REQUEST FOR PROPOSALS (RFP)

FOR

DATA & SYSTEMS STRATEGIC PLANNING SERVICES

1. OBJECTIVE

Clean Power Alliance of Southern California ("CPA") is seeking proposals ("Proposals") from qualified and experienced contractors (individually, a "Proposer" and collectively, "Proposers") to provide consulting services for the development of a refreshed strategic plan and roadmap for CPA's data and systems.

2. PROJECT BACKGROUND

CPA is a Community Choice Aggregation ("CCA") program, established as a Joint Powers Authority, made up of 35 local agencies across Los Angeles and Ventura Counties (CPA's member agencies are set forth in Attachment C). These agencies have banded together to provide cleaner electricity at competitive rates, offering a choice of electricity service providers to approximately three million residents and businesses through approximately one million customer accounts in Southern California.

In 2020, with the help of a consulting firm, CPA developed a strategic plan for data and systems (a copy of the original strategic plan is attached as Attachment F). CPA is looking to develop a refreshed strategic plan and roadmap for data and systems that addresses the following components:

- Data governance.
- Data architecture.
- Technology and systems, including, but not limited to analytics, Energy Trading and Risk Management (ETRM), Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), etc.
- Cybersecurity.
- People.
- Process.

CPA currently employs a variety of technologies to enable data analytics, including AWS, Snowflake, Sigma, Tableau, QuickBooks for accounting, and a custom-built ETRM platform hosted on AWS.

CPA is also in the process of procuring for a variety of managed information technology (IT) services, including:

- IT support, such as help desk services.

- Cloud infrastructure management.
- Application management.
- Cybersecurity services.

3. QUALIFICATIONS AND EXPERIENCE

A qualified Proposer should have the following minimum qualifications and experience:

- Proposer must have applicable qualifications and experience with developing technology strategic plans related to data management and data governance.
- Proposer must have developed a technology or data management strategic plan to at least three (3) other electric utilities, CCAs, or local government agencies.
- Proposer must have applicable qualifications and experience with providing with providing technology or data management strategic planning for CCAs or electric or municipal utilities.

4. SCOPE OF SERVICES

4.1. Scope of Work

A detailed description of the Scope of Work for the development of a refreshed strategic plan and roadmap for data and systems consulting Services is contained in Attachment A ("Contemplated Scope of Services").

4.2. Term of Work

Services under this RFP are expected to commence on July 15, 2024, and continue until January 1, 2025 ("Term").

5. PRICING

5.1. Proposer must (a) describe in detail the compensation structure to meet the Scope of Services specified in **Attachment A**; (b) describe in detail any fees or charges for travel, telephone calls, and any other expenses anticipated to be incurred, which shall be separately billed (NOTE: any compensation for such fees or expenses shall be at-cost, i.e., no margin, or additional fees shall be charged); and (c) describe in detail any discounts or downward adjustments that are available and the conditions for such discounts. The compensation structure can include (i) fixed price or (ii) hourly rates, in which case the Proposer must specify the rate increments for each professional who will or is anticipated to perform services outlined herein, and a not-to-exceed amount.

5.2. Proposer may, at its option, submit one (1) alternative pricing proposal but that proposal must specify any additional amounts proposed and justify in detail the cost breakdown for each individual scope item described in Attachment A, or by

another divisible increment. CPA reserves the right, at its sole discretion, to reject or accept any alternative pricing proposal.

6. RFP PROCESS

6.1. RFP Schedule

The timetable for this RFP is as follows:

Description	Date
Release of RFP	April 24, 2024
Deadline for Written Questions	May 1, 2024
Responses to Questions Provided	May 8, 2024
RFP Proposals Due	**May 17, 2024 (by 4:00 p.m. Pacific Time)**
Evaluation of Proposals	May 20 – 31, 2024
Interviews (if needed)	June 3 – 7, 2024
Notice of Intent to Award Provided	June 10, 2024
Contract Negotiations	June 10 – 21, 2024
Presented to the Board for Approval (if needed) and Execution of Contract	July 11, 2024
Commencement of Work	July 15, 2024

6.2. Proposer Questions and CPA Responses

Potential proposers may submit questions regarding this RFP by sending an email to contracting@cleanpoweralliance.org with a copy to cpadata@cleanpoweralliance.org. All questions must be received by 4:00pm (Pacific Time) on May 1, 2024. When submitting questions, please specify which section of the RFP you are referencing and quote the language that prompted the question. CPA will post responses to all of the questions received for this solicitation to CPA's website at: https://cleanpoweralliance.org/contracting-opportunities/ on May 8, 2024.

CPA reserves the right to group similar questions when providing answers. Questions may address issues or concerns that the evaluation criteria and/or business requirements would unfairly disadvantage providers or, due to unclear instructions, may result in CPA not receiving the best possible responses from provider.

6.3. Proposal Submission Deadline

A proposal should be submitted by email to contracting@cleanpoweralliance.org by 4:00 pm on May 17, 2024. Please include "PROPOSAL FOR DATA & SYSTEMS STRATEGIC PLANNING SERVICES" in the email subject line.

It is the sole responsibility of the submitting Proposer to ensure that its proposal is received before the submission deadline. Submitting Proposer shall bear all risks associated with delays in delivery. Any proposals received after the scheduled closing date and time for receipt of proposals may not be accepted.

6.4. Proposal Evaluation Criteria

Proposals will be evaluated in accordance with the following evaluation criteria:

Evaluation Criteria	Evaluation Criteria Weight
Proposer's qualifications and experience (*see* Section 3).	33%
Proposer's ability to provide the Contemplated Scope of Services identified in **Attachment A**.	33%
Proposer's Pricing (*see* Section 5)	34%

6.5. Evaluation Process

CPA will evaluate the proposals pursuant to the criteria specified in Section 6.4 above. CPA may select one particular Proposer or select a combination of Proposers (with or without interviews); or conduct interviews with a "short list" of Proposers, consisting of those Proposers reasonably likely, in the opinion of CPA, to be awarded the contract. Any interview may include discussions about services offered, conflicts of interests with other clients, or fees/compensation amount or structure. Interviews may take place through written correspondence, telephone or video conference, and/or face-to-face interviews, at CPA's sole discretion.

CPA reserves the right not to convene interviews or discussions, and to make an award on the basis of initial proposals received. References may be contacted at any point in the evaluation process.

After a Proposer has been selected, CPA will negotiate a contract for execution. If a satisfactory contract cannot be negotiated, CPA may, at its sole discretion, begin contract negotiations with the next qualified Proposer who submitted a proposal, as determined by CPA. Proposers are further notified that CPA may disqualify any Proposer with whom CPA cannot satisfactorily negotiate a contract. A contract may be presented to CPA's Board of Directors for approval.

6.6. Protest Process

Any Proposer who wishes to submit a written protest must do so by 12 p.m. (Pacific) on June 13, 2024, unless this date is further amended through an Addendum. Any written protest must contain a full and complete statement specifying in detail the

grounds of the protest and the facts in support thereof. The written protest must be e-mailed to contracting@cleanpoweralliance.org.

If CPA's Board of Directors ("Board") is the final approval authority for any contract(s) awarded from this RFP, you may also give a public comment when the item is scheduled before the Board. If you want to give a public comment, please contact CPA's Board Clerk prior to the meeting at clerk@cleanpoweralliance.org.

7. **PROPOSAL REQUIREMENTS**

   7.1. Proposals shall include the following components:

   7.1.1. Proposer's qualifications and experience with the elements specified in Section 3 (Qualifications and Experience). Proposer must provide qualifications for all team members, including the principal, company official(s), and other personnel who Proposer anticipates will be assigned to work on behalf of CPA. This requirement includes, but is not limited to, Proposer's anticipated subcontractors or teaming partners.

   7.1.2. Proposer's explanation for how it plans to meet Task and Deliverables specified in Attachment A (which will be attached as the scope of work to the final agreement as Exhibit A). This section must include:

   - 7.1.2.1. A list of the Proposer's planned project team, who will be assigned to work on behalf of CPA, and an explanation for each project team member's role and responsibility.
   - 7.1.2.2. A list of subcontractors, if any, and their respective roles and responsibilities separated by task.
   - 7.1.2.3. Proposer must provide its pricing proposal, including the information required in Section 5, "Pricing," above. Proposer should describe any fixed fees or hourly billing rates, fees, or other compensation that Proposer may seek from CPA for services, inclusive of staff time, equipment, materials, travel, administrative/clerical, overhead and other out-of-pocket expenses, if applicable to this contract.
   - 7.1.2.4. If a teaming arrangement is being proposed, teaming partner or subcontractor costs should be broken out separately.

   7.1.3. Proposer's completed Prospective Contractor References Form. *See* **Attachment B**.

   7.1.4. Any required changes to CPA's Pro Forma Contract. *See* **Attachment D.**

   7.1.5. Proposer's completed Campaign Contribution Form. *See* **Attachment E**.

8. RESERVATION OF RIGHTS

This RFP is a solicitation for proposals only and is not intended as an offer to enter into a contract or as a promise to engage in any formal competitive bidding or negotiations. CPA may, at its sole discretion, accept or reject any or all proposals submitted in response to this RFP. CPA also may, in its sole discretion, make no award for this RFP or cancel this RFP in its entirety. In addition, CPA may, at its sole discretion, only elect to proceed with contract negotiations for some of the services included in the proposal. CPA further reserves its right to waive minor errors and omissions in proposals, request additional information or revisions to offers, and to negotiate with any or all Proposers.

CPA shall not be liable for any costs incurred by the Proposer in connection with the preparation and submission of any proposal. CPA reserves the right to waive inconsequential disparities in a submitted proposal. CPA has the right to amend the RFP, in whole or in part, by written addendum, at any time. CPA is responsible only for that which is expressly stated in the solicitation document and any authorized written addenda. Such addendum shall be made available to each person or organization which CPA records indicate has received this RFP. Should such addendum require additional information not previously requested, failure to address the requirements of such addendum may result in the proposal being found non-responsive and not being considered, as determined in the sole discretion of CPA. CPA is not responsible for and shall not be bound by any representations otherwise made by any individual acting or purporting to act on its behalf. CPA has the right to reissue the RFP at a future date.

9. CONFIDENTIALITY AND PUBLIC RECORDS

Responses to this RFP shall become the exclusive property of CPA. CPA is subject to the California Public Records Act ("CPRA"). The recommended Proposer's proposal will become a matter of public record when contract negotiations are complete and when an agreement is executed by CPA. Exceptions to disclosure may be available to those parts or portions of proposals that are justifiably and reasonably defined as business or trade secrets, and plainly marked by the Proposer as "Trade Secret", "Confidential", or "Proprietary". CPA shall not, in any way, be liable or responsible for the disclosure of any such record or any parts thereof, if disclosure is required or permitted under the CPRA or otherwise by law.

In the event CPA receives a CPRA request for any of the aforementioned documents, information, books, records, and/or contents of a proposal marked "Confidential", "Trade Secrets", or "Proprietary", Proposer agrees to defend and indemnify CPA from all costs and expenses, including reasonable attorneys' fees, incurred in connection with any action, proceedings, or liability arising in connection with the CPRA request.

A blanket statement of confidentiality or the marking of each page of the proposal as confidential shall not be deemed sufficient notice of a CPRA exemption, and a Proposer who indiscriminately and without justification identifies most or all of its proposal as exempt from disclosure or submits a redacted copy may be deemed non-responsive.

10. CONFLICTS OF INTEREST

CPA is governed by the Political Reform Act, Government Code Section 1090, Government Code Section 84308, and other requirements governing conflicts, campaign contributions, and gifts. Proposers are required to review all applicable conflict of interest laws. In addition, CPA has adopted policies governing bidder conduct. Proposers are advised to review all policies, including the Vendor Communication Policy available here: https://cleanpoweralliance.org/key-documents/.

You may not contact or receive information outside of this RFP process. If it is discovered that the Proposer contacted and received information from anyone other than the email address specified above and under the process specified herein regarding this solicitation, CPA may, in its sole discretion, disqualify your proposal from further consideration.

All contact regarding this RFP or any matter relating thereto must be in writing and may be emailed to contracting@cleanpoweralliance.org with a copy to cpadata@cleanpoweralliance.org.

ATTACHMENTS

Attachment A – Scope of Services

Attachment B – Prospective Contractor References

Attachment C – CPA Member Agencies

Attachment D – CPA Sample Contract

Attachment E – Campaign Contribution Form (Government Code 84308)

Attachment F – 2020 Data & Systems Strategic Plan

ATTACHMENT A

SCOPE OF SERVICES

The principal responsibility of the selected Proposer(s) is to provide a full range of consulting services for the development of a refreshed strategic plan and roadmap for CPA's data and systems.

The selected firm will be responsible for leading the strategic planning process in close consultation with CPA's Data & Systems team and developing a strategic plan that will guide the CPA's decision-making on data management and systems development for the three (3) year horizon of 2025 – 2028.

The strategic plan should provide a robust framework for leveraging technology to achieve strategic objectives, organizational goals, enhance operational efficiencies and promote innovation.

Focus areas of the strategic plan should include digital transformation, cloud infrastructure modernization and integrations, strategic alignment, governance and risk management, measurement and reporting, and focus on end user experience.

The Services shall include, but are not limited to, the following:

Task #1: Current State Assessment

Provide a current state assessment of CPA's data maturity and current technology state related to:

1. Data governance.
2. Data architecture.
3. Technology-related policies and procedures.
4. CPA licensed or developed software and systems, including but not limited to, Energy Trading and Rick Management platform custom built on AWS), Adapt2 Settlements software, Quickbooks, Bill.com invoice management and payment system, Plexos, Salesforce CRM, etc.
5. Analytical tools and databases including but not limited to AWS, Snowflake, Sigma, Tableau, and Databricks
6. Tools, software and databases that support the following commercial activities: rate setting and tariff database management, load forecasting and analytics, budgeting, accounting, accounts payable and invoice processing and settlements, financial forecasting, energy position management and analytics, electric resource optimization including grid scale battery storage optimization, energy market and credit risk management, integrated resource planning, customer billing and service management, etc.
7. Third party controlled data sources, software and systems relied upon by CPA including but not limited to customer billing data hosted by CPA's data manager Calpine Energy Services, an ETRM, battery storage optimization software and

risk management and analytics software hosted by CPA's scheduling coordinator, Tenaska Energy Services and data provided by the California Independent Systems Operator

8. Cybersecurity and compliance
9. People
10. Process

Task #1 Anticipated Deliverables:

1. Current state overview and assessment section in the Data & Systems Strategic Plan, including time for CPA review and approval of iterations if necessary.

2. Provide an assessment of CPA's current state Identifying current state strengths, weaknesses, and opportunities.

Timeline for Task #1:

1. The Current State Assessment shall be completed by August 15, 2024.

Task #2: Update Data & Systems Strategic Plan (Technology Roadmap)

Build on Task 1 and CPA's 2020 Data and Systems Strategic Plan to develop future state recommendations for data and systems at CPA that address the following pieces within a three-year horizon of 2025 - 2028:

1. Data governance, including ensuring adherence to records retention requirements.
2. Data integrations across applications (application programming interfaces (APIs)).
3. Technology-related policies and procedures that CPA should consider adopting (e.g., technology acceptable usage policy).
4. Technology architecture planning, including:
   4.1. Data architecture.
   4.2. Cloud architecture.
   4.3. Life-cycle management practices (strengthen data inventory).
5. Technology cost optimization, including cloud cost management and license management.
6. Data analytics platform, including Tableau, and advanced features such as embedded analytics and self-service analytics.
7. Recommendations around managed IT services, such as Help Desk, cloud infrastructure, security services, and network services.
8. Technology and systems including but not limited to analytics, ETRM, ERP, and CRM (use enterprise services).
   8.1. Adoption of DevOps practices, including research, development, testing, and deployment iteratively and continuously.
9. Security, including:

  9.1. Cybersecurity.

  9.2. Compliance.

  9.3. Intrusion detection system.

  9.4. Data encryption in transit and at rest.

  9.5. Disaster recovery planning.

  9.6. Incident response planning.

  9.7. Enterprise security features included in Office 365 ecosystem.

  9.8. Data backup.

10. Cloud management on AWS:

  10.1. Security.

  10.2. Infrastructure as a service.

  10.3. Networking.

  10.4. Cost optimization.

11. People (provide ongoing assessment of staffing needs and effective technology delivery across hybrid and remote working engagements).

