

Rulemaking No.: 20-11-003.

Exhibit No.: TeMix 01

Witnesses Edward G. Cazalet, Ph.D.

Commissioner Marybel Batjer

ALJ Brian Stevens

**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.

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28 TeMix RATES™ platform² that can be utilized to host numerous pilots to support both the intent
29 of this OIR and the UNIDE vision simultaneously. The pilots can be in any sector: residential,
30 commercial, industrial, transportation and agriculture.

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

42 **II.**

43 **PILOT UNIDE PLATFORM PROPOSAL**

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

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

50 The pilot UNIDE platform:

- 51 1. Transmits tariff prices to retail customer facilities including Distributed Energy
52 Resources (DERs) and records transactions for settlement purposes.
- 53 2. Is securely hosted on Microsoft Azure™ cloud and can be operational by the end of
54 2021 for pilot implementation for Summer of 2022 and 2023.
- 55 3. Operates continuously, 24/7/365 on an hourly, 15-minute or 5-min intervals as needed.
- 56 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

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Total Enrolled Facilities	Annual Facilities Cost
Up to 50,000	\$150,000
Up to 100,000	\$300,000
Up to 500,000	\$1,200,000

81

82 For example, based on this Table 1, the Pilot UNIDE platform employed by 5 enrolled
83 LSEs with a total of 100,000 facilities among the LSEs, would cost \$2,500,000 plus \$300,000, or
84 \$2,800,000 per year, \$28.00 per customer/year, or 7 cents per customer/day. At 10 LSEs and
85 500,000 facilities the cost would be about 2 cents per customer/day.

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

89

III.

90

CONCLUSION

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

96 **EXHIBIT A**

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

98 Q1 *Please state your name and business address.*

99 A1 My name is Edward G. Cazalet, and my business address is TeMix Inc., 221 Main Street,
100 #360, Los Altos, CA 94023

101 Q2 *Briefly describe your present employment.*

102 A2 I am the CEO of TeMix Inc.

103 Q3 *Please summarize your professional and educational background. (Please see attached*
104 *resume)*

105 A3 I am a graduate of Stanford University with a PhD in Engineering-Economic Systems.

106 I have also received MSc and BSc degrees in Engineering from the University of Washington. I
107 have decades of experience in the electric power industry. I was a founder of Decision Focus,
108 Inc., Automated Power Exchange Inc., and MegaWatt Storage Farms., Inc. Previously I was a
109 Governor of the California ISO. I also served as the co-chair of the OASIS Energy Market
110 Information Exchange Technical Committee that developed the information model standards for
111 transactive energy.

112 Q4 *Have you previously testified on behalf of TeMix Inc., before the California Public Utilities*
113 *Commission?*

114 A4 No, I have not previously testified before the Commission on behalf of TeMix Inc.

115 Q5 *What is the purpose of your testimony?*

116 A5 The purpose of my testimony is to sponsor Exhibit TeMix-01: OPENING PHASE 2 PREPARED
117 TESTIMONY of TeMix Inc.

118 Q6 *Was Exhibit TeMix-01 prepared by you?*

119 A6 Yes.

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120 Q7 *Are the statements made in your testimony true and correct to the best of your knowledge*
121 *and belief?*

122 A7 Yes.

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

125 A8 Yes.

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

127 A9 Yes.

128 Q10 *Does this conclude your statement of qualifications?*

129 A10 Yes, it does.

130 **VERIFICATION**

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

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

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

136 _____/s/_____

137 Edward G. Cazalet

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139 **Resume of Edward G. Cazalet, Ph.D.**

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

143 Ed is the founder and CEO of TeMix Inc., a transactive energy services company and a founder
144 and VP of MegaWatt Storage Farms Inc., an independent grid storage advisory and policy firm.

145 He was previously a Governor of the California Independent System Operator (CAISO). He was
146 also the founder and CEO of Automated Power Exchange (APX), the first on-line, wholesale
147 power exchange and Decision Focus, Inc. (DFI), an energy and transportation consulting firm.

148 Earlier, he was a senior consultant and manager at Stanford Research Institute (SRI). He has
149 decades of energy industry experience in executive decision analysis consulting, government
150 policy analysis, grid and energy system modeling, market operations, and grid storage for a wide
151 range of corporations and government agencies.

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

160 Dr. Cazalet is also a leader in standards development for demand response, distributed energy
161 resources, storage, dynamic pricing, and transactive retail electricity tariffs. He is the lead author
162 of the Organization for Advancement of Structured Information Standards (OASIS) Transactive
163 Energy standards.

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164 Dr. Cazalet holds a Ph.D. from Stanford University focused on economics, decision analysis and
165 power systems. He also holds BS and MS degrees in engineering from the University of
166 Washington.

167

EXHIBIT B

168 **DESCRIPTION OF TEMIX RATES™**

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

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

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

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

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