OPENING PHASE 2 PREPARED TESTIMONY OF TEMIX INC.

Rulemaking 20-11-003  
2021 Extreme Weather Event Reliable Electric Service  

September 1, 2021
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I.

EXECUTIVE SUMMARY

TeMix Inc. (TeMix) is the industry leading Transactive Energy Services Provider.¹

Rulemaking R.20-11-003 is an Order Instituting Rulemaking (OIR) effort to Establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the Event of Extreme Weather Events. In its related concept paper, the CPUC Energy Division (ED) staff encourages parties for Summer of 2022 and 2023 “to submit, as part of their testimony, their own proposed rule changes or program designs” to assist this OIR in meeting its stated goals.

Moreover, the ED staff recently held a workshop, on May 25th, 2021, outlining a 6-step roadmap to establish a Unified, universal, dynamic economic signal (UNIDE) to help meet similar goals defined in this OIR. The UNIDE roadmap steps are:

Step 1: Standardized universal access to current electricity prices
Step 2: Dynamic prices based on real-time, wholesale energy cost (opt-in)
Step 3: Modify prices per real-time localized grid conditions (opt-in)
Step 4: Bi-directional prices (buy & sell)
Step 5: A subscription option
Step 6: Transactive features to lock in price in advance.

And finally, the ED staff’s DER Action Plan 2.0 envisions using time and location-based dynamic rates to be offered as an opt-in basis across all customer classes by 2024 and a “universal access” pricing platform that will eventually need to support the UNIDE roadmap.

Clearly, in this OIR and other filings, the CPUC and its ED staff are signaling they are seeking industry input on how to best utilize flexible devices and decentralized DERs to assist in meeting goals highlighted in this OIR and other proceedings.

In this testimony, TeMix does not need to repeat the strong case of the drivers behind this OIR or the UNIDE roadmap as the ED staff has put forth already.

Instead, to help accelerate, these CPUC initiatives, TeMix is proposing to provide a pilot UNIDE platform that is a white-label Software-as-a-Service (SaaS) license of its commercial

¹ See www.temix.com.
TeMix RATES™ platform\(^2\) that can be utilized to host numerous pilots to support both the intent of this OIR and the UNIDE vision simultaneously. The pilots can be in any sector: residential, commercial, industrial, transportation and agriculture.

UNIDE and the Pilot UNIDE Platform are especially applicable to DERs that are highly flexible, and have significant size and two-way, year-round, capability such as storage and electric vehicles. Behind-the-meter and in-front-of-meter storage, especially commercial and industrial storage, will be especially beneficial to their owners and to the grid and its reliability because the UNIDE approach enables self-dispatched storage to provide its full stacked value in response to forward dynamic prices. Similarly, the UNIDE approach will enable full value from price responsive, self-dispatched electric vehicles of all types including both one-way and two-way, bi-directional charging for V2G integration. Given the increasing pace of deployment of storage and electric vehicles, it is critical that UNIDE pilots for storage and electric vehicles not be delayed by information technology development and unnecessary paper studies, adopt a common platform, and as soon as possible, begin their transition to full deployment by the parties.

II.

PILOT UNIDE PLATFORM PROPOSAL

By this Testimony, Exhibit (Ex.) TeMix-01, TeMix proposes to provide a Pilot UNIDE Platform.

The platform will use the TeMix RATES™ platform architecture, piloted in a CEC EPIC grant EPC-15-054 and Southern California Edison. TeMix proposes to provide the platform for pilots arising from this OIR, and for other pilots arising from other CPUC proceedings. TeMix proposes to provide this pilot platform for a period of 3 years or longer if requested.

The pilot UNIDE platform:

1. Transmits tariff prices to retail customer facilities including Distributed Energy Resources (DERs) and records transactions for settlement purposes.
2. Is securely hosted on Microsoft Azure™ cloud and can be operational by the end of 2021 for pilot implementation for Summer of 2022 and 2023.
3. Operates continuously, 24/7/365 on an hourly, 15-minute or 5-min intervals as needed.
4. Is interfaced with the CEC’s MIDAS system and can support MIDAS’ goals.

\(^2\) RATES is the Retail Automated Transactive Energy System as described in Exhibit B
5. Is used by large and small Load-serving Entities (LSEs), including Community-choice Aggregators (CCAs).

