
l) Although an integration with the settlement software to Avista's Oracle E-Business Suite (EBS) financial system is desirable, it is not necessary for market entry. The project team will consider integration options, but be prepared to create a manual process for recording EIM financial data in the financial system. Costs associated with full integration between the settlement software and EBS are not included in the Scope program estimates.
m) As part of the PCI Asset Operations software suite, Avista purchased licenses for the PCI Journal module – a feature that supports operator logging. The Program costs include the purchase of the licenses and initial scoping with PCI for transmission and generation use, but the implementation of the module will be funded outside the EIM Program.
n) Joining the Western EIM presents a large amount of organizational business change that will require an Organizational Change Management (OCM) plan. An OCM specialist will start in September 2020 and

will be a dedicated advocate for the Program's success and employee adoption of the EIM practices through go-live.

o) The installation of revenue quality meters in substation will not preclude existing third-party meter data access. The new meters will continue to collect hourly data, and supplement with the collection of five-minute internal data for EIM.

p) If Avista fails to meet the March 2, 2022 market entry date with BPA and Tacoma, the CAISO will allow us to join April 1 with the rest of the 2022 class. This will present additional testing and operational challenges.

8.2 Risks

Program level risks will be managed through a spreadsheet and posted to a common work-space accessible by EIM project team members. Program risk will be discussed at steering committee meetings for mitigation recommendations and decisions, and decisions will be documented. The following are potential risks for the Program:

a) Interdependencies and integrations between EIM software projects will add complexity and may delay project completion.

b) Interdependencies among the control/meter upgrade projects and the network projects may delay project completion.

c) Competing priorities amongst other Avista programs/projects may constrain funds and resource availability. Resource areas that are likely to be constrained include network engineers, substation engineering and design, protection engineers and generation engineers.

d) This program requires multiple, concurrent projects to be in flight at the same time, while competing for the same business, engineering and technology resources.

e) Although an integration with the Settlement software to Avista's Oracle E-Business Suite financial system is desirable, the financial application upgrade timeline may not align with the EIM implementation timeline. If an integration were to be pursued on an unsupported platform, it could cause technical complications or require rework after the application is upgraded. The project team will pursue integration efforts, but will also create a manual process for recording EIM financial data in the financial system.

f) Delays in business processes re-engineering based on EIM requirements and complexities will impact the program/project schedule.

g) The in-flight HMI project utilizes the same ET resources needed for EIM-related projects that could cause delays in completing work.

h) Delays in the POPUD interconnection and generation meter upgrades will hinder Avista's ability to submit five-minute meter data granularity.

i) Market entry requires Avista to follow CAISO's time for FNM updates, including updates independent of Avista and those related to market entities interconnected with Avista. This timeline will impact field construction schedules and data submission deadlines. Although failure to meet these deadlines doesn't limit Avista's ability participate in the market, it does negatively impact neighboring interconnected entities and Avista's EIM settlements.

j) Avista plans to conduct an EMS upgrade prior to market entry funded by the SCADA BC. Although the upgrade is planned to be complete in March of 2021, prior to the internal Avista deadline of June 2021, any delays for this project would significantly impact Avista's ability to conduct the CAISO testing phases and market go-live as planned.

k) The completion of the Burke substation network upgrades may be at risk due to potential environmental compliance. The Burke substation is located on a Superfund site, which requires a long-term response to clean up hazardous material contaminations. Additionally, the site's climate incurs inclement weather regularly which could impact construction at the site, both for third party and Avista construction.

l) The COVID-19 pandemic has forced a majority of the Avista workforce to work remotely for an extended period of time. At the time of this writing, the overall Program schedule hasn't been impacted by this shift, though individual projects have been delayed due to crew's ability to work on site or the

constraints of conducting application design sessions remotely. It is unknown how long this pandemic may impact Avista's work plans, which may likely be a significant risk to meeting the Program schedule for market go-live.

8.3 Constraints

The program schedule is the hard constraint. Although Avista originally signed the CAISO implementation agreement with an EIM entry date of April 1, 2022, Avista plans to formally change their entry date to March 2, 2022 to align with BPA and Tacoma Power. In order to meet that date, Avista will chose to adjust scope and budget as necessary.

- Given a fixed schedule, we will choose a scope and adjust resources as necessary.

Place one "X" in each column (one per row) to provide a visual queue as to this project's Flexibility Matrix.

Flexibility Matrix	Low Flexibility	Medium Flexibility	High Flexibility
Scope		X	
Schedule	X		
Budget			X

- *Note: Quality is always expected to be high*

8.4 Dependencies

Given the vast business impact of the EIM program, there are multiple projects that rely on other portions of a project being complete – both inside the EIM BC and in other business cases – for EIM work to be completed.

8.4.1 GPSS Dependencies

a) The introduction of external routable communications at the Noxon 230kV interconnection substation due to EIM metering upgrades, has required the location to be classified as a Medium Impact Bulk Electric System (BES) Cyber System location. Medium Impact BES locations must comply with various Critical Infrastructure Protection (CIP) standards regulated by NERC. The Noxon 230kV CIP project must be complete prior to the Noxon 230kV metering upgrade project and the Noxon HSM, LSM and PLC projects conducting their integrated configurations and testing for production use.
b) The Cabinet Gorge HSM, PLC and LSM (not funded by EIM Program BC) projects all depend on the Cabinet Gorge Automation Project for Unit 2, 3 and 4 (not funded by EIM BC).
c) All LSM, HSM and PLC projects have some level of dependency on each other at the plants
d) Coyote Springs 2 and Lancaster both rely on PTs and high side meters at BPA substation interconnection sites. Avista will partner with BPA to perform the EIM-related work at those locations.
e) The completion of HSM projects will require completion of the PLC and network projects.

8.4.2 Network Dependencies

a) Conducting EIM operations from the Backup Control Center (BuCC) will be required. The EIM Program has planned to install an EIM BA workstation at the BuCC. The ability for EIM work to be quickly executed will be aided by the Session Initiation Protocol (SIP) project. This project will increase network bandwidth to Backup Control Center (BuCC) and is not funded by the EIM Program BC. The completion of the EIM BA workstation at the BuCC is not dependent on completion of the SIP project at the BuCC, but conducting work from the BuCC would be improved.

8.4.3 Transmission System Operations/SCADA Dependencies

a) None known at the time of the document submission.

8.4.4 Substation Dependencies

a) The EIM meter replacement at the Westside interconnection substation is not part of the EIM Program BC. The meter replacement scope will be funded under a multi-phase substation rebuild at Westside. The completion of the rebuild is dependent on the timing of another project – the Downtown Transmission Cable Replacement project. These dependencies impact the timeline of when the EIM work can be completed at Westside. The current schedule calls for the Westside rebuild to be completed by the end of

May 2021, which is close to the June 2021 EIM internal deadline for project completion. If the work cannot be completed within the EIM timeline, Avista may seek a metering exception for Westside with CAISO.

9 Program Costs

9.1 Actual Costs as of August 2020

The EIM Program formally began in March 2019 and the tracking of EIM project costs began in June 2019. The EIM software RFP process (expense) was conducted in 2019, and Avista began capital projects focusing on network, metering and control upgrades. As of August 2020, Avista has formally transferred to plant or put into production, seven projects:

- ET Applications: EIM MV90 head-end meter system, the CT Analyzer for transformer testing.
- ET Network: Nine Mile LSM Network, Post Falls LSM Network, the Noxon PLC Network
- Generation: Noxon HSM
- Substation: Noxon HSM Substation 230kV

The following details are reflected in the actual Program charges between June 2019 and August 2020:

- Avista began recording EIM expense labor as of June 1, 2019 with project accounts in the given business areas.
- The expense charges in Table 21 reflect totals and do not include a reduction associated with the Idaho Commission's deferral order.
- As described in the EIM Human Resource Plan, Avista planned to hire three temporary FTEs to support the Program implementation and 17 incremental FTEs to support on-going EIM operations. As of August 2020, Avista has hired two of the Program implementation FTEs (Program Manager and Substation Engineer) and two incremental FTEs for on-going support (EIM BA Operator and EMS Modeling Engineer).
- The Utilicast capital costs reflect charges under the 2020-2022 Implementation Agreement for support of metering, controls and network upgrades, and software application projects.
- The Utilicast expense costs are associated with the 2019 Utilicast Technology RFP and the 2020-2022 Implementation Agreement. The 2018 Utilicast Assessments expense costs were are not included. Although the Utilicast expense items may align with support of a specific business unit, the costs have been centralized under the EIM Program line and charged to the Power Supply business unit.
- The Substation business unit is inclusive of capital costs for the Transmission FNM support, the EIM Dispatch Module, the Noxon 230kV CIP project, the Noxon 230 kV project and the Northeast CT project.
- In terms of Implementation Expense, the EIM Program line represents the business units that charge labor expense to the Program, including Power Supply, Supply Chain, Legal, Rates and Technology Applications.

Table 21 – EIM Program Implementation Costs as of August 2020

Actual Program Costs by Business Unit (as of 08/2020)	Actual Program Costs (as of 08/2020)			
	Capital		Implementation Expense	
	Avista	Utilicast	*Avista*	Utilicast
ET Applications	$ 855,024	$ 477,231	$ -	
ET Network	$ 636,214	$ 46,399	$ 8,593	
GPSS	$ 1,946,138	$ 43,309	$ 206,822	
Substation	$ 624,687	$ 20,256	$ 54,374	
Transmission	$ -	$ -	$ 314,002	
Facilities	$ 34,072	$ -	$ -	
ADSS	$ 603,126	$ 70,281	$ -	
EIM Program	$ -	$ -	$ 569,983	$ 684,795
Totals	**$ 4,699,261**	**$ 657,476**	**$ 1,153,774**	**$ 684,795**
Grand Totals	**$ 5,356,737**		**$ 1,838,569**	

9.2 Forecasted Program Cost Estimates as of August 2020

The Charter estimates from May 2019 outlined the total integration costs for joining the EIM (Table 22). After a year into the EIM integration effort and acquiring a better understanding of the market operation support needs, the Program Scope Document reflects the updated estimated costs for market integration. The total project estimates from the original Charter to the Scope Document are provided in Table 22 (Charter) and Table 23 (Scope) for comparison.

Table 22 – Charter Program Estimates as of May 2019

EIM Program Charter Estimates (as of 05/2019)	Implementation	Contingency	Totals	Annual O&M Expenses	Annual Capital
Capital	$ 18,129,000	$ 4,532,250	$ 22,661,250	$ -	$ -
Expense	$ 2,380,000	$ 595,000	$ 2,975,000	$ 3,534,000	$ -
Pre-Paid Expense	$ 840,000	$ 210,000	$ 1,050,000	$ -	$ -
Total Costs	**$ 21,349,000**	**$ 5,337,250**	**$ 26,686,250**	**$ 3,534,000**	**$ -**

Table 23 – Scope Program Estimate as of August 2020*

EIM Program Scope Estimates (as of 08/2020)	Implementation	Contingency	Totals	Annual O&M Expenses	Annual Capital
Capital	$ 24,091,964	$ 2,600,000	$ 26,691,964	$ -	$ 500,000
Expense	$ 5,011,026	$ 400,000	$ 5,411,026	$ 3,907,100	$ -
Total Costs	**$ 29,102,990**	**$ 3,000,000**	**$ 32,102,990**	**$ 3,907,100**	**$ 500,000**

*Pre-paid expense estimates reclassified to capital

- **Implementation Capital** – this estimate includes all known updated project costs for EIM software integration, EIM resource plan, and metering and controls upgrades.

- **Implementation Expense** – this estimate includes all known expense costs associated with market integration prior to market entry, including existing Avista labor, new Avista labor (incremental) associated with the EIM HR Plan for market operations, and non-labor expense items such as the CAISO milestone payments and Utilicast.

- **Contignecy** – this estimate for capital and expense represents funds to cover unknown costs or increased costs above expected spend. This is consisent with Avista project estimating practices. Considering most phyiscal infrastructure projects have completed the 60% design phase and the hiring of new employees is set based on the EIM Human Resource plan, the contignecy estimate is lower than the Charter estimate.

- **Annual O&M Expenses** – this estimate includes all known updated costs associated market operations post go-live, including the incremental Avista labor to support EIM operations (EIM HR Plan), CAISO grid management fees, software maintenance and liscencing fees, and network maintenance.

- **Annual Capital Estimate** – this prelimary estimate represents anticipated capital costs for software enhancements and upgrades. Avista will have a better estimate after gaining operational experience and understanding the impact CASIO annual updates have on system integration. These estimates were not included in the cost benefit anaylsis.

9.3 Forecasted Program Cost Estimates by Business Area

The estimates in Table 24 (Charter) represent the Charter costs by business area, excluding the contingency. For comparison, Table 25 (Scope), excluding contingency, has been provided.

Table 24 – Charter Program Costs by Business Unit as of May 2019

Business Area (as of 05/2019)	Implementation Capital	Pre-Paid Expense	Implemention Expense	Annual O&M Expense
ET Applications	$ 4,640,000	$ 840,000	$ -	$ 593,000
Application Procurement	$ -	$ -	$ 1,180,000	$ -
ET Network	$ 2,465,000	$ -	$ -	$ 271,000
GPSS	$ 5,164,000	$ -	$ -	$ -
Transmission & Substation	$ 1,760,000	$ -	$ 420,000	$ -
EIM Program	$ 4,100,000	$ -	$ 780,000	$ 120,000
New Avista FTEs	$ -	$ -	$ -	$ 2,550,000
Grand Totals	**$ 18,129,000**	**$ 840,000**	**$ 2,380,000**	**$ 3,534,000**

**Capital labor associated with the New Avista FTEs was included in the Transmission & Substation estimate*

Table 25 – Scope Program Costs by Business Unit as of August 2020

Business Area (as of 08/2020)	Implementation Capital	Pre-Paid Expense	Implemention Expense	Annual O&M Expense
ET Applications	$ 9,760,600	$ -	$ -	$ 532,133
ADSS	$ 3,460,133	$ -	$ -	$ -
Application Procurement	$ -	$ -	$ 1,251,671	$ -
ET Network	$ 1,599,311	$ -	$ 10,000	$ 77,500
GPSS	$ 4,462,416	$ -	$ 284,576	$ -
Substation	$ 1,963,214	$ -	$ 264,820	$ -
Transmission	$ 280,000	$ -	$ -	$ -
Facilities	$ 311,071	$ -	$ -	$ -
EIM Program	$ -	$ -	$ 1,685,000	$ 120,000
New Avista FTEs	$ 2,255,219	$ -	$ 1,513,570	$ 3,177,467
Grand Totals	**$ 24,091,964**	**$ -**	**$ 5,009,637**	**$ 3,907,100**

9.4 Incremental Cost Guidance & Estimates

9.4.1 IPUC EIM Expense Deferral & Approval

On March 23, 2020, the Idaho Public Utilities Commission (IPUC) issued Order No. 34606 approving Avista's application to defer incremental O&M costs (without a carrying charge), associated with joining the EIM operated by the CAISO. Commission Staff comments, filed on March 4, 2020 expressed support of Avista's request to defer its EIM incremental expenses, noting they believe the Company demonstrated it is reasonable for it to join the EIM. Per Order No. 34606, the Company is to cease deferring the incremental implementation costs at the go-live date, and is to file a report after one year of participation, describing the costs and benefits of participation, any other relevant information.

including but not limited to the CAISO's quarterly Western EIM Benefits Report. Recovery of any operational cost associated with membership in the EIM after the Company's go-live date would be determined in a future proceeding. At that time, a prudency review would be conducted to determine the reasonableness of recovering the deferrals from Idaho customers.[1]

At the time of the filing, the Company expected the annual O&M expense after joining the market to be approximately $3.5 - $4.0 million per year on a system basis, mostly associated with adding 11-13 new employees to facilitate market operations and settlements, including a five-person 24x7 hour EIM operating desk. Idaho's share of these costs is approximately 35% or $1.2 - $1.4 million annually. Staff noted the Company's estimated costs appear reasonable and that it is Avista's responsibility to demonstrate these costs are prudent prior to recovery. Staff noted some concern over expected labor costs, when comparing Avista's estimated costs to that of similar utilities, but recognize current cost estimates may change and will be reviewed in detail in future general rate cases.

9.4.2 Avista's Incremental EIM FTE Guidance

After the approval by IPUC of the Company's accounting petition to defer incremental operating expenses associated with the implementation of EIM, the following guidance will be used to determine what expenditures are incremental. EIM incremental guidance determination:

- New positions* which are added specifically for EIM will be considered incremental if they meet one of the following criteria:
    - A new employee is hired into an EIM position.
    - An existing employee is hired into an EIM position and their previous position is backfilled.

  ** Avista will not account for partial positions (i.e. an employee is working on EIM and non-EIM work) as incremental unless there is a significant impact to the business and there is a determinable way to recognize and document the specific incremental portion of actual work.*

- Labor Loadings (primarily medical and retirement benefits) for incremental employees are tracked as "non-labor" within the Company's financial system. Loadings are determined monthly by the Company's internal Corporate Accounting team and represented as a percent which is applied to the account where the direct labor is charged. In order to appropriately represent the net cost of these incremental employees, the company will apply the loading rate to the incremental labor cost for each new employee.

Based on Avista's incremental guidance, the Table 26 represents incremental expense during implementation and the anticipated on-going expense.

Table 26 – Scope Incremental Cost Estimates

EIM Program Scope Estimates (as of 08/2019)	Implementation	Contingency	Totals	Annual O&M Expenses
Capital	$ 24,091,964	$ 2,600,000	$ 26,691,964	$ -
Incremental Expense	$ 3,608,880	$ 400,000	$ 4,008,880	$ 3,907,100
Total Costs	**$ 27,700,844**	**$ 3,000,000**	**$ 30,700,844**	**$ 3,907,100**

[1] Avista intends to include Washington's share of all incremental EIM capital expenses in future Washington General Rate Cases.

10 Cost Benefit Analysis

Prior to signing the CAISO EIM Implementation agreement in April 2019, Avista hired Energy and Environmental Economics (E3) to conduct an EIM benefit assessment in the fall of 2017. E3 conducted similar benefit assessments for several other utilities to help understand the potential value of EIM participation. The E3 assessment estimated that Avista could see a range of annual benefits from $2 to $12 million from EIM participation. There were four main study assumptions that drove the wide range of potential EIM benefits: the amount of flexible hydro Avista bids into the market, the amount of transmission made available for market transactions, the amount of renewable generation that is integrated into the Avista BAA, and the assumed EIM price volatility. E3 stated in the Avista's Benefit Analysis report in the Overview section on page 3, "actual benefits to Avista will depend primarily on the availability of its hydropower resources to participate in the EIM, the transmission capacity that is available for use by the EIM, expansion of wind and solar resources within the Avista balancing area, and EIM market conditions." These are the primary drivers for EIM benefits and will be different for each EIM participating utility.

Using Avista's best estimates for these critical study assumptions, Avista anticipates EIM annual benefits to be close to $6 million, with potential for benefits to move closer to the upper end of the study range depending upon observed market price volatility. Recent market price volatility experienced in 2018 significantly increased the benefits of current market participants. Both the Idaho Power Company (IPC) and Portland General Electric (PGE) achieved EIM benefits in 2018 that were over five times their anticipated benefits calculated by E3. Avista's resource mix and transmission connection to other EIM participants most closely matches IPC and PGE. Therefore Avista may achieve similar elevated EIM benefits during times of high market price volatility.

10.1 Analysis Based on the Charter Estimates

Avista performed an initial economic analysis to determine the system annual benefits required to breakeven over a ten-year operating period based on initial estimated EIM implementation and on-going costs based on two scenarios. The first scenario assumed integration costs of $21.4 million and on-going costs of $3.5 million (original expected system project costs) and the second scenario assumed integration costs of $26.7 million and on-going costs of $4.0 million (expected system with contingency).

In order to break even in 10 years, assuming integration costs of $21.4 million, Avista would need to achieve system annual benefits of approximately $5.0 million. Assuming integration costs of $26.7 million, Avista would need to achieve annual system benefits of approximately $6.0 million. As previously discussed, based on the E3 benefit analysis, Avista estimated conservative annual EIM benefits of $5.8 million (system). Therefore, Avista initially anticipated positive revenue from EIM participation in less than 10 years and could achieve breakeven much sooner if observed market benefits are closer to what IPC and PGE have experienced in 2018 and 2019.

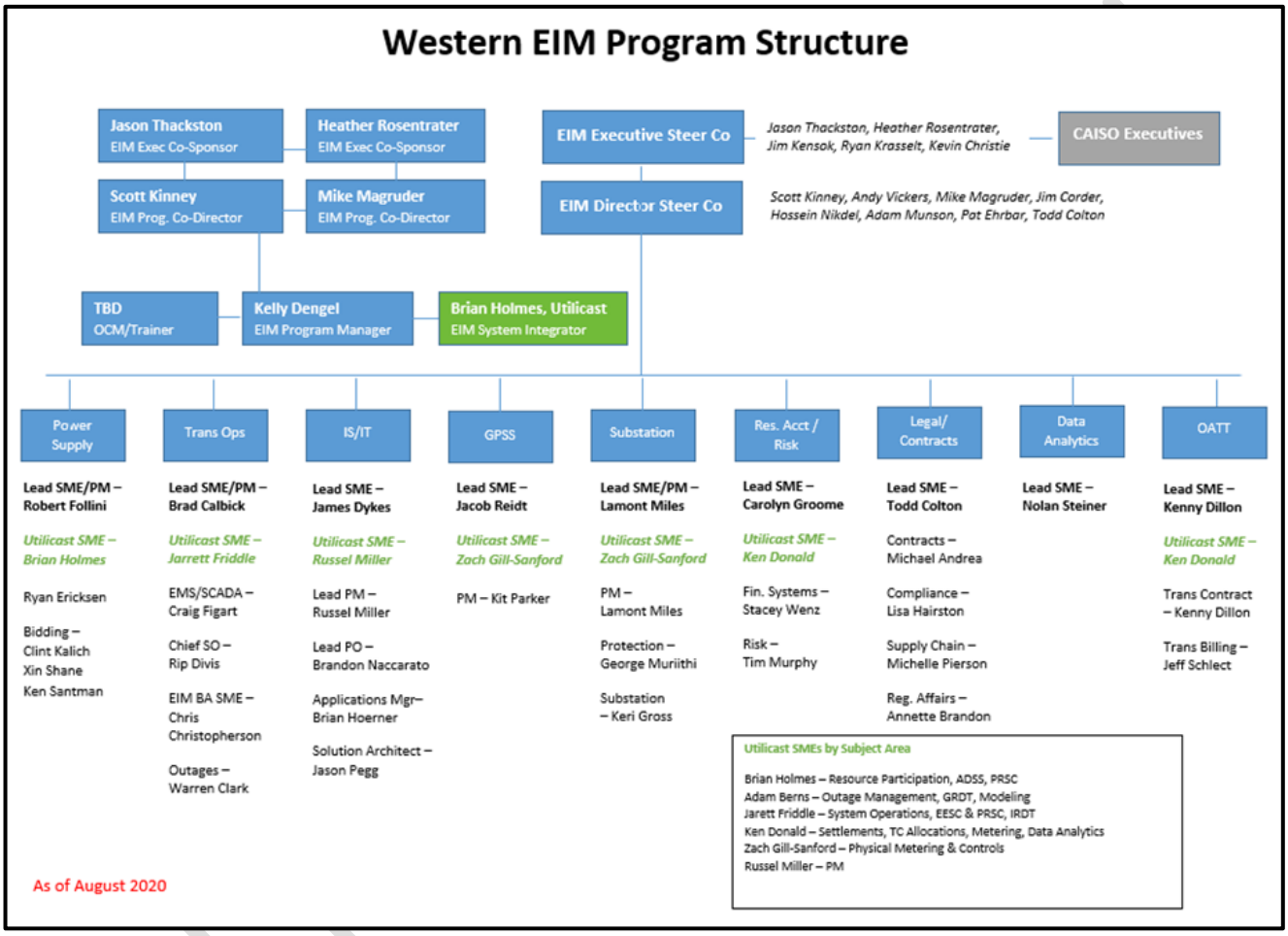
10.2 Analysis Based on Scope Estimates

Avista performed an additional economic analysis based on the updated costs estimates. Based on the new integration cost of $32.1 million and on-going costs of $3.9 million, an annual revenue of $7.8 million is needed to break even after 10 years of market operations. This is still well within the range of estimated benefits determined by E3 and quite a bit less than CAISO reported benefits for IPC and PGE in 2018 and 2019. If Avista's actual EIM system benefits are closer to or exceed the potential upper bound of $12 million, as determined by E3 and experienced by other similar situated EIM participating utilities, then Avista customers will see positive revenue in a much shorter time period. The economic analysis did not consider other EIM benefits such as reduced flexible ramping requirements, reliability and system visibility enhancements, and reductions in greenhouse gases.