12. Application of machine learning and artificial intelligence (AI) to transform data and operations.

Task #2 Anticipated Deliverables:

1. Data & Systems Strategic Plan, including time for CPA review and approval of iterations if necessary.

Timeline for Task #2:

1. Final Data & Systems Strategic Plan delivered by November 15, 2024.

Task #3: Data & Systems Roadmap

Develop a detailed roadmap for implementing the Data & Systems Strategic Plan that includes timing, dependencies, and necessary action plans within the three (3) year horizon of 2025 - 2028.

Task #3 Anticipated Deliverables:

1. Data & Systems Roadmap, including time for CPA review and approval of iterations if necessary.

Timeline for Task #3:

1. Final Data & Systems Roadmap delivered by December 13, 2024.

TTACHMENT B

PROSPECTIVE CONTRACTOR REFERENCES

Contractor's Name: _____

List three (3) References where the same or similar scope of services were provided in order to meet the Minimum Requirements stated in this solicitation.

1. Name of Firm	Address of	Contact	Telephone # ( )	Fax (
Name or Contract No.	# of Years / Term of Contract		Type of Service	Dollar Amt.
2. Name of Firm	Address of	Contact	Telephone # ( )	Fax (
Name or Contract No.	# of Years / Term of Contract		Type of Service	Dollar Amt.
3. Name of Firm	Address of	Contact	Telephone # ( )	Fax (
Name or Contract No.	# of Years / Term of Contract		Type of Service	Dollar Amt.

ATTACHMENT C

LIST OF CPA MEMBER AGENCIES

County/City
1. Agoura Hills
2. Alhambra
3. Arcadia
4. Beverly Hills
5. Calabasas
6. Camarillo
7. Carson
8. Claremont
9. Culver City
10. Downey
11. Hawaiian Gardens
12. Hawthorne
13. Hermosa Beach
14. LA County
15. Malibu
16. Manhattan Beach
17. Monrovia
18. Moorpark
19. Ojai
20. Oxnard
21. Paramount
22. Redondo Beach
23. Rolling Hills Estates
24. Santa Monica
25. Santa Paula
26. Sierra Madre
27. Simi Valley
28. South Pasadena
29. Temple City
30. Thousand Oaks
31. Ventura City
32. Ventura County
33. West Hollywood
34. Westlake Village
35. Whittier

ATTACHMENT D

SAMPLE CONTRACT

Attached is a sample CPA Agreement that will be negotiated between the CPA and the selected Proposer. Additional terms and conditions will be incorporated dependent on circumstances, including scope of services, the space selected, any tenant improvement or allowance, and other factors.

Clean Power Alliance of Southern California

This Professional Services Agreement (this "Agreement"), dated and effective as of [DATE] (the "Effective Date"), is made by and between:

CLEAN POWER ALLIANCE OF SOUTHERN CALIFORNIA ("CPA"), and

[**Legal Name of Contractor**]. ("Contractor").

CPA and Contractor are sometimes collectively referred to herein as the "Parties" and each individually as a "Party." In consideration of the terms of this Agreement, and for other good and valuable consideration, the Parties make the following acknowledgments and agreements:

RECITALS

WHEREAS, CPA may contract with a provider for consulting services for the development of a refreshed strategic plan and roadmap for CPA's data and systems;

WHEREAS, CPA conducted a Request for Proposals ("RFP") and CPA selected Contractor because Contractor has the expertise and experience to provide the specified services to CPA and offered CPA the Best Value;

WHEREAS, Contractor desires to provide these specified services to CPA;

WHEREAS, the purpose of this Agreement is to set forth the terms and conditions upon which Contractor shall provide services to CPA;

NOW, THEREFORE, it is agreed based on the consideration set forth below by the Parties to this Agreement as follows:

AGREEMENT

1. **Definitions**

   a. The definition of "Confidential Information" is set forth in paragraph 10.b. of this Agreement.
   b. "CPA Data" shall mean all data gathered or created by Contractor in the performance of the Services pursuant to this Agreement, including any customer or customer-related data.

c. "CPA Information" shall mean all confidential, proprietary, or sensitive information provided by CPA to Contractor in connection with this Agreement.

d. "CPA Materials" shall mean all finished or unfinished content, writing and design materials but not limited to messaging, design, personalization, or other materials, reports, plans, studies, documents and other writings prepared by Contractor, its officers, employees and agents for CPA for the performance of, the purpose of, or in the course of implementing this Agreement.

e. "CPA Product" includes collectively CPA Data, CPA Information, and CPA Materials.

f. "Services" shall mean the scope of work Contractor provides to CPA as specified in Exhibit A.

2. Exhibits and Attachments

The following exhibits and attachments are attached to this Agreement and incorporated into this Agreement by this reference:

Exhibit A – Scope of Work
Exhibit B – [Reserved]
Exhibit C – Compensation
Exhibit D – [Reserved]

Should a conflict arise between language in the body of this Agreement and any exhibit or attachment to this Agreement, the language in the body of this Agreement controls, followed by Exhibit A, B, C, and D in that order.

3. Services to be Performed by Contractor

In consideration of the payments set forth in this Agreement and in Exhibit C, Contractor shall perform services for CPA in accordance with the terms, conditions, and specifications set forth in this Agreement and in [Exhibits A and B] ("Services").

4. Compensation

CPA agrees to compensate Contractor as specified in Exhibit C:

a. In consideration of the Services provided by Contractor in accordance with all terms, conditions and specifications set forth in this Agreement and Exhibit A [and Exhibit B], CPA shall make payment to Contractor on a [time and materials, not-to-exceed, or fixed fee] basis and in the manner specified in Exhibit C.

b. Unless otherwise indicated in Exhibit C, Contractor shall invoice CPA monthly to accountspayable@cleanpoweralliance.org for all compensation related to Services performed during the previous month. Payments shall be due within

fifteen (15) calendar days after the date the invoice is submitted to CPA at the specified email address. All payments must be made in U.S. dollars.

5. <u>Term</u>

Subject to compliance with all terms and conditions of this Agreement, the term of this Agreement shall be one (1) year from the Effective Date ("Initial Term"0.

6. <u>Termination</u>

a. <u>Termination for Convenience</u>. CPA may terminate the Agreement in accordance with this paragraph in whole, or from time to time in part, whenever CPA determines that termination is in CPA's best interests. A termination for convenience, in part or in whole, shall take effect by CPA delivering to Contractor, at least thirty (30) calendar days prior to the effective date of the termination or prior to a Notice of Termination specifying the extent to which performance of the Services under the Agreement is terminated.

If the termination for convenience is partial, Contractor may submit to CPA a request in writing for equitable adjustment of price or prices specified in the Agreement relating to the portion of this Agreement which is not terminated. CPA may, but shall not be required to, agree on any such equitable adjustment. Nothing contained herein shall limit the right of CPA and Contractor to agree upon amount or amounts to be paid to Contractor for completing the continued portion of the Agreement when the Agreement does not contain an established price for the continued portion. Nothing contained herein shall limit CPA's rights and remedies at law.

b. <u>Termination for Default</u>. If Contractor fails to provide in any manner the Services required under this Agreement, otherwise fails to comply with the terms of this Agreement, or violates any ordinance, regulation or law which applies to its performance herein and such default continues uncured for thirty (30) calendar days after written notice is given to Contractor, CPA may terminate this Agreement by giving five (5) business days' written notice. If Contractor requires more than thirty (30) calendar days to cure, then CPA may, at its sole discretion, authorize additional time as may reasonably be required to effect such cure provided that Contractor diligently and continuously pursues such cure.

c. <u>Termination for Lack of Third-Party Funding</u>. CPA may terminate this Agreement if funding for this Agreement is reduced or eliminated by a third-party funding source.

d. <u>Effect of Termination</u>. Upon the effective date of expiration or termination of this Agreement: (i) Contractor may immediately cease providing Services in its entirety or if a termination to a part of the Agreement, cease providing the Services that have been terminated; (ii) any and all payment obligations of CPA under this Agreement will become due immediately except any equitable adjustment pursuant to Paragraph 5(a); (iii) promptly transfer title and deliver to CPA all CPA Product or any work in progress pursuant to this Agreement; and (iv) each Party will promptly either return or destroy (as directed by the other Party) all Confidential

Information of the other Party in its possession as well as any other materials or information of the other Party in its possession.

Upon such expiration or termination, and upon request of CPA, Contractor shall reasonably cooperate with CPA to ensure a prompt and efficient transfer of all data, documents and other materials to CPA in a manner such as to minimize the impact of expiration or termination on CPA's customers.

7. <u>Contract Materials</u>

CPA owns all right, title and interest in and to all CPA Materials and CPA Data. Upon the expiration of this Agreement, or in the event of termination, CPA Materials and all CPA Information, in whatever form and in any state of completion, shall remain the property of CPA and shall be promptly returned to CPA. Upon termination, Contractor may make and retain a copy of such CPA Materials if required by law or pursuant to the Contractor's reasonable document retention or destruction policies.

8. <u>Payments of Permits/Licenses</u>

Contractor bears responsibility to obtain any license, permit, or approval required for it to provide the Services to be performed under this Agreement at Contractor's own expense prior to commencement of the Services.

9. <u>No Recourse against Constituent Members</u>

CPA is organized as a Joint Powers Authority in accordance with the Joint Exercise of Powers Act of the State of California (Government Code Section 6500, et seq.) pursuant to the Joint Powers Agreement and is a public entity separate from its constituent members. CPA shall solely be responsible for all debts, obligations and liabilities accruing and arising out of this Agreement. Contractor shall have no rights and shall not make any claims, take any actions or assert any remedies against any of CPA's constituent members in connection with this Agreement.

10. <u>Confidential Information</u>

a. <u>Duty to Maintain Confidentiality</u>. Contractor agrees that Contractor will hold all Confidential Information in confidence, and will not divulge, disclose, or directly or indirectly use, copy, digest, or summarize, any Confidential Information unless necessary to comply with any applicable law, regulation, or in connection with any court or regulatory proceeding applicable in which case, any disclosure shall be subject to this paragraph, 10.c., and 10.d., below.

b. <u>Definition of "Confidential Information"</u>. The following constitutes "Confidential Information," whether oral or written: (a) the terms and conditions of, and proposals and negotiations related to, this Agreement, (b) information, in whatever form, that CPA shares with Contractor in the course and scope of this Agreement, or (c) information that either Contractor stamps or otherwise identifies as "confidential" or "proprietary" before disclosing it to the other.

Confidential Information shall not include: (l) information that is generally available to the public or in the public domain at the time of disclosure; (2) information that

becomes publicly known other than through any breach of this Agreement by Contractor or its Representatives; (3) information which is subsequently lawfully and in good faith obtained by Contractor or its Representatives from a third party, as shown by documentation sufficient to establish the third party as the source of the Confidential Information; provided that the disclosure of such information by such third party is not known by Contractor or its Representatives to be in breach of a confidentiality agreement or other similar obligation of confidentiality; (4) information that Contractor or its Representatives develop independently without use of or reference to Confidential Information provided by Contractor; or (5) information that is approved for release in writing by Contractor.

c. <u>California Public Records Act</u>. The Parties acknowledge and agree that the Agreement including but not limited to any communication or information exchanged between the Parties, any deliverable, or work product are subject to the requirements of the California Public Records Act (Government Code Section 6250 et seq.). In order to designate information as confidential, the Disclosing Party must clearly stamp and identify the specific portion of the material designated with the word "Confidential." The Parties agree not to over-designate material as Confidential Information. Over-designation includes stamping whole agreements, entire pages or series of pages as "Confidential" that clearly contain information that is not Confidential Information.

d. <u>Third Party Request for Confidential Information</u>. Upon request or demand of any third person or entity not a Party hereto pursuant to the California Public Records Act for production, inspection and/or copying of Confidential Information ("Requested Confidential Information"), CPA will as soon as practical notify Contractor in writing via email that such request has been made. CPA will be solely responsible for taking at its sole expense whatever legal steps are necessary to prevent release to the third party of the Confidential Information designated by Contractor. If Contractor takes no such action after receiving the foregoing notice from CPA, CPA shall, at its discretion, be permitted to comply with the third party's request or demand and is not required to defend against it. If Contractor does take or attempt to take such action, Contractor agrees to indemnify and hold harmless CPA, its officers, directors, employees and agents ("CPA Indemnified Parties"), from any claims, liability, award of attorneys' fees, or damages, and to defend any action, claim or lawsuit brought against any of CPA Indemnified Parties for Contractor's attempt to prevent disclosure or CPA's refusal to disclose any Confidential Information.

11. <u>Insurance</u>

All required insurance coverages shall be substantiated with a certificate of insurance and must be signed by the insurer or its representative evidencing such insurance to CPA within 10 business days after the Agreement is fully executed. The general liability policy shall be endorsed naming Clean Power Alliance of Southern California and its employees, officers and agents as additional insureds. The certificate(s) of insurance and required endorsement shall be furnished to CPA prior to commencement of work and maintained throughout the Term and any Renewal Term. Each certificate shall provide for thirty (30) days advance written notice to CPA of any cancellation or reduction in coverage. Said policies shall remain in force through the life of this Agreement and shall be payable on a per occurrence basis only, except those required by paragraph (d) below which may be

provided on a claims-made basis consistent with the criteria noted therein.

Nothing herein shall be construed as a limitation on Contractor's obligation under paragraph 12 of this Agreement to indemnify, defend, and hold CPA harmless from any and all liabilities arising from the Contractor's negligence, recklessness or willful misconduct in the performance of this Agreement. CPA agrees to timely notify the Contractor of any negligence claim.

Failure to provide and maintain the insurance required by this Agreement will constitute a material breach of the Agreement. In addition to any other available remedies, CPA may suspend payment to the Contractor for any services provided during any time that insurance was not in effect and until such time as the Contractor provides adequate evidence that Contractor has obtained the required coverage.

a.   General Liability

The Contractor shall maintain a commercial general liability insurance policy in an amount of no less than one million ($1,000,000.00) with a two million dollar ($2,000,000.00) aggregate limit. CPA shall be named as an additional insured on the commercial general liability policy and the Certificate of Insurance shall include an additional endorsement page.

b.   Auto Liability

Where the services to be provided under this Agreement involve or require the use of any type of vehicle by Contractor in order to perform said services, Contractor shall also provide comprehensive business or commercial automobile liability coverage including non-owned and hired automobile liability in the amount of one million dollars combined single limit ($1,000,000.00).

c.   Workers' Compensation

The Contractor acknowledges the State of California requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of the Labor Code. If Contractor has employees, a copy of the certificate evidencing such insurance or a copy of the Certificate of Consent to Self-Insure shall be provided to CPA prior to commencement of work.

d.   Professional Liability Insurance

Coverages required by this paragraph may be provided on a claims-made basis with a "Retroactive Date" either prior to the date of the Agreement or the beginning of the contract work. If the policy is on a claims-made basis, coverage must extend to a minimum of twelve (12) months beyond completion of contract work. If coverage is cancelled or non-renewed, and not replaced with another claims made policy form with a "retroactive date" prior to the Agreement effective date, the Contractor must purchase "extended reporting" coverage for a minimum of twelve (12) months after completion of contract work. Contractor shall maintain a policy limit of not less than $1,000,000.00 per incident. If the deductible or self-insured retention amount exceeds $100,000.00, CPA may ask for evidence that Contractor has segregated amounts in a special insurance reserve fund or Contractor's general insurance reserves are adequate to provide the necessary coverage

and CPA may conclusively rely thereon.

Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Agreement. Contractor shall monitor the safety of the job site(s) during the project to comply with all applicable federal, state, and local laws, and to follow safe work practices.

12. **Indemnification**

Contractor agrees to indemnify, defend, and hold harmless CPA, its employees, officers, and agents, from and against, and shall assume full responsibility for payment of all wages, state or federal payroll, social security, income or self-employment taxes, with respect to Contractor's performance of this Agreement. Contractor further agrees to indemnify, and hold harmless CPA from and against any and all third- party claims, liabilities, penalties, forfeitures, suits, costs and expenses incident thereto (including costs of defense, settlement, and reasonable attorney's fees), which CPA may hereafter incur, become responsible for, or pay out, as a result of death or bodily injuries to any person, destruction or physical damage to tangible property, or any violation of governmental laws, regulations or orders, to the extent caused by Contractor's negligent acts, errors or omissions, or the negligent acts, errors or omissions of Contractor's employees, agents, or subcontractors while in the performance of the terms and conditions of the Agreement, except for such loss or damage arising from the sole negligence or willful misconduct of CPA, elected and appointed officers, employees, agents and volunteers.

13. **Independent Contractor**

a. Contractor acknowledges that Contractor, its officers, employees, or agents will not be deemed to be an employee of CPA for any purpose whatsoever, including, but not limited to: (i) eligibility for inclusion in any retirement or pension plan that may be provided to employees of Contractor; (ii) sick pay; (iii) paid non-working holidays; (iv) paid vacations or personal leave days; (v) participation in any plan or program offering life, accident, or health insurance for employees of Contractor; (vi) participation in any medical reimbursement plan; or (vii) any other fringe benefit plan that may be provided for employees of Contractor.

b. Contractor declares that Contractor will comply with all federal, state, and local laws regarding registrations, authorizations, reports, business permits, and licenses that may be required to carry out the work to be performed under this Agreement. Contractor agrees to provide CPA with copies of any registrations or filings made in connection with the work to be performed under this Agreement.

14. **Compliance with Applicable Laws**

Contractor shall comply with any and all applicable federal, state and local laws and resolutions affecting Services covered by this Agreement.

15. **Nondiscriminatory Employment**

Contractor and/or any permitted subcontractor, shall not unlawfully discriminate against

any individual based on race, color, religion, nationality, sex, sexual orientation, age, protected veteran status, or condition of disability. Contractor and/or any permitted subcontractor understands and agrees that Contractor and/or any permitted subcontractor is bound by and will comply with the nondiscrimination mandates of all federal, state and local statutes, regulations and ordinances.

16. Work Product.

All finished and unfinished reports, plans, studies, documents and other writings prepared by and for Contractor, its officers, employees and agents in the course of implementing this Agreement shall become the sole property of CPA upon payment to Contractor for such work. CPA shall have the exclusive right to use such materials in its sole discretion without further compensation to Contractor or to any other party. Contractor shall, at CPA's expense, provide such reports, plans, studies, documents and writings to CPA or any party CPA may designate, upon written request. Contractor may keep file reference copies of all documents prepared for CPA.

17. Notices

Any notice, request, demand, or other communication required or permitted under this Agreement shall be deemed to be properly given when **both**: (1) transmitted via email to the email address listed below; and (2) sent to the physical address listed below by either being deposited in the United States mail, postage prepaid, or deposited for overnight delivery, charges prepaid, with an established overnight courier that provides a tracking number showing confirmation of receipt.

In the case of CPA, to:

> Name/Title: Theodore Bardacke, Chief Executive Officer
> Address: 801 S. Grand Ave., Suite 400, Los Angeles, CA 90017
> Telephone: (213) 376-4850
> Email: tbardacke@cleanpoweralliance.org

In the case of Contractor, to:

> Name/Title: [Name, Title]
>
> Address: [Address]
>
> Telephone: [Phone]
>
> Email: [Email]

18. Assignment

Neither this Agreement nor any of the Parties' rights or obligations hereunder may be transferred or assigned without the prior written consent of the other Party. Subject to the preceding sentence, this Agreement shall be binding upon and inure to the benefit of the Parties and their respective successors and permitted assigns.

19. Subcontracting

Contractor may not subcontract Services to be performed under this Agreement without

the prior written consent of CPA. If the CPA's written consent to a subcontract is not obtained, Contractor acknowledges and agrees that CPA will not be responsible for any fees or expenses claimed by such subcontractor.

20. Retention of Records and Audit Provision

Contractor and any subcontractors authorized by the terms of this Agreement shall keep and maintain on a current basis full and complete documentation and accounting records, employees' time sheets, and correspondence pertaining to this Agreement. Such records shall include, but not be limited to, documents supporting all income and all expenditures. CPA shall have the right, during regular business hours, to review and audit all records relating to this Agreement during the Agreement period and for at least five (5) years from the date of the completion or termination of this Agreement. Any review or audit may be conducted on Contractor's premises, or, at CPA's option, Contractor shall provide all records within a maximum of fifteen (15) days upon receipt of written notice from CPA. Contractor shall refund any monies erroneously charged. Contractor shall have an opportunity to review and respond to or refute any report or summary of audit findings and shall promptly refund any overpayments made by CPA based on undisputed audit findings.

21. Conflict of Interest

a. No CPA employee whose position with the CPA enables such employee to influence the award of this Agreement or any competing Agreement, and no spouse or economic dependent of such employee, shall be employed in any capacity by the contractor or have any other direct or indirect financial interest in this Agreement. No officer or employee of the Contractor who may financially benefit from the performance of work hereunder shall in any way participate in the CPA's approval, or ongoing evaluation, of such work, or in any way attempt to unlawfully influence the CPA's approval or ongoing evaluation of such work.

b. Contractor shall comply with all conflict of interest laws, ordinances, and regulations now in effect or hereafter to be enacted during the term of this Agreement. The Contractor warrants that it is not now aware of any facts that create a conflict of interest. If the Contractor hereafter becomes aware of any facts that might reasonably be expected to create a conflict of interest, it shall immediately make full written disclosure of such facts to CPA. Full written disclosure shall include, but is not limited to, identification of all persons implicated and a complete description of all relevant circumstances. Failure to comply with the provisions of this paragraph shall be a material breach of this Agreement.

22. Publicity

Contractor shall not issue a press release or any public statement regarding the Agreement, Services contemplated by this Agreement, or any other related transaction unless CPA has agreed in writing the contents of any such public statement.

23. Governing Law, Jurisdiction, and Venue

This Agreement shall be governed by, and construed in accordance with, the laws of the State of California. The Contractor agrees and consents to the exclusive jurisdiction of the courts of the State of California for all purposes regarding this Agreement and further agrees and consents that venue of any action brought hereunder shall be exclusively in the County of Los Angeles.

24. Amendments

None of the terms and conditions of this Agreement may be changed, waived, modified or varied in any manner whatsoever unless in writing duly signed by the Parties.

25. Severability

Should any provision of this Agreement be held invalid or unenforceable by a court of competent jurisdiction, such invalidity will not invalidate the whole of this Agreement, but rather, the remainder of the Agreement which can be given effect without the invalid provisions, will continue in full force and effect and will in no way be impaired or invalidated.

26. Complete Agreement

This Agreement constitutes the entire Agreement between the parties. No modification or amendment shall be valid unless made in writing and signed by each party. Failure of either party to enforce any provision or provisions of this Agreement will not waive any enforcement of any continuing breach of the same provision or provisions or any breach of any provision or provisions of this Agreement.

27. Counterparts

This Agreement may be executed in one or more counterparts, including facsimile(s), emails, or electronic signatures, each of which shall be deemed an original and all of which together will constitute one and the same instrument

IN WITNESS WHEREOF, the parties have executed this Agreement on the date first above written.

[Name of contractor].   Clean Power Alliance of Southern California

_____   _____

By: [Name]   By: Theodore Bardacke

Title: [Fill in]   Title: Chief Executive Officer

ATTACHMENT E

CAMPAIGN CONTRIBUTION DISCLOSURE FORM

Government Code Section 84308

In accordance with California law, bidders and contracting parties are required to disclose, at the time a proposal is submitted or pre-qualified provider receives a Task Order solicitation, information relating to any campaign contributions made to Clean Power Alliance of Southern California's (CPA) Regular or Alternate Directors, including: the name of the party making the contribution (which includes any parent, subsidiary or otherwise related business entity, as defined below), the amount of the contribution, and the date the contribution was made. 2 Cal. Code of Regs. (C.C.R.) §18438.8(b).

California law prohibits a party, participant, or an agent, from making campaign contributions to a CPA Director of more than $250 while their contract is pending before the CPA Board; and *further prohibits a campaign contribution from being made for three (3) months following the date of the final decision by the CPA Board*. Gov't Code §84308(d).

For purposes of reaching the $250 limit, the campaign contributions of the bidder or contractor plus contributions by its parents, affiliates, and related companies of the contractor or bidder are added together. 2 C.C.R. §18438.5.

In addition, a CPA Director must abstain from voting on a contract or permit if they have received a campaign contribution from a party or participant to the proceeding, or agent, totaling more than $250 in the 12-month period prior to the consideration of the item by the CPA Board. Gov't Code §84308(c).

The names of the Regular and Alternate Directors and their member agency is attached hereto as Attachment 1.

        *   *   *   *   *   *

Every bidder or contractor must disclose as follows:

Section 1

Bidder/Contractor (Legal Name)_____.

List any parent, subsidiaries, or otherwise affiliated business entities of Contractor (See definitions in 2 C.C.R.. §18703.1(d)):

_____

_____

_____

*Attach additional pages, if necessary

Section 2

Has Contractor or Bidder (identified in Section I) and/or any parent, subsidiary, or affiliated company, or agent thereof, made a campaign contribution(s) totaling $250 or more in the aggregate to a Director of CPA's Board in the 12 months preceding the date of execution of this disclosure?

Yes ☐

No ☐

If YES, proceed to Section 3 and complete. Then, sign and date under Section 4. If NO,

proceed to Section 4.

Section 3

Regular/Alternate Director	Amount of Contribution	Date of Contribution

*Attach additional pages, if necessary

Section 4

I,_____, [print name] am authorized to sign this disclosure on behalf of the Contractor/Bidder identified in Section 1. I acknowledge and understand Government Code Section 84308 requirements. I declare the foregoing disclosures to be true and correct.

TITLE: _____

SIGNATURE: _____

DISCLOSURE DATE: _____

The following individuals listed are elected officials who serve on Clean Power Alliance's Board of Directors as either Regular or Alternate Directors. Non-elected alternate directors are not included, unless they are campaigning for elected office.

REGULAR DIRECTORS

Member Agency	Regular Directors	Title
1. Agoura Hills	Deborah Klein Lopez	Councilmember
2. Alhambra	Jeff Maloney	Councilmember
3. Arcadia	Michael Cao	Councilmember
4. Beverly Hills	Julian Gold	Councilmember
5. Calabasas	David Shapiro	Councilmember
6. Camarillo	Susan Santangelo	Councilmember
7. Carson	Cedric Hicks	Councilmember
8. Claremont	Corey Calaycay	Councilmember
9. Culver City	Albert Vera	Mayor
10. Downey	Mario Trujillo	Councilmember
11. Hawaiian Gardens	Maria Teresa Del Rio	Councilmember
12. Hawthorne	Alex Monteiro	Councilmember
13. Hermosa Beach	Justin Massey	Councilmember
14. Los Angeles County	Lindsey Horvath	Supervisor, 3rd District
15. Malibu	Marianne Riggins	Councilmember
16. Manhattan Beach	Amy Howorth	Councilmember
17. Monrovia	VACANT	
18. Moorpark	Renee Delgado	Councilmember
19. Ojai	Betsy Six	Mayor
20. Oxnard	Bert Perello	Councilmember
21. Paramount	Vilma Cuellar Stallings	Councilmember
22. Redondo Beach	Paige Kaluderovic	
23. Rolling Hills Estates	Debby Stegura	Councilmember
24. Santa Monica	Gleam Davis	Councilmember
25. Santa Paula	Jenny Crosswhite	Councilmember
26. Sierra Madre	Robert Parkhurst	Councilmember
27. Simi Valley	Rocky Rhodes	Councilmember
28. South Pasadena	Jon Primuth	Councilmember
29. Temple City	Fernando Vizcarra	Councilmember
30. Thousand Oaks	David Newman	Councilmember
31. City of Ventura	Liz Campos	Councilmember
32. Ventura County	Vianey Lopez	Supervisor, 5th District
33. West Hollywood	John Erickson	Councilmember
34. Westlake Village	Ned Davis	Councilmember
35. Whittier	Fernando Dutra	Councilmember

ALTERNATE DIRECTOR(S)

County/City	Alternate Director(s)	Title
1. **Agoura Hills**	Illece Buckley Weber	Councilmember
2. **Alhambra**	Sasha Renee Perez	Councilmember
3. **Arcadia**		
4. **Beverly Hills**	VACANT	
5. **Calabasas**	Ed Albrecht	Councilmember
6. **Camarillo**	Martita Martinez-Bravo Tony Trembley	Councilmember Councilmember
7. **Carson**	Jim Dear	Councilmember
8. **Claremont**	Jennifer Stark	Councilmember
9. **Culver City**	Yasmine-Imani McMorrin	Councilmember
10. **Downey**	Tim Horn	Councilmember
11. **Hawaiian Gardens**		
12. **Hawthorne**		
13. **Hermosa Beach**		
14. **Los Angeles County**		
15. **Malibu**	Steve Uhring	Councilmember
16. **Manhattan Beach**	David Lesser	Councilmember
17. **Monrovia**		
18. **Moorpark**		
19. **Ojai**		
20. **Oxnard**		
21. **Paramount**	Isabel Aguayo	Councilmember
22. **Redondo Beach**	Todd Lowenstein	Councilmember
23. **Rolling Hills Estates**	Frank Zerunyan	Councilmember
24. **Santa Monica**		
25. **Santa Paula**		
26. **Sierra Madre**		
27. **Simi Valley**	Fred Thomas	Councilmember
28. **South Pasadena**		
29. **Temple City**	William Man Tom Chavez	Councilmember
30. **Thousand Oaks**		
31. **City of Ventura**	Mike Johnson	Councilmember
32. **Ventura County**	Janice Parvin	Supervisor, 4th District
33. **West Hollywood**	Chelsea Byers	Councilmember
34. **Westlake Village**	Susan McSweeney	Councilmember
35. **Whittier**	Octavio Martinez	Councilmember

ATTACHMENT F

2020 DATA & SYSTEMS STRATEGIC PLAN

[Continued on Following Page]

Clean Power Alliance
Data and Systems Strategic Plan
Final Report

Submitted by the Energy Research Co-Operative

May 15, 2020

Table of Contents

Data and Systems Strategic Plan

This Data and Systems Strategic Plan (Plan) provides a 5-year roadmap for CPA to increase internal capabilities through gaining more access and control over their data and systems and relying less on external support in the major functional business areas. This will improve data quality, increase automation, reduce manual intervention, and increase overall management oversight of CPA's business. This document should be useful to CPA's future Technology Manager and High-Level – Middle Office personnel as an overview of the Data and Systems Strategic Plan. The Plan provides overall recommendations, sequencing of products and systems, high-level costs and benefits, and implementation considerations. We also provide a review of possible scenarios that may occur that would further impact the Plan, particularly in the later years of the Plan.

As we have identified and discussed in the current and future state phases of this project, CPA has a set of complex and interdependent business processes. These processes will benefit from a more formal alignment to front, middle, and back office functions as is seen in organizations managing large commodity or equity transactions. This separation of duties provides subject matter experts to focus on their core capabilities, while providing checks and balances as required for managing large and volatile energy transactions. This should lead to improved risk management and in the long-term will enable more effective transactions lowering the overall procurement costs.

