Exhibit to Agenda Item #1

Provide the Board an informational presentation and executive summary on the 2030 Zero Carbon Plan Progress Update.

Board Energy Resources & Customer Services Committee and Special SMUD Board of Directors Meeting

Wednesday, April 19, 2023, scheduled to begin at 6:00 p.m.
2030 Zero Carbon Plan

2022 accomplishments
2023 priorities

April 19, 2023
• **Zero carbon overview** — Joel Ledesma, Director Power Generation

• **Utility-scale** — Joel Ledesma
  - New Tech
  - Proven Clean Technology

• **Customer Programs & Initiatives** — Ed Hamzawi, Director Advanced Energy Solutions
  - Program Portfolios
  - Communications, Marketing & Outreach
  - Community Impact Plan
Zero carbon overview

- **Goal:** Eliminate CO₂ from SMUD’s power supply

- **New technology & business models**
  - Pilot & scale new projects and programs
  - 2x savings from energy efficiency & building electrification
  - Education & demand flexibility
  - Virtual power plants & vehicle-to-grid technology
  - New grid-scale technologies

- **Maximize community benefits**
  - Keep affordable rates & reliable power
  - Improve local air quality & overall community health
  - Reduce regional impacts of carbon – drought, wildfires & extreme weather
  - Create regional clean tech jobs
  - Strengthen all communities
  - Support under-resourced communities
  - Involve our customers & community in the transition

- **Financial**
  - Pursue grants & partnerships
  - Limit rate impacts to rate of inflation

- **Natural gas generation repurposing**
  - Replace 2 power plants with renewable and storage resources and retrofit remaining 3 to minimize emissions

- **Proven clean technology**
  - Expand SMUD’s renewable and battery storage resources by 3.5x
  - Equivalent to energy needs of more than 600,000 homes

- **Financial**
  - Reduction of greenhouse gas emissions

- **Goal:** Zero carbon by 2030

- **$2 billion investment**
  - Thousands of new regional clean tech jobs

- **$2.5 billion investment**

April 19, 2023

Board Energy Resources & Customer Services Committee and Special SMUD Board of Directors Meeting
Total new renewable resources (MWs) including storage & Distributed Energy Resources
Work in progress vs 2030 Zero Carbon Plan

- Transitional phase now – 2030.
- Steep climb to achieve goals.
- Uncertain economy continues to create challenges.
- Developing pipeline of projects for future years.
- Greenhouse gas emissions (GHGs)
  - Prior to 2026: Similar to historical & driven by hydro
  - After 2026: Step change reduction after large local utility scale solar + battery projects come on-line
SMUD's Greenhouse Gas Emissions
Growing our Carbon-Free Renewable Resources

- 2010-23: + 1000 MW
- 2021-23: + ~370 MW
- 2024- : > 1500 MW in various stages of planning & development
  - Many locally to support natural gas transition plan
- More to develop as part of the ZCP

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>MW</th>
<th>Equivalent Annual GHG Emissions Reductions (MT)</th>
<th>Equivalent Light Duty Vehicles Removed from Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>378</td>
<td>512,014</td>
<td>110,586</td>
</tr>
<tr>
<td>Solar</td>
<td>442</td>
<td>290,865</td>
<td>62,822</td>
</tr>
<tr>
<td>Geothermal</td>
<td>151</td>
<td>441,908</td>
<td>95,445</td>
</tr>
<tr>
<td>Biogas/Biomass</td>
<td>19</td>
<td>47,541</td>
<td>10,268</td>
</tr>
<tr>
<td>Hydro</td>
<td>10</td>
<td>5,699</td>
<td>1,231</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,000</td>
<td><strong>1,298,026</strong></td>
<td><strong>280,351</strong></td>
</tr>
</tbody>
</table>

*Approximate GHG reductions based on SMUD’s thermal fleet average carbon intensity factor of 0.39 MTGHG/MWh.