11 Roles and Responsibilities

11.1 Program Organization Chart

The below program organization chart represents information known at the time of document submission. The organization chart will be a living document with updates and additions throughout the duration of the program. The organization chart(s) are posted on the EIM SharePoint site.



12 Program Governance and Reporting

12.1 Reporting

The purpose of these procedures and documents is to provide effective mechanisms to record and control the scope of the program, manage issues and risks and monitor progress. Program level management of decisions and documents will be discussed at the EIM Director and Executive Steering Committees and posted to the EIM SharePoint site. Enterprise Technology projects, and their associated processes, will be managed within Clarity. Generation, transmission operations and substation projects will be managed through their established project management processes and procedures, and final documentation posted to the EIM SharePoint site. Each project artifact will reference the EIM program with narrative related to EIM scope, CAISO track, requirements, and the financial structure with the EIM Parent Project ID of EIM422 and the associated Expenditure Request (ER) and Budget Item (BI). The request to open EIM projects will be reviewed by the EIM Program Manager and approved by the Business Case Sponsor.

12.2 Financial Control

Financial controls at the program level will managed with monthly financial reporting through Oracle reports, with assistance from the Financial Planning and Analysis team and project managers from the impacted business units. The Program finances and forecasted spend will be reviewed monthly with the Director and Executive Steering Committees. The Capital Planning Group (CPG) will also be kept informed of the Program Finances through existing CPG processes.

12.3 Change Control / Approval Authority

12.3.1.1 *Advisory Committee*

The Advisory Committees consist of the subject matter experts in the various business units who can direct the technical work, make engineering decisions and deliver the technical solution that meets the business need. The Advisory Committee is supplemented with input and knowledge from Stakeholders amongst neighboring business units. As needed, members of the Director Program Steering Committee will participate in the Advisory Committee meetings for input and decisions. The EIM Program manager will be invited to all Advisory Committee meetings and serve as a consistent conduit from the Advisory Committees to the EIM Program Steering Committee. Communication of project schedule risks, scope issues and financial impacts will be provided by the various project managers at the Advisory Committee and, where appropriate, reported to the EIM Director or Executive Steering Committee. The Advisory Committee does not have the authority to independently approve change requests, but must seek approval from the EIM Director Steering Committee.

12.3.1.2 *EIM Director and Executive Steering Committee*

Program level authority resides with the EIM Director and Executive Steering Committees. Ultimate approval authority resides with the Executive Steering Committee. The Executive Steering Committee is responsible for taking recommendations from the Director Steering Committee and ultimately making Program level decisions for use of contingency funding. In the unforeseen event that the EIM Program schedule is at risk, the Executive Steering Committee has the right to review and adjust the EIM go-live date. Members of the Executive Steering Committee and the Program Sponsors would then be responsible for re-negotiation of the EIM Implementation Agreement with the CAISO.

13 Director Approvals

_____

Scott Kinney, Director of Power Supply

_____

Andy Vickers, Director of Generation Production and Substation Support

_____

Mike Magruder, Director of System Operations and Planning

_____

Jim Corder, Director of Information Technology and Security

_____

Hossein Nikdel, Director of Applications and System Planning

_____

Adam Munson, Director of Accounting

_____

Pat Ehrbar, Director of Regulatory Affairs

_____

Todd Colton, Senior Legal Counsel

14 Executive Approvals

_____

Heather Rosentrater, Sr. VP of Energy Delivery

_____

Jason Thackston, Sr. VP of Energy Resources

_____

Kevin Christie, Sr. VP of External Affairs

_____

Jim Kensok, VP Chief Information & Security Officer

_____

Ryan Krasselt, VP and Controller

documents; nor shall such action be deemed as recognition of any claimed contractual right or obligation affecting or relating to such service or rate; and such acceptance is without prejudice to any findings or orders which have been or may hereafter be made by the Commission in any proceeding now pending or hereafter instituted by or against CAISO.

This action is taken pursuant to the authority delegated to the Director, Division of Electric Power Regulation - West, under 18 C.F.R. § 375.307. This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R § 385.713.

Issued by: Steven T. Wellner, Director, Division of Electric Power Regulation - West

Entire Document is CONFIDENTIAL

Cost Estimate Associated with the Human Resource Plan

Pages 1 through 2

EIM Human Resource Plan

Program Name: Energy Imbalance Market
Program Manager: Kelly Dengel
Business Case Name: Energy Imbalance Market
Expenditure Request (ER): 7141 – Energy Imbalance Market
Submit Date: 06.17.2020

1 Key Roles & Program Information

Program Sponsor(s):	Scott Kinney/ Mike Magruder	**Business Case Owner(s):**	Kelly Dengel
Business Program Manager:	Kelly Dengel	**Executive Steering Committee Members:**	Jason Thackston, Heather Rosentrater, Jim Kensok, Ryan Krasselt, Kevin Christie
Director Steering Committee Members:	Scott Kinney, Andy Vickers, Mike Magruder, Jim Corder, Hossein Nikdel, Adam Munson, Pat Ehrbar, Todd Colton	**Other Stakeholders:**	James Dykes, Robert Follini, Annette Brandon, Jacob Reidt, Kit Parker, Bob Weisbeck, Tom Dempsey, Alexis Alexander, Kristina Newhouse, Glen Farmer, Jeff Schlect, Brad Calbick, Craig Figart, Rip Divis, Kenny Dillon, Mike Andrea, Glenn Madden, Randy Spacek, Lamont Miles, Xin Shane, Brian Hoerner, Jason Pegg

2 Contents

3 Executive Summary

In preparation for Avista to enter the Western Energy Imbalance Market (EIM), it's imperative to discuss the needed roles and teams required for a successful market entry and on-going operations. This document reflects the resources identified for the program implementation and the post-implementation phases, with a proposal for 17 incremental full-time employees (FTE). It includes justification for each position, an explanation of job functions as they relate to EIM and associated risks if the position isn't approved for hire. After reviewing the program implementation schedule, and accommodating a timeline for resources to participate in the software implementation phases, a preferred hire date was developed. This preferred hire date, along with an estimation of time allocated to EIM capital activities and expense activities, provided input for a 2020-2023 annual financial estimate, with 2023 representing a full-year of operations and maintenance (O&M) expense activities. In 2018, Avista originally estimated annual O&M expense at $3.5 - $4.0 million, with $2.5 million attributed to the original labor estimate of 11-13 incremental EIM FTEs. The revised estimate of 17 EIM FTEs increases the annual labor estimate to $3.2 million (system loaded). The need for the additional 4 FTEs (17 vs. 13), was determined through staffing conversations with other EIM entities, who indicated lean staffing levels at the time of market entry have hindered operational performance. Avista believes the 17 FTEs represents a mature workforce needed to fully support EIM operations at market entry. Any additional EIM roles Avista may need will be assessed after Avista has gained experience operating in the market.

This document represents Avista's desired human resource plan based on all information currently available. Elements of the plan will be progressively reviewed, and approved or denied, as new and additional information is presented and business conditions are assessed throughout the 2020-2021 time frame. Although this document calls for a formal approval with associated financials by the Director and Executive Steering Committees, it will not substitute for the individual review and approval of each position prior to job posting. At the timing of this document's approval, future positions will be reviewed and approved at the Director and Executive Steering Committee meetings to ensure the position, timing of the hire and associated financials are acceptable. Where possible, Avista leadership will review new EIM roles and responsibilities in light of existing employees that can assume additional duties, without backfilling the original position. In order for Avista to have trained personnel that are ready to engage in the mandated EIM testing phases six months prior to market entry, all EIM FTEs must be onboarded by September 2021.

4 Background

In 2018, Avista developed its initial Western EIM costs estimates in partnership with Utilicast, taking into consideration what resources would be needed to prepare for market entry, and including those needed to operate effectively and efficiently in the market. This included an estimate of resources needed to establish an EIM Program during the implementation phase and an estimate of new EIM-related employees needed post-implementation, with associated costs. This also included estimates for when the new positions should be hired within the implementation phase to support software projects, learn the market design and prepare Avista for EIM operations as the Company transitioned to market go-live in April 2022.

Throughout most of the evaluation, it was assumed existing Avista resources would be adequate to perform various meter and control upgrades, software implementations and learn market requirements during the implementation phase. However, some additional roles were identified for program implementation, including an EIM Program Manager, Organization Change Management Specialist and a temporary Substation Engineer. These temporary roles were planned for the implementation phase, without an expectation of transitioning to an EIM-related (FTE) role post market entry.

As Avista considered new EIM-related employees after committing to join the market in April 2019, the Company sought input from other EIM participating utilities, including Portland General Electric, Idaho Power Company, Arizona Public Service and PacifiCorp. Avista met with these utilities to discuss the roles and responsibilities needed to successfully operate in the market post go-live. These utilities indicated that a separate EIM specific operating desk was required to interact with the CAISO and ensure reliable market operations. The utilities also shared that they hired new employees to support settlement activities, data collection and review, network model maintenance, system operations support, resource bidding strategies, and new application technology support. After collecting this information, Avista consulted

with Utilicast regarding the new job responsibilities and functions to get input based on their knowledge and experience with CAISO EIM requirements and integrating other EIM participating utilities.

Avista didn't anticipate eliminating any current positions based on new EIM requirements, and remains open to repurposing employees, if existing work processes can be supported and maintained. The estimated resource plan was developed based on expected new market operational work requirements. It may be possible to spread some new expected work across existing employees, but only if it supplements current job responsibilities and doesn't introduce additional burden beyond employee capacity.

5 Implementation Resources

5.1 Incremental FTE Summary

These temporary roles were planned for the EIM Program implementation phase to establish the program and address gaps that existed based on existing resources and Avista priorities outside the EIM Program. It was assumed the substation engineer and change management specialist roles would terminate near the market entry timeframe, while the program manager role would transition to an operations stabilization role through the end of 2022.

Chart 1 – Implementation Temporary FTE Summary

Role*	Department	Position	Quantity	EIM Process
1	Power Supply	EIM Program Manager	1	Overall program/project management
2	Power Supply	Organizational Change Management Specialist	1	Lead Avista through operational changes due to EIM entry
3	Substation Engineering	Substation Engineer	1	Metering upgrades for interchange locations, third-party generation sites
		Original Estimated Totals	3	

*See Appendix C for Role designation.

5.1.1 Role: EIM Program Manager (1 FTE)

This was the first role hired for Avista's EIM Program with the intent to lead the development and implementation of the program from inception to completion – managing the scope, schedule and cost. This role was planned to work closely with business partners in Power Supply, System Operations, Generation and Substation Support, Substation Engineering and Enterprise Technology to develop the strategy, business case objectives and project plans to support a successful implementation. The EIM Program manager was responsible for establishing a program/project structure, establishing a project document governance plan and creating a communication plan to stakeholders. Ultimately, this role is responsible for delivering the EIM project implementation on time.

5.1.1.1 Key Attributes

- Required Timing: Q1 2019
- Reporting Structure: Director of Power Supply
- Other Considerations: Must possess the ability to learn organized market design and Avista's resource operating characteristics.
- Essential Functions:
    - Responsible for overall coordination, status reporting and stability of the EIM integration project including; scope, scheduling, resource requirements, staffing, budgeting and customer satisfaction
    - Communicates with all areas of the company that impact scope, budget, risk and resources of the assigned project(s). Manages communication activities to ensure consistency with company guidelines, policies and procedures.

- Manages and facilitates understanding of budget issues within business units. Ensures that internal controls are adequate and documented. Directs the analysis and reporting of performance indicators that best support management decision making.
- Tracks key milestones and adjusts project plans and/or resources to meet the needs of the involved business units. Provides timely and accurate information and status updates to project sponsors, end users and management.
- Responsible for program level documentation creation and approval, and provides guidance on all project-level documentation and approval levels.
- Responsible for management and interaction with the implementation consultant, Utilicast.

5.1.2 Role: Organization Change Management Specialist (1 FTE)

Joining an organized market brings significant change to an organization and the Organizational Change Management (OCM) Specialist is a key role in helping the EIM Program meet business and schedule objectives. Avista's OCM Specialist will have an emphasis on the people side of change – including changes to business processes, systems and technology, job roles and organizational structure across all impacted business units. A primary focus of the OCM Specialist will be to create and implement change management plans that minimize employee resistance and maximize employee engagement. The OCM Specialist will work to drive faster adoption, greater utilization of EIM systems and higher proficiency on the changes impacting employees in the organization such that business results are achieved.

5.1.2.1 Key Attributes

- Required Timing: Q3 2020
- Reporting Structure: EIM Program Manager
- Other Considerations: Prior OCM experience on a large-scale program is desired.
- Essential Functions:
  - Responsible for creating and implementing complete Change Management Plans for change initiatives, incorporating communication and training plans that minimize employee resistance and maximize employee engagement.
  - Work with project stakeholders to identify potential risks and anticipated points of resistance and develop specific plans to mitigate.
  - Develop and implement a set of actionable and targeted change management plans which include: communication, sponsor roadmap, coaching plan, training plan and resistance management plan.
  - Be an active and visible coach to executive leaders who are change sponsors, members of the project team and end-users to encourage adoption of new operations/processes.
  - Work with project manager to integrate change and management activities into the overall project plan.
  - Coordinate with training development personnel in the formulation and delivery of training plans and activities in support of project implementation.

5.1.3 Substation Engineer (1 FTE)

In order to perform metering upgrades at various Avista substation interchange locations and third-party generation sites, Avista needed a Senior Electrical Engineering to design metering solutions to meet EIM requirements. This role will be responsible for creating new designs or making modifications to existing electrical distribution and transmission substations interchanges designs, including the physical, electrical and control designs. They will also assists in the development, evaluation and selection of station layout options, and be responsible for the all drawings and specifications used for construction, including drawings that must be submitted to CAISO for Settlement Quality Meter Data plans. In April 2020, this role was converted from a temporary position to full time employee. It's anticipated that EIM metering upgrades will be the primary focus for the position through the end of 2020, with 2021 representing an estimated time allocation of 30% on EIM projects and 70% other substation engineering projects.

5.1.3.1 Key Attributes

- Required Timing: Q1 2020
- Reporting Structure: Substation Engineering Manager
- Other Considerations:

- Approximately 8 years of experience in Substation Engineering, using engineering principles to produce drawings for substation engineering construction. Professional Engineer's License is preferred.
- Able to demonstrate proficiency in all analytical tools specific to Substation Engineering.
- Must have a positive level of recognition within the engineering community regarding their work ethic, expertise and interpersonal skills, and recognition of their expertise by outside groups is an added attribute.
- Experience working in teams and the ability to collaborate with a wide group of stakeholders is essential.

6 Post Implementation Resources – Original Estimates

6.1 Estimated Incremental FTE Summary

These EIM-related FTE resources were part of the original program estimates in 2018. Of the original $3.5-$4M annual estimated O&M impact, $2.5M was estimated (assumed 60% loading rate) for 11-13 incremental FTEs.

Table 2 – Original Avista FTE Estimates

Department	Position	Quantity	EIM Process
Power Supply	Analyst	1	Market bids analysis, settlement analysis
System Operations	Network Model Tech	1	Support network model operations
System Operations	SCADA Tech	1	Support SCADA operations
System Operations	EIM BA Desk	5	EIM BA operations
TBD	Settlement Analyst	1	EIM settlements
TBD	Data Management Operator	1	EIM meter data submittal to CAISO
TBD	Compliance	0 or 1	FERC EQR or greenhouse gas reporting
Enterprise Technology	IT Analyst	1 or 2	EIM Applications support
	Original Estimated Totals	11 to 13	

6.2 Discovery & Analysis

In order to determine an appropriate and successful EIM operational course, Utilicast led Avista through conversations regarding the structure and components of the EIM Settlements team and the EIM Balancing Authority (BA) Desk. These discussions were supplemented by conversations with other EIM utilities on topics including: team responsibilities, management expectations, and integration of EIM functions with existing teams and business processes. The current EIM utilities shared that they have modified their structure, focus and number of employees to support settlement activities after gaining operating experience in the market. The result of these conversations led to the creation of two Key Decision Documents to outline the roles, responsibilities and the advantages/disadvantages of how to approach a particular model. A summarized highlight of these Key Decision Documents are listed below, with the full documents provided in the appendix.

6.2.1 EIM Settlements Team Evaluation & Recommendation

The management and understanding of EIM settlements is a key component of identifying and analyzing business and technical decisions for conformance to market design principles and market operations to ensure maximum performance in the market. Avista recommends pursuing a hybrid structure with both centralized and distributed components – a centralized Settlements Team that handles shadow settlements for both the Merchant and the Balancing Authority, also known as the EIM Entity (Entity), with a separate analyst role embedded in the Merchant and Entity that coordinate with the Settlements Team and conducts deeper market analysis. This centralized Settlements Team supports Merchant and Entity settlements, promotes expansion of settlement specific skill sets and ensures the timely analysis and appropriate priority is given to settlements. This centralized team will have visibility to the financial

results for both the Merchant and Entity, so cost benefit studies and overall market performance can be more easily evaluated and assembled.

The primary functions of the Settlements Team include: daily generation and interchange meter validation and processing, daily settlement processing, sub allocation of transmission customer charges, market analytics, financial reporting, and cost benefit analysis. The distributed analyst roles in the Merchant and Entity, along with the Settlements Team, will analyze both individual business unit performance and Avista's overall market performance. This hybrid structure will facilitate deep analytical capabilities through direct links with the Merchant and Entity analysts, while also supporting the myriad of daily shadow settlement processing tasks.

To best support EIM functions, Avista recommends a Settlements Team of five total individuals – four analysts with shared responsibilities and a Settlement Manager. The Settlement Manager will also perform analytic activities. This team will report to the Director of Accounting.

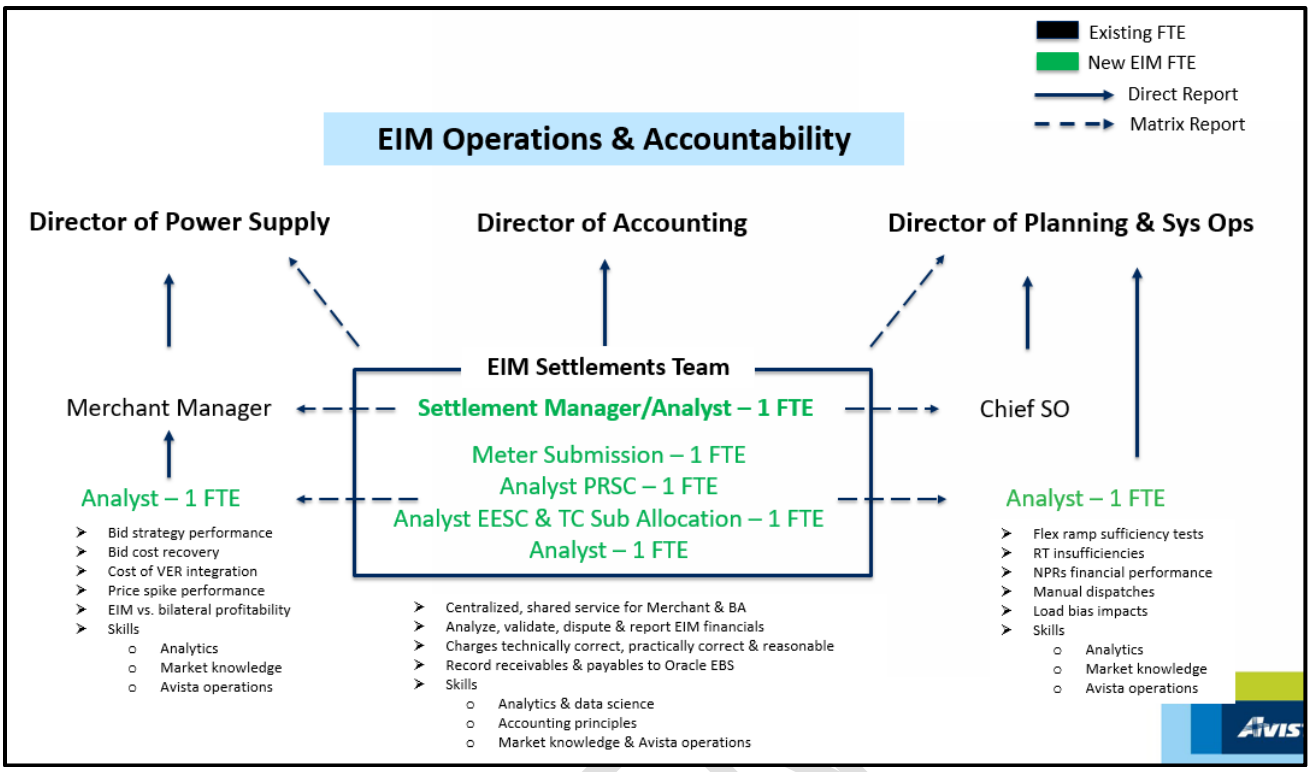
Table 3 - Summary of Settlement Staffing Requirements

Role / Allocation	Reports to:	Resides within:
Settlements Team		
Settlement Manager / 1 FTE	Director of Accounting	Accounting
Meter Processing		
Meter Analyst / 1 FTE	Settlement Manager	Accounting
Shadow Settlement		
Settlement Analyst / 1 FTE	Settlement Manager	Accounting
Settlement Analyst / 1 FTE	Settlement Manager	Accounting
Settlement Analyst / 1 FTE	Settlement Manager	Accounting
Market Analytics		
Market Analyst / 1 FTE	Manager Preschedule & Real Time	Power Supply/Merchant
Market Analyst / 1 FTE	Director of System Ops & Planning	BA Entity

Within the settlement functions, it is possible some of the duties may be performed by existing employees without the need to backfill roles. Avista leadership will conduct further evaluation to assess the resource need as the EIM Program progresses and business processes are refined.

For details on the settlement structure see Appendix A - "EIM Key Decision – Settlement, Bill & Analytics Roles"

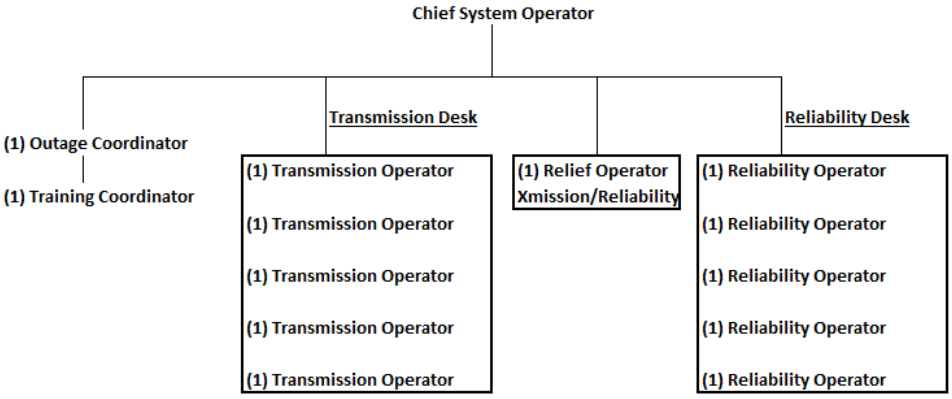
Chart 1 – EIM Settlements Team Structure



6.2.2 EIM Real Time Operator Roles Evaluation & Recommendation

Transmission System Operations currently has two 24x7 desks – the Reliability Desk and the Transmission System Operator Desk. The below chart explains how System Operations is currently organized pre-EIM entry.

Chart 2 – Transmission System Operations Pre EIM

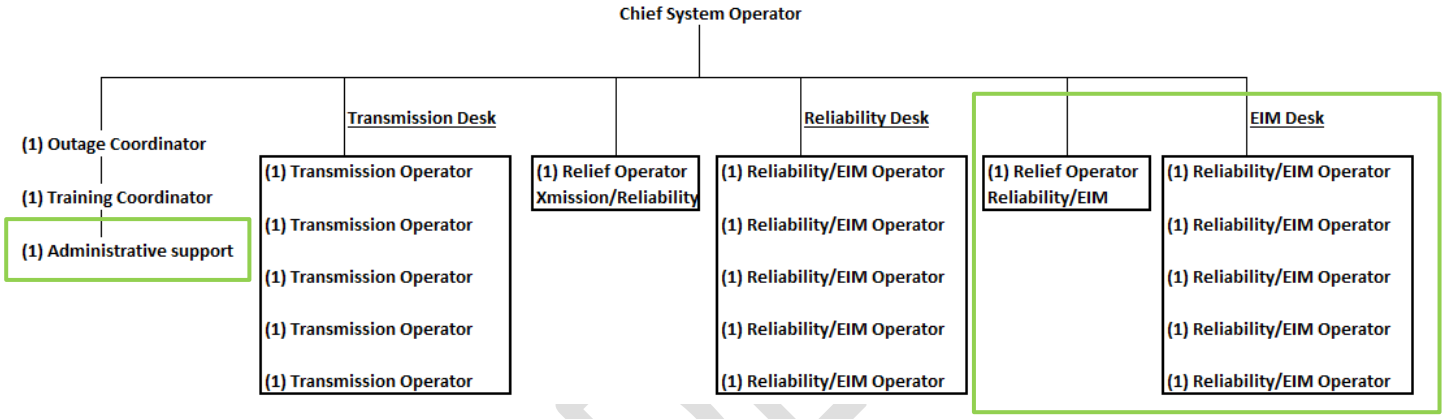


The organizational structure required to perform all existing functions and accommodate new EIM functions can take several forms. A common approach to EIM functions includes adjusting existing desk processes/responsibilities and adding an EIM Desk to focus solely on pre-operating hour EIM operations. Through discussions with Utilicast, Avista identified which tasks would reside with the Merchant and which tasks would reside with the Entity. The results included: shared generation management tasks between the Merchant and Reliability Operators, new EIM tasks for the Reliability & Transmission Desks, and a full set of tasks for the new EIM Desk.