A more responsive scheduling coordinator and risk manager should help in enabling CPA to better align to this front, middle, and back office paradigm. As we discuss below, it may require having greater control over the trading and risk system before CPA will have the control necessary to effectively establish a front, middle, and back office environment. This control will be built in over time through the strategic plan time horizon and enabled through the enterprise architecture that is described in the future state report. The architecture acts as the glue that ties the individual projects together as an overall program.

The Plan focuses on the need to control the end-to-end process to align data and systems across the major functional business areas:

- Energy forecasting and analysis
  - Energy procurement, hedging strategies, risk management, and energy settlements
- Financial forecasting and analysis (including rate and customer program analysis)
- Corporate Accounting
- Customer engagement and analysis

This alignment will enable a cohesive business strategy and structure the data flows to pass from system-to-system with controls, consistent data, transparency, and management oversight. Retail forecasting would segment customers to support various business functions (e.g. energy procurement, financial forecasting analysis, and customer engagement). Wholesale energy transactions would be tracked and accounted for in a way (e.g. categorizing various products: energy, derivatives, resource adequacy, renewable credits) that the information would align with financial analysis and with payables and receivables flowing through to AR/AP. The financial budget and planning analysis would be aligned to the accounting system to seamlessly view actual, forecast, and budget information. This alignment occurs through a disciplined enterprise architecture approach that builds this consistency and interoperability as various products and services are deployed. This disciplined approach creates a controlled, automated, and effective data and systems environment.

These recommendations will enable CPA to create an agile data and systems environment that will provide the necessary flexibility to grow and evolve. This agile environment will allow CPA to have control over the core, critical data and systems. Currently CPA is constrained by systems that are designed to support other companies' business processes. Bringing these systems in-house will create the environment for more sophisticated risk, valuation, and financial analysis.

People/Process/Systems Recommendations

While the Plan is focused on Data and Systems, there are several key people and process changes that we are recommending.

People

People – two critical areas to support the future state objectives are technology resources (to assist in deploying and developing applications over the strategic plan horizon) and middle office resources (to support the procurement group to manage the overall energy portfolio risk). Additionally, as more CAISO scheduled resources are managed by CPA, the settlement process for CAISO charges will increase in importance. An additional settlement person with CAISO experience is recommended.[1]

1) Hire a Technology Manager and Technology Analyst (two analysts if future needs warrant). A technology manager responsible for overall enterprise architecture (data, interfaces, deployment, and maintenance) with knowledge of energy trading or financial transaction systems and a technology analyst/data engineer with experience using one or more cloud environments would assist in managing the technology aspects of the strategic plan going forward. There are significant increases in CPA managed technology incorporated throughout the strategic plan that will need guidance from technology resources. We discussed in the Current State report several challenges with hiring well-qualified staff in this field and reiterate our recommendation to begin this process as soon as possible.

2) Hire a High-Level Middle Office person and a Middle Office Analyst. A more defined middle office with focused attention to managing forward price curves, assessing risk metrics, approving procurement group valuation assumptions, and overall governance and oversight of procurement operations is necessary to achieve the strategic plan objectives. A sophisticated Front Office origination group will work to satisfy the retail load requirement. A strong middle office will provide a risk-centric approach to the hedging strategy. This is done through controlling the price curves and option models used in trading assumptions, validating long-term contract decisions, and overseeing the introduction of new products (e.g. derivatives). The middle office will also be a key contributor to how an in-house Energy Trading and Risk Management (ETRM) is configured. The ETRM will require front, middle, and back office input as well as technology support and integration.

3) Hire a CAISO Back Office person. The Back Office currently consists of front office settlement support for bilateral transactions, the Scheduling Coordinator managing CAISO settlements, and Finance approving and processing payments and receipts. A subject matter expert to manage complex energy transactions, particularly CAISO settlements. This CAISO settlement expertise will be necessary as CPA continues to contract for long-term resources that need to be optimized in the Day-Ahead and Realtime CAISO market. We recommend this individual be

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[1] Roles and Responsibilities for these positions are included in the appendix

within the Finance group to begin establishing Back Office as a separate organization than the Front Office.

Process

Processes – increased automation to streamline processes and reduce manual intervention to correct and manage data. There are a few areas that CPA should investigate:

1) Develop RMT delegation authority for standard products. After establishing a well-defined Middle Office with access to an ETRM system's data, this RMT delegation would cover standard products within defined volume and term limits. This enables CPA to manage lower risk transactions through a disciplined and well controlled Front-Middle-Back Offices while providing the RMT with bandwidth to review and approve the higher risk long-term contract commitments and assess risk metrics reporting.
2) Develop a formal valuation process. This would be a core component of the Middle Office to support long term contracting, resource planning, and dispatch optimization. This process will be supported by a production cost modeling system (to specifically support Integrated Resource Planning) and access to ETRM valuation tools (e.g. forward price curves, option models). This process would be a coordinated effort between the Front and Middle Offices.
3) Develop a real-time market strategy. As dispatchable resources (e.g. Storage, Demand Response programs) are available to CPA, there is an opportunity to include convergence bidding in the CAISO market or participating in the CAISO's Energy Imbalance Market. This strategy would likely be implemented as guidelines and instructions for the Scheduling Coordinator (SC) to manage CPA contracted resources in real-time.
4) Develop a formal Back Office group and begin with CAISO settlement expertise. Currently there is not an internal process to review CAISO settlement charges. CAISO shadow settlements and dispute resolution with the CAISO is a complex process. The 3rd party SC is likely to provide adequate capabilities in managing the settlement process. It would be beneficial to CPA to proactively review the charge types and validate them, at a minimum, by comparing historical charges to current charges. This becomes particularly important considering the increase in dispatchable resources. With these dispatchable resources there are increased opportunities in the Day-Ahead (DA) and Real-Time (RT) markets as well as the ongoing need to manage CAISO imbalance charges.

Systems

Systems are further described in the prioritization and sequencing, costs and benefits, and deployment considerations sections. Our systems recommendations include:

1) Manage the Data and Systems Strategic Plan as a program. This means using the architecture as a roadmap on how to implement the individual projects within the overall program. The architecture defines the interoperability that each of the individual projects will align with in the short-term and conform to in the long-term.
2) Manage overall implementation risk by addressing easier systems to implement first. The three most complex implementations are:
    a) Energy Trading and Risk Management (ETRM)
    b) Phase II of the Data Analytics Platform
    c) Financial Planning and Analysis.
These projects are deferred to Phase 2 and 3 of the Strategic Plan.

3) Develop contingency plans for Phase I Data Analytics Platform/Forecasting and Analysis. Since Phase I includes importing, storing, and managing all Meter Data, replacing The Energy Authority (TEA) forecasting and financial modeling, and defining necessary customer information to store along with the customer meter data, it is a significant undertaking in a short timeframe. Beyond the current plan for replacement using AWS tools and storage, we suggest:
   a) Continuing discussions with East Bay Community Energy (EBCE) concerning their solution, potential support, and open sourcing the solution
   b) Reviewing Financial Planning and Analysis systems that may support the more complex financial modeling and not require immediate work from the Phase I effort
   c) Evaluating the new Scheduling Coordinator/Risk Manager for supporting load forecasting and financial modeling if necessary
   d) Considering consultant resources to assist in the Phase I implementation

Systems Prioritization and Sequencing

We have divided the Data and Systems Strategic Plan into 3 phases and future considerations. The three phases include:

1. Phase 1
   a. Import and store all customer meter data and manage the transition from TEA and MRW to CPA for forecasting and financial modeling and analysis
   b. Implement a Production Cost Model to support fundamental energy analysis and internally manage the 2022 Integrated Resource Plan (IRP)
   c. Implement a Customer Relationship Management system with CPA's top 1,000 major accounts
2. Phase 2
   a. Determine if the new SC/Risk Manager provides sufficient access to position and risk information to not require an in-house ETRM system (Scenario B)
   b. Implement Phase II Data Analytics Platform if the new SC/Risk Manager provides sufficient access (Scenario B)
   c. Implement an ETRM system if the SC/Risk Manager does not provide sufficient access (Scenario A)
   d. Implement Finance and Accounting system to replace Quickbooks (Scenario A or B)
3. Phase 3
   a. Implement Phase II Data Analytics Platform if Scenario B is employed
   b. Implement Customer Relationship Management for all CPA customers

It is feasible to do these three phases within a three to four-year timeframe with the following assumptions:

1. CPA hires the recommended personnel and implements the recommended process changes
2. CPA resources have sufficient bandwidth to actively participate in the product development (Data Analytics Platform) and implementations (ETRM, CRM, F&A)
3. CPA, at a minimum, uses consultants to assist with the ETRM selection and implementation and the Phase II Data Analytics Platform development

A more detail program plan is provided in the appendix.

Strategic Plan Costs and Benefits

Phase 1

System	Costs	Benefits
Data Analytics Platform	$100,000 implement $5-10k operating (Y1)	• Direct access to meter data and other customer information that is foundational to CPA business • Supports load forecasting and scenario analysis, rate setting, revenue forecasting and estimation (revenue accrual) • Decreased dependence on Calpine services • Enables future advanced customer analytics to support programs and customer engagement • Future linkages to CRM
Forecasting and Analysis	$50,000 implement $5-10k (Y1)	• Improved control and accuracy of LF used to determine RA requirements, hedge targets (DA to LT), revenue and COE projections • Supports customer engagement
Resource Planning	$100,000 implement $75,000/year	• Supports Integrated Resource Plan (2022) • Identifies long-term market fundamentals for price forecasting and valuation reducing long-term contract risk • Supports resource short and long-term resource optimization strategies (e.g. Storage) • Provides analysis to support policy positions
Customer Major Accounts	$30,000 implement $10,000/year	• Pending additional research on existing CRM functionality and syncing • Improves engagement tracking with major customers • Facilitates customer segmentation, customer program support, and advanced analytics
Summary	$280,000 one time $125,000 annually	• Improve overall capabilities to manage core business functions and support long term contracts reducing procurement costs

Phase 2

System	Costs	Benefits
Energy Trading and Risk Management (Scenario A)	$1,400,000 implement $250,000/year	• ETRM System configured to CPA business (aligning forecast segmentation, to portfolio book structure, to GL accounts) • Increased overall data access, improved governance and control, and increased management oversight • Enables a fully integrated front, middle, and back office, and increase overall management oversight • Eliminates 3rd party Risk Management costs
Finance & Accounting	$200,000 implement $50,000/year begin FY 2021/22	• Replaces Quickbooks; improves functionality enabling more advanced budget and forecasting analysis • Increased automated integration with energy forecasting and energy trading and risk management tools • Improves data quality through reduced spreadsheets, increases audit capabilities with role-based security, and improves and automates financial reporting capabilities
Phase II Data Analytics Platform (Scenario B)	$800,000 implement $40-60k/year	• Leveraging Phase 1 work, increases overall data analytics, energy and financial forecasting, and customer rates and program analysis • Creates interoperable environment with all major systems (forecasting, financial analysis, energy procurement, risk management, energy settlements, and customer engagement) • Creates an agile data environment to manage emerging trends and opportunities
Scenario A	$1,600,000 one time $30,000/year	• Scenario A enables full control over energy transactions from origination to risk analysis to settlement while increasing overall Corporate Finance and Accounting functionality
Scenario B	$1,000,000 one time $100,000/year	• Scenario B provides a sophisticated data analytics environment leveraging Phase 1 work while increasing overall Corporate Finance and Accounting functionality

Phase 3

System	Costs	Benefits
Phase II Data Analytics Platform (Scenario A)	$800,000 implement $40-60k/year	• Leveraging Phase I work, increases overall data analytics, energy and financial forecasting, and customer rates and program analysis • Creates interoperable environment with all major systems (forecasting, financial analysis, energy procurement, risk management, energy settlements, and customer engagement) • Creates an agile data environment to manage emerging trends and opportunities
Customer Relationship Management	$50,000 implement $25,000/year	• Further decrease dependence on Calpine services • Have full access to customer information for increased customer engagement, program design, and behavior analysis • Fully leverage customer analytics through interface to Phase II MDFA

Other Systems	TBD	• Potential emerging needs
		   • Continued optimization of long-term contract resources
		   • Optimization distributed energy resources including demand response programs
		   • Increased City engagement (GHG tracking, EE/DR programs, local resources) leveraging Phase II MDFA and CRM with all customers
		   • Evaluation of joint ownership with Cities/Developers on local resources possibly including Utility Capital Deferment Opportunities (I.e. Non-Wire Alternatives)
		   • Consider opportunities with proactive resource management and 7x24 operations including SC function
		   • Potential municipalization trends

Deployment Considerations

We recommend that the new Technology Manager would be responsible for the overall program management of the Data and Systems Plan. This person would work closely with the business Directors, Managers, and Analysts to ensure the business processes are supported by the technology.

We expect the Technology Analyst will assist with specific development efforts associated with the Data Analytics Platform, both Phase I and II. Additionally, this individual will review technology used by vendors, evaluate vendor Application Programming Interface (API) strategies, develop interfaces, and support project implementation. This individual is also likely to maintain the business process flowcharts in conjunction with the business process subject matter experts. Technology Analysts generally have a good understanding of business process tools like Visio and need to understand the underlying business processes to effectively support the technology environment.

For complex implementations like the ETRM and the Phase II Data Analytics Platform, we recommend using consultants with specific experience in implementing and configuring ETRM systems and developing and deploying data stores and analytical tools. For the more straightforward implementations like the CRM for Major Accounts and the F&A, we also recommend using consultants with specific knowledge on the selected system. Some vendors have internal staff to assist with implementations, but often software vendors concentrate on software development and have 3rd party partners that they recommend for implementation. An experienced implementor of the system is likely to be a useful investment to configure, test, and deploy these systems.

For the CRM with all customers, we expect the ability to have access to customer data from SCE through Calpine may be complicated. Through both the Phase I Data Analytics Platform and CRM for Major Accounts (if CPA moves forward with this project), CPA will have greater experience in how well the information can obtained from SCE to CPA. This will inform both the Phase II development and the CRM for all customers.

Concerning Phase I Data Analytics Platform, we mentioned four contingency plans. We recommend that each of these be pursued as Phase I is critical and complex. An important component will be the level of access to data that the new SC/Risk Manager will support. This will be an important indicator of the SC/Risk Manager's ability to meet CPA's expectations for position and risk data.

There are additional considerations with regard to the Energy Trading and Risk Management system selection and implementation (if CPA pursues Scenario A) and overall architecture considerations for custom development in the Appendix.

Future Scenarios

For this Strategic Plan we assumed a variety of constraints to bound the project. Over the 5-year strategic plan horizon, these assumptions included:

1. Approximately 100% growth in customers
2. Schedule Coordinating and 7x24 operations continues to be outsourced to a 3rd party
3. Billing and Payments and Customer Call Center continues to be outsourced to a 3rd party
4. No significant increase in Distributed Energy Resources that are owned or controlled by CPA
5. No municipalization of electric utility infrastructure

There are significant changes in the data and systems strategic plan if these assumptions change.

If CPA customer growth exceeded 100%, CPA would approach providing energy to a majority of SCE service area customers. This would create debate on whether CPA, rather than SCE, should be the default energy provider. It may also trigger SCE to consider exiting power procurement similar to the proposals floated by San Diego Gas & Electric.[2] This scenario would further increase the need for control and access over data and systems than anticipated in this plan and would likely lead to rethinking the assumptions associated with scheduling coordination and possibly billing and payments. This strategic plan should provide a solid foundation if this scenario were to arise but would require a further investment in additional technology and business resources to adapt to this level of procurement and transaction processing.

There are several possible scenarios with Billing and Payments. This plan assumes a status quo. If the customer growth scenario described above were to occur, CPA could consider billing their customers directly or there could be a scenario where CPA would be the primary billing and payment agency. This latter scenario is unlikely as SCE will have the meter infrastructure, a new, capitalized Customer Information System, and a strong incentive to maintain control over all aspects of billing and payment related to their activities. But a viable scenario is CPA producing a separate bill and payment process for their customer energy procurement activities. This would further establish CPA as a separate entity from SCE, as well as provide a direct and regular contact with CPA's customers.