Renewable Resource Additions 2010-2023

- 2010-23: + 1000 MW
- 2021-23: + ~370 MW
- 2024- : > 1500 MW in various stages of planning & development
  - Many locally to support natural gas transition plan
- More to develop as part of the ZCP

Growing our Carbon-Free Renewable Resources

Normalized (SD9) and Non-Normalized (SD7) GHG Emissions

- 20190 GHG Emissions
- 2020 SD9 Goal

[Graph showing normalized and non-normalized GHG emissions over years from 2014 to 2021]
Utility-Scale
Hydrogen – ARCHES – State hub concept

New Tech

- Department of Energy (DOE) regional Clean Hydrogen Hubs (H2Hubs) program.
- **$7 billion** to establish 8 -10 H2Hubs across U.S.
- Selection of regional hubs expected in fall 2023.
- ARCHES encouraged by DOE to submit full-length proposal.
- SMUD concepts are “alternatives” in the ARCHES proposal.
  - **Concept 1:** Electrolytic hydrogen production to support power, transportation & industrial applications.
  - **Concept 2:** Thermochemical conversion of biomass to hydrogen to support power, transportation and industrial applications.
Long-duration energy storage & carbon capture & storage

New Tech

Long-duration energy storage
• ESS partnership – Phase 1
  • Demonstration (4 MW/24 MWH).
  • Construction began April 2023.
  • Expected COD Fall 2023.
• Pursuing another technology to pilot.

Carbon capture & storage
• Exploring potential PPA for carbon capture with Calpine at Sutter Energy Center.

April 19, 2023
9
Board Energy Resources & Customer Services Committee and Special SMUD Board of Directors Meeting
- SMUD Board approval on March 16, 2022.
- 10-year power purchase agreement.
- 100 MWs of energy from Calpine’s operations at The Geysers.
- Adds 100 MWs of geothermal energy to SMUD’s portfolio, enough to power about 100,000 homes for a year. The addition of this renewable energy source is equivalent to removing 342,000 metric tons of greenhouse gas emissions.

Located north of San Francisco, The Geysers is the single largest geothermal electrical operation in the world.
Solano 4 Wind project

Proven Clean Tech

• **Decommissioning Phase: Solano 1**
  (Completion May 2023)
  - Removing 23 wind turbines.
  - 0.66 MW each, 15 MW total.

• **Construction Phase: Solano 4**
  (Begins April 2023)
  - Installing 19 wind turbines:
    9 Solano 4 East, 10 Solano 4 West.
  - 4.5 MW each, 85.5 MW total.
  - Commercial Operation Date expected May 2024.

• **SMUD Solano assets**
  (May 2024)
  - Solano 2, 3, & 4 will have a total installed capacity of 300 MW.
Country Acres (PPA)
344 MW / 172 MW

Coyote Creek (PPA)
200 MW / 100 MW

Sloughhouse (PPA)
50 MW

All 3 projects in Permitting Phase. Commercial Operation Date forecast of early 2026.
<table>
<thead>
<tr>
<th>Year</th>
<th>Project</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>30 MW</td>
<td>40 MW</td>
</tr>
<tr>
<td>2022</td>
<td>Drew/NTUA (PPA)</td>
<td>100 MW</td>
</tr>
<tr>
<td></td>
<td>Calpine (PPA)</td>
<td>100 MW</td>
</tr>
<tr>
<td></td>
<td>Hedg - Lithium</td>
<td>91 MW</td>
</tr>
<tr>
<td></td>
<td>Iron Flow LDES (ESS)</td>
<td>TBD - 1.5 MW</td>
</tr>
<tr>
<td>2023</td>
<td>2.5 MW</td>
<td>TBD</td>
</tr>
<tr>
<td>2024</td>
<td>344 MW</td>
<td>172 MW</td>
</tr>
<tr>
<td></td>
<td>Country Acres (PPA)</td>
<td>70 MW</td>
</tr>
<tr>
<td></td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>2025</td>
<td>200 MW</td>
<td>100 MW</td>
</tr>
<tr>
<td></td>
<td>Coyote Creek (PPA)</td>
<td>80 MW</td>
</tr>
<tr>
<td></td>
<td>50 MW</td>
<td>TBD</td>
</tr>
<tr>
<td>2026</td>
<td>Slough House (PPA)</td>
<td>TBD</td>
</tr>
<tr>
<td>2027</td>
<td>CCS</td>
<td>250-300 MW</td>
</tr>
<tr>
<td></td>
<td>Carbon Capture</td>
<td>70 MW (PPA)</td>
</tr>
<tr>
<td></td>
<td>w/Calpine at Sutter</td>
<td>38-438 MW</td>
</tr>
<tr>
<td></td>
<td>220-440 MW</td>
<td>156 MW / 78 MW TDB</td>
</tr>
<tr>
<td>2028</td>
<td></td>
<td>275 MW / 138 MW TBD</td>
</tr>
<tr>
<td>2029</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Red – Complete
Green – In Progress
Blue – Prospective - Local
Purple – Prospective - Regional
Customer Programs & Initiatives
2022 accomplishments / 2023 priorities