In order to provide continuity amongst all the operators and an environment for cross-functional desk qualifications, Avista recommends NERC certification for the EIM Desk operators. This would entail all of the System Operators obtaining NERC certification and qualifying on their respective desks with the Reliability Operators and EIM Operators being qualified on both desks. This will allow greater flexibility for covering shifts during emergency conditions, training, vacations and unexpected absences. NERC certification will require the EIM Operators to be hired at least 12-16 months in advance to allow time to become NERC certified and learn the job function. Future plans include training the operators to be qualified to work all three desks in System Operations.

Following input from Utilicast and other EIM entities, Avista recommends adding a third 24x7 desk focusing on EIM operations with five operators, and one relief operator to manage EIM real-time operations and a training administrator to help with additional operator training requirements.

Chart 3 – Transmission System Operations Post EIM



For details on the EIM BA operator role see the Appendix B - “EIM Key Decision – RT Operator Functional Role Evaluation”

7 Post Implementation Resources – Updated Estimates

7.1 Proposed Incremental FTE Summary (17 FTEs)

After evaluation and review amongst stakeholders, directors and executives, Avista recommends the following incremental full-time employees to support Avista EIM operations. Through conversations with Utilicast and other EIM entities, it's common for utilities to re-evaluate their EIM structure and resource allocation post-EIM entry and make changes in terms of reporting structure or number of employees supporting EIM operations. Avista will evaluate the operating structure and implement adjustments as necessary to ensure successful EIM operations.

Table 4 – Incremental FTE Summary

Role*	Department	Position	Original	Proposed	EIM Process
4	Power Supply	Analyst	1	1	Market bids & settlement analysis
5	System Operations	Analyst	0	1	BA EIM operations analysis
6	System Operations	EMS Modeling Engineer	1	1	Support network model operations
	~~System Operations~~	~~SCADA Tech~~	~~1~~	~~0~~	~~Support SCADA operations~~
7	System Operations	EIM BA Desk Operator	5	6	EIM BA operations
8	System Operations	Training Administrator	0	1	Support NERC Training Coordinator
9	Accounting	Settlement Manager	0	1	EIM settlements & analysis
10	Accounting	Settlement Analyst	1	3	EIM settlements & analysis
11	Accounting	Meter Analyst	1	1	EIM meter data submittal to CAISO
	~~TBD~~	~~Compliance~~	~~0 or 1~~	~~0~~	~~FERC EQR/Green House Gas Reporting~~
12	Enterprise Tech	Technical System Analyst	1 or 2	1	EIM applications operations support
13	Enterprise Tech	Ops Technical Lead	0	1	EIM applications operations support
		Totals	11 to 13	17	

*See Appendix C for Role designation.

7.2 Department: Power Supply Operations (1 FTE)

7.2.1 Role: Power Supply Analyst (1 FTE)

The EIM is a complex market design requiring comprehensive, precise and timely analysis of processes along with operational and settlement data to ensure business decisions are achieving the desired results. In the EIM the merchant is the Participating Resource Scheduling Coordinator (PRSC). Avista's PRSC manages all of the base schedule and bid curve submittals for all of the participating generation resources. These resources are dispatched by the Market Operator (CAISO) based off of submitted bid curves and the market solution's Locational Marginal Prices (LMP's). The market solutions have reliability and economic affects that are substantial. It is incumbent upon every EIM PRSC to have a detailed knowledge of the market design and evaluate their business decisions, operational performance, settlement and analytical implications and results made from bidding in participating resources. The analyst will need to inform and create ongoing bid strategy and assist in the development of the EIM benefits summary.

The EIM Power Supply Analyst position will report to the Manager of Preschedule and Real Time and work closely with the Preschedule, Real Time, Generation Production Substation and Support, Enterprise Technology and the Settlements Team. This position will require a deep knowledge of organized market designs, knowledge of the western Bulk Electric System, generation resource characteristics and operations, and a thorough knowledge and use of data and visual analytical tools. This position will require excellent communication and collaboration skills to reach across business units to push and pull information and data informing and recommending business strategies for optimal market participation.

The position is also expected to monitor market stakeholder initiatives and track implementation of future EIM enhancements such as EIM Day Ahead Market (EDAM) and enhancements to the existing Day Ahead Market.

7.2.1.1 Risk Considerations

As noted above, it is of the utmost importance that business decisions and market interaction strategies conform to Avista's specific resource characteristics, technology integrations and human performance. It is incumbent on Avista to carefully analyze the business decisions and market interactions to ensure maximum market benefits. If this position is not filled, Avista will be exposed to market settlements that could be detrimental to Avista's monetary benefit in the EIM, with little to no feedback loop on performance to the merchant group. This type of analytical neglect could lead to long periods of time with unsatisfactory market strategy submissions before errors or faulty business logic are rectified.

7.2.1.2 Key Attributes

- Required Timing: Q3 2021
- Reporting Structure: Manager of Preschedule & Real Time
- Other Considerations: In depth knowledge of data analytics and the ability to learn organized market design and resource operating characteristics. This position should be posted internal and external.
- Essential Functions:
    - Evaluate bid strategy performance
    - Evaluate bid cost recovery performance
    - Evaluate the cost of Variable Energy Resource (VER) integration
    - Evaluate generation availability and performance
    - Evaluate EIM vs. bilateral market profitability
    - Help determine EIM benefits calculations logic and counter-factual calculations
    - Manage Generation Resource Data Template (GRDT) inputs and Masterfile information
    - Evaluate market design impacts to the business
    - Work with the Settlements Team to ensure accurate settlement data and overall market performance

7.3 Department: Transmission System Operations (9 FTE)

7.3.1 Role: EIM BA Analyst (1 FTE)

The EIM is a complex market design requiring comprehensive, precise and timely analysis of processes along with operational and settlement data to ensure business decisions are achieving the expected results. In the EIM, the BA is the EIM Entity Scheduling Coordinator (EESC). As a complement to the Power Supply Analyst and EIM Settlements Team who will commit to robust economic analysis, the Entity BA also needs to commit to understanding the BA's financial impact on market performance and the settlement impacts to its third party transmission service customers. In the EIM, the System Operator's actions can have a significant impact on Avista's overall performance and financial benefit in the market. These Operators are responsible for the final resource balancing process each hour, self-scheduling non-participating resources, entering manual dispatches, ensuring the BA is meeting its performance standards, and ensuring both physical and scheduling constraints are maintained by the market dispatch. The operators will also review the dispatch instructions and start-up instructions received from CAISO and ensure the plants perform to those instructions. It is important for the System Operators, whose primary objective is to maintain the reliability of the Avista transmission system, to also understand the financial consequences of market transactions where reliability may not be a primary driver.

The BA Analyst will review Avista's market performance and evaluate impacts to system reliability and transmission service. This analysis will help drive overall System Operator process improvements and decision making consistency across the various System Operator functions. In addition, the BA Analyst will review the load, interchange transactions and third-party resource settlements which will be part of the overall EIM benefits and impacts summaries. The position is also expected to monitor market stakeholder initiatives and track implementation of future EIM enhancements such as EIM Day Ahead Market (EDAM) and enhancements to the existing Day Ahead Market.

The EIM BA Analyst position will report to the Director of Planning and System Operations, and work closely with the Chief System Operator, System Operators, the Enterprise Technology department, the Settlements Team. This position will require a deep knowledge of organized market designs, knowledge of the western Bulk Electric System, transmission service administration, scheduling, transmission constraints and a thorough knowledge and use of data and visual analytical tools. This position will require excellent communication and collaboration skills to reach across business units to push and pull data and make process improvement recommendations to System Operations for optimal market participation.

7.3.1.1 Risk Considerations

If this position isn't filled, market feedback to the EIM Operator about the effectiveness of their decisions will be delayed and it will be difficult to research and identify the financial impacts of operator decisions. There will also be reduced financial analysis of the third-party settlements, load and interchange transactions which are a part of the EIM Entity Scheduling Coordinator settlement (EESC) process. Without this role, the Chief System Operator and other support personnel, will need to identify operation process improvement recommendations and training needs in addition to their existing operational job tasks. The Avista EIM BA Operator needs to be proficient and consistent in their actions, while understanding the financial impact of their action. The existing Operator roles are also affected by this new paradigm of operation under EIM. Timely feedback for improvements will be important. This role serves this need, and provides market insight and influence for developing System Operations' training and data materials.

7.3.1.2 Key Attributes

- Required Timing: Q3 2021
- Reporting Structure: Director of Transmission System Operations & Planning
- Other Considerations: In depth knowledge of data analytics and the ability to learn organized market design and Avista's resource operating characteristics. This position should be posted internal and external.
- Essential Functions:
    - Evaluate sufficiency test performance
    - Analyze manual dispatch and load bias impacts to price volatility and infeasibilities
    - Evaluate resource performance to Dispatch Operating Targets (DOTS)
    - Evaluate market impacts to Critical Performance Standards (CPS) and NERC Balancing Authority Ace Limit (BAAL) standards for compliance
    - Analyze impacts of third-party changes to generation or interchange schedules
    - Analyze EIM Transfer System Resource (ETSR) and intertie constraint strategies
    - Help determine EIM benefits calculations and counter-factual calculations logic
    - Update intertie resource configurations in the EIM Entity Scheduling Coordinator (EESC) application
    - Manage Intertie Resource Data Template definitions (IRDT) and Masterfile information
    - Evaluate market design impacts to system operations
    - Work with the Settlements Team to ensure accurate settlement data and overall market performance

7.3.2 Role: EMS Modeling Engineer – SCADA (1 FTE)

This position will work under the technical guidance of the SCADA/EMS Manager and will be responsible for supporting ongoing maintenance of the Avista's electrical transmission network model. The network model is an integral part of the reliability monitoring of Avista's electrical transmission system, and is crucial to Avista's participation in the Western EIM. The responsibilities of this position include the maintenance of an Energy Management System (EMS) Network, SCADA and Alarm models, the real-time ICCP measurements, and the EMS displays used to provide an accurate representation of the state of the Avista's portion of the Bulk Electric System (BES). This position will be responsible for exchanging accurate network model with neighboring utilities, the Reliability Coordinator (RC West), and the Western EIM. This position will be assisting with all technical details of the network modeling effort in formats and exports for planning, EMS, and network applications purposes. This position includes a close working relationship with other SCADA/EMS engineers, Avista engineering and operations personnel, vendors, and neighboring utilities. Since this position supports the network model for both RC West requirements and the EIM, it is anticipated that fifty percent of

this positions time will be allocated to each function. The allocation of work time will be adjusted after market experience is gained.

7.3.2.1 Risk Considerations

Management of a real-time network model of Avista's electrical system is an entirely new body of work for Avista. Prior to EIM entry, it was sufficient to let the Reliability Coordinator (Peak Reliability) manage the real-time model of Avista's electrical network. When errors or inconsistencies were present, System Operations engineers resolved them in real time and there was little reliability or financial risk.

With the change of Reliability Coordinator responsibilities shifting to the RC West, pending EIM entry and recent changes to NERC reliability standards, it is crucial that Avista take responsibility for managing its own network model. Avista has learned from other EIM participants that incorrect modeling of the electrical network will result in the EIM market algorithm non-optimally dispatching resources, and even dispatching units out of the market. CAISO considers the accuracy of the model to be Avista's responsibility. Any EIM dispatch risk due to modeling errors will be Avista's obligation to manage.

Management and maintenance of the real-time network model is required, regardless of whether this position is approved. Should this position not be filled, Avista will need to contract external resources for ongoing management of the model.

7.3.2.2 Key Attributes

- Required Timing: Q2 2020.
- Reporting Structure: Manager of SCADA/EMS
- Essential Functions
    - Implement, enhance and resolve issues of modeling the Western Interconnection, including, but not limited to, updating the Avista EMS Network, SCADA, Alarm, and ICCP models.
    - Implement, enhance, and resolve issues associated with EMS overview and substation displays which are used by the Avista System Operators to maintain real-time situational awareness.
    - Work closely with Balancing Authority, Transmission Operations, and Energy Imbalance Market teams, vendors, and support personnel to resolve issues.
    - Work closely with Transmission Operations Engineers and the SCADA/EMS engineering team to provide support pertaining to the maintenance and enhancement of the EMS models to better meet the needs and functionality of Avista's reliability functions.
    - Recommend creative and innovative information systems solutions to various business or technical problems. Ensure work is technically sound and in compliance with established standards, codes, and regulations.
    - Be involved in the modification, integration and migration of EMS systems to new software versions.
    - Plan and coordinate database and display changes to reflect the true and ever-changing configuration of the transmission system to correct problems and to meet user needs, requests, and schedules.
    - Exchanging accurate network model information with neighboring utilities, the Reliability Coordinator (RC West), and the CAISO Western EIM.

7.3.3 Role: EIM BA Operator (6 FTE: 5 EIM Operators and 1 Relief Operator)

The EIM BA Desk operators will staff a new 24x7 hour operating desk in Transmission System Operations. The five new EIM operators will conduct the final balancing process and data checks for market base schedule submission prior to each operating hour. As part of the overall base schedule process, the EIM BA Operator will also be responsible for providing generator information to the CAISO for any non-participating generation resources not managed by the Merchant, including any third-party resources within the Balancing Authority Area (BAA). The EIM BA Operator will have oversight of the automated processes in the EESC application that determine the intertie resource base schedules and real-time values being submitted to CAISO to ensure they align with the BAA scheduled interchange. The EIM Operator will also oversee ETSR and Intertie Constraint (ITC) limits, overriding limits if necessary or locking EIM transfer capacity.

The EIM BA Operator will cross-train for certification as a Reliability Operator as well. The Reliability Operator is responsible for many of the transmission service management and scheduling activities, ensuring the BA performance criteria are met, generation adjustments for transmission reliability issues, implementing schedule curtailments when necessary, approving and submitting outages to the Reliability Coordinator, updating outages on OASIS and initiating or responding to NWPP reserve sharing events. Operating under EIM will also bring more real-time activities to this role including the review of generation dispatch and start-up instructions, manual dispatch process and load bias processes.

System Operators have the primary responsibility of maintaining the reliability of the Avista transmission system. They will also have significant real-time interaction with the Market Systems and Market Operator for things that are not necessarily reliability related. Their actions will have economic impacts to the overall performance of Avista in the EIM. It will be important for the System Operators to understand the EIM market design, how it impacts and can improve reliability and also understand the financial consequences of market constraints if they are not managed properly.

7.3.3.1 Risk Considerations

If the EIM BA Operator team is not approved, these new EIM functions would be added to the Reliability Operator role causing an unmanageable workload and priority conflict. Risk would include an inability to adequately and consistently pass hourly market requirements, failure to perform additional intra-hour tasks and ultimately cause a degradation in maintaining reliability. During contingency events, conflicting obligations between reliability and EIM priorities could cause Avista to reduce market effectiveness and cause potential reliability issues. Reliability tasks could even be missed, resulting in non-compliance and subject to punitive regulatory action. Ultimately, if the two desks were to be combined, there is a risk to operator retention and recruiting due to unmanageable work load and tasks.
Based on the importance of the Reliability and EIM Operators and the significant overlap of functions, there is a need to consider hiring an additional Operator to serve as a relief position for both desks.

The current Relief Operator provides coverage at a 1:10 Operator ratio, covering both the Transmission Reliability Desks. The addition of the EIM Desk would increase the Relief Operator's coverage to a 1:15 ratio, with support of all three desks. This would be a 150% increase in the number of Operators to support, in addition to staying proficient on the existing desks, while learning additional duties and skills for the EIM Desk. Existing standards require a substantial amount of annual training, and the additional EIM desk will significantly increase those annual training requirements, which must be completed while maintaining adequate desk coverage.

The Relief Operator is critical for maintaining coverage for sick leave, vacations, jury duty, and unplanned absences. The risk of inadequate coverage to support desk operations in the event an Operator has to, or elects to, suddenly leave System Operations or the Company should also be considered. In the long term, these unplanned vacancies take a toll on System Operations, as it takes six months for a System Operator to complete NERC certification and adequately train on systems and procedures required to work the desk independently. Without the presence of an additional Relief Operator, these unplanned or long-term vacancies require the existing Operators to cover shifts through overtime, working a shift during their training week or postponing planned vacations.

Requiring an Operator to work his/her training week to cover a shift presents a risk. System Operators must complete more than 200 hours of required training to maintain NERC certification. These training weeks are critical for the Operators to ensure their understanding of Avista's infrastructure and supporting systems, and to ensure job effectiveness. Avista's System Operators are highly experienced and have significant amounts of One Leave. The Relief Operator allows for better planning of shift schedules. Overall, it's not reasonable to expect one Relief Operator to provide adequate coverage for the EIM, Reliability, and Transmission Desks.

7.3.3.2 Key Attributes

- Required Timing: Progressive hires from Q1 2020 – Q1 2021
- Reporting Structure: Chief System Operator
- Other Considerations: Experience in Power Supply and electric markets, Real-Time Transmission or Distribution Operations, Operations Engineering or Transmission System Field work with the ability to learn organized

market design. NERC Reliability Coordinator certification will be required. This position should be posted internal and external.

- Essential Functions:
  - Create and submit third-party Non-Participating Resource (NPR) base schedules prior to T-75, T-55, T-40 operating hour
  - Finalize contingency and regulating reserves for EIM prior to T-40 operating hour
  - Review and respond to sufficiency test failures (Capacity, Balance, Flex Ramp) for the BAA prior to T-40
  - Balance and submit all final generation resource base schedules prior to T-40 (in coordination with Merchant)
  - Submit real-time (RT) Variable Energy Resource (VER) forecasts to CAISO (automated)
  - Create and submit aggregated intertie base schedules for each intertie location prior to T-75, T-55, T-40 (automated)
  - Determine EIM transfer limits for each intertie to another EIM participant and submit to BAAOP continuously (automated but with override capability)
  - Provide a rolling five hour forecast or ramped interchange for each intertie at a 5-minute granularity, refreshed every 5 minutes (automated)
  - Single point of contact for CAISO RT Market Operator
  - Coordinate shutdown of Avista generation (shared)
  - Submit After the Fact (ATF) RT interchange schedules to CAISO (Automated)

7.3.4 Role: Training Administrator (1 FTE)

In order to have competent proficient operators that are able to understand and function in the EIM, and manage Avista's system in the most reliable and efficient way, they must have a training program that is robust and keeps their skills and knowledge at the highest level.

The System Operator positions require 200 Continuing Education Hours (CEH) of training every 3 years in order maintain their NERC credentials and to be able to perform their Reliability Related Tasks (RRT). The EIM BA Operator and the BA System Operator will both perform some of these tasks. The training for these positions is developed, delivered and documented in house and must be specific to the system they operate. Generic operator training does not meet compliance standards. At present, there is one trainer that fulfills this role for the current 13 NERC certified personnel in System Operations. With the addition of the EIM BA desk, there will be up to 19 NERC certified personnel in System Operations. Other EIM entities have a training staff to operator ratio of between 1:6 and 1:8. Avista operates with a 1:13 ratio today. With the added EIM BA desk personnel, that ratio would increase to 1:19. After this training administrator is added to support the training coordinator, the ratio would decrease to 1:9.5.

To accommodate this increased training demand, it is necessary to add either a second trainer or a training admin role. The training admin position will assist the Training Coordinator with the increased administrative work caused by the increase in NERC certified System Operators, and will aid the trainer in the documentation, scheduling and logistics processes.

7.3.4.1 Risk Considerations

In order to support the increase operator-to-training coordinator ratio, while not decreasing training performance or compliance obligations, Avista supports hiring a Training Administrator to assist with training goals and objectives. This allows the Training Coordinator to embrace the market complexity and build more robust EIM training, while maintaining current reliability training compliance objectives. If this role is not approved, the Training Coordinator may be unable to develop new training materials to ensure operator proficiency, or identify and address operator learning deficiencies in a timely manner. This increase in operator training will require additional documentation and maintenance, which if not addressed will likely cause audit deficiencies and a reduction in training quality.

7.3.4.2 Key Attributes

- Required Timing: Q1 2022

- Reporting Structure: Chief System Operator
- Essential Functions:
  - Prepare individual documents for required training courses.
  - In conjunction with Trainer develop, update and maintain training schedule for 19 certified operators.
  - Maintain all compliance required documentation using QTD, SOCCED, CATSWEB and Source Training.
  - Input completed training documents into electronic format.
  - Assist Trainer in developing and documenting individual training plans.
  - Work with Trainer to assess effectiveness of training by evaluating completed assessments and course evaluations.
  - Assist Trainer with budget and keep accounting records for training budget.
  - Assist Trainer in maintaining simulator updates by tracking system changes.
  - Administer operator competency assessments and compile data to help identify training deficiencies.
  - Complete other administrative work as directed by Chief and Trainer.

7.4 Department: Finance (5 FTE)

7.4.1 Role: Settlement Manager (1 FTE)

In Avista's proposed Settlement Team structure, the Settlement Manager would lead a group of four analysts by monitoring, guiding and directly supporting meter data verification and submittal, statement and invoice processing, shadow verification, sub allocation, and troubleshooting of daily activity corresponding to Trade Dates in the T+3B, T+12B and T+55B CAISO settlement timeline, which may span up to 8 or more cycles and as many as 36 months of history. Other matrixed analysts (2) embedded within the Merchant and BA organizations will collaborate closely with and use software tools of the Settlement Team to perform deep-end financial and strategic analyses. The Settlement Manager is also expected to participate in and contribute to weekly BA performance reviews with CAISO staff, monitor market stakeholder initiatives and track implementation of future EIM enhancements such as EIM Day Ahead Market (eDAM) and enhancements to the existing Day Ahead Market.

7.4.1.1 Risk Considerations

A less-than-fully-staffed settlement team would generally be deficient in its capability to identify:

- Settlement calculations errors due to mishandling of input data on CAISO's part,
- Data submission problems related to Avista software or processes
- Operational behavior patterns resulting in suboptimal settlement and financial results
- Capture benefits through dispute resolution or educating others on the settlement consequences of operational decisions.

The Settlement Manager will prioritize the processing and analytical activities of the group to focus on those which will provide the most value. He or she will also provide the leadership necessary to properly anticipate market enhancements, voice Avista's position in proposed CAISO rule changes and manage evolution of the EIM Entity commercial model.

7.4.1.2 Key Attributes

- Required Timing: Q3 2020
- Reporting Structure: Director of Accounting
- Other Considerations: Well qualified candidates should possess a working knowledge of Avista's metering portfolio and generation operational characteristics, familiarity with MV-90, PI and Nucleus and their integrations with the Energy Accounting system, intimate understanding of the CAISO meter submittal timeline and a basic awareness of EIM settlement calculations and market operations, as well as the ability to handle and analyze large data sets.
- Essential Functions:
  - Troubleshoot interruptions in acquisition of data from upstream system
  - Acknowledge, analyze and respond appropriately to validation messages generated by the Energy Accounting system

- Validate calculations in the Energy Accounting system to aggregate, net, profile or prorate raw metering to achieve CAISO resource ID net high-side data submittals
- Verify timely submission to the CAISO Market Results Interface – Settlements (MRI-S) application
- Reconcile submittals against downloads from CAISO
- Support analysis of unit performance related to Uninstructed Imbalance Energy
- Manage Energy Accounting system configuration for modeling and metering changes
- Support the annual Self-Audit Attestation and biannual Audit & Testing of Metered Facilities required of EIM Bas
- Ensure Merchant and EIM Entity analysts have adequate information to evaluate market performance

7.4.2 Role: Meter Analyst (1 FTE)

Responsibility of the EIM Meter Data Analyst starts after generation and interchange meter data that has been collected by MV-90, PI or Nucleus and interfaced to the new EIM application called Energy Accounting. Validation, Estimation and Editing (VEE) occurs within the system as raw data is transformed to resource identification level, with net high-side meter values submitted to CAISO. Submittals are expected by eight business days after the trade or operating date with provision for a true-up by 48 days following the trade date. This processing is entirely subject to the availability and quality of data from upstream systems and requires the analyst monitor it continuously for omissions and warning flags. The Avista meter model for EIM is not static – modifications of physical equipment and inclusion of additional resources will require updates to software and processes. The Meter Analyst is expected to work with other groups to ensure adaptation of these changes is well anticipated and seamlessly executed.

