Exhibit to Agenda Item #1

a. Provide the Board an overview of Virtual Power Plants (VPP) and application within the industry.
b. Brief the Board on SMUD’s VPP pilot.

Board Energy Resources & Customer Services Committee and Special SMUD Board of Directors Meeting
Tuesday, June 16, 2021, scheduled to begin at 5:30 p.m.
Virtual Meeting (online)
Virtual Power Plants in the 2030 Plan

2021 - 2030 Timeline:

2021:
- Natural gas generation repurposing
- Proven clean tech
- New tech & business models
- Financial impact & options

2023:
- McClellan
- Campbell
- Carson

2025:
- Solar: 500-750 MW
- Batteries: 50-250 MW

2027:
- 850-1,250 MW
- 300-600 MW
- 600-1,000 MW
- 100-220 MW

2030:
- Procter & Gamble
- Cosumnes

Key Focus Areas:
- Re-assess, adjust, prioritize, scale
- Partnerships, grants, joint ventures
- Financial impact & options
- Identify internal savings
- Assess & mitigate financial risks
- Regulatory and legislative advocacy for zero carbon solutions

VPP Pilots
- 44-254 MW

V2G Pilots
- Research game changing tech: Storage, biodeserts, desalination

SMUD
SMUD’s Virtual Power Plant Journey

- **2013**: Anatolia PV and Smart Grid Pilots
- **2014**: 2500 R Street Integrated Energy Management Pilot
- **2017**: Began development of a Distributed Energy Resource Management System
- **2018-2019**: Launched Power Minder and Smart Energy Optimizer Pilots
- **2020-2021**: StorageShares: Construction of Hedge 4MW Distribution Sited Storage System
- **2021**: Q1 RFO for Multi-DER VPP Released. Q3 RFP for Storage VPP Planned
- **Support for the 2030 Zero Carbon Plan**
Upcoming Virtual Power Plant Pilots

- Multi-DER Virtual Power Plant
- Vehicle to Grid & EV Managed Charging
- Storage Based Virtual Power Plant
Multi-DER Virtual Power Plant

- Technology aggregator to provide load flexibility through automated device response and incentives
  - Residential Thermostats, EVs, Batteries
- Optional Critical Peak Price (CPP) rate to provide customer benefit and additional price signals
  - Pilot will include control groups and non-CPP incentive-based groups
- Day ahead/Day of event notifications
- Future Integration with DERMS for streamlined operation

2021
RFQ Released and CPP Rate Proposed

2022
Customer Enrollment, Operation Begins Summer 2022

2023
Performance Evaluation and Consideration of Technology Expansion

2024+
Quantify Operational Confidence, Consolidate Solutions and Optimize
Storage Based Virtual Power Plant

- Near real time dispatch of behind the meter batteries through a 3rd party aggregator
- Intended for residential and commercial customers
- Initial battery incentive up to $2,500 for residential customers
- Participation payments based on grid benefits
  - Final benefits dependent upon aggregator costs

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<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>2021</td>
<td>Launch Aggregator RFP</td>
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<td>2022</td>
<td>Aggregator Integration and Preliminary Customer Enrollment</td>
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<td>2023</td>
<td>Operation of VPP, Technology &amp; Aggregator Expansion</td>
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<tr>
<td>2024+</td>
<td>Quantify Operational Confidence, Consolidate Solutions and Optimize</td>
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Vehicle to Grid Pilots

• Vehicle to Home, Building, or Grid (V2H, V2B, or V2G) adds the capability of discharging EV energy out the charger
  • V2G supplements EV charge management (traditional load flexibility or demand response) and introduces VPP capabilities

• Currently planning a V2G demonstration with Twin Rivers Unified School District
  • ~1 MW of discharge capable electric school buses

• Exploring additional Commercial and Residential Light Duty V2G project opportunities

| 2021 | 2022 | 2023 | 2024+
|------|------|------|------
| Scope demonstration projects | Launch demonstrations & scope pilots | Launch pilots | Pilot evaluation and planning for expansion |
Moving VPPs From Idea to Implementation

- Customer Partners
- 3rd Party Aggregators
- Grid Operations (Today)
- Power Market Participation
- Grid Planning (Future)
To Scale Up, Normal Processes Need to Adapt

- Load and Adoption Forecasting
- Integrated Resource Planning (IRP)
- Grid Operations (Including DERMS)
- Distribution Resource Planning (DRP)
- Customer Engagement and Enrollment

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<td>Specific Purpose</td>
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<td>20+ Year Equipment Life</td>
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<td>5 – 20 Year Equipment Life</td>
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Questions?