Customer Zero Carbon Program Portfolios

- All-Electric Equivalent Homes
  - 2023 All-Electric Equivalent Homes
  - 2023 Program Plan
  - YTD AEH Program Actual

- Electric Vehicles
  - 2023 Electric Vehicles
  - Program Plan
  - YTD Program Actual

- Distributed Energy Resources
  - 2023 Distributed Energy Resources (DER)
  - Program Plan
  - YTD Program Actual

- All-Electric Equivalent Homes by 2030
  - Plan
  - Actual

- Electric Vehicles by 2030
  - Plan
  - Actual

- DER Cumulative MW by 2030
  - Plan
  - Actual
Key metrics & milestones
Building Electrification and Energy Efficiency

<table>
<thead>
<tr>
<th></th>
<th>2022 Final</th>
<th>2023 March Actual</th>
<th>2023 Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Pump HVAC Conversions</td>
<td>2,109</td>
<td>510</td>
<td>2,180</td>
</tr>
<tr>
<td>Heat Pump Water Heater Conversions</td>
<td>897</td>
<td>191</td>
<td>1,000</td>
</tr>
<tr>
<td>Induction Cooktop Conversions</td>
<td>256</td>
<td>84</td>
<td>300</td>
</tr>
<tr>
<td>All Electric New Homes &amp; Multifamily Units Constructed</td>
<td>1,299</td>
<td>158</td>
<td>750</td>
</tr>
<tr>
<td>Multifamily Units Retrofitted</td>
<td>954</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Commercial Retrofit Projects</td>
<td>311</td>
<td>44</td>
<td>500</td>
</tr>
<tr>
<td>All Electric Equivalent Homes (Cumulative)</td>
<td>57,000</td>
<td>57,925</td>
<td>61,287</td>
</tr>
</tbody>
</table>

**In progress:**
- Relaunch of Home Electricity Reports
- Community Impact Plan offerings
- HPWH SMUD Energy Store turnkey solution
- Carbon free loans

April 19, 2023
Board Energy Resources & Customer Services Committee and Special SMUD Board of Directors Meeting
2022 accomplishments 

- Residential Neighborhood Electrification – Gardenland (150+ measures).
- Commercial Business District Electrification – Partnership with Sacramento Hispanic Chamber of Commerce (ARPA funds) in Gardenland.
- Regional Workforce Development – 90 people received workforce education, 105 people received training & skills development, & 16 people in job placement.
- Inclusive Economic Development – expanded partnerships with 14 Property Business Improvement Districts.

2023 priorities:

- Carbon Free Loan program – Financing options for median-income customers.
- Residential & Commercial Electrification – North Highlands, Meadowview, Gardenland.
- Shine Awards – Increased investment to ensure reach.
- Community Ambassadors – Targeted outreach and education.
Key metrics & milestones
Transportation Electrification

<table>
<thead>
<tr>
<th></th>
<th>2022 Actual</th>
<th>2023 March Actual</th>
<th>2023 Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential EV Chargers Installed</td>
<td>577</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>Commercial EV Chargers</td>
<td>349</td>
<td>42</td>
<td>355</td>
</tr>
<tr>
<td>Residential EV Rate Participants (Cumulative)</td>
<td>17,229</td>
<td>19,027</td>
<td>22,620</td>
</tr>
<tr>
<td>E-Fuel Solutions Projects</td>
<td>-</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Managed Charging Pilot Participants (Cumulative)</td>
<td>297</td>
<td>330</td>
<td>1000</td>
</tr>
<tr>
<td># of Light Duty EV's in Service Territory (Cumulative)</td>
<td>32,396</td>
<td>34,796</td>
<td>39,000</td>
</tr>
</tbody>
</table>

In progress:

- Expanding home charger contractor network
- ChargeReady Community (REACH) project

- SMUD Energy Store home charger installation offering
- Vehicle-To-Grid (V2G) research and pilot projects
Vehicle to Grid (V2G) Research & Pilots

**Electric school bus V2G**
- Awaiting charger commissioning then testing.
- Seeking additional candidate school bus fleets.