7.4.2.1 Risk Considerations

Without dedicating a stand-alone resource to the task of processing and analyzing metering, which is eventually submitted to CAISO for EIM settlement calculations, the job would have to be shared among others either in the settlements group or prior to settlements, among staff primarily focused on physical metering or the MV-90 system. As one of only two or three principle billing determinants over which Avista will actually have control, metering collection and verification represents an extremely important input to settlement calculations. Ensuring submitted values start with complete and accurate raw data, are validated for known anomalies and are properly transformed through algorithms performing aggregation, netting, proration or profiling to the CAISO resource identification level is required.

Timely data submission has a high impact on successful settlement results and will help prevent unnecessary work. Analysts in the settlement group are tasked with interpreting CAISO calculations and results, so transitioning between metering and settlement concerns would surely diminish the effectiveness of their efforts. Likewise, to expect that staff previously obligated to manage installation, testing and maintenance of all metering devices or responsible for troubleshooting data collection from all equipment in the field on a daily basis, would not provide sufficient attention to the VEE processes and data submittal functions.

7.4.2.2 Key Attributes

- Required Timing: Q2 2021
- Reporting Structure: Settlement Manager
- Other Considerations: Well qualified candidates should possess a working knowledge of Avista's metering portfolio and generation operational characteristics, familiarity with MV-90, PI and Nucleus and their integrations with the Energy Accounting system, intimate understanding of the CAISO meter submittal timeline and a basic awareness of EIM settlement calculations as well as the ability to handle and analyze large data sets.
- Essential Functions:
  - Troubleshoot interruptions in acquisition of data from upstream systems
  - Acknowledge, analyze and respond appropriately to validation messages generated by the Energy Accounting system
  - Validate calculations in the Energy Accounting system to aggregate, net, profile or prorate raw metering to achieve CAISO resource ID net high-side submittals
  - Verify timely submission to CAISO MRI-S
  - Reconcile submittals against downloads from CAISO

- Support analysis of unit performance related to Uninstructed Imbalance Energy
- Manage Energy Accounting system configuration for modeling / metering changes
- Support the annual Self-Audit Attestation and biannual Audit & Testing of Metered Facilities required of EIM BAs
- Assist field personnel with meter data collection issues

7.4.3 Role: Settlement Analyst (3 FTE)

Under the direction of the Settlement Manager, Settlement Analysts will oversee the processing of daily settlement statements to ensure accuracy of the results, agreement with shadow calculations, isolate the root cause of any variances and communicate issues with operational groups or create CAISO disputes when necessary as well as reconcile weekly CAISO invoices with daily settlement results.

7.4.3.1 Risk Considerations

While dispute resolution may be infrequent, the potential financial impact when extrapolated over 288 intervals per Trade Date and 75-100 resource locations is significant. Unfortunately, there is no way for a Settlement Analyst to predict exactly when or where the settlement may produce a favorable financial outcome. Only heightened software business intelligence tools and diligent review of their indications will yield consistent results. It is a job that has to be done thoroughly for each Trade Date and every subsequent settlement update from CAISO. While it certainly is possible to simply accept CAISO results, a slim settlement team will miss the opportunity to reclaim, through dispute resolution, routinely large financial sums due to:

- Settlement calculations errors due to mishandling of input data on CAISO's part
- Data submission problems related to Avista software or processes
- Operational behavior patterns resulting in suboptimal settlement results

Additionally, Avista will send bills to its Transmission Customers representing the suballocation of EIM Entity settlement with CAISO. The process is highly automated, but may require some additional communication with the recipients – particularly with those not already participating in another EIM BA – to understand their content and meaning. Of course every utility wants to be perceived as providing superior customer service, but this does not happen automatically. A settlement team taxed with simply processing its own settlement artifacts from CAISO will undoubtedly sacrifice the customer service it could perhaps otherwise provide its own Transmission Customers.

7.4.3.2 Key Attributes

- Required Timing: Q2 – Q3 2021
- Reporting Structure: Settlement Manager
- Other Considerations: Candidates should demonstrate a basic understanding of EIM economic and operational concepts, knowledge/understanding of CAISO charge code calculations, Open Access Transmission Tariff (OATT) provisions and the ability to work with settlement software to manage processing of settlement information in an effective and timely manner.
- Essential Functions:
  - Awareness of the status of daily trade date processing corresponding to the current calendar day and week while maintaining synchronicity with the CAISO settlement timeline
  - Ability to detect processing disruptions and "kick start" the system manually (i.e. reacquire quantities or prices from upstream systems) when required
  - Ability to compare daily CAISO settlement results with:
    - those from a previous iteration of the settlement cycle
    - those calculated within the shadow system using statement inputs
    - those calculated within the shadow system using first principle inputs

    … and address variances appropriately
  - Validate CAISO invoices and generate AR/AP for transmittal to the financial system upon approval by authorized personnel in the financial system of record.
  - EESC – perform daily suballocation calculations and reconcile with CAISO Entity Charge Code amounts

- Transmission Customer's suballocation statements are made available daily, while validated invoices are prepared weekly for approval and publication by authorized personnel in Resource Accounting. Accounts Receivable/Accounts Payable are generated as suballocation invoices are validated and made ready for transmittal to the financial system upon approval by authorized Resource Accounting personnel

- PRSC – perform analysis of key performance indicators which may illuminate suboptimal financial positions, flawed bidding strategy for Participating Resources (PRs) or poor generation dispatch following for PRs
- EESC – perform trending analysis of Entity settlement amounts which may reveal Transmission Operation problems, flawed bidding strategy for PRs or poor generation dispatch following for PRs and NPRs

7.5 Department: Enterprise Technology (2 FTE)

7.5.1 EIM Technology Summary

To successfully support the technical aspects of the EIM software application platform and meet the business expectations outlined below, Avista recommends two additional FTEs be hired to join the EIM Program in early 2020. Both FTEs are expected to integrate with the project team to ensure non-functional requirements and automated platform support are delivered, and gain a deep understanding of business workflows and processes. Upon project completion, they will become the primary application support personnel for all aspects of EIM software, MV90, ADSS and Nucleus. They will also be part of the larger EIM support organization as dedicated operations resources.

Avista's proposed support model for EIM is informed by learnings from Avista's Automated Meter Infrastructure (AMI) support model. This model assumes matrix organization accountability, with both dedicated and shared resources from IT and business areas working as a team to provide a holistic EIM support approach. The EIM platform will bring five new hosted applications, three new "hybrid-on-premise" applications, along with heavily integrated on-premise systems (ADSS, MV90). Although some applications are hosted solutions, the EIM applications will have many integration points that will need both traditional and enhanced levels of IT support. Support expectations are near real-time response expectations with quick resolution and 24x7 availability. Operations support for Nucleus and ADSS, primary energy resources software applications, will also be supported by this team.

The two new technology FTEs will provide onsite business hours support alongside of the larger EIM support organization. For after-hours support needs, the Network Operations Center (NOC) analysts will be trained on specific support tasks that can be performed without guidance. For items that the NOC analysts are not trained to support, an on-call schedule will be in place to allow escalation when timely resolutions are needed. Based on conversations with other utilities, two dedicated support team members have been sufficient based on their volume and needs.

7.5.2 EIM Operations Technical Lead (1 FTE)

The first FTE to be hired will be the EIM Operational Technical Lead (OTL). This individual will be considered the Subject Matter Expert on the EIM platform and its accompanying systems.

7.5.2.1 Risk Considerations

Hiring the EIM Operational Technical Lead in the specified timeline allows the individual to participate in project decisions, and have a thorough understanding of why decisions were made. Delaying the start would create knowledge gap, transfer risk and potentially add unnecessary documentation burden. The Operations teams would lack the technical expertise to effectively and efficiently address complex system issues, which could lead to delivery resources being on-call and performing operations work. Additional risks associated with not hiring a dedicated EIM OTL include:

- During the lifecycle of the product(s), critical EIM project resources may be reprioritized to work high level system outages and failure
- Projected O&M costs would still remain, but would be performed by Delivery resources
- Delivery resources would need to be on-call, resulting in risk to project deadlines

7.5.2.2 Key Attributes

- Required Timing: Q2 2020
- Reporting Structure: Matrix reporting with a solid line to IT Operations Manager and dotted lines to the EIM support organization's manager or business manager.
- Other Considerations
    - The OTL role requires not only an understanding of how Avista systems are meant to work, but also a sufficient skillset to adjust when they don't function as designed. This individual will partner with Avista's application development teams and business partners, to build, deploy, and support a reliable, resilient, and high performing user and customer experience.
    - The OTL is expected to provide proactive leadership regarding implementation of non-functional requirements and take the technical lead on operational availability, performance and optimization for their respective platforms.
- Essential Functions:
    - Work closely with business partners in a matrix organizational structure
    - Work closely with software development teams and architects to ensure the operational success of production applications and roadmap compliance
    - Lead task forces, comprised of cross-functional disciplines, to troubleshoot resolve complex issues with follow-thru to resolution
    - Identify and develop the automation and software changes needed to address operational issues to reduce manual effort, reduce outages, and enhance scalability and resiliency
    - Resolve production issues, identify root causes, and iterate on improving both production and pre-production environments.
    - Create and maintain operational documentation and runbooks
    - Design, automate, and implement monitoring, metric collection and alerting

7.5.3 EIM Technical Systems Analyst (1 FTE)

The second FTE to be hired will be the Technical Systems Analyst. This individual will primarily focus on user and system support, service order resolution, break-fix, routine maintenance, configuration and utilization of tools to send proactive alerts, creation of error messages that provide actionable information to end users, creation of system design and configuration documentation, development of step-by-step support task documentation for ancillary support groups, and other activities designed to streamline day-to-day operational support.

7.5.3.1 Risk Considerations

Hiring the EIM Technical Systems Analyst in the specified timeline allows the individual to participate in project decisions, and have a thorough understanding of why decisions were made. Delaying the start would create knowledge gap, transfer risk and potentially add unnecessary documentation burden. The Operations teams would lack the technical expertise to effectively and efficiently address complex system issues, which could lead to delivery resources being on-call and performing operations work.

7.5.3.2 Key Attributes

- Required Timing: Q2 2020
- Reporting Structure: Matrix reporting with a solid line to IT Operations Manager and dotted lines to the EIM support organization's manager or business manager.
- Other Considerations:
    - Tier 1 and 2 application support of the EIM platform will be required along with strong communication and analytical skills.
- Essential Functions
    - Holds domain and working knowledge of production system(s)
    - Serves as front line of support for customers and users
    - Monitors for state and health of production assets/systems and addresses all assigned work within appropriate KPI priorities

- Actively participates in system projects, change planning and execution and executes routine maintenance for EIM technologies
- Documents procedures and maintains knowledge base

8 Idaho Public Utilities Commission – EIM Incremental Expense Deferral

8.1 EIM Deferral Request & Approval

On March 23, 2020, the Idaho Public Utilities Commission (IPUC) issued Order No. 34606 approving Avista's application to defer incremental O&M costs (without a carrying charge), associated with joining the California Independent System Operator's (CAISO) Western Energy Imbalance Market (EIM). Commission Staff comments, filed on March 4, 2020 expressed support of Avista's request to defer its EIM incremental expenses, noting they believe the Company demonstrated it is reasonable for it to join the EIM. Per Order No. 34606, the Company is to cease deferring the incremental implementation costs at the go-live date, and is to file a report after one year of participation, describing the costs and benefits of participation, any other relevant information, including but not limited to the CAISO's quarterly Western EIM Benefits Report. Recovery of any operational cost associated with membership in the EIM after the Company's go-live date would be determined in a future proceeding. At that time, a prudency review would be conducted to determine the reasonableness of recovering the deferrals from Idaho customers.[1]

At the time of the filing, the Company expected the annual O&M expense to be approximately $3.5 - $4.0 million per year on a system basis, mostly associated with adding 11-13 new employees to facilitate market operations and settlements, and a five-person 24x7 hour EIM operating desk. Idaho's share of these costs is approximately 35% or $1.2 - $1.4 million annually. Staff noted the Company's estimated costs appear reasonable and that it is Avista's responsibility to demonstrate these costs are prudent prior to recovery. Staff noted some concern over expected labor costs, when comparing Avista's estimated costs to that of similar utilities, but recognize current cost estimates may change and will be reviewed in detail in future general rate cases.

8.2 Avista's EIM Incremental FTE Guidance

Due to the approval by the IPUC of the Company's accounting petition to defer incremental operating expenses associated with the implementation of EIM, the following guidance will be used to determine what expenditures are incremental. EIM incremental guidance determination:

- All non-labor, including contracted labor, charged to EIM will be considered incremental.
- New positions* which are added specifically for EIM will be considered incremental if they meet one of the following criteria:
  - A new employee is hired into an EIM position.
  - An existing employee is hired into an EIM position and their previous position is backfilled.

* Avista will not account for partial positions (i.e. an employee is working on EIM and non-EIM work) as incremental unless there is a significant impact to the business and there is a determinable way to recognize and document the specific incremental portion of actual work.

9 Implementation & Post-Implementation Resources – Estimated Financials

9.1 Incremental FTE Summary

In order to estimate the financial requirements both during the implementation phase and post-implementation phase, each resource previously discussed was assigned an estimated hire date, annual salary (assumed 78.05% loaded rate) and a breakout of efforts between capital and O&M. These resources were further assigned an estimated annual 3% annual merit increase, and where applicable, incremental step increases based on achieving certain experience levels.

[1] Avista intends to include Washington's share of all incremental EIM capital expenses in future Washington General Rate Cases.

This framework provided an estimate of annual capital and O&M FTE costs across 2020-2023, with 2022 representing a shift to primarily O&M expenses based on a market go-live date of April 2020. The anticipated annual O&M expense, based on a staggered hiring of the 17 EIM employees, is provided below. This baseline will be updated after FTEs are hired.

Chart 4 – FTE O&M Labor Estimates (in Millions) Including Idaho Commission Deferral

	Implementation			Post Go Live	
FTE Labor Estimates	2020	2021	2022 (thru March)	2022 (April-Dec)	2023
O&M	$0.43	$1.55	$0.21	$2.24	$3.23
Deferral	$0.15	$0.53	$0.07	$0	$0
O&M Less the Deferral	$0.28	$1.02	$0.14	$2.24	$3.23

$ in Millions

- Includes OCM & Prg Manager roles.
- Implementation = 19 FTEs

- OCM excluded in 2022-2023
- Prg Manager thru end of 2022
- 2023 = 17 FTEs

9.2 FTE Capital & Operating Expense Estimates

Chart 5 – FTE Capital & O&M Expense Estimates (in Millions)

EIM FTE Positions Grouped by New Hire Year	Implementation						Post Go-Live			
	2020		2021		2022 (Jan-March)		2022 (April-December)		2023	
	Capital	O&M	Capital	O&M	Capital	O&M	Capital	O&M	Capital	O&M
New Hires 2019	$ 0.09	$ 0.03	$ 0.08	$ 0.03	$ 0.03	$ 0.01	$ 0.00	$ 0.08	$ 0.00	$ 0.00
New Hires 2020	$ 0.29	$ 0.26	$ 0.39	$ 0.44	$ 0.21	$ 0.07	$ 0.00	$ 0.50	$ 0.00	$ 0.77
New Hires 2021	$ 0.00	$ 0.00	$ 0.25	$ 0.40	$ 0.28	$ 0.03	$ 0.00	$ 0.63	$ 0.00	$ 0.97
New Hires 2022 (Jan - March)	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.01	$ 0.00	$ 0.05	$ 0.00	$ 0.08
New Hires 2022 (Apr - Dec)	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
New Hires 2023	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Total:	**$ 0.38**	**$ 0.29**	**$ 0.72**	**$ 0.87**	**$ 0.52**	**$ 0.12**	**$ 0.00**	**$ 1.26**	**$ 0.00**	**$ 1.81**
Loaded Labor Estimate: 78.05%	**$ 0.68**	**$ 0.52**	**$ 1.28**	**$ 1.55**	**$ 0.92**	**$ 0.21**	**$ 0.00**	**$ 2.24**	**$ 0.00**	**$ 3.23**
										$ in Millions

This Excel file is not imbedded in the PDF document, but available as a separate file titled "Confidential – EIM HR Plan Financials – Final 05.20.2020"

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10 Recommendation & Approvals

10.1 Director Steering Committee Review

At the March 2020 EIM director steering committee meeting, the proposal of 17 FTE roles was discussed, with emphasis on the Settlement team and EIM BA desk. The directors were in support of proposed Settlement team structure (see Chart 1) and a recommendation was made for the team to report to the Director of Accounting. They also supported a Settlement team of five FTEs, with corresponding analysis outside the Settlement Team within Power Supply and System Operations. A draft version of the document was sent for review and feedback was incorporated.

10.2 Executive Steering Committee Review

At the April 2020 EIM executive steering committee meeting, the proposal of 17 FTE roles was discussed, with emphasis on the Settlement team and EIM BA desk. The executives were in support of proposed Settlement team structure (see Chart 1) and approved the team to report to the Director of Accounting. They also supported a Settlement team of five FTEs, with corresponding analysis outside the Settlement Team within Power Supply and System Operations. A draft version of the document was sent for review and feedback was incorporated.

10.3 Director Approvals

Approve EIM HR Plan Document - Approval Needed by May 29 - Scott Kinney - 06.01.2020.msg

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Scott Kinney, Director of Power Supply

Approve EIM HR Plan Document - Approval Needed by May 29 - Andy Vickers - 05.20.2020.msg

_____

Andy Vickers, Director of Generation Production and Substation Support

Approve EIM HR Plan Document - Approval Needed by May 29 - Mike Magruder - 05.29.2020.msg

_____

Mike Magruder, Director of Transmission Operations and System Planning

Approve EIM HR Plan Document - Approval Needed by May 29 - Jim Corder - 06.08.2020.msg

_____

Jim Corder, Director of Information Technology and Secruity

Approve EIM HR Plan Document - Approval Needed by May 29 - Hossein Nikdel - 05.28.2020.msg

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Hossein Nikdel, Director of Applications and System Planning

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Approve EIM HR Plan Document - Approval Needed by May 29 - Adam Munson - 06.09.2020.msg

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Adam Munson, Director of Accounting

RE EIM HR Plan Document - Approval Needed by May 29 - Pat Ehrbar - 05.28.2020.msg

_____

Pat Ehrbar, Director of Regulatory Affairs

10.4 Executive Approvals

Approve Final EIM HR Plan Document - Approval Needed by June 19 - Jason Thackson - 06.12.2020.msg

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Jason Thackston, Senior VP of Energy Resoruces

Approve Final EIM HR Plan Document - Approval Needed by June 19 - Heather Rosentrater - 06.15.2020.msg

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Heather Rosentrater, VP of Energy Delivery

Approve Final EIM HR Plan Document - Approval Needed by June 19 - Kevin Christie - 06.12.2020.msg

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Kevin Christie, Sr. VP of External Affairs

Approve Final EIM HR Plan Document - Approval Needed by June 19 - Jim Kensok - 06.11.2020.msg

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Jim Kensok, VP Chief Information & Secruity Officer

Approve Final EIM HR Plan Document - Approval Needed by June 19 - Ryan Krasselt - 06.17.2020.msg

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Ryan Krasselt, VP and Controller

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11 Appendix

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Appendix A – Settlement, Bill & Analytics Roles

EIM Key Decision

Settlement, Billing & Analytics Roles

Table of Contents

Revision History	Date	Author
0.0 – First Draft	2/5/2020	kdonald
0.1 – Removing content related to ATF RTIS submittal / verification – responsibility of the RT desk and incorporating kdengel feedback	2/6/2020	kdonald
0.2 – Updating with decision from 2/28/2020 meeting	2/28/2020	kdonald
0.3 – Updated with director edits and comments	04/20/2020	kdengel

Key Decision Topic: ***EIM Settlements, Billing & Analytics Roles*** **Decision:** **Approved ☒**

Date: 04/30/2020 **Not Approved ☐**

Author(s): Ken Donald - Utilicast

Decision Makers: EIM Director Steering Committee

Decision Support: Kelly Dengel, Robert Follini, Xin Shane, Kenny Dillon, Carolyn Groome, Ian McLelland, Lauren Pendergraft

1 Recommendation

A hybrid of centralized and distributed organizational models is proposed to support on-going EIM market operations. This structure will facilitate deep analytical capabilities through matrixed relationships to resources within the Merchant and BA groups, while also supporting flexibility in the application of resources to cover the myriad of daily settlement processing tasks. Because settlement represents such an integral part of successful EIM participation, a strong sense of accountability within this team and among operational groups to this team is necessary. The group is directly tied to leadership at a director position in order to enhance escalation of issues to an appropriate level. To best support EIM functions, the settlement function should be comprised of a centralized Settlement group reporting to the Director of Accounting with indirect ties to analysts in Power Supply and System Operations (Entity/BA) as shown in Table 1 below:

Table 1 - Summary of Settlement Staffing Requirements

Role / Allocation	Reports to:	Resides within:
Settlement Manager / 1 FTE	Director of Accounting	Accounting
Meter Processing (T+8B & T+48B)		
Meter Analyst / 1 FTE	Settlement Manager	Accounting
Shadow Settlement (T+3B, T+12B & T+55B Trade dates - at a minimum)		
Settlement Analyst / 1 FTE	Settlement Manager	Accounting
Settlement Analyst / 1 FTE	Settlement Manager	Accounting
Settlement Analyst / 1 FTE	Settlement Manager	Accounting
Market Analytics (T+3B, T+12B & T+55B Trade dates)		
Market Analyst / 1 FTE (some portion of this FTE is dedicated to other non-settlement Merchant Operations analysis tasks)	Manager Real Time & Day Ahead	Power Supply/Merchant
Market Analyst / 1 FTE (some portion of this FTE is dedicated to other non-settlement Transmission Operations analysis tasks)	Director of System Ops & Planning	BA Entity

2 Background

There is no cookie-cutter template for building an organizational structure to support EIM functions. A recent survey of existing EIM BAs reveals varying approaches dependent on, in no certain order, the size and diversity of the BA footprint, utility culture, experience of existing staff with EIM software products and maturity of pre-EIM functions such as meter data management.

At the root of the problem is the need to answer questions such as: "Should I pay my CAISO bill without any verification of its accuracy?" An only partly facetious answer might be "Sure, CAISO is usually correct." As a theoretical baseline, it is entirely valid to consider that there is absolutely no requirement for a BA to shadow its settlement artifacts, modify Transmission Customer billing procedures or commit to robust economic analyses in order to join the EIM. However, the effort and expense involved in procuring sophisticated software systems is a good indication that Avista wishes to join as an informed participant.

What is meant for a settlement organization to be an "informed participant" in EIM is that on a daily basis settlement data is analyzed to ensure that charges and credits are:

- Technically Correct – CAISO has accurate data and performs settlement math appropriately
- Practically Correct – Result amounts represent reality
- Reasonable – Results are consistent with expectations

Whereas settlement results from bidding at the CAISO interties in the normal daily and hourly market (Market Redesign and Technology Upgrade or MRTU) are more directly traceable to discreet transactions, the number of moving variables in EIM are increased exponentially and more difficult to understand. It is essential that the analyses consider approximately 100 price points in all 288 intervals of each Trade Date. The value these efforts provide to Avista, in terms of its ability to operate successfully in the EIM, ranges from very concrete near-term effects to more distant and strategic goals.

- Identification of CAISO data handling or calculation errors and disputing unfavorable settlement amounts
    - CAISO is not infallible – notable examples from other EIM Entities where an incorrect price was applied range from hundreds to approaching a million dollars per occurrence
- Isolation of internal system failures which prevent timely and accurate flow of data necessary to ensure economic dispatch by CAISO
    - Most often this occurs with generation Base Schedule and interchange snapshot submittals, but could include outage information, bid data, etc. By performing shadow calculations against First Principle inputs from Avista's own systems, settlements can determine where CAISO did not have the data necessary to produce the correct result. Often this is the fault of the EIM Entity and not able to be remedied by settlement dispute, but communication with EIM groups upstream of settlements can prevent continued failures.
- Recognition of market power flow patterns and situational awareness of related financial data
    - By combining operational characteristics such as Energy Transfer System Resource (ETSR) flow, application of load bias and CAISO unit commitments with settlement results, patterns will begin to evolve which could be used to guide future bidding behavior. The settlement system acts as a manifold for the universe of market data while "Business Rules" filter it for specific scenarios:

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        - Are CAISO committed resources being run at minimum and therefore not setting price?
        - Is CAISO dispatch respecting modeled limits?
        - Are significant number of Avista resources being displaced by cheaper generation from the EIM?
        - Does limitation of flow into and out of Avista through ETSR dispatch produce repeatable and predictable impacts on Energy, Congestion and Loss Offset Charge Codes?
- EIM Benefits / counterfactuals
    - The question of whether the decision to participate in EIM was a good one, or how good it was, is inevitable and requires collection and processing of atomic level data well in advance of the question being proposed
    - CAISO will publish EIM benefits quarterly, but these results are no less fallible than the daily settlement artifacts. Robust EIM participation will involve independent verification of the quarterly benefits
    - Not only should the informed EIM BA shadow the CAISO calculations, but may also want to develop and execute its own metrics

In the analysis below the steps required to answer: "Should I pay my CAISO bill?" and other important considerations are categorized; details of the specialized tasks and skills involved in doing so are presented in Table 2.