6. Is used by large and small Distribution Operators (DOs).

7. Uses an open standards-based information model developed by National Institute of Standards and Technology (NIST).

8. Requires no counterfactual baselines.

9. Provides Application Programming Interfaces (APIs) to the CAISO, DO, LSE metering, scheduling, and settlement systems as well as end-device manufactures.

10. Uses 3rd party internet, FM, and LTE communication mediums.

11. Uses TeMix Agents™ or 3rd party Agents via Application Service Providers (ASPs) and others for device optimization.

12. Is maintained 24/7/365.

13. Provides documentation, help desk, and web-based, self-paced, training to the CPUC, LSE/CCAs, DOs, ASPs, device vendors, ASPs, and end-customers.

Once an LSE or DO moves a tariff from a pilot to a production stage, TeMix will continue to provide the Platform under a separate agreement or agreements to be negotiated with the CPUC and/or the LSEs and DOs individually.

TeMix will provide the Pilot UNIDE Platform services described above for an annual fee that depends on the number of LSEs enrolled to perform UNIDE pilots and the total number of enrolled facilities as outlined in Table 1 below. The annual cost is the enrolled LSE cost plus the enrolled Facility cost.

Table 1: UNIDE Cost Matrix

<table>
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<tr>
<th>Enrolled LSEs</th>
<th>Annual LSE Cost</th>
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<tbody>
<tr>
<td>1</td>
<td>$350,000</td>
</tr>
<tr>
<td>Up to 3</td>
<td>$950,000</td>
</tr>
<tr>
<td>Up to 10</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Up to 25</td>
<td>$4,500,000</td>
</tr>
<tr>
<td>Total Enrolled Facilities</td>
<td>Annual Facilities Cost</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Up to 50,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Up to 100,000</td>
<td>$300,000</td>
</tr>
<tr>
<td>Up to 500,000</td>
<td>$1,200,000</td>
</tr>
</tbody>
</table>

For example, based on this Table 1, the Pilot UNIDE platform employed by 5 enrolled LSEs with a total of 100,000 facilities among the LSEs, would cost $2,500,000 plus $300,000, or $2,800,000 per year, $28.00 per customer/year, or 7 cents per customer/day. At 10 LSEs and 500,000 facilities the cost would be about 2 cents per customer/day.

TeMix is prepared to execute a service contract for this information technology system with the CPUC, or other CPUC designated entities, and provide the Pilot UNIDE Platform under the terms described herein.

III. CONCLUSION

TeMix applauds the vision and work of the CPUC in this proceeding and in the UNIDE roadmap. TeMix is pleased to propose a Pilot UNIDE Platform that will support: (1) increased load and supply responses to Extreme Weather Events for 2022, 2023 and beyond; (2) implementation of the CPUC UNIDE vision; and (3) achievement of California’s clean energy transition, DER, and electrification goals at the lowest possible cost.
EXHIBIT A

STATEMENT OF QUALIFICATIONS OF EDWARD G. CAZALET, Ph.D.

Q1 Please state your name and business address.
A1 My name is Edward G. Cazalet, and my business address is TeMix Inc., 221 Main Street, #360, Los Altos, CA 94023

Q2 Briefly describe your present employment.
A2 I am the CEO of TeMix Inc.

Q3 Please summarize your professional and educational background. (Please see attached resume)
A3 I am a graduate of Stanford University with a PhD in Engineering-Economic Systems. I have also received MSc and BSc degrees in Engineering from the University of Washington. I have decades of experience in the electric power industry. I was a founder of Decision Focus, Inc., Automated Power Exchange Inc., and MegaWatt Storage Farms, Inc. Previously I was a Governor of the California ISO. I also served as the co-chair of the OASIS Energy Market Information Exchange Technical Committee that developed the information model standards for transactive energy.

Q4 Have you previously testified on behalf of TeMix Inc., before the California Public Utilities Commission?
A4 No, I have not previously testified before the Commission on behalf of TeMix Inc.

Q5 What is the purpose of your testimony?
A5 The purpose of my testimony is to sponsor Exhibit TeMix-01: OPENING PHASE 2 PREPARED TESTIMONY of TeMix Inc.

Q6 Was Exhibit TeMlx-01 prepared by you?
A6 Yes.
Q7 Are the statements made in your testimony true and correct to the best of your knowledge and belief?

A7 Yes.

Q8 To the extent that Exhibit TeMix-01 contains expressions of opinion, do they represent your best professional judgment?

A8 Yes.