**Light-duty V2G**
- Initial testing completed - fleet Nissan Leaf with Fermata bidirectional charger.
- Federal grant applications partnered with GM, Nissan and Ford.
- Customer pilots in planning.
Key metrics & milestones
Load Flexibility and Battery Storage

<table>
<thead>
<tr>
<th></th>
<th>2022 Actual</th>
<th>2023 March Actual</th>
<th>2023 Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Energy Optimizer Smart Thermostats (Cumulative)</td>
<td>12,503</td>
<td>16,119</td>
<td>16,000</td>
</tr>
<tr>
<td>My Energy Optimizer Starter Batteries (Cumulative)</td>
<td>144</td>
<td>218</td>
<td>306</td>
</tr>
<tr>
<td>My Energy Optimizer Partner+ Batteries</td>
<td>-</td>
<td>0</td>
<td>400</td>
</tr>
<tr>
<td>Peak Conserve (NextGen ACLM) enrollments</td>
<td>-</td>
<td>0</td>
<td>2,000</td>
</tr>
<tr>
<td>PowerDirect Commercial Customers (Cumulative)</td>
<td>36</td>
<td>42</td>
<td>82</td>
</tr>
<tr>
<td>Total MW (Cumulative)</td>
<td>30</td>
<td>34</td>
<td>41</td>
</tr>
</tbody>
</table>

In progress:

- My Energy Optimizer Partner+ Battery launch
- My Energy Optimizer Thermostat Critical Peak Pricing expansion
- Peak Conserve (Next Gen ACLM) launch
- PowerDirect small-medium businesses expansion
Key metrics & milestones

Green Pricing

<table>
<thead>
<tr>
<th></th>
<th>2022 Actual</th>
<th>2023 March Actual</th>
<th>2023 Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Greenergy customers</td>
<td>65,257</td>
<td>66,296</td>
<td>69,000</td>
</tr>
<tr>
<td>Commercial Greenergy customers</td>
<td>1,621</td>
<td>1,582</td>
<td>1,600</td>
</tr>
<tr>
<td>Neighborhood SolarShares homes (Cumulative)</td>
<td>489</td>
<td>489</td>
<td>796</td>
</tr>
<tr>
<td>Commercial SolarShares Customers / Accounts</td>
<td>30 / 436</td>
<td>30 / 437</td>
<td>30 / 436</td>
</tr>
<tr>
<td>Total Qualifying GWh Sales</td>
<td>762</td>
<td>160</td>
<td>770</td>
</tr>
<tr>
<td># of trees planted</td>
<td>9,525</td>
<td>2,302</td>
<td>10,000</td>
</tr>
</tbody>
</table>

In progress:

- Development of Existing Home SolarShares program
- Planning for Commercial Renewable Shares offerings
- Planning for Community Solar for schools & nonprofits
- Expanding community tree plantings
2022 accomplishments / 2023 priorities

Solar: Behind the Meter

Solar Applications

<table>
<thead>
<tr>
<th>Year</th>
<th>Retrofit</th>
<th>New Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>3,949</td>
<td>4,968</td>
</tr>
<tr>
<td>2022</td>
<td>3,601</td>
<td>4,746</td>
</tr>
<tr>
<td>2023 (thru 3/28)</td>
<td>469</td>
<td>605</td>
</tr>
</tbody>
</table>

Solar Installations - Residential

<table>
<thead>
<tr>
<th>Year</th>
<th>Retrofit</th>
<th>New Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>2,815</td>
<td>1,749</td>
</tr>
<tr>
<td>2019</td>
<td>2,373</td>
<td>2,094</td>
</tr>
<tr>
<td>2020</td>
<td>2,470</td>
<td>2,510</td>
</tr>
<tr>
<td>2021</td>
<td>2,553</td>
<td>2,999</td>
</tr>
<tr>
<td>2022</td>
<td>3,033</td>
<td>3,988</td>
</tr>
<tr>
<td>2023 (thru 3/28)</td>
<td>383</td>
<td>659</td>
</tr>
</tbody>
</table>

Solar MWs

<table>
<thead>
<tr>
<th>Year</th>
<th>Commercial Installs</th>
<th>Residential Installs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>3.3</td>
<td>26.6</td>
</tr>
<tr>
<td>2022</td>
<td>6.1</td>
<td>33.8</td>
</tr>
<tr>
<td>2023 (thru 3/28)</td>
<td>5.6</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Solar Installations - Commercial

<table>
<thead>
<tr>
<th>Year</th>
<th>Retrofit</th>
<th>New Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>56</td>
<td>4</td>
</tr>
<tr>
<td>2019</td>
<td>35</td>
<td>3</td>
</tr>
<tr>
<td>2020</td>
<td>61</td>
<td>91</td>
</tr>
<tr>
<td>2021</td>
<td>31</td>
<td>141</td>
</tr>
<tr>
<td>2022</td>
<td>67</td>
<td>202</td>
</tr>
<tr>
<td>2023 (thru 3/28)</td>
<td>4</td>
<td>27</td>
</tr>
</tbody>
</table>
END