As mentioned in the future state report, as CPA establishes itself with customers as a distinct partner in electricity services to its customers, there may be less direct connection between SCE and CPA rates than currently exists. Under this scenario, the cost of service modeling and analysis would take on a greater importance than the CPA rate differential from SCE. This is most likely under the scenario where CPA begins to be the procurement agent for a majority of SCE customers. As SCE's role as the "natural" supplier of energy and the default provider diminishes, CPA could view rate setting more aligned with customer needs and not the SCE rate paradigm. As distributed energy resources, building electrification, and electric vehicle and transportation evolve, developing rates in this environment may be more beneficial for customers and CPA than tracking to SCE tariffs.

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[2] https://www.greentechmedia.com/articles/read/sdge-quit-electricity-procurement-business

While municipalization is a complex process, with minimal success to date[3], the efforts by the City of San Francisco, Valley Clean Energy, and the South San Joaquin Irrigation District are important to follow.[4] Pacific Gas & Electric is particularly susceptible to external innovation changing the energy landscape. Southern California and San Diego are in different regulatory and financial positions. But if there is any success by these Northern California entities, there will likely be other cities interested in investigating similar opportunities. Again, not to minimize the complexity of this issue, but much of the utility operations is managed by International Brotherhood of Electrical Workers (IBEW) and a municipal contract with the union would transition much of the electric utility operations to the city, possibly managed by a Community Choice Aggregator. Additionally, the electric utility business is a capital-intensive industry and the existing municipalities have a lower cost of capital from tax free municipal bonds.

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[3] https://ceadvisors.com/wp-content/uploads/2019/11/Privatization-White-Paper-10-2-19.pdf
[4] https://ilsr.org/municipalization-electric-utilities-update-2020/

Appendix
Personnel
High-Level Middle Office Position
Responsibilities
- Lead the overall functions of a middle office in a high transaction volume Load Serving Entity organization
- Identify, analyze, and monitor financial risks of CPA's commodity portfolio including market, price and counterparty credit risks
- Analyze portfolio positions, mark-to-market, realized and unrealized P&L, and standard risk metrics (e.g. Value at Risk, counterparty credit risk) and provide reports to Risk Management Team
- Review and approve transactions as delegated by Risk Management Team
- Develop and maintain hedging strategy guidelines and review hedge trades for compliance with the guidelines
- Maintain CPA's Credit Protocol and support credit negotiations with counterparties as assigned
- Validate and approve option and forward price models. Manage and maintain models as needed.
- Collaborate with Power Planning & Procurement, Load Forecast and Analysis, and Customer Programs to review and comment on potential energy resource contracting and customer program modeling
- Suggest prudent risk reduction measures through hedging strategies and derivative products
- Evaluate energy trading and risk management tools and reporting processes and recommend enhancements as necessary
- Participate in Risk Management Team meetings
- With Information Technology, establish and maintain high standards of data quality
- Demonstrate thought leadership in the research and development of emerging issues and solutions impacting risk management in CCAs by publishing in and speaking to industry forums

Requirements
- 5+ years of experience in commodity risk management, pricing or energy trading
- Good understanding of California ISO (CAISO) and bi-lateral wholesale electricity markets, including energy, resource adequacy, renewables, and carbon-free products
- CCA experience is a plus
- Knowledge of physical and financial instruments transacted in CAISO and, on wholesale power market exchanges and bi-laterally
- Strong knowledge of risk concepts and business processes; credit experience is a plus
- Technical Knowledge: Expertise in model building and valuation of electricity products and physical resource assets
- Knowledgeable of Energy Trading and Risk Management (ETRM) systems with experience with Allegro, Endur OpenLink, PCI, OATI or similar systems
- Ability to perform within a dynamic and evolving environment
- Excellent leadership skills, written and verbal communication skills, ability to communicate complex ideas to a variety of audiences
- Proven analytical and creative problem-solving abilities, and ability to maintain detail-orientation in high-pressure situations

Risk Management Quantitative Analyst
Responsibilities

- Works with High-Level Middle Office Position to contribute to decisions involving market risks analysis, long term contract risk, operational risks, and analysis of regulatory policy changes
- Identifies business implications of these risks using quantitative tools, stochastic models, complex statistical and financial formulas and algorithms, methodologies, and analytic procedures and processes
- Assists in translating business concerns and issues into appropriate mathematical models and data-driven analysis
- Designs and develops quantitative models, analytic tools, methodologies, procedures, and processes to address complex issues in valuing assets, transactions, and portfolios
- Performs research on analytical methods
- Identifies portfolio impacts in light of complex interrelationships across commodities, market conditions, and regulatory policies
- Explains findings, methodologies, and business implications to internal and external stakeholders in clear business terms
- Generates periodic, insightful and business-oriented reports using programming tools
- Creates clear documentation for models and procedures

Requirements

- 2+ years of relevant experience in the energy sector exposed to energy commodities such as energy, capacity, Resource Adequacy, and environmental attributes
- Effective oral and written communication skills adaptable to address diverse audiences such as senior management, regulatory, technical, and non-technical groups
- Collaborative person with an orientation to team problem-solving and contribution.
- Demonstrated experience deploying financial and real-options analysis including Monte Carlo Simulation
- Graduate degree (PhD or masters) in mathematics, physics, engineering, or other highly quantitative discipline. Preference for experience in one or more of the following areas of specialization: Options analysis, financial engineering, decision analysis, predictive analytics, finance, and/or statistics.
- Experience with one or more Energy Trading and Risk Management systems
- Strong programming skills including knowledge of some of the following tools: Python, Advanced Excel, Matlab, Optimization tools

Technology Manager

Responsibilities

In partnership with the IT Director and key stakeholders across the organization, ensure that the technology CPA deploys meets CPA's needs in the most effective and efficient way possible.

Data & Systems Strategic Planning
- Guide and manage data and systems strategic plan development, implementation, and periodic review and updating to support evolving business needs.
- Analyze business requirements to identify technology solutions to meet business needs.
- Lead overall technology decisions and ensure that technology decisions align with data and systems strategic plan.

Architecture, Systems Design, and Deployment
- Oversee design and deployment of overall enterprise architecture including but not limited to system interfaces, data security, and maintenance. Create design documentation including Concept of Operations, Architecture and Component Documentation as appropriate.
- Provide input to technology evaluation and selection and assist throughout the deployment process.

- Lead large IT projects, including the design and deployment of new IT systems and services.

Systems Management & Oversight
- Monitor performance of IT systems to determine cost and productivity levels and to make recommendations for improving the IT infrastructure.
- Manage individual product updates, cybersecurity and IT policies, and management and control of data throughout the enterprise.
- Source project staff and consultants and oversee performance evaluation.

Experience
- Bachelor's degree in information technology, computer science, information systems, or a related field, or equivalent experience.
- Minimum 5 years of experience managing IT operations.
- Well-versed in cloud environments, managing big data, systems engineering, best-practice data security, data privacy regulations, and interface strategies.
- Deep understanding of the interactions between systems and how business processes are enabled and impacted by those systems.
- Experience with energy trading or financial transaction systems.
- Experience in major technology transformation initiatives.

Key areas of focus
- IT and engineering process and team leadership
- Program management
- IT architecture, systems, and data alignment with the business

Technology Analyst
Responsibilities
Systems Development/Deployment
- Support deployment of third-party systems and development of custom-built systems (e.g., Meter Data, Forecasting, and Analysis system).
- Assist in technology configuration and interface development and maintenance across various in-house and external applications, including meter data, forecasting and analysis (MDFA); finance and accounting; energy trading and risk management (ETRM); and customer relationship management (CRM).
- Develop scripts to access data and develop and perform Extraction, Transformation, and Load ("ETL") processes to make external data available to the data stores.
- Develop models and algorithms to generate analytic insights from CPA data, disseminate those insights across the organization, and extract the most value out of CPA's data;
- Develop, perform and maintain queries and reports on metered usage, billing and other data;
- Work in close collaboration with the marketing, account services, finance and power procurement teams to analyze data;
- Troubleshoot data quality and transfer issues with services providers, SCE, and customers;
- Research and support the deployment of new data storage and processing technologies;
- Support the organization's day-to-day technology and data needs.
- Develop and maintain data pipelines between CPA's various data sources and its analytics platform/data warehouse, including writing and scheduling recurring data processing jobs/scripts
- Implement and maintain business intelligence (BI) tools and dashboards in collaboration with the marketing, account services, finance, and power procurement teams

User Support

- Assist users across the organization with data access, development of standard and customized reports, and technical issues.
- Provide help desk related support to internal staff.

Systems Maintenance & Support
- Install and configure hardware and software components.
- Upgrade systems to enable compatible software.
- Install and upgrade antivirus software.
- Test and evaluate new technology.
- Perform tests on new hardware and software.
- Troubleshoot hardware and software issues.
- Analyze IT requirements and provide objective advice on the use of IT.
- Set up new user accounts and profiles and handle password and security issues.

Experience
- Bachelor's degree in computer science or engineering or related field, preferred.
- Minimum 3 years of experience in a similar role.
- Experience troubleshooting systems.
- Skilled in database programming and software installation.
- Proficient with cloud computing environments including but not limited to AWS and Microsoft Azure.
- Excellent written and oral communication skills.
- Familiar with a range of software and hardware.
- Able to lift up to 30 pounds.
- Experience in an energy trading/transaction-based environment.

Key areas of focus
- Principals of data storage and access in cloud environment
- Technology assessment, interface development, and product implementation and support
- Technology project management

General Technology Support

CPA has a need to provide desktop support, on-board employees with computers and system access, support application troubleshooting, provide overall system security and access rights, install periodic application updates, develop queries within the CRM, assist with customer rate comparisons, and support corporate technology policies.

Current State: CPA currently employs Integritek as their desktop support service provider. This has been adequate, but it does not provide specific CPA business and systems knowledge that an internal resource would provide.

Future State: As CPA deploys the Data and Systems Strategic Plan, the technology environment will increase in sophistication and complexity. The proposed technology analyst would provide this support in the initial phase of the Strategic Plan (Phase 1). But as the plan is deployed in Phase 2 and 3, an additional analyst may be required. Similar to the first technology analyst, the individual would have cloud-computing environment experience, development capabilities, interface expertise as well as the ability to support general technology requests. Both of these analysts would report to the Technology Manager. One analyst may focus on development and interfaces while the other analyst may provide

more general technology support and be the main contact for business users. The expectation is that both individuals would be able to manage each other's areas of responsibility to provide depth and flexibility within the organization.

Settlements Analyst

Responsibilities

- Process CAISO invoices and reconcile to shadow settlement statements
  - Consolidate data in a consistent format
  - Compare projections to plan and report information internally
  - Identify discrepancies and variances
    - Research and resolve meter data discrepancies
  - Identify CAISO Market data and CPA bid/dispatch instructions to assist in identifying data issues and errors in CAISO Settlements as well as identifying resource optimization improvements
- Verify resource contract compliance by calculating and analyzing resource energy transactions against contract terms for Inter-SC Trades (ISTs)
- File or manage disputes subject to meter data issues, price corrections, and CAISO System/calculations failures
- Maintain knowledge of the ISO Tariff and CAISO Business Practice Manuals as amended
- Maintain good working relationship and communication with CAISO
- Obtain data from multiple internal and external sources including co-workers, databases, and industry reports
- Prepare and distribute reports on a weekly, quarterly, monthly, and yearly basis for internal and external customers
- Recommend process changes and/or data storage changes and implement approved changes to ensure compliance with internal controls, and/or state and federal regulations
  - Assist with the implementation of new settlement systems and/or procedures as necessary
- Contribute to internal decision-making processes relevant to CAISO and Bilateral Transaction settlement and provide research and analytical support
- Travel to trainings, meetings, and conferences

Requirements

- Bachelor's degree in Business, Finance, Economics, Mathematics, Statistics or Physics, Engineering or related field of study
- CAISO Settlement expertise (may consider significant experience in similar market settlement environment)
- Strong organizational and problem-solving skills required
- Excellent written and oral communications skills
- Must be able to work in a team environment
- Strong interpersonal communication skills and problem solving skills
- Proficiency in the use of settlement tools
  - Shadow settlements within Excel
  - Experience with industry ETRM systems/shadow settlement systems preferred
- Strong individual contributor with high technical proficiency and ability to operate self-sufficiently in open system environment

- Excellent written and verbal communication skills, ability to communicate complex ideas to a variety of audiences
- Proven analytical and creative problem-solving abilities, and detail-oriented

Energy Trading and Risk Management

ETRM Selection

A core ETRM selection team will be defined with representation from front, middle and back office. This core team will be primarily responsible for defining the requirements of the ETRM and the key business processes which will be supported by the ETRM. In addition, a key step is to bring in a consultant (firm) to assist the core team with the ETRM selection and configuration phases. An experienced ETRM selection consultant will have an inventory of ETRM requirements available as a starting point for the selection process. The requirements for an ETRM system can easily number into the hundreds - particularly if it is covering both bilateral trading and market-trading.

Once the ETRM requirements inventory has been reviewed and requirements have been customized and selected for inclusion, the remainder of the RFP can be developed with this set of requirements as the core for ETRM vendors to respond to. In addition to the functional requirements, CPA and the ETRM selection consultant will gather technical, training and support requirements. Vendors will be asked to self-assess their ability to meet the requirements on a standard scale. The vendors will also be asked to include indicative costs for licensing, implementation and support. Finally, vendors will be asked for customer reference contacts for those customers whom they feel to be closest in operations, size, and complexity to CPA.

CPA and the selection consultant will work to develop a short-list of vendors (preferably 5-6) to whom to send the RFP. These vendors will most likely be pre-qualified by size of installed customer base, especially customers similar to CPA in terms of location, asset-base, load size and commodities traded. After the RFP is released, CPA and the selection consultant will work on developing Demonstration Scenarios for the Vendors to demonstrate during the selection process. The demonstration scenarios should include some of the business processes which are the most difficult for CPA to execute/analyze in the current state. There should be no more than 3-5 scenarios for demonstration. These scenarios should go through the entire life-cycle of a transaction/contract from origination through entry, reporting and settlement. In addition, CPA and the selection consultant will develop a standard scorecard for the core selection team to use in assessing the RFP responses.

The RFP will be analyzed against the vendor's self-assessment of their ability to meet the functional, technical and support requirements, indicative cost estimates and input from the ETRM selection consultant. A shorter-list of vendors will be developed. The shorter-list vendors will be sent the transaction scenarios and asked to demonstrate how these scenarios will flow through their system(s).

After assessing the vendors' demonstration of the scenarios, CPA will rank the vendors and solutions and identify their top choice and a secondary choice. Contract negotiations will begin with the top vendor. While this process is on-going CPA will request vendor training on the software as well as a 'sandbox' platform on which to begin to interact with the software. Training for the core team usually consists of training on the unconfigured 'base' system prior to any modifications/configuration by the core team which happens during the implementation phase.

Depending on the vendor selected, CPA may choose to continue to engage the selection consultant into the implementation phase. CPA and the vendor and/or implementation consultant will put together an implementation workplan based on vendor input. They will also identify gaps between the functional requirements and the software based on the RFP responses and the scenario demonstrations.

ETRM Implementation

ETRM Implementation consists primarily of configuring the ETRM software to match as closely as possible the desired CPA business process model for their commodity trading, reporting, management and settlements as defined in the requirements from the selection phase.

Each ETRM package varies in terms of how much/how little can be configured. Some vendor solutions allow only configuration settings to be changed and rudimentary data aggregation/allocation settings to be configured. Other packages allow for the user to define flows/paths through the system, define and develop custom algorithms/models, and considerably alter the look and feel of the software.

CPA will work with the vendor and/or implementation consultant staff to map requirements from the RFP to the software configuration settings. In addition to business process configuration settings, the vendor and/or implementation consultant will help ensure configuration is made in ways which align with CPA' s risk policies: who can trade, in which books, what products, what tenors, etc. In addition, the gaps identified at the end of the selection phase will be addressed by the vendor – some gaps may be addressed via custom modifications while others may be addressed via off-system business process.