3 Analysis

Broadly, the key settlement functions can be classified into these groups.

- Meter processing – both physical data and software accuracy. Under EIM, the need to troubleshoot issues and anticipate regular model or equipment changes is underscored by daily acquisition, validation and submission of 5-minute interval data.
- Daily settlement processing – in acquiring First Principle inputs from Avista's own internal systems the reconciliation of EIM Charge Code amounts involves much more than checking that CAISO's math is correct. The Merchant and Entity sides perform shadow validation and invoice roll-up calculations independently. The CAISO settlement timeline folds into a business-day calendar and iterates for a single Trade Date at least 3 and possibly up to 8 times as much as 3-years beyond the Trade Date. As a consequence, settlement analysts need to be capable of processing a more than a handful of Trade Dates each day.
- Transmission Customer sub-allocation – Third Party Load, Non-Participating Generation and Interchange Transactions share in the amounts directly charged or credited by CAISO to the EIM Entity. The tools and methods are far less standard than those associated with shadow settlement.
- Market Analytics – Starting with "simple" tasks involved in identifying variances due to input data problems or calculation errors and building up to complex comparison of generation and transmission operational characteristics ensuring consistent modeling and market solutions.
- Financial Reporting and Cost Benefits – Identifying how market results impact overall costs.

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- Market Initiatives – Keeping pace with the constant current of market enhancements proposed in CAISO stakeholder forums. Anticipating the changes and managing the necessary software modifications is a key to success in the EIM.

The table below contains some of the key tasks for EIM which fall into the groups identified above. Detail of the specific systems and processes required will be refined during the EIM Implementation with input from vendor functional designs.

Table 2 - Major EIM Settlement Tasks

Task	System	Estimated hours per day
Meter Processing (T+8B & T+48B)		
Obtain/VEE Generation and Interchange Meter Data	Energy Accounting	1 hour
Identify/rectify communication failures from upstream systems	Energy Accounting	1 hour
Process/Submit Generation and Interchange Meter Data (possibly at T+1 for interchange as well)	Energy Accounting	1 hour
Troubleshoot/Calculate/Submit ELAP Load Meter Data	Energy Accounting	1 hour
Obtain/VEE 3rd party load data	Energy Accounting	0.5 hour
Prepare for meter configuration changes related to new resources or equipment changes*	Energy Accounting	0.5 hour
Analysis & Reporting (T+48B only)	Energy Accounting	0.5 hour
Shadow Settlement (T+3B, T+12B & T+55B Trade dates - at a minimum)		
Process PRSC Market Results and EIM Settlement Statements, identify issues with upstream data, isolate result variances, create disputes	Settlements – Merchant	4 hours
Process EESC Market Results and EIM Settlement Statements, identify issues with upstream data, isolate result variances, create disputes	Settlements - Entity	3 hours
Process sub-allocation statements invoices from other EIM BAs	Settlements – Merchant	0.5 hours
Sub-allocation of Entity settlements to Transmission Customers, Receive/Analyze/Process TC disputes and post disputes to OASIS	Settlements - Entity	2 hours
Reconcile PRSC Invoices – convey AR/AP to FSO** (weekly)	Settlements – Merchant	0.25 hours
Reconcile EESC Invoices – convey AR/AP to FSO** (weekly)	Settlements – Entity	0.25 hours

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Task	System	Estimated hours per day
Create, verify & transmit sub-allocation invoices** (weekly or monthly)	Settlements – Entity	0.25 hours
Create EQR reflecting EIM Transactions, combine with bilateral EQR and upload to FERC	Settlements – Merchant	0.25 hours
Process GHG Obligations and Open Positions / Mark to Market	Settlements – Merchant	0.25 hours
Market Analytics (T+3B, T+12B & T+55B Trade dates)		
Merchant P&L analysis (UIE, LMP, BCR, Limit violations etc.)	Visual Analytics - Merchant	4 hours
Entity BA analysis (VERs, UFE, ACE, ETSRs, BCR uplift, Offsets, Load Bias etc.)	Visual Analytics - Entity	2 hours
EIM Benefits / Counterfactual analysis	Visual Analytics - Entity	0.5 hours
Strategic Initiatives (Not tied to Trade dates)		
Review Daily CAISO Market Reports to identify issues	N/A	2 hours
Prepare for and attend CAISO "week in review" meetings covering the impacts of congestion, ETSR flow, transmission constraints etc.	N/A	1 hours
Track progression of market enhancements such as eDAM & DAME	N/A	0.5 hours
Contribute to & attend CAISO stakeholder events	N/A	0.5 hours

*Requires significant collaboration with resources upstream working with field equipment and systems (i.e. MV-90)

**Manage AR/AP & credit not included in settlement tasks

4 Options & Peer Evaluation

Based on previous EIM Entity Implementations, settlement groups have evolved into two distinct patterns with software systems that commonly support both structures – either centralized or decentralized teams. In order to understand the options, Avista spoke with settlement team members at Puget Sound Energy, Portland General Electric, Idaho Power, NV Energy, and Arizona Public Service. Through these conversations, Avista learned it was common for early EIM Entities to take a decentralized team approach, while more recent entrants took the centralized approach. Each Entities' settlement team was structured a little differently within each model, but they all stressed the importance of understanding settlements as a whole and avoiding a model where analysis is separated into work groups which creates several challenges to fully understand overall market performance. They also stressed the importance of strong, cross-functional communications amongst all impacted departments for settlement discrepancy resolution, determining operational impact and making operational decisions to improve performance. This resolution and performance improvement is also aided by the presence of strong analysts in the Merchant and Entity groups that can compare operational decisions against the financial settlements to determine if the group is making sound economical choices for Avista. Based on their feedback, and information shared by Utilicast, Avista recommends pursuing the centralized team structure, with indirect ties to analysists in Power Supply and System Operations (Entity/BA).

4.1 Centralized Organization

Characterized by a common group of co-located staff members working strictly with the confines of settlement functions but spanning both Merchant and Entity interaction with CAISO.

4.1.1 Advantages

- Facilitates job sharing between Merchant and Entity activities
- Promotes expansion of settlement specific skills and knowledge within the group
- Settlements tend to be given more timely focus and appropriate priority
- With vision over financial results from both groups, cost benefit studies are more easily assembled

4.1.2 Disadvantages

- A settlement "silo" may not have immediate awareness of operational consideration which manifest in financial results
- Possible Standards of Conduct concerns

4.2 Distributed Organization

Characterized by dedication of certain individuals physically and organizationally within the Merchant and Entity groups to settlement functions separately.

4.2.1 Advantages

- "Shallow" and "Deep end of the pool" analyses reside with the same individuals
- Operational conditions more easily considered in settlement analysis

4.2.2 Disadvantages

- Diminished opportunity to "crossover" with partial FTEs

- Potential of falling behind on daily settlement tasks when local concerns take precedence
- Challenging to see complete financial picture for both Merchant and Entity

5 Approvals

EIM Director Steering Committee Approvals:

Scott Kinney **Date: 04/28/2020**

Approve EIM - Settlements Document Approval Due April 30 - Scott Kinney - 4.28.2020.msg

Mike Magruder **Date: 04/30/2020**

Approve EIM - Settlements Document Approval Due April 30 - Mike Magruder - 04.30.2020.msg

Hossein Nikdel **Date: 04/23/2020**

Approve EIM - Settlements Document Approval Due April 30 - Hossein Nikdel - 04.23.2020.msg

Jim Corder **Date: 04/30/2020**

Approve EIM - Settlements Document Approval Due April 30 - Jim Corder - 04.30.2020.msg

Adam Munson **Date: 04/30/2020**

Approve EIM - Settlements Document Approval Due April 30 - Adam Munson - 04.30.2020.msg

Pat Ehrbar **Date: 04/23/2020**

Approve EIM - Settlements Document Approval Due April 30 - Pat Ehrbar - 04.23.2020.msg

Appendix B – RT Operator Functional Role Evaluation

EIM Key Decision

Real Time Operator Functional Role Evaluation under EIM

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Key Decision Topic: ***RT Operator Functional Role*** **Decision:** **Approved ☒**

Date: 04/22/2020 **Not Approved ☐**

Author(s): Jarrett Friddle / Brian Holmes - Utilicast

Decision Makers: Rip Divis, Mike Magruder, Scott Kinney, Robert Follini

Decision Support: Kelly Dengel, Robert Follini, Rip Divis, Mike Magruder, Scott Kinney

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1 Background

Joining the Western EIM will require many new tasks to be performed. This summary focuses only on the Real-Time Merchant and Transmission Operations functions. For successful participation, the new tasks and responsibilities need to be aligned in a logical way, supported by the software, workable within CAISO roles and restrictions, and defined in sufficient detail in business processes.

The purpose of this document is to:

1. Document the key Real-Time roles and tasks associated with EIM
2. Provide a framework for the distribution of those tasks to specific Real-Time Desks at Avista
3. Provide a concrete framework for discussing pros, cons and tradeoffs
4. Document the final decision of Avista on the functional tasks of each RT Operator Group

Table 3 lists some of the major Real-Time roles and responsibilities in traditional utility operations which will continue in EIM. They are grouped into major similar categories and may not be grouped the same way that Avista currently accomplishes these tasks. Additional tasks can be added.

Table 4 lists some of the major Real-Time roles and responsibilities in EIM operations. They are grouped into major similar categories and may not be grouped the same way that Avista will accomplish these tasks. Additional tasks can be added.

Table 3 – Major Traditional Real-Time Roles & Responsibilities

Energy Supply and Trading	RT Generation/BAA Management	Transmission Provider	Transmission Operations
• **Determine optimal unit commitment and Adjust forward Generation Plan** • **Determine Long / Short Position and purchase or sell energy and capacity bilaterally** • **Determine optimal Contingency / Regulating reserve placement** • **Determine and schedule available energy from hydro resources** • **Tag purchases and sales** • **System and/or BA Load Forecasting** • **Hourly VER Forecasting**	• Monitor and control Generation to manage ACE / BAAL and follow load intra-hour (Regulation) • Monitor and Maintain Contingency Reserve Levels • Enter Generator Forced Outages into OMS • Ensure Contingency Reserves are responding to events to meet required response times • Activate Reserve Sharing Processes • Adjust generation to manage transmission system overloads • Where applicable, manage Hydro flow / elevation constraints in Real-Time • Adjust Generation to respond to schedule curtailments	• Review and approve e-tags for the BA/TP • Review and approve short-term transmission service • Check out Scheduled Interchange with neighboring BAs. • Calculate operational NSI for AGC • Curtail tags for reliability / to manage transmission system overloads	• Transmission Switching and tag out management • Create or Review and Approve Switching Orders • Enter Forced Transmission Outages into OMS • Perform Contingency Analysis studies • Review Gen Plan for Reliability Impacts • Coordinate with generation management to address transmission system overloads through generation and/or transmission switching. • RAS scheme arming and implementation

Table 4 – Major EIM Operational Roles & Responsibilities

PRSC EIM Bidding/Base Scheduling	EIM Entity Base Scheduling	EIM Generation/BAA Management	EIM Scheduling Management	EIM Transmission Management
• **Create and Submit Avista Participating Resource Base Schedules prior to T-75 and T-55** • **Designate Contingency and Regulating Reserves for EIM prior to T-75 and T-55** • **Create and Submit 4-Part Economic Bids to drive Market outcomes** • **Review / Respond to Sufficiency Test Failures (Capacity, Balance, Flex Ramp) for the PRSC prior to T-55** • **Manage Market De-Rates to Resource Availability** • **Monitor CAISO Dispatches in Real-Time in ADS** • **Submit Hourly VER Forecasts as part of Base Schedules**	• Create and Submit Non-Participating Resource Base Schedules, including 3rd Party • Review / Respond to Sufficiency Test Failures (Capacity, Balance, Flex Ramp) for the BAA by T-40 • Modify and Submit all final Generation Resource Base Schedules prior to T-40 • Finalize Contingency Reserves and Regulating Reserves for EIM Entity Area prior to T-40 • Submit RT VER Forecasts	• Review / approve / block generation dispatches in BAAOP • Activate Contingency Events in BAAOP • Initiate Reserve Sharing with NWPP • Manage EIM through load conformance process (especially during contingency events) in BAAOP • Perform manual dispatch as needed through EIM processes in BAAOP, including shutdowns • SPOC for CAISO for all Generation Outages / Availability, including 3rd Party • Coordinate Market Generation Following / Independent Dispatch with plants and RTMO	• Create and Submit aggregated Intertie Base Schedules for each Intertie Location prior to T-75, T-55, T-40 • Determine EIM Transfer limits for each Intertie to another EIM participant and submit to BAAOP continuously • Provide a rolling five hour forecast or ramped interchange for each Intertie at a 5-minute granularity, refreshed every 5 minutes to BAAOP • Perform ATF interchange checkout for tags and EIM Transfers, update EIM Dynamic ETSR Tags • Submit ATF RTIS	• Review / Respond to Sufficiency Test Failures (Congestion) • Troubleshoot topology errors in BAAOP • SPOC for CAISO all Transmission Outages / Availability • Manage EIM binding constraints (physical) and perform transmission conformance as needed in BAAOP • Verify and confirm transmission outage information

The organizational structure design to perform all existing and the new functions specifically arising from being a participant in EIM can take several forms. A common approach to the general process flow under EIM tends to follow current processes with some adjustments plus the addition of an EIM Desk in Transmission Operations. However, to the extent the Merchant organization is more engaged with RT Generation Management, there has generally been a little more responsibility shift to or sharing with the Transmission Operations side.

Typically, the Merchant will account for the Hydro Resource Plan, Variable Energy Resource forecasts, Load Forecast and Generation Outages to build the DA Plan. Prior to the hour, the input information will be tuned to reflect latest conditions and observations and the Merchant will optimize the remaining fleet along with bilateral trading to meet the expected BAA or net load and to market excess available energy.

Transmission Operations will normally review the plan for reliability impacts and communicate if adjustments need to be made. That process continues up until roughly 60 minutes from the start of each operating hour and then bilateral trading ceases around T-60. All Intertie Resource (Interchange) and Generation Base Schedules are expected to be submitted as final and balanced to the Market Operator by T-55. So it is the functions from T-60 through the end of the operating hour that generally needs some adjustment in most utilities that join EIM.

2 Discussion

Below is a table of the existing setup of Avista and which Real-time functions are performed by each RT Desk.

Table 5: Existing Avista RT Operator Functions

RT Merchant Operators	Reliability Operators	Transmission Operations
• **Determine Long / Short Position and purchase or sell energy and capacity bilaterally** • **Determine optimal unit commitment (in coordination with Transmission Operations to meet reliability targets)** • **Determine optimal Contingency / Regulating reserve placement (in coordination with Transmission Operations to meet reliability targets)** • **Monitor and control Generation to manage ACE / BAAL and follow load intra-hour** • **Monitor and Maintain Contingency Reserve Levels**	• Review and approve e-tags for the BA/TP • Review and approve short-term transmission service • Check out Scheduled Interchange with neighboring BAs. • Calculate operational NSI for AGC • Curtail tags for reliability / to manage transmission system overloads • Notify RC of Forced Gen and Transmission Outages • Ensure Contingency Reserves are responding to events to meet required response times • Activate Reserve Sharing Processes	• Transmission Switching and tag out management • Create or Review and Approve Switching Orders • Enter Forced Transmission Outages into OMS • Perform Contingency Analysis studies • Coordinate with generation management to address transmission system overloads through generation and/or transmission switching. • RAS scheme arming and implementation

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• **Enter Generator Forced Outages into OMS** • **Where applicable, manage Hydro flow / elevation constraints in Real-Time** • **Adjust Generation to respond to schedule curtailments** • **Determine and schedule available energy from hydro resources** • **Tag purchases and sales**	• Adjust generation to manage transmission system overloads	

Here are a few things to consider when determining where some of the RT functions land while operating under EIM.

2.1 Permissions to CAISO Applications

CAISO's access policies to ensure SOC compliance present restrictions to the Merchant employees that would prevent them from performing many of the interactions with the Market system in Real-time.

- The Balancing Authority Area Base Schedule Coordinator role is the only role allowed to update Base Schedules after T-55 for the final binding Sufficiency Tests of the EIM Entity at T-40. This role is not allowed to be assigned to a Merchant Function Employee or system certificate.
- The majority of interaction with the Market Operator and its systems after T-55 is strictly allowed only by the Balancing Authority Operator and is not permitted by Market Function Employees. Most systematic communication of changes in Real-time to the Market Operator is via the CAISO Balancing Authority Area Operations Portal (BAAOP) which is restricted to non-MFE personnel only due to non-public transmission information and 3rd Party generation information that is also available.

2.2 Dispatch in the Market

There should be less interaction from Avista in terms of managing generation to meet load and manage the ACE and congestion in real time. Start Up and Shut Down activities will likely still require communications to the Plants, but the market will also have a big hand in determining those starts and stops beyond the units that are already base scheduled to be online through the Base Schedules.

- Barring intervention by the BAA, the following things will be true from the Market dispatch.
  - Self-Committed resources designated in the Base Schedule will be dispatched to start by the Market and expected to be on-line for those hours.
  - Within EIM, the generation commitment outside of hours with non-zero base schedules is a function of the Merchant determined 4-part Bids for Participating Resources (locked in at T-75) and the resource's availability submitted for the market clearing process (via OMS).
  - For all non-VER PRs, the real-time dispatch for all committed hours will be determined by the incremental energy bid curves and the resource's availability submitted for the market clearing process (via OMS)

  - VERs without Bids will be "dispatched" to their forecasts. If a VER is participating, then it could be dispatched down economically from its forecast based on the bid curve submitted by the Merchant.
  - All other Non-participating Resources and Participating Resources with no bid-curve will be dispatched to their hourly base schedule, including ramp impacts across the hour boundary (except when deployed for Available Balancing Capacity based on BAA infeasibility and the Default Energy Bid defined for that NPR).
  - The market dispatch will target dispatching the generation and EIM Transfers to optimally meet the net demand forecast and scheduled interchange every 5 minutes.
- Managing the dispatch, under the context of EIM, takes on a slightly different form from today's operation. To obtain the most benefits from the market, the dispatch should be determined as much as possible through the Market Operator's Security Constrained Economic Dispatch (i.e. by following the Bids).

2.3 Economics and Reliability

Although the load following and balancing needs are generally met through the Market process, there can be significant interaction between the Market Operator and the EIM Entity. There are legitimate reasons to modify the known input parameters for the resources when the physical or economic circumstances have changed since T-55 or even T-40.

Historically, AVA has had the Merchant function manage most generation decisions in real time. Changes in base points, responses to contingencies, managing plant/unit unavailability issues and other things where economics of the units is the primary driver are under the Merchant's purview. There are two areas where the Transmission System Operators are involved in the generation movement; 1) ensuring there are resources on AGC control for ACE/BAAL excursions and 2) unit re-dispatch for transmission system reliability.

Given the access restrictions above, however, the System Operators in the Transmission Function side of the house will need to be involved in helping to manage the real-time generation when necessary. All those decisions and actions will have financial implications for Avista. So, it is important that the Transmission side System Operators, who have traditionally been concerned strictly with maintaining reliability, can understand and evaluate the financial consequences when making adjustments in the market. Reliability issues will still trump economics if they are present, but many of actions taken in the market will not be in response to a reliability risk.

There will certainly be times when the reliability indicators are all acceptable, but AVA is being economically harmed by how the resources are performing. The System Operators need to be able to recognize these situations and be part of the solution to ensure all Reliability and Economic goals are achieved as a part of the Energy Imbalance Market. There will need to be coordination and a sharing of responsibilities between the Transmission System Operators and the Real-time Traders to manage manual generation changes while operating in the EIM.

Below is a list of items to consider and activities that have both reliability and economic impacts where the Transmission System Operator will be involved.

- There are not only financial consequences for intentionally moving a unit away from its market dispatch target, but also reliability consequences (and unless done in conjunction with a Load Bias, may not have the intended effect). The market will be assuming the entity to follow its

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generation and EIM Transfer dispatch instructions. The EIM Transfer will typically be fully automated and integrated into the scheduled interchange component of the ACE equation. Units not following their DOTs will result in Area Control Error increasing, posing a risk to Control Performance Standards or being outside BAAL requirements unless other units or regulating units are also moving in conjunction, which then puts them off their economically based DOTs.

- Communication of intent to deviate from the submitted bids, availability and base schedules supplied by T-40 is extremely important so that the SCED reflects these modifications and you are not fighting with the CAISO dispatch within the BA.
- The following items that affect the Real-time Market Dispatch are submitted via BAAOP, again only available to the Transmission System Operators
    - Manual Dispatch of an NPR away from its Generator Base Schedule
        - To supply identified contingency reserves during an event
        - Physical Problem at the plant
        - Hydro flow management
        - Correction of localized constraints that cannot be unloaded effectively by re-dispatch of PRs.
        - Generation Testing
    - Manual Dispatch of a PR to a fixed MW quantity (ignores bid curve)
        - To supply identified contingency reserves during an event
        - Physical Problem at the plant
        - Hydro flow management if Market-based dispatch modifies elevations to an unacceptable level.
    - Manual Dispatch change of Pmin and/or Pmax of a PR not reflected through Rerates or Derates in outage records.
        - Physical Problem at the plant
        - Hydro flow management if Market-based Dispatch modifies elevations to an unacceptable level.
    - Submit Load Bias due to a Reserve Sharing activation or to arrest ACE excursions which could be due to the following reasons
        - True Load or VER Forecast Error
        - Resources not following DOTs
        - Mismatches in Scheduled Interchange representations between Avista Scheduling System and that submitted to CAISO as Intertie Resource Schedules
        - The best response to ACE deviations is either:
            - If there are no input data errors, load or VER forecast issues, contingency events, or generation problems, wait until the next market solution.
            - If one of the above is true, use Load Conformance in BAAOP to adjust the market solution target. Adjusting individual generation via manual dispatch will not have an effect, as the market will just dispatch another unit, import or export in the equal and opposite manner to compensate.
    - The ability to block or modify a Dispatch instruction or block a Start-up/Shutdown notice is only available in BAAOP. Although Starts and Stops are available to the Merchant via the ADS instructions, the ability to block them has already passed by the time the

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instructions are issued. The time available to block or modify a Dispatch instruction or block a Start-up/Shutdown notice is about 30-90 seconds.

- Changes in Import and Export limits for EIM Transfers are generally managed automatically in the systems once the rules are defined, but manual intervention for these items or locking the ETSRs, which will also have an impact on the RT Dispatch, are also changed in BAAOP.
- Although Avista appears to have limited internal physical transmission constraints, if those need to be activated or have limits adjusted, that activity is only available in BAAOP.

- The exception allowed for direct communication of input data changes to the Market Operator by the Merchant function after T-55 would be for any Generator Availability modifications submitted via the Avista OMS system or for Participating Resources directly in CAISO WebOMS. These are updated continuously.

3 Proposal to Incorporate EIM tasks at Avista

The table below describes the proposed distribution of tasks including all new EIM related items across the three existing RT Operators plus the new EIM desk. The result is some Shared Generation Management tasks between the Merchant and the Reliability Operator and some EIM tasks added to Reliability and Transmission along with a full set of primarily pre-hour activities for the new EIM Operator.