Q9 Do you adopt Exhibit TeMix-01 as your sworn testimony in R.20-11-003 (Extreme Weather)?

A9 Yes.

Q10 Does this conclude your statement of qualifications?

A10 Yes, it does.

VERIFICATION

I, Edward G. Cazalet am authorized to make this verification on behalf of TeMix Inc.

I declare under penalty of perjury that the statements in the foregoing Testimony are true of my own knowledge, except as to matters which are therein stated on information or belief, and as to those matters, I believe them to be true.

Executed on September 1, 2021, at Los Altos, California.

/s/
Edward G. Cazalet
Resume of Edward G. Cazalet, Ph.D.

Dr. Cazalet is a leader in (1) the design and operation of transaction services for electricity, (2) the commercialization of electricity storage, and (3) quantitative modeling and analysis of corporate and public energy decisions.

Ed is the founder and CEO of TeMix Inc., a transactive energy services company and a founder and VP of MegaWatt Storage Farms Inc., an independent grid storage advisory and policy firm. He was previously a Governor of the California Independent System Operator (CAISO). He was also the founder and CEO of Automated Power Exchange (APX), the first on-line, wholesale power exchange and Decision Focus, Inc. (DFI), an energy and transportation consulting firm. Earlier, he was a senior consultant and manager at Stanford Research Institute (SRI). He has decades of energy industry experience in executive decision analysis consulting, government policy analysis, grid and energy system modeling, market operations, and grid storage for a wide range of corporations and government agencies.

Dr. Cazalet is a leader in technology for automated transactions for electric power as a key element of the “internet of things”. He advocates electricity market designs using price responsive demand and forward contracts to support high penetration of variable renewables and reliable decentralized grid operations. He has extensive experience in designing, building, and operating high-speed, reliable transaction systems for electric power that interface with existing transaction systems and markets. He was the principal investigator on a $3.2 million, California Energy Commission funded pilot of a Retail Automated Transactive Energy System (RATES) with Southern California Edison.

Dr. Cazalet is also a leader in standards development for demand response, distributed energy resources, storage, dynamic pricing, and transactive retail electricity tariffs. He is the lead author of the Organization for Advancement of Structured Information Standards (OASIS) Transactive Energy standards.
Dr. Cazalet holds a Ph.D. from Stanford University focused on economics, decision analysis and power systems. He also holds BS and MS degrees in engineering from the University of Washington.
EXHIBIT B

DESCRIPTION OF TEMIX RATES™

The TeMix Platform™ uses the latest in SaaS architecture, deployed on-premises or cloud-centric, to store and forward payloads (messages) using a profile of the NIST open-standard eMix protocol; known as TeMix, to and from the participating parties to create a Transactive Electricity Market (TEM). The primary messages are Tenders (binding offers, price, and quantity, to deliver electricity) and Transactions (acceptance, in-part or whole, of a Tender). All messages are stored securely in the TeMix Platform™ distributed ledger. There can be multiple ledgers connected in one TEM to support scaling 5-minute, 15-minute, and hourly transactions for millions of parties and their devices. The TeMix Platform™ processes transactions for contract settlement, auditing, and compliance related matters.

The TeMix Agents™ are lightweight artificial intelligence and machine learning models that reside on an electrical consuming device controller, in the cloud, or on an edge-gateway. The agents perform optimization routines, unique to each device, to determine the most beneficial operation of the device based on the device owner’s comfort vs. savings preferences for that device and current tender prices, usage forecast, and other variables such as weather.

The TeMix Interface™ is between the TeMix protocol and any party or facility such as a Load Serving Entity (LSE), Distribution Operator (DO), Wholesale ISO or RTO, end customer facility, standalone generator, or standalone storage.

TeMix RATES™ is an application of the TeMix technologies. It is a low-cost, complete system for coordinating investment and operations for all parties on a distribution grid. RATES can support many tariffs (static or dynamic) such as Time-of-Use (TOU), Critical-Peak Pricing (CPP) and Real-Time Pricing (RTP). However, the power of RATES is fully realized using the Subscription Transactive Tariff (STT).

The STT’s subscription element supports customer and supplier bill stability and investment coordination. The transactive element coordinates operation of all electric devices and grid operations. Importantly, most applications of RATES do not require regulatory or organizational changes, such as the development of a centralized distribution system operator (DSO). The creation and approval of a STT for a set of customers is the first step to deploy RATES.