CPA and the vendor and/or implementation staff will develop test criteria, test data, expected results for system testing (by the core-team) and user acceptance testing (by a wider user-team). They will also identify custom reporting/data analytics, that will be required. The team will develop a plan to convert data from existing spreadsheets/systems into the new ETRM. The vendor will develop any custom code/screens/reports identified as part of the gap assessment. While the vendor develops customizations, the core team works to design interfaces into and out of the ETRM. The development of the interfaces may be undertaken by the vendor, the implementation consultant, or internal resources (often a combination of all three).

Once system configuration, customizations (screen and/or functional business flow), interfaces, and custom reports/data analytics have been developed, system testing will begin by the core team. The team will execute the test cases and work with the vendor to address any bugs or issues. During this time, the wider user group will have training on the configured system. After successful system-test completion, the users will conduct a user-test as a way to complete their training and prepare for system production use.

Typically, a parallel operations period is defined whereby transactions are captured in both the existing systems/spreadsheets/reports and the new ETRM. Comparisons are made between the existing system(s) and the ETRM outputs to define any issues/variances. Upon successful completion of a parallel period, the ETRM is made ready for production by the removal of system/user testing data, final setup in a production environment and testing of technical functions such as cut-over for system faults, disaster-recovery testing, etc.

Key Considerations for Implementation

An ETRM system is primarily an enabling technology to enable a commercial strategy with maximum flexibility and data quality, minimum duplication of effort, and appropriate risk management oversight and institutional control. ETRMs are complex systems where seemingly simple decisions made during configuration phase have significant downstream implications for the ability to aggregate and disaggregate

data for off-system processing. For example, the creation of the book structure will make the extraction of data simpler or more difficult based on how well the structure aligns with off-system needs for financial reporting, ability to easily and accurately process load forecast ingestions, resource forecast ingestions, etc.

CPA's middle and back-office staff should play a major role in identifying reporting requirements of the ETRM. The "work backwards" approach of defining reports and middle- and back-office needs and then moving those needs back toward front-office data capture can often significantly reduce rework required when configuring the system from a front-office only perspective. The middle office should ensure risk metrics and key financial reports are able to be easily derived and automatically routed from the system to management, other business areas, counterparties, customers and regulators.

Selection and Implementation assistance for an ETRM are important in keeping an ETRM implementation as close to timeline and budget as possible. Without a background in the ETRM system and without having a good understanding of the implications of choices made early in the configuration process, it is difficult to conclude the implementation without rework or a sub-optimal mapping of business requirement to ETRM process flow.

Trading Operation Discussions

The Energy Authority (TEA)

Discussed on February 26 with Carrie Carrigan (TEA) the recent Allegro Horizon implementation. TEA replaced their Triplepoint CXL ETRM (implemented in 2010). The planning, assessment, selection, and implementation took approximately 3 years (included front, middle, and back office participation as well as extensive IT support). Allegro's Horizon was implemented in August 2018 for Gas Trading and April 2019 for Power Trading. They estimated that they implemented 80% base functionality and 20% customizations. Because of TEA's agent function, there was customization required to handle that functionality. TEA uses Hartigen's PowerOptix for their California ISO market and settlement interface (Inter-SC Trades are double entered). Horizon captures WSPP bi-lateral trades, RECs, ZECs. Transmission transactions are built in-house. They are still working to resolve real-time Credit risk (particularly difficult as they are running it for their multiple clients). Horizon handles Specified Source transactions, LCFS, carbon trading transactions, Mark-to-Market on Resource Adequacy position. TEA runs Horizon on-premise. Data requirement is large. Settlement data is at a daily level and blocks for sub-daily. Running valuation to the hourly level requires a lot of processing. There is no-sub-hourly tracking. Adjustments made to real-time by price adjustments. Good management of forward price curves and ability to rerun a prior price. RECs, Carbon Free, Carbon Trading was managed well with standard configuration. Not integrated with physical asset optimization (done in-house by TEA). The implementation used consultants throughout, significant internal IT resources (including getting deal capture and GL accounts aligned), and required extensive testing (loading data, test cases, regression testing).

Pasadena Water and Power (PWP)

Discussed on March 4, 2020 with Kelly Nguyen (Assistant General Manager Power Supply) and Tony D'Aquila (Wholesale Operations Manager). PWP uses ACES Power Marketing as their Scheduling Coordinator (SC). They engaged ACES for over 10 years as SC. They have adjusted the level of service over that time depending on their internal capabilities. PWP does trade capture in their own ETRM – PowerSettlements. PWP gets their MtM from their PowerSettlements system. They use APIs to get the data back and forth to ACES. ACES uses an in-house scheduling system (Einstein) and Allegro as their ETRM. PWP directs pre-scheduling. Pre-scheduling at PWP – based on pre-approvals for some transactions or individual approvals

where no pre-approval is in place. ACES handles transactions for Fifteen-Minute Market (FMM) and Real-Time (RT). The amount of transactions in the FMM is small. They update forecast information. They survey prospective counterparties for transactions. They revise bids. They handle outage notifications and transmission re-rates. ACES uses PRT (now Enverus) for short-term load forecasting. It is on-premise but they are moving to cloud. PWP had a credit manager through August 2019. The credit manager retired and now ACES is doing credit risk management in parallel with PWP. ACES' package offering includes Middle-Office support. There is no reconciliation between ACES ETRM and PWP ETRM. PWP is reviewing options for SCs. They did an RFP to get information from other prospective SCs. Their opinion of TEA was that their data transfer capabilities are limited. From ACES, PWP gets a report of all transactions via an FTP site. These are then run into PowerSettlements. PWP found ACES to be 'not the cheapest' but competitive. PWP finds the ACES IT staff to be phenomenal. For Market Intelligence, ACES is responsive and good at getting back with answers.

Southern California Edison

Discussed on May 13 with Jim Ishiguro (IT Directory), Venkata Poosarla (SCE Business), and Roger Schaffland (consultant). They did their Endur implementation in two phases: 1) structured contracts; and 2) exchange and standard contracts. Phase 3 will include Counterparty Credit Risk that is done in a different system (since acquired by ION that also owns Openlink Edur). Each of the first two phases took approximately 1 ½ years. They used a large System Integrator and found them difficult to work with. They took more of the project internally (60% business/40% IT/Consultants/Vendors) with Mr. Schaffland as the lead consultant. The Phase 1 project team was approximately 70 FTEs and Phase 2 approximately 100 FTEs. The cost of Phase 1 and Phase 2 was approximately $19M (based on General Rate Case filing). As part of their selection process they held a 3-month "Conference Room Pilot" where they had Endur configure and demonstrate a set of scripted cases. They characterized Endur as a "platform" that is very configurable and does not have much out-of-the-box functionality. They said the support from the Endur implementation team was good, but that they were not always available and not the best resource always available. Their implementation to license cost was approximately 5x in Phase 1 (the large SI) and 3x in Phase 2. The Phase 1 contract was delayed to get the SI and Openlink to an agreement (Openlink was sub-contractor to the SI). Currently working on modeling storage resources in Endur. The only major change they have made to the system since production (mid-2019) has been a major revision to the ICE Gateway (brought on by a change by ICE).

Design Notes on Data Analytics Platform/Forecasting & Analysis System

Introduction

CPA anticipates building a Data Analytics Platform to enable a variety of business processes. Currently meter data is obtained from SCE by Calpine on CPA's behalf. Historical meter data is directly available from SCE. CPA does not have a set of tools for consuming, storing, or using this meter data.   CPA is working to import the meter data, store it in a consistent fashion, and then use it in a variety of ways. Meter data will be used to develop profiles that will be used for load forecasting. Meter data and forecasted load data will be combined with cost of energy information to estimate CPA's current financial position. It may also be presented to customers to help them make business decisions or guide them towards more efficient consumption of energy as well as evaluate rates and programs. Energy consumption patterns will also help CPA bid more accurately and reduce overall CAISO market imbalance charges. The timelier the data is, the more useful it becomes to these business processes. CPA is also working to improve this area.

The purpose of this document is to provide design notes that may assist CPA as it builds a system. These notes are architectural principles and should apply to any technology choice, whether cloud-based or on-premise. This document emphasizes efficiency. It is worth noting that modern cloud-based systems

bring substantial computing power to bear, making efficiency less costly and impactful than it would be with an on-premise solution. Nevertheless, efficiency remains important. Queries that process six gigabytes of data cost more than those that process four, in terms of energy and often in terms of cloud service fees as well.[5]

This document is written for managers and technical leaders within CPA. It may also be useful for consultants assisting CPA. This document reviews some basics of forecasting that may be obvious to experienced readers. These basics are provided to ensure the document is accessible to all readers. Readers familiar with forecasting experience should feel free to skip ahead where appropriate.

## Forecasts, Profiles, and Meter Data

Interval forecasts have typically been created by performing some sort of linear regression. By taking the average load profile (i.e. interval data) for a given class of customer (e.g. winter-peaking residential customers) and performing an statistical or econometric analysis, a formula can be derived which will predict what the usage would be for any given interval, based on some combination of weather forecast, day type (e.g. week-day versus weekend versus holiday), and other demographic factors (e.g. heating type, solar panels, electric vehicles, square footage, building construction, location, business type etc.). The available demographic data may be limited for some customer classes (e.g. residential versus business), and the statistical analysis may show multicollinearity such that certain independent variables are not worth using. Selecting how to segment customers and which demographic factors to consider is a key part of the art of forecasting.

Typically, once a predictive regression has been created for a given customer segment, it can be used in a variety of ways. If a profile has been created for the average of a given segment, it can be used to create individual forecasts for each customer within that segment by scaling the output based on historical usage relative to average. Once the individual forecasts have been created, they can be aggregated with other forecasts to predict load by area (e.g. Temecula or Santa Monica), or customer segment (e.g. residential customers or all convenience stores), or customer (e.g. all the Target stores). Alternatively, the system can simply calculate and store an aggregate forecast for the class. While this is more efficient, it is less informative in a market context.

In a market environment, it is often helpful to do a series of forecasts for each metered point, though sometimes forecasts are created at higher aggregate levels. If each class supports a basic forecast that uses day-type and predicted high and low temperatures along with any demographics, load forecasts can be generated sixty days or more into the future. These forecasts have limited accuracy, but they are used for near-term energy procurement (e.g. monthly, quarterly transactions). Closer in forecasts (one to fourteen days) are likely to have more detailed information, such as insolation/irradiance, hourly temperature, etc. which will drive more accurate load forecasts. Depending on CPA's market strategy, new load forecasts can be generated which provide more accurate load data. Because of the way SCE reads its meters and delivers that data via Calpine to CPA it can take as long as twenty business days for the data to be available. The interval data can be estimated by combining the profile with historical meter data and the actual weather data to estimate the missing meter days, a process also known as backcasting. This load forecast can

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[5] The structure of cloud fees varies between providers. Some providers charge by the amount of data processed when executing a query or the length of time processing requires. Others do not consider how much data a given query involves but do charge a fee for the amount of data stored in the platform. Many use a combination of techniques. Regardless of the pricing methodology, efficiency lowers costs and improves system performance.

function as a stand-in for net-position, shadow settlement estimates, and other financial calculations until the actual meter data is available.
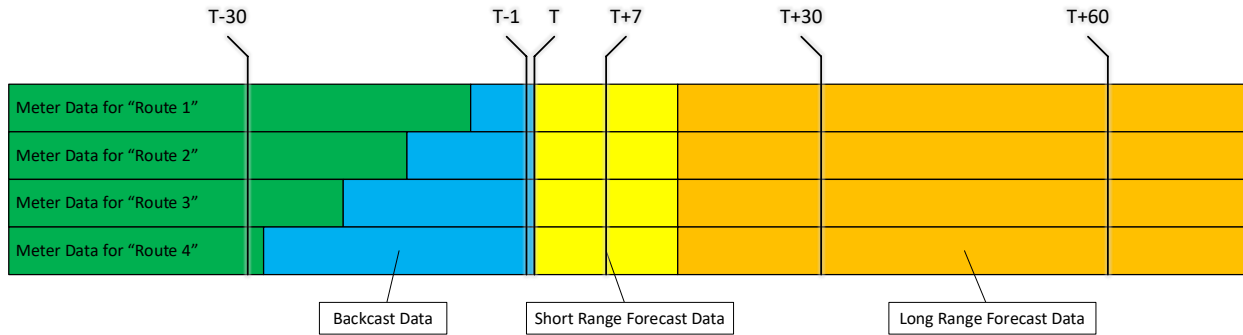
The figure above shows this in action. For any given point in time T, there may be multiple forecasts for any given metered point: zero or more long range forecasts and one or more short range forecasts, depending on business needs. At T-1 it becomes possible to back-cast the data. Actual meter data will arrive each business-day over a 20 day cycle each month, following a three to four-day lag. By T-30, all meter data should be received, though it is possible it will still be missing selected points because of issues with metering, data collection, or data transmission. As such, some points may have backcasted data for an extended period of time.

While the exact number of forecasts required will depend on CPA's business needs, there are two major take-aways. First, the Data Analytics Platform will need a mechanism for maintaining multiple sets of interval data for each metered point. While it is possible to simply overwrite the data for any given metered point as new forecast, backcast, and or actual meter data becomes available, doing this may make it difficult to evaluate the quality of the data being used in a given calculation, report, or interface. It also makes it impossible to evaluate forecast performance for a given point. Second, the application of forecasts to metered points is a mechanical, production process where a multi-regression formula is calculated for a given set of forecasted (or backcasted) independent variables and applied to hundreds of thousands or millions of metered points. The Forecasting & Analysis system must provide a rich set of tools for forecast analysis while the Data Analytics Platform must provide an efficient engine for production application of those forecasts. The more efficient the two systems are, the more cost effective the overall solution will be and the better the user experience can be.

General Design

The Data Analytics Platform/Forecasting & Analysis System has several major functions:

- The meter data, customer data, and weather data that the system uses needs to be ingested and stored. This is the raw material for any other processing that the DAP performs. The ingestion process ensures that it is readily consumable. The storage process ensures that it is consistent. For high-quality data from trusted providers, this process may require little more than aggregating or disaggregating data to a consistent interval size and converting data to a consistent unit-of-measure. For low-quality data, additional validation, editing, and estimation (VEE) processes may be necessary.
- The Forecasting and Analysis System (FAS) needs to provide a set of tools for profile creation. Profile creation is where the forecasting expert uses historical data to create regressions which will allow accurate forecasting of load based on a combination of forecasted weather, day type, demographic, and a scaling factor like historical average load. Profile creation is often as much art

as it is science. It can be iterative in nature as the forecaster tweaks the regression to better match the historical data under a wide variety of conditions.

- The DAP/FAS needs to support production application of the customer segmented profiles to the customer profiles, generating forecasted meter data for whatever period is desired and at whatever customer aggregation level. Depending on CPA's needs this could be done on a leading basis, seven, ten, or even thirty or sixty days into the future. Meter data forecasts could be updated as better, more accurate weather forecasts are available. Profiles can also be applied where meter data is not yet available (because of meter reading cycles), but weather data is, because the day has occurred.
- The DAP needs to aggregate meter data and forecasted meter data into load shapes for a demographic or a region, such as a city. This is needed not only for reporting, but for providing data to upstream systems for shadow settlements and position calculations. It can also be helpful for understanding how different customer classes, or geographical areas, or demographics are consuming energy. The DAP needs to be able to do this dynamically for one-off queries, as well as on a scheduled basis to provide information to upstream systems and to optimized frequently run reports.
- The Forecasting and Analysis System should support profile validation through backcasting. That is, as meter data is made available, the actual readings should be compared with the profiled readings which were generated using known whether data. The divergence should be recorded to enable evaluate the effectiveness of the profile.
- The DAP needs a rich set of reports that enable CPA to make informed decisions in a timely matter.