Table 6: New EIM Desk with Shared Generation Management and some EIM tasks added to Reliability and Transmission

RT Merchant Operator	New EIM Operator	Reliability Operator	Transmission Operator
• **Determine Long / Short Position and purchase or sell energy and capacity bilaterally** • **Determine and schedule available energy from hydro resources** • **Submit Hourly VER Forecasts as part of Base Schedules** • **Determine optimal unit commitment, Basepoint and Reserve Allocations for all Avista Resources** • **Submit Base Schedules to EIM by T-75, T-55** • **Enter Generator Planned/Forced Outages into OMS (ahead of Real-time)** • **Tag purchases and sales** • **Create and Submit 4-Part Economic Bids prior to T-75 to drive Market outcomes** • **Review / Respond to Sufficiency Test Failures (Capacity, Balance, Flex Ramp) for the PRSC prior to T-55** • **Manage Hydro flow / elevation constraints in Real-Time in**	• Create and Submit 3rd Party Non-Participating Resource Base Schedules prior to T-75, T-55, T-40 • Finalize Contingency and Regulating Reserves for EIM prior to T-40 • Review / Respond to Sufficiency Test Failures (Capacity, Balance, Flex Ramp) for the BAA prior to T-40 • Balance and Submit all final Generation Resource Base Schedules prior to T-40 (in coordination with Merchant) • Submit RT VER Forecasts • Create and Submit aggregated Intertie Base Schedules for each Intertie Location prior to T-75, T-55, T-40 • Determine EIM Transfer limits for each Intertie to another EIM participant and submit to BAAOP continuously • Provide a rolling five hour forecast or ramped interchange for each Intertie at a	• Review and approve e-tags for the BA/TP • Review and approve short-term transmission service • Calculate operational NSI for AGC • Curtail tags for reliability / to manage transmission system overloads • Approve Gen and Transmission Outages and forward to RC/Market • Update Outages on OASIS • Activate Contingency Events in BAAOP • Initiate Reserve Sharing with NWPP • Manage EIM through load conformance process (especially during contingency events) in BAAOP • Ensure Contingency Reserves are responding to events to meet required response times using BAAOP Manual Dispatches • Adjust generation to manage transmission system overloads • Perform manual dispatch as needed through EIM processes in BAAOP (in coordination with Merchant/Plants/RTMO) and EMS generation dispatch mode • Review / approve / block generation dispatches in BAAOP	• Transmission Switching and tag out management • Create or Review and Approve Switching Orders • Enter Transmission Outages into OMS • Perform Contingency Analysis studies • Coordinate with generation management to address transmission system overloads through generation and/or transmission switching. • RAS scheme arming and implementation • Review / Respond to Sufficiency Test Failures (Congestion) • Troubleshoot topology errors in BAAOP • Manage EIM binding constraints (physical) and perform transmission conformance as needed in BAAOP • Verify and confirm transmission outage information in BAAOP

coordination with Reliability (shared) • **Manage Market De-Rates for Resource Availability** • **Monitor CAISO Commitments & Dispatches in Real-Time in ADS** • **Coordinate shutdown of Avista Generation (shared)**	5-minute granularity, refreshed every 5 minutes • SPOC for CAISO for all RT Market Operator • Coordinate shutdown of Avista Generation (shared)	• Monitor and manage ACE / BAAL • Monitor and Maintain Contingency Reserve Levels (shared) • Manage Hydro flow / elevation constraints in Real-Time in Coordination with Merchant (shared) • Monitor Performance to Dispatch Instructions • Check out Scheduled Interchange with neighboring BAs, including updating tags for Dynamic ETSR Transfers. • Submit ATF RTIS	

Legend:

Black: Existing Functions
Red: Existing Function Transferred or Shared responsibility
Blue: EIM Specific
Brown: Existing Function Impacted by EIM

Transitioned Functions: The Reliability Operator will have the responsibility for monitoring and managing ACE and any Balancing Authority ACE Limit (BAAL) issues. As mentioned above, the CAISO Dispatch is designed to achieve a set of DOTs with each dispatch that will zero an EIM Entity Area's ACE every five minutes if followed. This is not always perfect, however. Several factors can lead to ACE reaching levels where action will need to be taken to remain in compliance with Reliability Standards. Although probably not the first option to address this scenario under EIM, if it is necessary to manually move a Resource, the Reliability Operator will coordinate with the Merchant which resource(s) to move.

Shared Functions between Merchant and Reliability: RT Generation Movement within the operating hour make up the areas where there is a sharing between the Reliability Operator and the RT Trader, who has historically managed real-time generation movement. Several possible reasons for Manual Dispatch were listed in the discussion of Section 2. Any of these reasons for Manual Dispatch of Resources should be coordinated with the RT Trader unless necessary for local Transmission Reliability. (Contingency Reserve Dispatch, Availability Issues, Contingency Reserve Recovery, Hydro Level Management, Shutdown, etc.)

Existing Functions Affected by EIM: Curtailing Tags for Reliability at the instruction of the RC or for management of local transmission issues will continue to occur, however, occurrences may be decreased if the constraint is actively monitored and can be managed effectively through the re-dispatch of the Energy Imbalance Market. Any physical constraint should be activated within the Market unless the constraint is only impacted by output of one or two resources. The Outage Management role the Reliability Operator has will be modified slightly with the use of the new AVA Outage Management System, but the RO will be required to actively review and perform the submission to CAISO for most outages.

The assignment of responsibilities across the Merchant, EIM Operator, Reliability Operator and the Transmission Operator is based on what information is known and understood at the time of the document approval. After Avista has joined the market and has gained operational experience, these responsibilities will be evaluated and re-assigned as needed to meet the business objectives and maintain operational excellence.

4 Approvals

Rip Divis, Chief System Operator **Date 04.22.2020**

Approve EIM RT Operator Functional Roles Doc Approval - Rip Divis - 04.22.2020.msg

Robert Follini, Manager of Real Time & Day Ahead **Date 03.03.2020**

Approve EIM RT Operator Functional Roles Doc Approval - Robert Follini - 03.03.2020.msg

Mike Magruder, Director of Trans Planning & System Operations **Date 03.31.2020**

Approve EIM RT Operator Functional Roles Doc Approval - Mike Magruder - 03.31.2020.msg

Scott Kinney, Director of Power Supply **Date 03.03.2020**

Approve EIM RT Operator Functional Roles Doc Approval - Scott Kinney - 03.03.2020.msg

Appendix C – FTE Capital & Operating Expense Estimates

This Excel file is not imbedded in the PDF document, but available as a separate file titled "Confidential – EIM HR Plan Financials – Final 05.20.2020"

Confidential – EIM
HR Plan Financials – F

Entire Document is CONFIDENTIAL

Updated Cost Estimate associated with the Human Resource Plan

Pages 1 through 2

Avista Energy Imbalance Market Benefits Assessment

October 11, 2017

Energy+Environmental Economics

Exhibit No. 8
Case No. AVU-E-21-01
S. Kinney, Avista
Schedule 11, Page 1 of 16

Table of Contents

Overview

Since its creation in 2014 through September 2017, the Western Energy Imbalance Market (EIM) has expanded to include four participating EIM entities (which are each balancing authority areas, or BAAs) and the California Independent System Operator (CAISO). Portland General Electric (PGE) entered the EIM in October 2017, and six additional EIM entities are expected to enter between 2018 and 2020.[1] Before deciding whether to enter the EIM, prospective participants have undertaken studies to assess the EIM's value proposition for their customers, to weigh the potential benefits against the costs of participation.

This report estimates potential benefits to Avista Utilities from participating in the Western EIM, based on benchmarking and statistical analyses that draw on nine publicly-available EIM potential benefit studies and the CAISO's quarterly *Western EIM Benefits Reports*. With this approach, the report provides reasonable estimates of the range of expected benefits from EIM participation for Avista, without the need to undertake a detailed modeling study.

Based on this approach, the study estimates that EIM gross benefits to Avista in 2023 would range from $2 million to $13 million per year (all values in 2017$). Actual benefits to Avista will depend primarily on the availability of its hydropower resources to participate in the EIM, the transmission capacity that is available for use by the EIM, expansion of wind and solar resources within the Avista balancing area, and EIM market conditions.

This report is organized into three sections:

- Section 1 provides a general overview of the kinds of potential benefits and costs for EIM participants, as background;
- Section 2 describes methods and results from the benchmarking and statistical analyses; and
- Section 3 summarizes key conclusions from the analyses.

[1] Entities that are currently committed to join include Idaho Power Company (IPC) and Powerex, which are scheduled to go online in 2018, Seattle City Light (SCL), Sacramento Municipal Utility District (SMUD) and Los Angeles Department of Water and Power (LADWP) in 2019, and Salt River Project (SRP) in 2020.

1. EIM Benefits and Costs

Quantitative benefit projections in EIM studies have largely focused on the value of interregional dispatch savings and, to a lesser extent, reduced flexibility reserve needs. The CAISO's *Western EIM Benefits Reports* include ex-post estimates of actual interregional dispatch savings (in dollars), reduced flexibility reserve needs (in MW and percent reduction), reduced wind and solar energy curtailment (in GWh), and reduced greenhouse gas (GHG) emissions (in metric tons of CO_2). Table 1 describes five categories of expected benefits for participating entities in the Western EIM.

Table 1. Descriptions of EIM benefit categories

Benefit Category	Description
Interregional dispatch savings	Cost savings from more efficient real-time dispatch of generation across the EIM footprint including access to excess renewable energy from other participating EIM entities.
Reduced flexibility reserve needs	Cost savings from lower flexibility or "load following" reserve requirements to balance within-hour changes in load, wind generation, and solar generation
Reduced wind and solar curtailment	Fuel cost savings, and avoided loss of renewable energy credits and tax credits where applicable, from reduced curtailment of wind and solar generation
Reduced GHG emissions	Reductions in GHG emissions from more efficient dispatch of thermal generation and reduced wind and solar curtailment
Improved reliability	Reduced risk of reliability violations, through greater regional visibility and situational awareness of system conditions and contingencies, automated security-constrained response to congestion, and mitigation of delays in manually finding generation to replace operating reserves

The scope of this report on EIM benefits is limited to interregional dispatch savings. This focus on dispatch savings is not because it is necessarily the largest benefit, but rather because it is the most straightforward to quantify and is the only metric that has been quantified across all EIM studies. To the extent that other benefit categories are also applicable to Avista, those benefits would represent additional upside potential from EIM participation.

Incremental costs to EIM participants have included the initial, upfront cost of software and system integration, estimated at $10-20 million, and annual operating costs, estimated at $1-3 million per year.[2] The wide range of estimated up-front costs are a result of EIM entities treating internal costs, such as meter upgrades, differently and starting at different integration points. Recent experience shows that improvements made by the CAISO and application vendors should result in integration costs towards the lower end of this range. Of this amount, the CAISO-related costs are estimated to be $400,000 up-front and $250,000 annually. The sum of upfront costs and the present value of annual costs can be compared against the present value of annual EIM benefits over a specified time horizon, to assess the cost-effectiveness of EIM entry.

[2] See, for instance, cost estimates in the APS and NV Energy EIM benefit studies, available at https://www.westerneim.com/Pages/About/default.aspx.

2. Avista Benefits Assessment

This study uses two approaches to estimate EIM benefits to Avista: (1) a benchmarking analysis, and (2) a statistical (regression) analysis. This section describes the data sources, methods, and results for both approaches.

Data Sources

Both the benchmarking and regression analyses draw on publicly-available EIM potential benefit studies[3] and the CAISO's quarterly *Western EIM Benefits Report*[4] series. Table 2Table 1 lists 50 total modeled scenarios, based on study-specific assumptions about a range of sensitivity variables including transmission availability, hydropower generation levels, and natural gas prices. CAISO and the eight utilities in Table 2 are referred to as 'EIM entities' in the remainder of this report.

Table 2. EIM benefit studies and CAISO reports used in this analysis

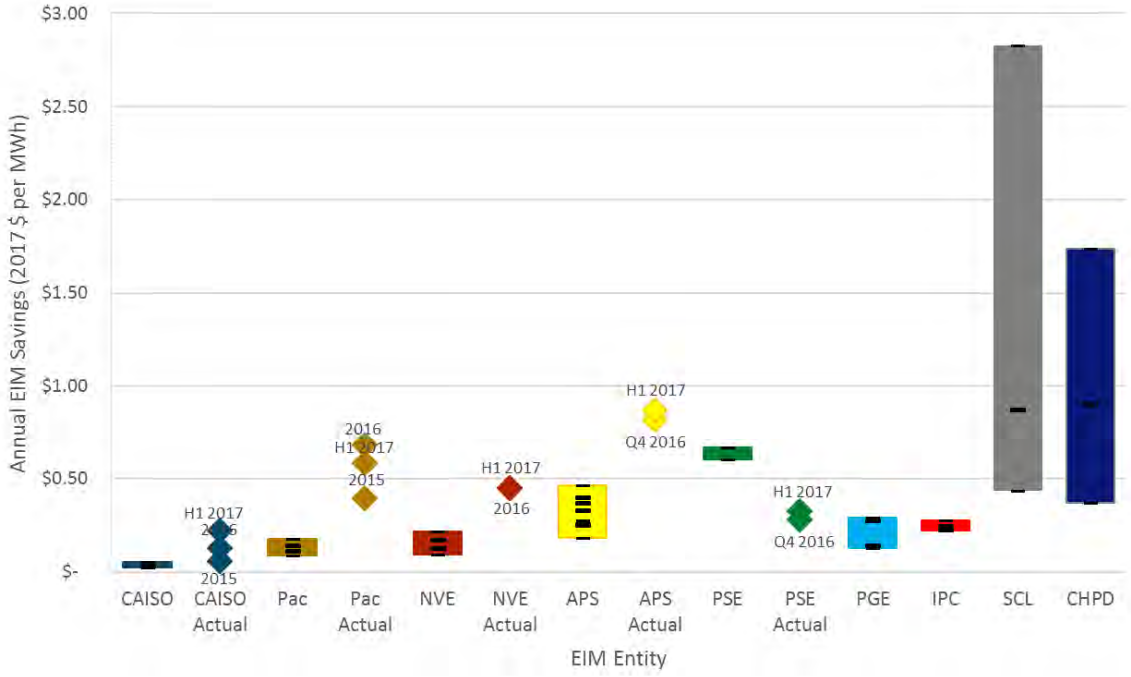
EIM Entity	Acronym	EIM Benefit Potential Study Scenarios	CAISO Report Coverage
CAISO	CAISO	6	Q4 2014 - Q2 2017
PacifiCorp	PAC	6	Q4 2014 - Q2 2017
NV Energy	NVE	4	Q4 2015 - Q2 2017
Puget Sound Energy	PSE	2	Q4 2016 - Q2 2017
Arizona Public Service	APS	13	Q4 2016 - Q2 2017
Portland General Electric	PGE	4	n/a
Idaho Power Company	IPC	4	n/a
Seattle City Light	SCL	8	n/a
Chelan County Public Utility District	CHPD	3	n/a

The 50 benefit potential scenarios and CAISO quarterly benefit reports create a wide range of projected and reported benefits (dispatch savings) to EIM entities, shown in Figure 1.

For comparability among EIM entities, this study normalized the benefits in Figure 1 to each entity's load for the historical year or projected study year. An exception is that the CHPD's benefits, which are normalized by generation rather than load, because of the large amount of hydropower in its balancing area relative to the size of its load. If normalized to load, the upper end of CHPD's benefit range would be higher than that of SCL. This study extrapolated partial year benefits for APS and PSE in 2016 and for all participating entities in 2017.

[3] See reference section for list of published benefit studies. CAISO and PacifiCorp benefits were studied jointly. CHPD results based on information described in Clearing Up, 1783, January 20, 2017 (Source: Energy News Data).
[4] See references section.

Figure 1. Range of annual load normalized benefits ($/MWh) to EIM entities, based on EIM studies and CAISO reports ("Actual")



The range of projected benefits in EIM potential studies (columns in Figure 1) is driven by scenario assumptions, while the range of CAISO-reported benefits (diamonds in Figure 1) is driven by actual market, weather and other operational conditions. Differences between projected benefits and actual benefits (as reported by CAISO) are driven both by differences between study assumptions and actual conditions and by the fact that modeling studies tend to underestimate the value of automated, centralized real-time dispatch relative to (non-EIM) business as usual operations.

CAISO-reported actual benefits for EIM entities have typically been higher than the estimated benefits in potential studies. PSE actual benefits for the first 3 quarters of EIM participation have thus far been lower than studied amounts, though CAISO staff indicates that one factor that may contribute to the lower actual observed savings are constraints applied by BPA on the rate of change of EIM flows across BPA flow gates. CAISO is working with BPA to enhance when and how such rate of change constraint limits should be applied.

A key question in this study is: **How can the range of benefit estimates across EIM entities in Figure 1 be narrowed to arrive at EIM benefit estimates that are consistent with the characteristics of Avista's electricity system?** Both the benchmark and regression analyses seek to address this question, using different approaches.

Benchmarking Analysis Methods and Results

The benchmarking analysis involves three steps:

1) Compare Avista with other EIM entities using five key metrics;
2) Narrow the range of load normalized benefits from Figure 1, based on the results of (1);
3) Estimate benefits to Avista in 2023, by multiplying the range of load normalized benefits from (2) by Avista's forecasted 2023 load.

Based on our experience identifying drivers of dispatch savings in previous EIM studies, this study selected the following five key metrics to compare Avista with other EIM entities:

1) Annual energy (load or generation);
2) Hydropower capacity as a share of generating capacity;
3) Transmission transfer capability to the rest of the EIM;
4) Solar and wind generating capacity as a share of generating capacity; and
5) Combustion turbine (CT) capacity.

The five figures that follow compare Avista to other EIM entities on the basis of these five metrics.

Figure 2. Annual load comparison:
Avista's annual load is most comparable to SCL, IPC, and PGE

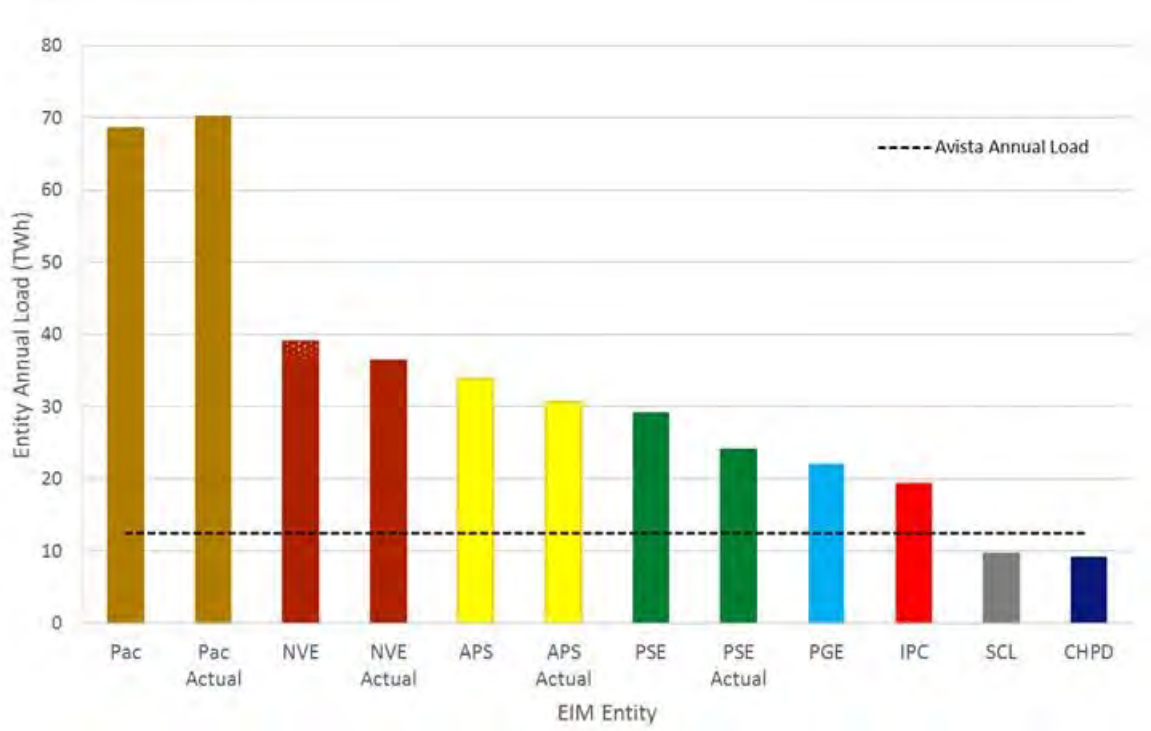


Figure 3. Hydropower share comparison:
Avista's share of hydropower capacity as a share of total generating capacity is most comparable to IPC, SCL, and CHPD

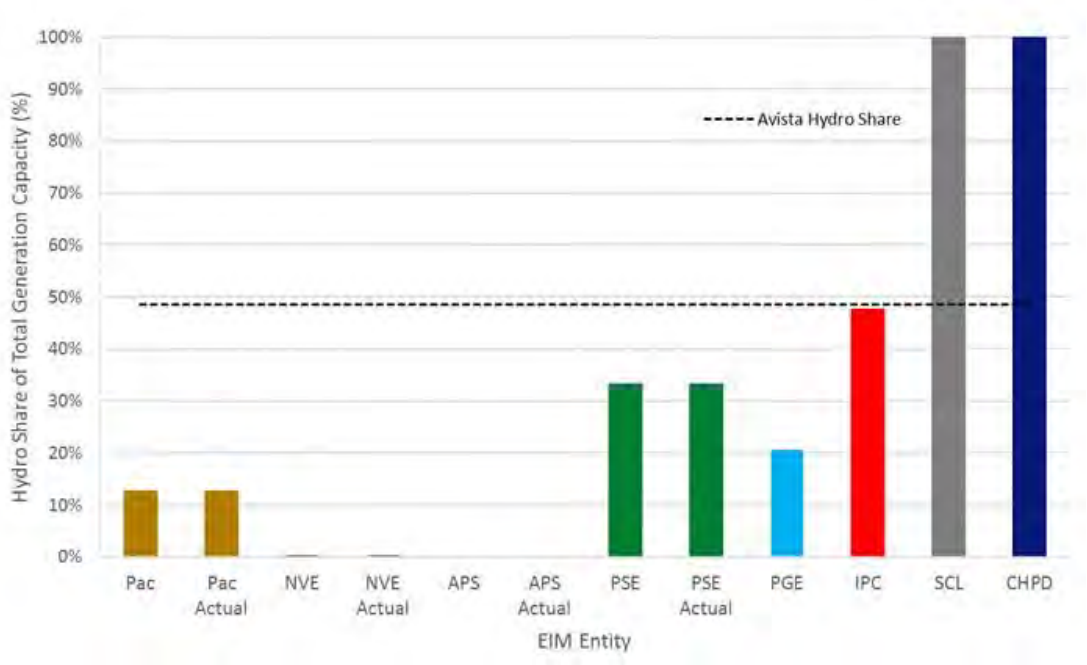


Figure 4. EIM transmission comparison:
Avista's transmission transfer capability to the rest of the EIM is most comparable to SCL, PSE, and PGE

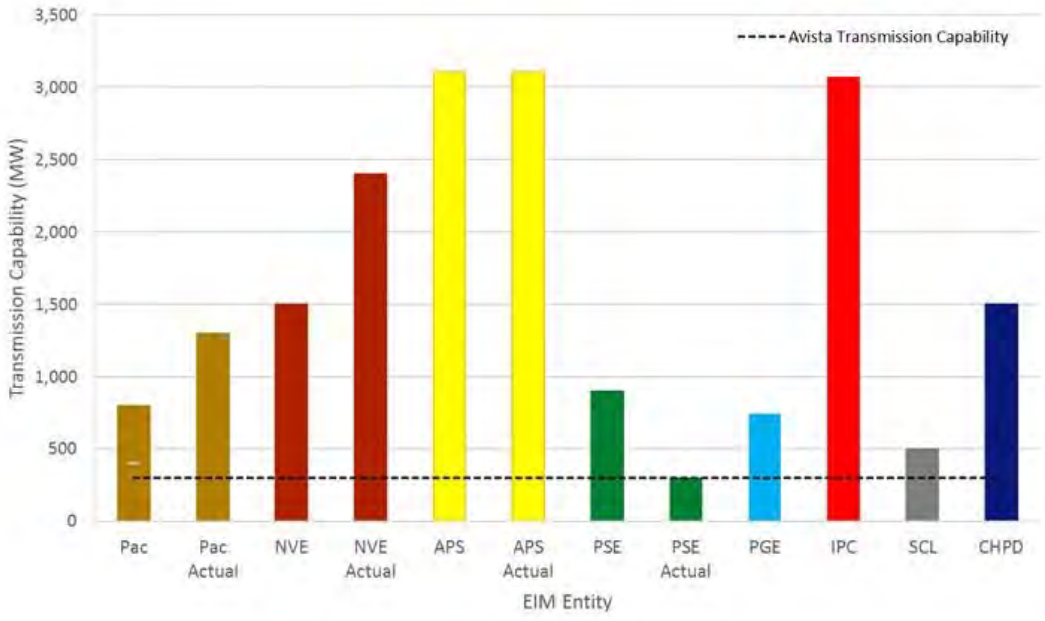


Figure 5. Solar and wind share comparison: ***Avista's wind and solar capacity as a share of total generating capacity is most comparable to PGE and NVE***

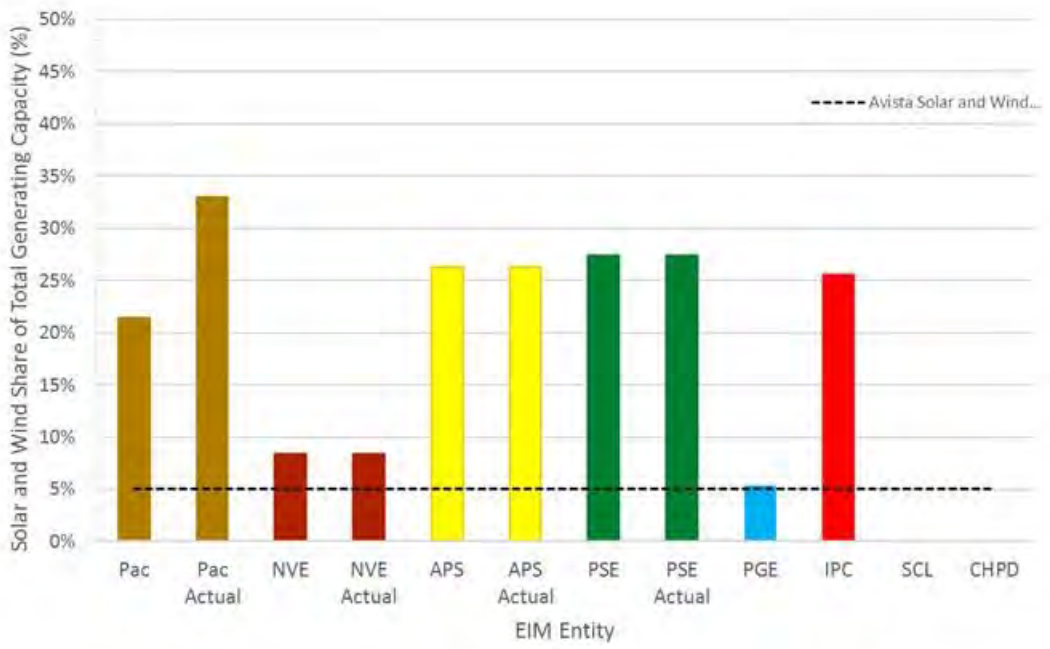
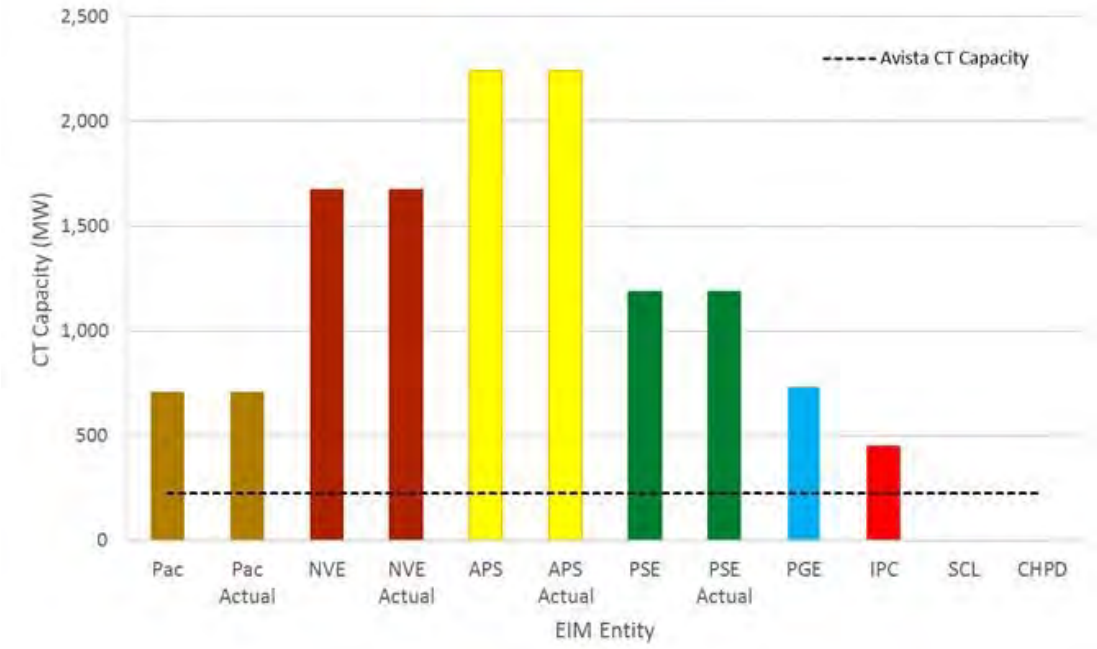


Figure 6. CT capacity comparison: ***Avista's CT capacity is most comparable to IPC and PGE***

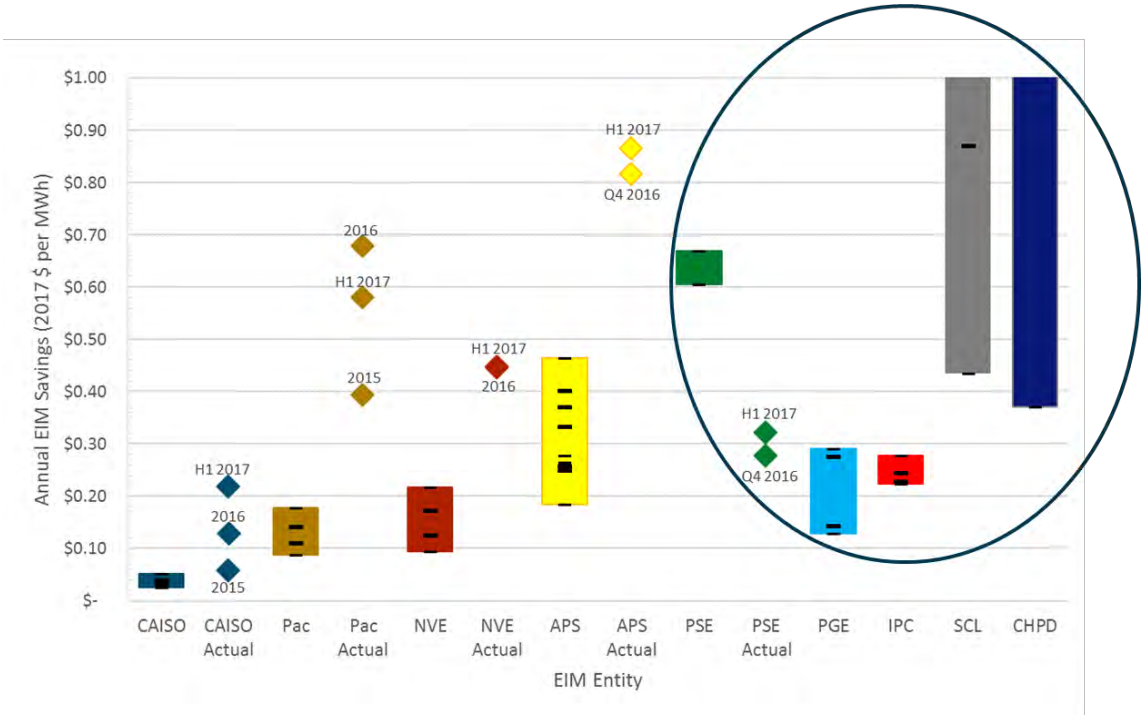


Across these five metrics, Avista most closely resembles PGE, SCL, IPC, PSE, and CHPD, as summarized in Table 3. The range of normalized benefits for these five utilities is highlighted in Figure 7, with benefits ranging from $0.13/MWh (PGE lowest case) to $2.83/MWh (SCL highest case). To be conservative, this study limited the maximum end of this range to $1.00/MWh, as shown in Figure 7.

Table 3. Summary of EIM Entities that Most Closely Resemble Avista for the Five Metrics

Key Metric	Avista Most Closely Resembles
Annual load/generation	SCL, IPC, PGE
Hydropower share of total generating capacity	IPC, SCL, CHPD
Transmission transfer capability to EIM	SCL, PSE, PGE
Solar and wind capacity share of total generating capacity	PGE, NVE
CT capacity share of total generating capacity	IPC, PGE

Figure 7. Range of Annual Load Normalized Benefits from Figure 1, Highlighting PGE, SCL, IPC, PSE, and CHPD



To estimate potential EIM benefits to Avista, this study multiplies the load-normalized range of benefits for the five utilities highlighted in Figure 7 ($0.13 to $1.00/MWh) by Avista's projected balancing authority area load of 12.45 terawatt-hours (TWh) for 2023. This produces an EIM benefits range for Avista of approximately $2 million to $13 million per year.

Statistical Analysis

For the statistical analysis, this study developed a regression model that estimates annual EIM benefits (dependent variable) as a function of key explanatory factors (independent variables). This study uses the regression to predict annual EIM benefits to Avista in 2023. All of the regression analysis and prediction was done using the SAS statistical software package.

Table 4 shows dependent and independent variables used in the regression. This study chose independent variables based on a combination of our experience with EIM studies and practical considerations around data availability. For instance, hydro generating capacity share of total generation is a proxy for hydropower capacity that is available to participate in the EIM, because data were insufficient to distinguish EIM-available hydropower for all entities included in the regression model.

Table 4. Description of regression variables[5]

Variable	Transformation	Units
Dependent Variable		
Annual EIM benefits	Natural log	Million 2017$
Independent Variables		
Benefit estimate source (1 = study, 0 = actual)	None	Dummy variable
Annual load	Natural log	TWh
Generating capacity	Natural log	MW
Natural gas price	Natural log	$/MMBtu
Transmission transfer capability to the EIM	Natural log	MW
Total EIM participants	Natural log	Number
California renewables as a share of sales (RPS)	None	%
Hydro share of total generation capacity	None	%
Wind and solar share of total generation capacity	None	%
CT share of total generation	None	%

Table 5 shows regression model coefficient and probability value results, with statistically significant coefficient estimates highlighted in bold text and coefficients color coded on the basis of their sign.

Table 5. Regression model coefficient estimates and p-values

Variable	Coefficient	p-value
Benefit estimate source (1 = study, 0 = actual)	**-0.294**	**0.0070**
Annual load	0.320	0.1101
Generating capacity	-0.224	0.1664
Natural gas price	0.906	0.2380
Transmission transfer capability to the EIM	**0.382**	**0.0002**
Total EIM participants	**-1.376**	**0.0006**
California renewables as a share of sales (RPS)	5.895	0.0769
Hydro share of total generation capacity	**1.870**	**0.0012**
Wind and solar share of total generation capacity	0.303	0.7544
CT share of total generation	-1.013	0.3750

[5] The value of most of the Table 4 variables in the regression varies for each EIM entity depending on when the EIM study was conducted or when the applicable CAISO report was released. “California renewables as a share of sales (RPS)” is California’s equivalent RPS at the time the EIM study was conducted or when the applicable CAISO report was released.

The coefficient signs and p-values in Table 5 suggest four statistically significant results:

1) Actual benefits tend to be higher than modeled benefits;
2) Higher transmission transfer capability between an entity and the rest of the EIM tends to increase EIM benefits for that entity;
3) On average, incremental EIM benefits tend to decrease as the number of participants increases;
4) An EIM entity's hydropower capacity (as a share of total generation capacity) tends to increase EIM benefits for that entity.

This study estimates EIM benefits to Avista by applying Avista-specific inputs (Table 6) to the regression model. This study uses low, mid, and high scenarios for Avista to capture how EIM benefits vary with four inputs: (1) whether the EIM benefits are consistent with EIM studies ("modeled") or CAISO reports ("actual"); (2) the amount of Avista's transmission transfer capability to the EIM; (3) Avista's hydropower capacity as a share of its total generating capacity, as a proxy for Avista's hydropower capacity available to participate in the EIM; and (4) Avista's wind and solar generation capacity as a share of its total generation capacity.

Table 6. Avista-specific regression inputs[6]

Variable	Units	Inputs		
Fixed Inputs				
Annual Avista BAA load	TWh	12.45		
Generating capacity	MW	2,366		
Natural gas price	$/MMBtu	3.81		
Total EIM participants	#	12		
California renewables as a share of sales (RPS)	%	40%		
CT share of total generation	%	11% (253 MW)		
Avista Scenario Inputs		**Low**	**Mid**	**High**
Benefit estimate source	Dummy	1	-	0
Transmission transfer capability to the EIM	MW	300	-	500
Hydro share of generation capacity	%	13% (298 MW)	24% (578 MW)	49% (1158 MW)
Wind and solar share of generation capacity	%	5% (120 MW)	-	26% (620 MW)

The scenario inputs in Table 6 lead to 24 EIM benefit scenario results. Table 7shows predicted EIM benefits to Avista (rightmost column) for each of these 24 scenarios.

[6] Fixed inputs were obtained directly from Avista. Annual load is 2023 forecasted load. Generating capacity is based on current Avista generating mix. Natural gas price is based on 2023 annual average for the Malin hub.

Table 7. Predicted EIM benefits to Avista in 2023 by scenario

Scenario	Model	Transmission (MW)	Hydro share (%)	Wind/solar share (%)	Predicted Annual EIM Benefits (million 2017$ per year)
1	1	300	13%	5%	1.54
2	1	300	13%	26%	1.63
3	1	300	24%	5%	1.88
4	1	300	24%	26%	2.00
5	1	300	49%	5%	2.92
6	1	300	49%	26%	3.10
7	1	500	13%	5%	1.84
8	1	500	13%	26%	1.96
9	1	500	24%	5%	2.27
10	1	500	24%	26%	2.41
11	1	500	49%	5%	3.51
12	1	500	49%	26%	3.73
13	0	300	13%	5%	4.94
14	0	300	13%	26%	5.17
15	0	300	24%	5%	6.12
16	0	300	24%	26%	6.40
17	0	300	49%	5%	9.66
18	0	300	49%	26%	10.11
19	0	500	13%	5%	5.96
20	0	500	13%	26%	6.22
21	0	500	24%	5%	7.39
22	0	500	24%	26%	7.72
23	0	500	49%	5%	11.69
24	0	500	49%	26%	12.22

Because the "hydro share of generating capacity" variable is a proxy for hydropower owned or contracted by Avista and able to participate in the EIM, the "low" scenario for this variable should be seen as representing a situation in which Avista's EIM-available hydropower is less than anticipated. These scenarios provide indicative guidance on the impact of low water flow years. The 13% (298 MW), 24% (578 MW), and 48% (1,158 MW) values do not imply that Avista would have this amount of hydropower capacity available to participate in the EIM. For SCL, for instance, the "hydro share of generating capacity" is 100%, but less than 100% of its total hydropower capacity is available to participate in the EIM.

The range of potential EIM benefits for Avista in Table 7 is approximately $2 million to $12 million per year. This range is consistent with the $2 million to $13 million range of potential benefits from the benchmark analysis, which multiplies the load-normalized range of benefits for the five utilities highlighted in Figure 7 ($0.13 to $1.00/MWh) by Avista's projected balancing authority area load for 2023.

Seasonal Considerations for EIM Entry

As part of this analysis, this study reviewed CAISO-reported EIM benefits by quarter to determine if there has been significant seasonal variation in benefits that might influence when a new entity would want to join the EIM. The results, shown in Figure 8, indicate that there is no definite trend thus far in the variation of the quarterly benefits across current entities in the EIM. Additionally, there is no definite pattern in the quarterly share of total annual EIM benefits (for all participants), as shown in Figure 9.

Figure 8. Quarterly and annual average benefits to EIM entities

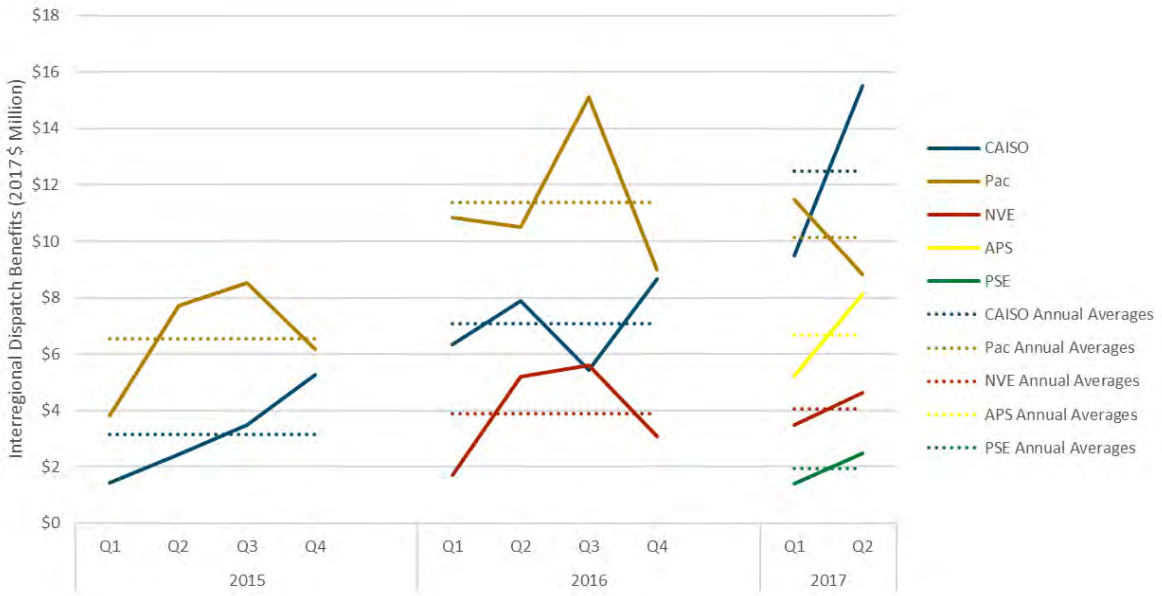
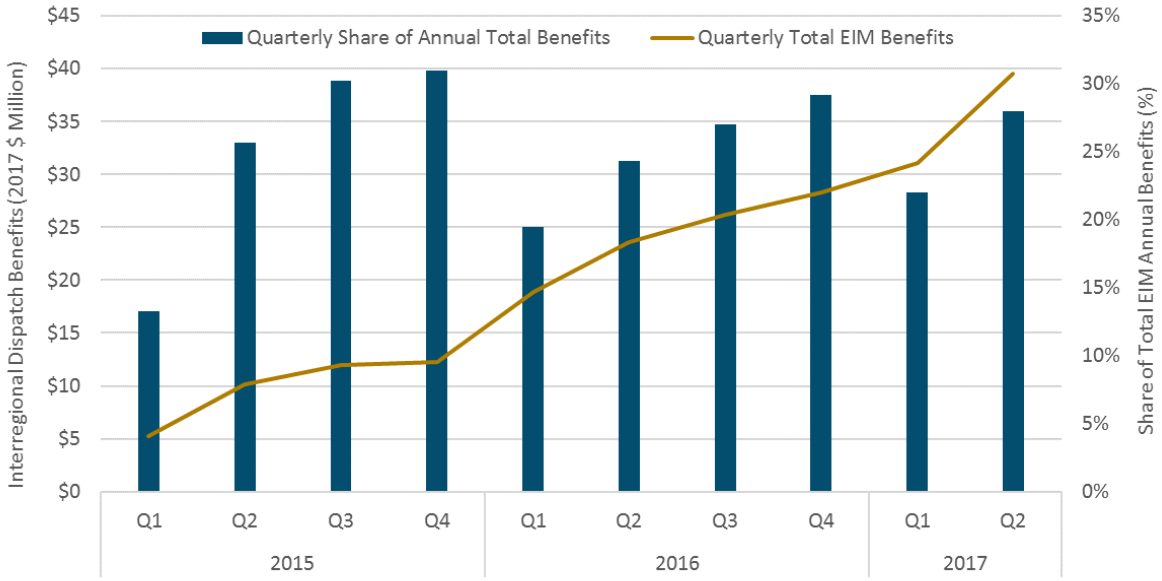


Figure 9. Quarterly share of annual total EIM benefits



3. Summary and Conclusions

This report assesses the range of potential benefits to Avista from participating in the Western EIM, focusing on dispatch cost savings. Drawing on publicly-available data, this study used benchmarking and statistical analyses to estimate a range of potential EIM benefits to Avista.

The benchmarking analysis compared Avista to other EIM entities using five key metrics: (1) annual load, (2) hydropower capacity as a share of generating capacity, (3) transmission transfer capability to the rest of the EIM, (4) solar and wind generating capacity as a share of generating capacity, and (5) CT capacity. Through this comparison, it was determined that Avista most closely resembles Portland General Electric, Seattle City Light, Idaho Power Company, Puget Sound Energy, and Chelan County Public Utility District.

This study used a range of load- or generation-normalized EIM benefits to these entities ($0.13/MWh to $1.00/MWh) to estimate EIM benefits to Avista by multiplying this range by Avista's forecasted load for 2023. This analysis produced an estimated range of annual EIM benefits to Avista of approximately $2 million to $13 million (2017$) per year.

The statistical analysis used a regression model to predict annual EIM benefits to Avista as a function of 10 explanatory variables. The study used this model to predict annual EIM benefits to Avista in 2023, using inputs obtained from Avista. The regression analysis produced an estimated range of annual EIM benefits to Avista of approximately $2 million to $12 million (2017$) per year.

In both analyses, the range of projected annual EIM benefits to Avista is driven by the amount of hydropower capacity available to participate in the EIM, transmission transfer capability available for the EIM, expansion of wind and solar generation capacity, and actual EIM market conditions. Within base case conditions modeled, based on Avista's current expectation for characteristics of its system for the test year of 2023, estimated savings could range from $3 million to $10 million (represented as the range of savings between the regression-based scenarios 5 and 17, respectively). Avista's realized benefits are more likely to fall toward the upper end of this range (or possibly beyond) under conditions with more volatile sub-hourly prices in the EIM, high availability of flexible hydropower in Avista to respond to EIM prices, and available transmission for Avista to transact with other EIM participants at those prices, as well as higher penetration of wind in the Avista BAA, which would increase the value of market flexibility to Avista. A dampening of EIM price volatility, or generation or transmission conditions that more tightly constrict Avista's ability to respond to EIM prices could lead to benefits at the lower end of this range.

This study also reviewed CAISO-reported quarterly EIM benefits, to determine whether seasonal variation in benefits might influence when a prospective entity might want to join the EIM. This review did not identify any clear patterns in quarterly benefits among individual EIM benefits or for the EIM as a whole.

It is important to note that the potential EIM benefits quantified in this analysis are focused exclusively on interregional dispatch savings because it is the most straightforward to quantify and is the only metric that has been quantified across all EIM studies. To the extent that other EIM benefit categories such as improved reliability as a result of real-time regional system awareness provided by the EIM, are applicable to Avista, those benefits would represent additional upside potential from EIM participation.

References

CAISO-reported benefits:

Quarterly Western EIM Benefits Reports, CAISO, 2015-2017. Available at: https://www.westerneim.com/Pages/About/QuarterlyBenefits.aspx.

EIM benefit studies:

PacifiCorp-ISO EIM Benefits Assessment. Energy & Environmental Economics, 2013. Available at: https://www.westerneim.com/Documents/PacifiCorp-ISOEnergyImbalanceMarketBenefits.pdf.

NV Energy-ISO EIM Economic Assessment. Energy & Environmental Economics, 2013. Available at: https://www.westerneim.com/Documents/NV_Energy-ISO-EnergyImbalanceMarketEconomicAssessment.pdf.

Benefits Analysis of Puget Sound Energy's Participation in the ISO EIM. Energy & Environmental Economics, 2014. Available at: https://pse.com/aboutpse/EnergySupply/Documents/PSE-ISO_EIM_Report_wb.pdf and https://www.caiso.com/Documents/PugetSound-ISO_EnergyImbalanceMarket-BenefitsAnalysis.pdf.

APS EIM Participation: Economic Market Assessment. Energy & Environmental Economics, 2015. Available at: https://www.westerneim.com/Documents/ArizonaPublicService-ISO-EnergyImbalanceMarketEconomicAssessment.pdf.

PGE EIM Comparative Study: Economic Analysis Report. Energy & Environmental Economics, 2015. Available at: http://edocs.puc.state.or.us/efdocs/HAD/lc56had152028.pdf

Idaho Power Company Energy Imbalance Market Analysis. Energy & Environmental Economics, 2016. Available at: http://edocs.puc.state.or.us/efdocs/HAA/haa144137.pdf.

Seattle City Light: Benefits of EIM Participation. Energy & Environmental Economics, 2016. Available at: https://www.rtoinsider.com/wp-content/uploads/E3_SCL_EIM_Study_FinalReport_2016-05-31.pdf (accessed on September 16, 2017).

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Capital Investment Business Case Justification Narratives Index

EXECUTIVE SUMMARY

In an effort to continue as a low cost, customer-focused energy service provider, Avista signed an Implementation Agreement on April 25, 2019 with the California Independent System Operator (CAISO) to join the Western Energy Imbalance Market (EIM) by April 2022. The Western EIM is a real-time, intra-hour energy market operated by CAISO that facilitates regional resource dispatch on a five minute basis to dispatch the lowest cost resources across the entire market footprint, while balancing in-hour load and resource obligations. This market allows participants to lower energy costs by either dispatching less expensive resources to meet load obligations, or by increasing revenue through the bidding of excess energy into the market. By the time Avista joins, more than 82% of the Western Interconnection load will be transacting in the EIM. As such, the liquidity of the hourly bi-lateral market Avista has traditionally transacted in will be significantly impacted because market rules require EIM participants to determine their resource schedules well in advance of the upcoming hour. As such, non-EIM participants will have less counterparties to transact with close to the operating hour. In addition, as renewable portfolios are increasingly mandated, Avista will need the market to ease the financial pressure of integrating renewable resources, while maintaining reliability.