While it is possible to do all of this work in a single solution, we have separated the Forecasting and Analysis System (FAS) and the Data Analytics Platform (DAP). This allows separation between the creative / analytical / exploratory space and the high volume / high efficiency space (DAP). Separating them allows the two technologies to evolve independently. The diagrams below show several potential architectures for the overall solution.
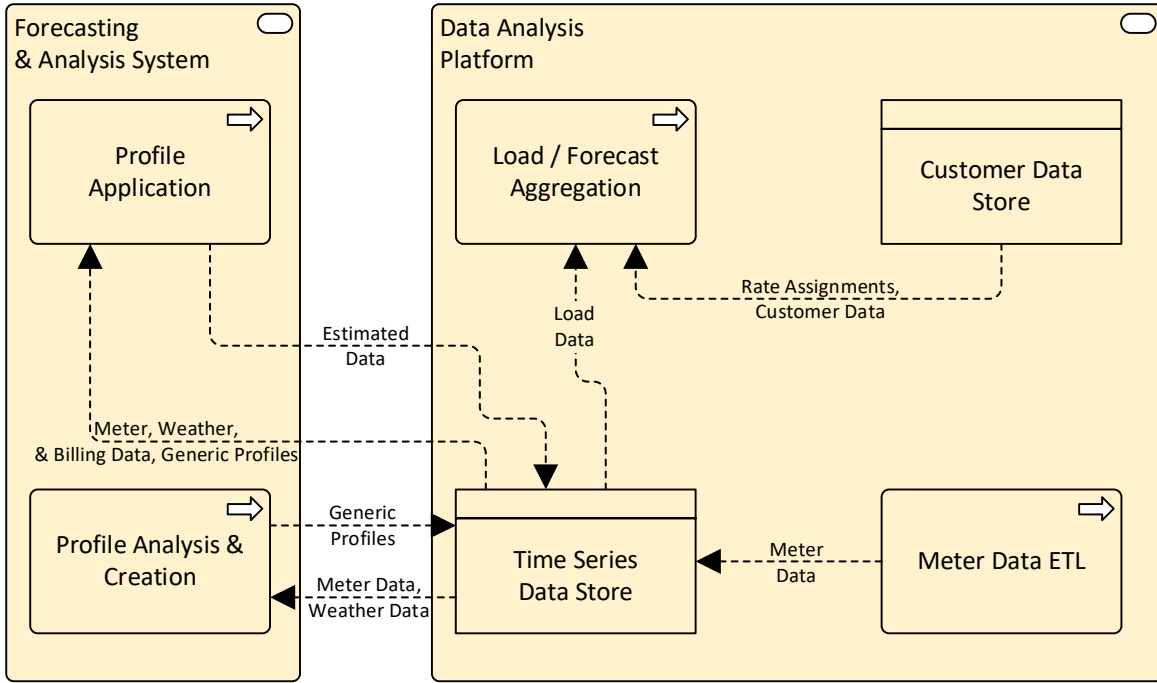
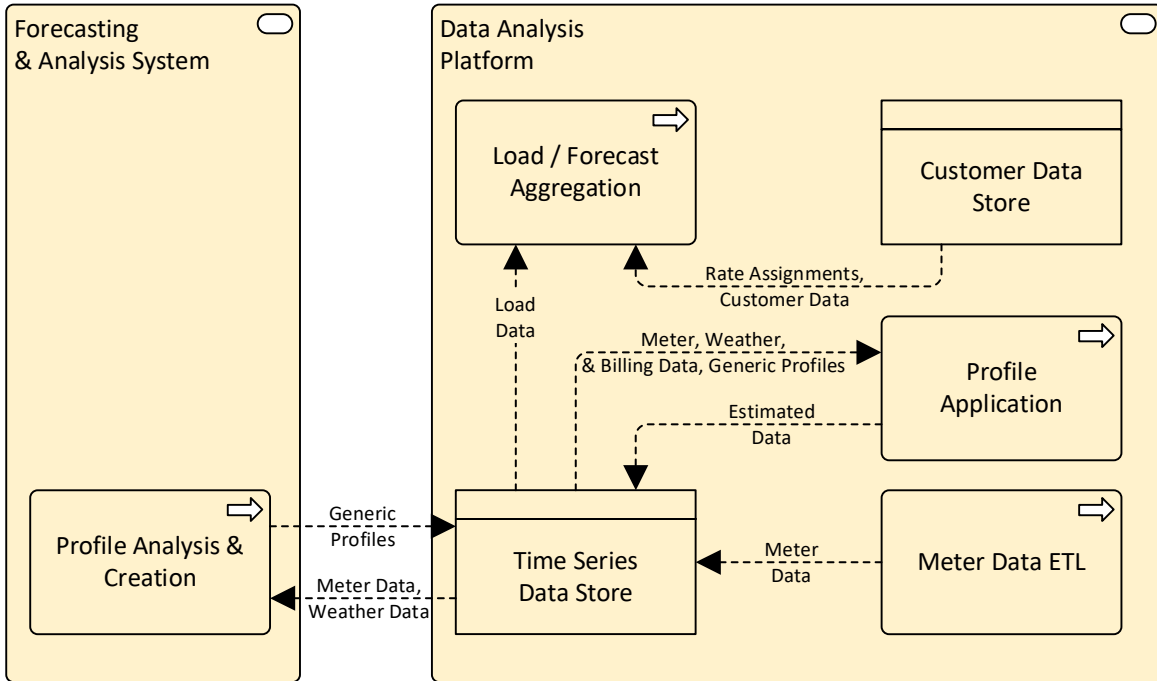*Figure 1 - Data Analytics Platform and "Profile Engine" Forecasting & Analysis System*

Figure 2 - Data Analytics Platform and "Forecast Studio" Forecasting & Analysis System

Figure 1, the "Profile Engine" Forecasting and Analysis System variant, has the generation of the forecast profiles and the large-scale application of those profiles in a single system. This approach can be very powerful, especially if there are business needs to convert between different unit of measurement or interval sizes and the Forecasting and Analysis System encapsulates this functionality from the Data Analytics Platform. Figure 2, the "Forecast Studio" Forecasting and Analysis System variant, focuses on

providing a rich analytical environment for forecasting, while leaving the production application of profiles to millions of metered points to the Data Analytics Platform. This architecture can be more efficient than the "Profile Engine" variant, especially if the Forecasting and Analysis System is in a separate environment (e.g. different cloud service, on-prem, etc.) than the DAP. Any of these three variants should meet CPA's needs. The "best" choice will be determined in part by the choice of technologies used to implement the overall solution and by consideration regarding which parts of the process are likely to be the most subject to change and redevelopment.
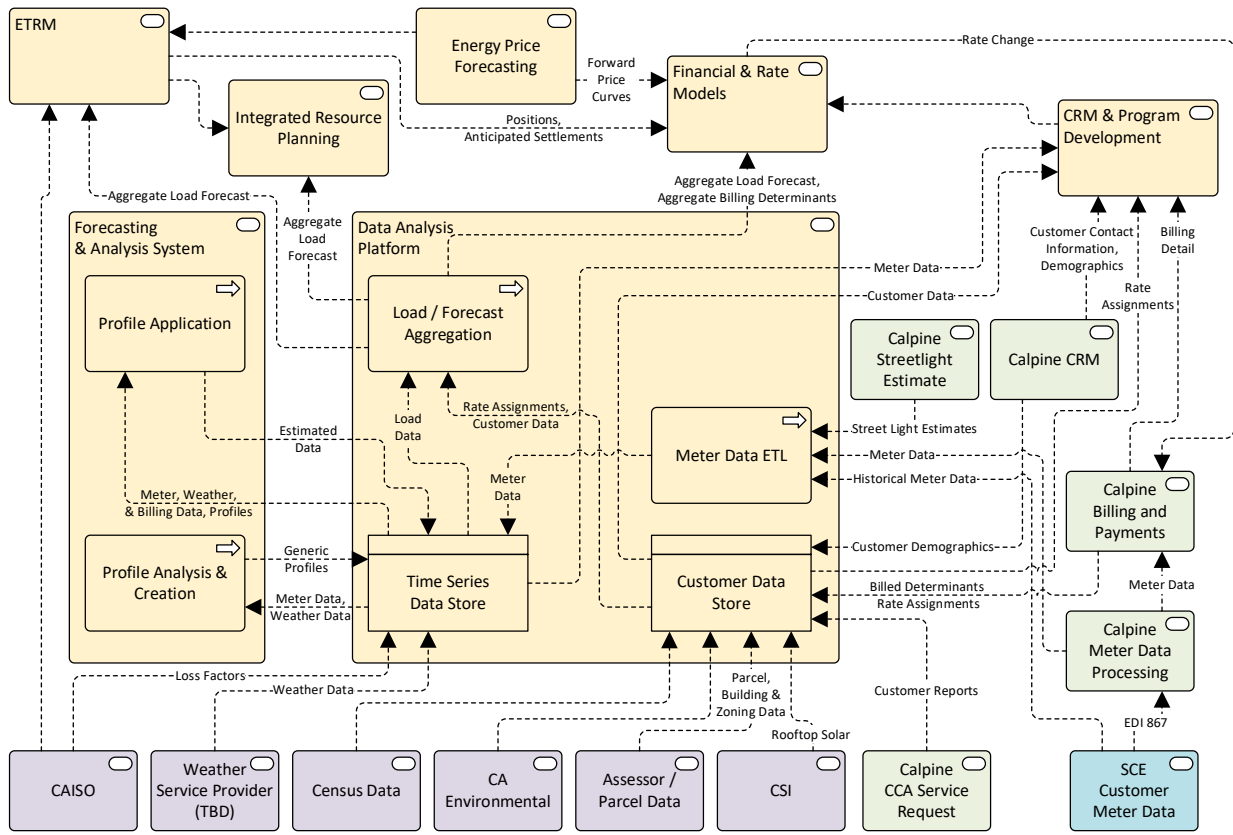

Figure 3 - System Context

Figure 3 shows the overall system context for the DAP and FAS, including external systems that the DAP will interface with directly. Besides serving up data for the FAS, the DAP also acts as a repository for many other CPA systems. Other important CPA systems (like the Finance and Accounting system) which the DAP is not expected to interface with are not shown. Regardless of exact internal architecture of the solution, the DAP must receive data from a variety of sources. This data broadly falls into two categories: time series data (like meter data, forecasts, and weather) and customer data, including both specific customer records and broader demographic data. The DAP is expected to act as a direct data source for upstream systems, like the Customer Relationship Management and Program Development system, and an aggregate data source, providing rolled up values for the Integrated Rate Planning and Financial & Rate Modeling systems.

Specific Notes
What follows are specific design notes about selected major functions the overall solution needs to provide.

Data Ingestion & Storage
Modern cloud-based data tools make it easy to consume a wide-variety of data sources and perform well enough that it is no longer necessary to work out all of the details of the database design in advance to have

a workable system. That said, it is still important to optimize around the most common behavior, which, in this case, is reading data. It is highly likely the meter data and the forecast data that is used by the DAP will be read from the data store ten times as often as it is written. For example, a day's interval data for a given customer may end up being aggregated as part of determining the net position, be part of a report on a given customer class, be used for shadow-settlement, be part of company dashboard calculations over several days, and be presented via a web-interface to the customer themselves. It is highly unlikely that the data coming from SCE or Calpine will be in the desired form that the reporting and aggregation tools will prefer. Assuming that reads are 10x more frequent than writes, it is advisable to transform the data into the preferred storage format once, when it is loaded into the system, rather than every time the data is accessed.

Amazon provides a great example about the impact of the data ingestion process in their pricing guidance for their Redshift product (a competitor to Snowflake and Google's BigQuery):

> *Consider a table with 100 equally sized columns stored in Amazon S3 as an uncompressed text file with a total size of 4 terabytes. Running a query to get data from a single column of the table requires Redshift Spectrum to scan the entire file, because text formats cannot be split. This query would scan 4 terabytes and cost $20. ($5/TB * 4TB = **$20**)*
>
> *If you compress your file using GZIP, you may see a 4:1 compression ratio. In this case, you would have a compressed file size of 1 terabyte. Redshift Spectrum has to scan the entire file, but since it is one-fourth the size, you pay one-fourth the cost, or $5. ($5/TB * 1TB = **$5**)*
>
> *If you compress your file and convert it to a columnar format like Apache Parquet, you may see a 4:1 compression ratio and have a compressed file size of 1 terabyte. Using the same query as above, Redshift Spectrum needs to scan only one column in the Parquet file. The cost of this query would be $0.05. ($5/TB * 1TB file size * 1/100 columns, or a total of 10 gigabytes scanned = **$0.05**).[6]*

Obviously, this particular example is specific to Amazon and is not directly applicable to other products, but it demonstrates how processing data at time of loading can impact the efficiency of both storage and queries and, as a result, costs.

Parsing the data on read makes a great deal of sense when working with very large volumes of data that may never be used, that are high variable, or that are highly disparate, such as in big data systems. None of these apply within the DAP. It is likely that every piece of data will be used. Most of the data will be quite similar in format for years if not decades. Computationally, it is worth considering the data storage process as key component of the ingestion process.

With interval metering data in particular it is worth considering what a value for a given time means. Most metering data is the integral, the area under the curve, rather than the peak or some other instantaneous value, but this is not always the case. Given that interval data may be for an hour, for fifteen minutes, for one minute, or even an instantaneous value taken at a given point in time, it is important to consider how this is reflected in the data store. It is possible to aggregate fifteen minute intervals and hourly intervals, or to disaggregate fifteen minute intervals into five minute intervals, or to convert kW data to estimated interval data; however, this is very difficult if the associated meta-data is not stored along with the intervals. To this end, best practice is to include a start time, an end time, and a unit of measure (UOM) with every

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[6] https://aws.amazon.com/redshift/pricing/

interval, unless all data is normalized to a single UOM or interval size. It is possible to store UOM data separately from interval data, which saves on storage space, but this will require a look-up to a second table any time data is accessed.

As noted previously, it is likely that there will be a series of forecasts for a given metered point, each one better than the last, eventually being supplanted by a backcast and, finally, actual metering data. The system needs to handle this. One approach is to have different tables (or columns within a single table) with known levels of data quality: e.g. forecast-60, forecast-30, forecast-14, forecast-7, forecast-3, forecast-1, backcast, actual. The exact number of different tables or columns would depend on CPA's identified business needs and may include far fewer forecasts. A properly crafted view with the database would allow users to always grab "best" data available for reports or exports and to do so transparently. Another approach is to "version" the data and flag each interval's quality, distinguishing between forecasted, backcasted (or estimated), and actual data.

Regardless of the approach to storage, it is highly recommended to treat interval data consistently throughout the system regardless of whether the data is generated from a forecast, a backcast, or an actual meter. Doing this allows much richer reporting, as things like usage reports can be run against forecasts to estimate future usage. It also allows the system to be much more resilient to gaps in data, as it can easily be filled in with estimates.

Regarding customer data, be thoughtful about which information is linked to the customer of record and the associated account, versus which information is linked to the physical meter location. If possible, tie geospatial information (parcel, topography, microclimate), to a set of coordinates rather than a premise address. This approach will unlock much greater geospatial possibilities than having to convert from addresses, which may be faulty. Even if the conversion from addresses is 99.9% accurate, that still leaves one thousand conversions to correct manually for CPA's one million customer accounts.

Profile Creation & Validation
Profile creation is the space where the forecast analyst really brings value to CPA. The ideal Profile Forecast and Analysis environment will give the analyst a very rich set of tools to generate and validate the forecasts they create. At a minimum this should include both visualization and statistical tools. One approach to fulfilling these needs would be to integrated programming languages like R or Python which already have well established libraries for facilitating this sort of analysis. In a "forecast studio" architecture, this could be provided by a commercial-off-the-shelf package if desired. The choice of technology used for profile creation should align closely with the skills of the forecasting staff.

Profile validation, the process of analyzing the accuracy of forecasts by comparing backcasts to actuals, is important to ensure the profiles provide the expected level of prediction. The statistical and validation tools needed to create the profiles should be equally applicable to validating profiles, though it may be valuable to automatically validate and score profiles. Doing this would potentially allow an analyst to receive a warning when the predictive accuracy of a given profile begins to diminish.

The profile creation and validation process is the most manual and iterative part of the forecasting process. Because of this, it can be helpful for the forecasting and analysis environment to provide affordances for versioning regressions and recording notes about the creation process. While this is not required, it can be helpful when an analyst needs to return to a forecasting exercise that has been on-hold for a time, or when transferring analyses between analysts. If the regression analysis is expressed as R or Python source code, one easy approach is to take advantage of a revision control system like git or svn.

Profile Application

Profile application is a production data creation function: for each and every meter to be forecasted, obtain the historical and demographic data required, combine it with the weather forecast, day-type, etc., and generate the forecast for that point. Depending on the forecast design, it is possible that the forecast can be generated for the class and simply scaled based on the target metering point's relationship with the class average. The important design point is that profile application should be as efficient as possible.

Assume for the moment that there are one million points that need to be forecasted four ways: backcast, oneday forecast, threeday forecast, and fourteen-day forecast. For hourly intervals, there are 96 million values which need to be generated. Further assume that these one million customers can be divided into twenty different customer classes. If the forecasts can be generated for each of the 20 classes and scaled, the system must generate 80 forecasts and then complete 96 million scaling multiplications. If forecasts must be generated individually, four million forecasting operations will be required.

Architecturally, it will be fastest if the profile application process is as simple as possible and as close to the database as possible. The highest performance profile application process runs natively on the database platform, without requiring external calls. Such an approach is unlikely to be possible if the forecasting process must be done individually for each point, rather than scaled for a class. Clearly, the most important design requirement is that the forecast meet the business needs of CPA, but given the choice between two equally effective forecasts, the one which can be applied faster should be preferred, as it will result in direct time and costs savings.

In some designs, it is possible to dispense entirely with generating and storing the forecast data and simply generate the forecast data dynamically when needed. This is not recommended. Storage is relatively inexpensive. Generating and storing the forecast data allows it to easily be aggregated with other metered data and used in reports. Storing the forecasts only as scaling factors (i.e. the usage ratio between the metered point and the class) limits the availability of forecast data to the rest of the enterprise.

Data Aggregation

Data aggregation is the process of adding together sets of time-series data to provide an aggregate load (or generation) profile for a set of metered points. Typical aggregations include by customer class, rate tariff, or the entire LAP for procurement. Like profile application, data aggregation will be most efficient when executed as close to the database as possible. Typically, data from the customer data store is used to select the points to be aggregated. A critical design question is whether aggregations should be generated dynamically or generated periodically and stored. Depending on the needs of consuming systems it may be necessary to do both. Aggregations that are computationally expensive and frequently used (for example, total load for all customers or total load for all customers in a given class) should be calculated each day and stored. This will speed up reports and avoid unnecessary queries and recalculations.

Simultaneously, speculatively precalculating and storing aggregations that might be required is inefficient and likely to be ineffective as well. In most cases, the available reporting tools will be able to facilitate dynamic aggregations. The one exception to this is when the data to be aggregated requires special handling because of differing units of measure or interval size. The simplest way to handle this is to normalize how the interval data is stored such that aggregation is always just an addition and subtraction process. Alternatively, it is possible to write a library that embeds the special handling that is required when aggregating data with different units of measure or interval sizes and have the reporting tools call the library when aggregated data is required.

General Design Documentation

Design documentation provides an explanation of how a system (or component) works, allowing programmers, data engineers, and system architects to understand the behavior of a system. While it is possible to build systems without creating formal documentation, this is not recommended for any non-trivial system. Undocumented systems are problematic, as they make it difficult to maintain systems through personnel changes and organizational evolutions.

Waterfall development (one formal stage after another) places a heavy emphasis on documentation, often going through a series of design stages and gates for which full design documentation needs to be complete before work can proceed. Agile approaches to development (a series of short iterations) reduce documentation requirements and place an emphasis on the code itself as the only required documentation. We recommend a balance between these two approaches to documentation. Thinking through a design and documenting the approach prior to building is valuable. In any complex system, design documents that describe a component's behavior are critical to gain understanding of component behavior and interaction as well as validating that the design meets the business requirements.

With this in mind, Energy Research Cooperative recommends a lightweight approach for design documentation consisting of three design documents:

- Concept of Operations
- Solution Architecture
- Component Documentation

A document is only valuable if it actually is read, or if its creation provides a benefit to the writer, such as assisting her in clarifying and developing her ideas. Documentation must be maintained as well – a misleading document that has not been updated can be worse than no documentation at all.

The Concept of Operations (ConOps) document comes out of systems engineering best practices. It describes what the user of a system expects it to do with the system. Creating a ConOps involves interviewing system stakeholders and recording their vision for the system. The ConOps should record clear goals and objectives for the system. If there will not be a separate set of business requirements, they should be included in the ConOps so that there is an unambiguous record of the necessary functionality. It is critical to document the expectations for the system in sufficient detail that those working on the system know what to build, and that the system matches stakeholder expectations. This document does not describe system internals such as how the system is constructed or broken down into sub-components. It describes what the users and other stakeholders expect the system to achieve. A comprehensive ConOps may include details such as funding and organizational responsibilities, as well as lifecycle information about how the system will be developed, maintained, and retired.

The Solution Architecture document captures the theory of operation of a system. At a minimum it should discuss what technologies will be used and how those technologies will be assembled to deliver the stakeholder needs that are recorded in the ConOps. The Solution Architecture should document the major sub-components which make up a system and how those sub-components interact. The Solution Architecture is not a detailed design specification. It does not discuss every detail of every interface nor does it cover every interaction. The goal with the Solution Architecture document is to have worked out a general technological approach to meeting the needs prior to any large-scale development.

Component documentation provides specific details on the design and construction of a given system component. Component documentation is what allows a custom system to be maintainable over time. Development requires the programmer to hold a complete mental model of the problem-space in her head while crafting code. The programmer must understand both the business needs (the objective) and the machine needs (the means) to create a component that delivers the desired behavior. Component documentation facilitates building (or rebuilding) this mental model. This is critical for future developers – so they understand the thinking of the original developer – but it is critical for the current developer as well. Depending on the development environment, component documentation might be achieved with comments within the code itself, or it might be a separate stand-alone component design document. For drag-and-drop or visual programming environments, it is important to document the data sources and data transformations used, and how they deliver the business requirements. For compiled languages it can be sufficient to include documentation within the source-code itself, though it may still be useful to have independent component documentation. For any non-trivial system, it quickly becomes impossible for the developer to mentally keep track of the entire system at once. Well written code with clear names for variables and functions can make the code self-explanatory, but it does not obviate the need for component documentation.

There are other documents that may be useful to develop as there is need, such as user documentation or data model diagrams or object model diagrams. Depending on the environment though, these are not strictly required. For example, user documentation may not be needed if the system provides a very intuitive web-based user interface with appropriate mouse-over tooltips. Depending on the development environment, object models and the data model may not provide valuable insights and may just be another thing to maintain. As CPA grows, test plans can be very valuable, especially as there is a need to demonstrate that a given system delivers promised functionality, but formal test plans are not necessarily useful in a small team environment.

We recommend only producing documents for which there are clear purposes and consumers, but believe that some documentation is always required:

- The Concept of Operations document records the users and stakeholders' vision for the system and should be consumed by the system architects / designers.
- The Solution Architecture document records the design of the system, including the breakdown of interfaces and subcomponents and the use of chosen technologies. It should be consumed by the programmers / developers. It should be updated when the development process results in major changes in the architecture.
- Component documentation records the design details which make it easier for current and future programmers to maintain the system and make changes when necessary.

Other documentation may be valuable and should be created as it serves specific needs.

Customer Relationship Management Considerations

As discussed in the Stage Gate 3 meeting, there are at least two options to improving CRM use: 1) use the Calpine CRM; or 2) an internally owned and configured CRM system.

On the first option, we have recommended that the Calpine CRM is not likely to improve. We base this recommendation on the incentives they have to improve. The CRM system appears to work satisfactorily for

their Call Center personnel. Providing a usable system to CPA is not a priority for them (or CPA) in comparison to their core services of Billing and Payments and Call Center responsibilities. Additionally, there is an existing contract that extends to 2022. Based on this, it appears that Calpine has little motivation to correct the CRM for CPA's use. This is the feedback we have received from the CPA users on Calpine's efforts to improve the CRM as well as experience that CPA personnel has experienced with Calpine in other organizations. It takes considerable CPA staff time to explain the problem and troubleshoot the solution as Calpine rolls out on an iterative basis a solution. We do believe a technical resource should help this situation, but we also envision that technical resource having quite a few other activities that will engage him/her immediately (particularly the details of transitioning load forecasting, financial modeling, and risk analysis with the new SC/Risk Manager).

In our last call with Calpine (May 12), they indicated that the Dynamics user interface was being upgraded in the next release, they would provide additional training to CPA Account Managers, they would continue to work on improving reporting, and they would explore providing mechanisms (whether they had capabilities with the Dynamics Application Programming Interface – API).

Requirements

Karen has developed a set of business requirements. She has divided the requirements into 4 groups: A) overall usability of the system (hopefully improved with the latest release); B) data that is not currently captured in the Calpine CRM system (e.g. DAC designation, DER equipment); C) customer information and functions that may be provided by the Data Analytics Platform (TBD)[7]; and D) information that would be helpful to have from Calpine in a new CRM. The full set of requirements are on the CPA Sharepoint. Requirements D are provided below:

Data	Current Access	Notes
Call Center contact	This is provided at the service account level. Calpine has created a report but not user friendly.	Option 1) Improve report Option 2) Import to new CRM on daily basis
Opt-out notification	Calpine has discussed pushing an email notification to account managers.	This would solve this issue for both Options (along with a daily update to the new CRM).
Service Account ID, service address, rate schedules, CPA product tiers, program enrollment	Available in Calpine CRM and would be incorporated in DAP Phase I to map customer information to meter data	Option 1) no change Option 2) DAP feeds data to new CRM
Customized rate comparisons using historical data	Currently available through Calpine CRM/PowerBI. Modifying data output or updating customer presentation template is time-consuming process.	Option 1) improve report Option 2) HUD available in DAP Phase I and would feed to new CRM or available as DAP dashboard
Ability to add new major account customers	Addition of individual or batched customers to parent customer list currently done through request to Calpine	Option 1) no change Option 2) within DAP Phase I and feed to new CRM
Summary data on historical usage at parent customer level and by service	Calpine CRM does not provide access to HUD. Monthly billed usage is available by SA but not in a way that	Option 1) develop report Option 2) Available in DAP and feed to new CRM

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account (e.g. total usage by year and for most recent 12 months)	is easily accessed, aggregated or analyzed.	
Customized rate comparisons for parent customer by service account, using most recent 12 months of actual usage	Calpine indicated they are working on this.	Option 1) develop report Option 2) Available in DAP and feed to new CRM

These requirements will help Calpine determine if they can support the requirements. They will also help with the Phase I Data Analytics Platform to understand what information is important to account managers and to consider these into the design. Finally, these requirements will assist the Technology Analyst to have further discussions with Calpine on whether that data can be derived from the Calpine systems.

Calpine Interface

On the May 12th call with Calpine, there was a discussion on synching bi-directionally. Without Calpine having experience in the API (they are investigating whether they have that expertise or not), we would not recommend this approach. As described above in the requirements section, it appears that a one-way push of data from the Calpine CRM using the API (if they have expertise or want to develop it) or via a Comma Separated Values (CSV) file output (periodic report published) would be sufficient for the new CRM. If a bidirectional interface is required and the two systems need to be synchronized, we would recommend to delay this work to Phase 3.

In Phase 3 we are recommending an in-house CRM for all customers. This recommendation assumes that near real-time data from the Call Center interactions is available. At this point synching to the Calpine CRM would be a necessary component (unless other changes were made associated with Billing and Payments and Call Center support - see Future Scenarios section above). We are recommending this as a long -term solution, because we think the CRM is a key tool in program design and adoption and overall customer engagement. Much of this could be supported in the Data Analytics Platform Phase II and its associated dashboards, but we are also expecting that the DAP would provide customer usage data, forecast data, and customer information to the CRM. We would not suggest that data be sent to the Calpine CRM as we believe the CRM is an important component of CPA's business and in this Phase 3 effort should be brought in-house.

Future State

As described in the future state report, the CRM is highly related to Calpine as CPA's Billing & Payment provider and Customer Call Center support. Since Calpine is importing customer data from SCE and maintains key systems for customer billing and calls, they will have a great deal of control over the data. While it makes sense for Calpine to provide a CRM system with customer data as a service to CPA, the system does not appear to be configured to be useful for CPA customer engagement. As the primary and critical components of Calpine's service to CPA is the Billing & Payment process and the Customer Call Center support, it seems unrealistic to assume that Calpine will substantially improve their CRM offering.

We recommend that the future state focus on CPA's 500-1000 major accounts within a new CRM system that is configured for CPA's customer engagement business activities. This will require work to take the existing Calpine customer information and aggregate it (for customers like Kaiser with multiple meter accounts) and segment it so CPA Customer Account Managers can evaluate programs by customer segment.

This is work that is likely included in the Data Analytics Platform Phase I as it will be helpful to have the associated of meters to customers with multiple meters. The DAP environment, can perform this customer pre-processing and then load the data into a new CRM. This CRM would then be used by the Customer Account Managers to increase customer engagement with these major customers and be able to track customer contact within a CRM system configured and managed by CPA. This CRM could potentially be used to provide additional online services to CPA's major customers (e.g. on-line chat) that do not appear to be configured in the Calpine CRM.

The future state would evolve to increasing numbers of customers being included in the new CRM. Whether residential customers need to be ported eventually or if CPA decides that Calpine can provide mass market customer information through Power BI reports can be determined at a later time (Phase 3). This determination would depend on the functionality of the new CRM, the mass market programs that may be developed, and Calpine's ability to provide useful reports and analysis.

Since Calpine is providing critical customer services, the data flow will be dependent on Calpine to pass data to CPA in a timely and automated manner. The future state does anticipate access to billing, payment, and call center information, but in a preliminary call with Calpine (March 26) this does not appear to be easily accomplished. We are recommending a new CRM for major accounts that are preprocessed (through the DAP) to create a data structure within the CPA CRM to import and be useful to the Customer Account Managers. At this time, CPA could provide specific interface requirements for billing, payment, and call center information to Calpine to see if they could export that information for this limited set of major accounts. If this were successful, this would be extended to a broader group of customers to further enable customer engagement and program development.

There are several commercially available, cloud-based CRM solutions. Possible vendors include Salesforce, Microsoft Dynamics 365 (used by Calpine), Zendesk, Pegasystems, and Oracle CX Cloud Suite. These solutions have various platform environments that enable 3rd parties to develop add-ons (e.g. PowerPath) that may be useful to CPA as the programs develop and customer analysis increases.

The future state anticipates that increased customer information will be available through the Customer Data Store within the DAP. Developing this core data for 500-1000 major accounts will be important to capture the data required within the new CRM, but also to begin to define the future customer data information required for all customers. The architecture also assumes integration between rate setting and program development as the combination of the two will determine the customers' energy charges. Obtaining this early view of more advanced customer information for this set of major accounts will be helpful in the overall design of the Customer Data Store. The future state also anticipates the advanced customer analytics enabled by the DAP Phase II system will be available within the CRM for the major account engagement.

The new CRM is likely to be a cloud-based system with a minimal license fee as there are likely no more than four primary users. The customer information aggregation and segmentation, importing this data for the 500-1000 major accounts, and the configuration of the CRM is likely to be a significant amount of work over a two to four-month timeframe. The effort would require business experts and technology support (contracted or internal) familiar with the chosen CRM solution.