In July 2020, in partnership with CAISO and the Bonneville Power Administration (BPA), Avista changed their entry date to March 2022, to align with BPA and Tacoma Power. This decision was made in an effort to coordinate the testing phases and go-live operations amongst northwest entities for a smoother market entry transition.

Avista will need to implement a variety of EIM software solutions, perform metering upgrades at a majority of its generation and substation interconnection sites, and install generation control systems. The original estimates described in the EIM Program Charter reflected $18.1M, with $4.5M planned in contingency, for a total estimated capital spend of $22.6M. The Charter also outlined $2.9M in implementation expense for a total Program implementation cost estimate of $26.6M and $3.5-$4M in on-going annual expense. In October 2020, cost estimates were updated in the Program Scope document, reflecting $24.1M with $2.6M planned in contingency, for a total estimated capital spend of $26.7M. The Charter also outlined implementation expense estimates at $5.4M for a total Program implementation cost estimate of $32.1M and an on-going annual expense estimate of $3.9M.

The Program implementation effort began in 2019 and will continue through March 2022, with warranty and closing activities through summer 2022. The CAISO allows Entities to join the market annually in April, with a fixed CAISO-set schedule for testing phases and market go-live. If Avista does not meet the planned go-live date, Avista will need to wait until April 2023 to join the market. Missing the go-live date will put Avista at risk for maintaining reliable service to our customers, providing energy services at the lowest costs, integrating renewable energy at the lowest costs and hindering de-carbonization efforts.

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The work in the EIM Business Case (BC) will benefit electric customers in Washington and Idaho while the network improvements will benefit gas and electric customers in Washington, Idaho and Oregon.

VERSION HISTORY

Version	Author	Description	Date	Notes
1.0	*Kelly Dengel*	*Original Business Case Template*	*4/29/2019*	
2.0	*Kelly Dengel*	*Updated Business Case Template*	*7/31/2020*	*Based on Charter Document*
3.0	*Kelly Dengel*	*Updated Business Case Template*	*12/17/2020*	*Based on Scope Document*

GENERAL INFORMATION

Requested Spend Amount	$26.7M
Requested Spend Time Period	3 Years – 2019 through 2022
Requesting Organization/Department	Power Supply
Business Case Owner | Sponsor	Kelly Dengel | Scott Kinney & Mike Magruder
Sponsor Organization/Department	Power Supply | System Operations
Phase	Execution
Category	Program
Driver	Performance & Capacity

1. BUSINESS PROBLEM

1.1 What is the current or potential problem that is being addressed?

Avista, and other utilities across the northwest, have traditionally operated in a bilateral market. As more utilities join an organized market, market liquidity will be impacted by reducing the number of available bi-lateral trading partners to conduct near term daily energy transactions. This puts Avista at risk for higher market prices and reliability issues if energy can't be procured from the bi-lateral market during stressed conditions, such as the loss of an Avista generating facility. Avista's resource mix continues to change with the inclusion of additional renewable resources to meet both internal clean energy goals and state policy requirements. As additional renewable energy integrates into the Avista portfolio, it becomes more expensive to manage and follow the variable nature of these resources. The EIM provides a more economic means to manage renewable resource variability.

In monitoring this risk and bilateral market shift, Avista has progressively monitored organized energy market activity within the west including the CAISO EIM and the possible formation of the

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Mountain West Transmission Group (MWTG). In April 2018, the MWTG initiative was deferred, and in December 2018 Avista decided to pursue entry to the Western EIM. Avista signed an EIM Implementation Agreement with the CAISO on April 25, 2019 to join the market in April 2022. In July 2020, in partnership with CAISO and the Bonneville Power Administration (BPA), Avista changed their entry date to March 2022, to align with BPA and Tacoma Power. This decision was made in an effort to coordinate the testing phases and go-live operations amongst northwest entities for a smoother market entry transition.

1.2 Discuss the major drivers of the business case *(Customer Requested, Customer Service Quality & Reliability, Mandatory & Compliance, Performance & Capacity, Asset Condition, or Failed Plant & Operations)* and the benefits to the customer

The major drivers influencing Avista's decision to join the market centered on reliability, the integration of renewable resources and a desire to adhere to clean energy goals.

The CAISO EIM is an in-hour economic based regional resource dispatch program that allows participants to maintain system reliability and lower energy costs by either dispatching less expensive resources to meet load obligations, or increase revenue through the bidding of excess energy into the market. The EIM dispatches the most economic resource across the entire market footprint based on bid prices to balance in-hour load and generation, resulting in lower overall dispatch cost for each individual participant. The EIM also lowers the amount of on-line regulation that each utility holds in excess every hour to make up the error between the forecasted load and resource plans, and what actually occurs during the operating hour. The reduced regulation can then be monetized creating additional revenue.

Another driver for joining the EIM is the integration of additional renewable resources in the Avista Balancing Authority Area (BAA). Renewable generation requires additional regulation and load following to back up the intermittency of the resource. There is a tipping point where Avista's existing hydro flexibility can't sufficiently or economically supply the required load following for the amount of renewable resources integrated into the Avista BAA. The EIM allows for the expanded integration of renewable resources by providing a cost effective, reliable market backstop to balance intermittent resources. Currently Avista has only a single 100 MW wind facility and a 20 MW solar facility within its BAA, so there is adequate hydro flexibility to follow these plants. Recently Avista signed a new 20 year Power Purchase Agreement with Clearway Energy for 145 MW of wind starting in the fall of 2020. In addition there are multiple third-party independent power producers in the Avista transmission interconnection queue that are exploring integration into the Avista BAA, including projects that meet the Public Utility Regulatory Policies Act requirements to be considered as a qualifying resource.

In April of 2019, Washington State passed clean energy legislation that will drive additional renewable resources to be built in Avista's BAA. Finally, Avista recently announced its own clean energy goals that will transition our resource mix to 100 percent clean by 2045. Any additional renewable resource integrated in Avista's service territory results in a reduction of hydro flexibility to follow these variable resources, and the EIM is the most efficient and cost effective way to provide the required flexible ramping capability.

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1.3 Identify why this work is needed now and what risks there are if not approved or is deferred

Entities typically announce their intent to join the market at least two years prior to go-live, while the CAISO-driven implementation schedule is 18 months for market integration. Avista has given itself a little over 2.5 years to prepare for market entry, as there is a substantial body of technical work, physical construction work and business process design Avista must complete. This extended timeline allows Avista to implement five new software applications, conduct upgrades to existing software, and perform generation metering and control upgrades, interconnection metering upgrades at substations and associated network infrastructure upgrades. Throughout the implementation, Avista will rely on Utilicast, their consultant system integrator, to provide market education and expertise in preparing the company for successful market participation.

Several northwest utilities, (PacifiCorp, Portland General Electric (PGE), Puget Sound Energy, Idaho Power Company (IPC), Northwestern, Seattle City Light and BPA) along with other western utilities, have either already joined the CAISO EIM or announced they will join in the near future. When BPA joins the Western EIM in March 2022, more than 80 percent of the load in the Western Interconnection will be participating in the market. This shift in market participation will impact daily market liquidity by reducing the number of available bi-lateral trading partners to conduct near term daily energy transactions. The risk of limited trading partners could drive daily market prices higher and/or cause reliability issues for Avista if energy can't be procured from the bi-lateral market during stressed conditions, such as the loss of an Avista generating facility.

1.4 Identify any measures that can be used to determine whether the investment would successfully deliver on the objectives and address the need listed above.

CAISO publishes a quarterly benefit report, which represents a calculation of each Entities' market benefits. This report will be used in part to reflect Avista's EIM benefits, and determine the EIM Business Case investment payback period. Avista will also develop an internal benefit report, which will include considerations for hydro bidding and Avista specific operational factors that may not be adequately represented in CAISO's benefit calculation. These two items combined will help Avista determine the financial investment return.

Prior to signing the CAISO EIM Implementation agreement in April 2019, Avista hired Energy and Environmental Economics (E3) to conduct an EIM benefit assessment in the fall of 2017. E3 has conducted similar benefit assessments for several other utilities to help understand the potential value of EIM participation. The E3 assessment estimated that Avista could see a range of annual benefits from $2 to $12 million from EIM participation.

There are four main study assumptions that result in the wide range of potential EIM benefits: the amount of flexible hydro Avista bids into the market, the amount of transmission made available for market transactions, the amount of renewable generation that is integrated into the Avista BAA, and the assumed EIM price volatility. Using Avista's best estimates for these critical

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study assumptions, Avista anticipates EIM annual benefits to be close to $6 million, with potential for benefits to move closer to the upper end of the study range depending upon observed market price volatility. Recent market price volatility experienced in 2018 significantly increased the benefits of current market participants. Both IPC and PGE achieved EIM benefits in 2018 that were over five times their anticipated benefits calculated by E3 studies. Avista's resource mix and transmission connection to other EIM participants most closely matches IPC and PGE. Therefore Avista may achieve similar elevated EIM benefits during times of high market price volatility.

1.5 Supplemental Information

1.5.1 Please reference and summarize any studies that support the problem

Additional Program detail is provided in the EIM Program Initiation Charter dated May 17, 2019 and the EIM Program Scope Document dated October, 29, 2020. Both are posted to the EIM SharePoint site.

1.5.2 For asset replacement, include graphical or narrative representation of metrics associated with the current condition of the asset that is proposed for replacement.

Across a majority of the generation and substation sites, Avista has relied on non-revenue quality meters with no ability to securely retrieve 5-minute revenue quality interval meter data required for market participation. Most of Avista's generation sites did not have revenue class Current Transformers (CTs) or Potential Transformers (PTs) that allow for accurately measuring generation output. Avista also has very limited Automated Generation Control (AGC) systems and associated Programmable Logic Control (PLC) at its generation plants – both of which are required for a resource to receive and follow a market dispatch signal. Although there is a communication network presence at most of these generation sites, not all generation meters are capable of connecting to the network for retrieval of 5-minute interval data. However, the current state of Avista's meters, generation controls and associated network connectivity was acceptable, as Avista traditionally operated in a bi-lateral hourly market. The generation meters will be replaced with a SEL-735 meter, or a locations where the SEL-735 already exists, the meter will be reprogrammed to collect 5-minute reads.

Throughout substation interconnection sites, Avista does meet the revenue quality meter requirement with JEMStar meters and accurate CTs/PTs. Although Avista considered reprograming these meters to collect 5-minute interval data with an associated memory upgrade, these meters are at least 12 years old, require dial up communications to retrieve interval data and are unable to connect via Internet Protocol (IP) communications. Considering the age of the meters and the fact that Avista should not rely on dial up communications alone, the decision was made to replace the meters with a SEL-735 meter, capable of 5-minute interval data and multiple connectivity options.

Due to limited field support of dial up communications and lack of monitoring capabilities, Avista decided to replace dial up communications in favor of IP communications installations wherever cellular installations are feasible –this aligns with Avista's preferred communication protocol and

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long-term operational plan. For the purposes of EIM, the IP communications migration will be limited to MV-90, engineering access, and metering communications, but eventually could include migration of SCADA as part of a future project if the new IP communications circuits are deemed reliable. Migration to IP communications for SCADA and metering has been a long-term focus and evolution for Avista. Avista does collect hourly interchange meter data, but it's done at most substations by non-revenue meters with varying capabilities, with various network protocols, manual processes and supplemented with information from PI (Plant Information) and SCADA averages. This process and the associated data are not scalable or reliable for accurate 5-minute interval EIM metering and settlements.

Option	Capital Cost	Start	Complete
CAISO Western Energy Imbalance Market	*$26.7M*	*05/2019*	*06/2022*
Do Nothing	*$0*	*N/A*	*N/A*

2.1 Describe what metrics, data, analysis or information was considered when preparing this capital request.

Reference key points from external documentation, list any addendums, attachments etc.

Avista developed its initial EIM implementation estimate with help from Utilicast who has aided several other Utilities prepare for market operations. Avista hired Utilicast to perform a technology assessment, a meter and controls assessment, and develop an overall cost assessment in 2018. Avista recognizes that the EIM project implementation cost estimate is a working estimate and will evolve as the Company learns more about the specific CAISO EIM requirements, determines the capability of its existing equipment, completes the preliminary design of required upgrades and selects its market application vendors.

After the Utilicast assessments were complete, Avista used the information to reexamine the work load and design requirements for facility upgrades including meters, generation controls, and communication networks. Avista also develop a project schedule, project structure and preliminary resource plan. This updated information was used to develop the EIM Program Initiation Charter in May of 2019 and inform the EIM Business Case narrative. The Program Scope document approved in October 2020 provided further cost estimate updates base on completing initial project designs and installations and reevaluating employee resource needs. Avista recognizes the cost and preparation for EIM entry is significant so it has been diligent in its structured approach to estimate project costs and keep actual costs under control. The Company reached out to multiple existing EIM participating entities to acquire best practices based on their approach and experience. Avista chose to hire Utilicast to leverage its EIM operational and integration expertise in lieu of attempting an Avista-guided implementation.

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2.2 Discuss how the requested capital cost amount will be spent in the current year (or future years if a multi-year or ongoing initiative). (i.e. what are the expected functions, processes or deliverables that will result from the capital spend?)**. Include any known or estimated reductions to O&M as a result of this investment.**

[Offsets to projects will be more strongly scrutinized in general rate cases going forward *(ref. WUTC Docket No. U-190531 Policy Statement)*, therefore it is critical that these impacts are thought through in order to support rate recovery.]

The EIM Program is a multi-year program affecting Generation Production & Substation Support, Power Supply, Transmission System Operations, Substation, Enterprise Technology, Accounting and SCADA. The below tables represents the anticipated capital allocation request per year based on the Program Scope estimates and a summary of what projects or deliverables will be addressed.

BC Year	Capital Request	Projects/Deliverables
2019	$1,510,000	Controls/meter upgrades, EIM MV90 project
2020	$9,860,000	Controls/meter upgrades, EIM software projects
2021	$10,500,000	Controls/meter upgrades, EIM software projects
2022	$4,830,000	EIM software projects
Total	**$26,700,000**	

In preparation for Avista to enter the Western EIM, the discussion of the roles and teams required for a successful market entry and on-going operations was imperative. As described in the executive-approved EIM Human Resource Plan of May 2020, 17 incremental full-time employees were identified for the program implementation and the post-implementation phases. This document includes justification for each position, an explanation of job functions as they relate to EIM and associated risks if the position isn't approved for hire. After reviewing the program implementation schedule, and accommodating a timeline for resources to participate in the software implementation phases, a preferred hire date was developed. This preferred hire date, along with an estimation of time allocated to EIM capital activities and expense activities, provided input for a 2020-2023 annual financial estimate, with 2023 representing a full-year of operations and maintenance (O&M) expense activities.

In 2018, Avista originally estimated annual O&M expense at $3.5 - $4.0 million, with $2.5 million attributed to the original labor estimate of 11-13 incremental EIM FTEs. The revised estimate of 17 EIM FTEs, as described in the EIM Human Resource Plan, increases the annual labor estimate to $3.2 million (system loaded) and the total estimated annual expense to $3.9M. The need for the additional 4 FTEs (17 vs. 13), was determined through staffing conversations with other EIM entities, who indicated lean staffing levels at the time of market entry have hindered operational performance. Avista believes the 17 FTEs represents a mature workforce needed to fully support

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EIM operations at market entry. Any additional EIM roles Avista may need will be assessed after Avista has gained experience operating in the market.

In August 2020, prior to incorporating the updated EIM Human Resource Plan cost estimates in the Scope Document estimates, the FTE cost estimates were reviewed in light of the EIM Charter estimates and reductions were made. Reductions were also made to reflect 2020 hiring delays and the postponement of two positions – the Training Admin and one of the Settlement Analysts. These positions are anticipated to be hired approximately six months after market go-live.

2.3 Outline any business functions and processes that may be impacted (and how) by the business case for it to be successfully implemented.

By joining the Western EIM, many existing business processes will be impacted and Avista will adopt an entirely new set of market processes to incorporate in daily operations. The primary business groups impacted by operating in the market include Power Supply, Transmission System Operations and Accounting/Finance. The Power Supply group will be responsible for generating hourly market bids for generation resources, while System Operations will implement a new 24-hour desk with EIM operators representing Avista's Balancing Authority Area (BAA) in the market and the Accounting/Finance group will analyze data and CAISO settlement information. These three groups will need to communicate closely with each other and the plant operators through phone calls and the aid of the EIM software applications. The Accounting/Finance business unit will acquire a new Settlements team to perform market settlements and analysis of Avista's financial position in the market. Throughout substation and generation projects, a planning and timing shift will need to occur to align Avista's delivery schedules with CAISO's scheduled updates. If Avista does not align with CAISO's update schedules for physical changes in the BAA, such as new substations or transmission lines, Avista's physical system will not be represented in CAISO's market design, which could result in negative financial impacts for Avista.

2.4 Discuss the alternatives that were considered and any tangible risks and mitigation strategies for each alternative.

As stated in Section 1.1, Avista monitored EIM expansion and development activity in the West and as more northwest utilities joined the CAISO EIM, it was inevitable that Avista would also need to join an in-hour market to reduce market liquidity risk and costs to integrate renewable resources. Avista delayed a market entry decision until the financial and operational risks were present. Once the MWTG initiative was deferred in April 2018, Avista decided to pursue entry to the Western EIM in December 2018 since it was the only market option available.

2.5 Include a timeline of when this work will be started and completed. Describe when the investments become used and useful to the customer, spend, and transfers to plant by year.

The EIM Program began in April 2019, and capital project progressively began in May 2019. The bulk of the capital investments centered on the implementation of the EIM software, the upgrade of Avista's metering infrastructure across generation and substation to install revenue quality meters capable of secure 5-minute reads, and the upgrade of some plant control systems in generation. While the completion of the generation and substation projects will be progressive

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throughout late 2020 and into early 2021, the EIM software applications will not be complete until market entry in March 2022.

2.6 Discuss how the proposed investment aligns with strategic vision, goals, objectives and mission statement of the organization.

In April of 2019, Avista announced its own clean energy goals that will transition our resource mix to 100 percent clean by 2045. Also in 2019, Washington State passed clean energy legislation that will drive additional renewable resources to be built in Avista's BAA to meet specific emission reduction requirements between 2030 and 2045. Any additional renewable resource integrated in Avista's service territory results in a reduction of hydro flexibility to follow these variable resources, and the EIM is the most efficient and cost effective way to provide the required flexible ramping capability.

2.7 Include why the requested amount above is considered a prudent investment, providing or attaching any supporting documentation. In addition, please explain how the investment prudency will be reviewed and re-evaluated throughout the project

Avista conducted a cost to benefit analysis based on the information developed from the E3 benefit study and the EIM Program Initiation Charter. Based on the estimated benefits and costs from these assessments, Avista anticipates breaking even with its EIM investments in 7-8 years assuming an annual revenue of $6M from market participation.

Avista performed an additional economic analysis based on the updated costs estimates provided in the EIM Scope Document. Based on the new integration cost of $32.1 million and on-going costs of $3.9 million, an annual revenue of $7.8 million is needed to break even after 10 years of market operations. This is still well within the range of estimated benefits determined by E3 and quite a bit less than CAISO reported benefits for IPC and PGE in 2018 and 2019. If Avista's actual EIM system benefits are closer to or exceed the potential upper bound of $12 million, as determined by E3 and experienced by other similar situated EIM participating utilities, then Avista customers will see positive revenue in a much shorter time period. The economic analysis did not consider other EIM benefits such as reduced flexible ramping requirements, reliability and system visibility enhancements, and reductions in greenhouse gases.

2.8 Supplemental Information

2.8.1 Identify customers and stakeholders that interface with the business case

Avista internal stakeholders include: Power Supply, Transmission System Operations, SCADA, Generation Production & Substation Support, Substation Engineering, Finance & Accounting, Distribution System Operations, Risk, Network and Technology. Avista's primary external stakeholder is CAISO, however the EIM software vendors – Power Costs, Inc., and Power Settlements – are also key stakeholders. The below table represents business units that will perform capital projects under the EIM BC and the associated rate jurisdiction:

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Business Unit	Service Code	Rate Jurisdiction	Location
Generation	ED-Electric Direct	AN-Allocated North	098-Common-WA/ID
Substation	ED-Electric Direct	AN-Allocated North	098-Common-WA/ID
ET Applications	ED-Electric Direct	AN-Allocated North	098-Common-WA/ID
ET Network	CD-Common Direct	AA-Allocated All	099-Common-WA/ID/OR
SCADA	ED-Electric Direct	AN-Allocated North	098-Common-WA/ID
Facilities	ED-Electric Direct	AN-Allocated North	098-Common-WA/ID

2.8.2 Identify any related Business Cases

The Energy Imbalance Market Business Case and the Resource Metering, Telemetry and Controls Upgrade Business Case were initiated in 2017 to prepare Avista to join an organized energy market. In 2019, the Resource Metering, Telemetry and Controls Upgrade Business case scope, and the then allocated $2.21M (2019 and 2020 funds), were consolidated under the Energy Imbalance Market Business Case, which at that time, and had a placeholder estimate of $9.4M. With the help of Utilicast, Avista continues to gain a better understand of the current status and capability of existing equipment and full pre-market integration requirements. This information has been used to create the current Program estimate.

Market entrance is also dependent on the creation and integration of the Full Network Model delivered under the SCADA/SOO/BuCC BC (System Operations Office and Backup Control Center).

3.1 Steering Committee or Advisory Group Information

The EIM Business Case has the following levels of program governance; the business unit Advisory Committees, the Director Steering Committee and Executive Steering Committee.

- **Advisory Committees** – varies by business unit for technical subject matter expertise
- **EIM Director Steering Committee** – Scott Kinney, Andy Vickers, Mike Magruder, Jim Corder, Hossein Nikdel, Pat Ehrbar, Todd Colton, Adam Munson and Clay Storey
- **EIM Executive Steering Committee** – Jason Thackston, Heather Rosentrater, Jim Kensok, Ryan Krasselt and Kevin Christie

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3.2 Provide and discuss the governance processes and people that will provide oversight

The Advisory Committees consist of the subject matter experts in the various business units who can direct the technical work, make engineering decisions and deliver the technical solution that meets the business need. The Advisory Committee is supplemented with input and knowledge from Stakeholders amongst neighboring business units. As needed, members of the Director Program Steering Committee will participate in the Advisory Committee meetings for input and decisions. The EIM Program manager will be invited to all Advisory Committee meetings and serve as a consistent conduit from the Advisory Committees to the EIM Program Steering Committee. Communication of project schedule risks, scope issues and financial impacts will be provided by the various project managers at the Advisory Committees and, where appropriate, reported to the EIM Director or Executive Steering Committee. The Advisory Committee does not have the authority to approve change requests, but must seek approval from the EIM Director Steering Committee.

Program level authority sits with the EIM Director Steering Committee, and the Executive Steering Committee. Ultimate approval authority sits with the Executive Steering Committee. The Executive Steering Committee is responsible for taking recommendations from the Director Steering Committee and ultimately making Program level decisions for use of contingency funding. In the unforeseen event that the EIM Program schedule is at risk, the Executive Steering Committee has the right to review and adjust the EIM go-live date. Members of the Executive Steering Committee and the Program Sponsors would be responsible for this re-negotiation of the EIM Implementation Agreement with the CAISO.

3.3 How will decision-making, prioritization, and change requests be documented and monitored

The EIM Program has implemented procedures and documentation to provide effective mechanisms to control the scope of the program, manage issues and risks and monitor progress. Project level change requests will be discussed at the Advisory Committees, and approvals will be granted at the EIM Director Steering Committee. Program level management of decisions and documents will be discussed at the EIM Director and Executive Steering Committees and posted to the EIM SharePoint site. Enterprise Technology projects, and their associated processes, will be managed within Clarity. Generation, transmission operations and substation projects will be managed through their established project management processes and procedures, and final documentation posted to the EIM SharePoint site. Each project artifact will reference the EIM program with narrative related to EIM scope, CAISO track, requirements, and the financial structure with the EIM Parent Project ID of EIM422 and the associated Expenditure Request (ER) and Budget Item (BI). The request to open EIM projects will be reviewed by the EIM Program Manager and approved by the Business Case Sponsor.

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The undersigned acknowledge they have reviewed the *Energy Imbalance Market* Business Case and agree with the approach it presents. Significant changes to this will be coordinated with and approved by the undersigned or their designated representatives.

Signature:	Kelly Dengel	Date:	12-17-2020
Print Name:	Kelly Dengel		
Title:	EIM Program Manager		
Role:	Business Case Owner		

Signature:	Scott Kinney	Date:	12-17-20
Print Name:	Scott Kinney		
Title:	Director of Power Supply		
Role:	Business Case Sponsor		

Signature:	Michael A Magruder	Date:	12-17-2020
Print Name:	Mike Magruder		
Title:	Director System Ops & Planning		
Role:	Business Case Sponsor		

Signature:		Date:	
Print Name:			
Title:			
Role:	Steering/Advisory Committee Review		

Template Version: 05/28/2020

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