Energy Operations
2020 Proposed Budget & Initiatives

Paul Lau
Chief Grid Strategy & Operations Officer
## Energy Operations

### Business Segments and Functions

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Distribution System Planning</td>
<td>Energy Trading</td>
<td>Climate Change</td>
<td>New Business Development</td>
</tr>
<tr>
<td>System Protection and Control</td>
<td>Power / Gas Contracts &amp; Reserves</td>
<td>Renewable and Distributed Generation</td>
<td>Strategic Planning</td>
</tr>
<tr>
<td>PSO/DSO Training</td>
<td>Energy Imbalance Market</td>
<td>Energy Storage, Load Flexibility, &amp; Grid Evolution</td>
<td></td>
</tr>
<tr>
<td>Energy Imbalance Market</td>
<td>Manage Commodity Risk</td>
<td>Energy Efficiency &amp; Building Electrification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Optimize Energy Operations Assets</td>
<td>Transportation Electrification</td>
<td></td>
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</tbody>
</table>

### Notable Areas:
- Energy Operations
- Business Segments & Functions
- Commodity Procurement & Sales
- Energy Strategy, Research & Development
- Resources & New Business Strategy
2020 Proposed Budget by Theme

- Keeping the Lights On: $54.9M
- Optimization/Operational Excellence: $32.2M
- Risk Mitigation: $3.0M
- Embracing the Future: $142.7M

Allocated Costs: $47.5M

SMUD Board of Directors Meeting - Budget 2020
Reliability and Compliance
- Load serving capability
  - Upgrade Hurley - Proctor transmission line for increased capability
  - Install capacitors to increase voltage support at Natomas and Foothill substations
- Additional Distribution capacity
  - Add four new neighborhood substations
  - Site selection for future substation to serve the Railyards and surrounding area development
- Adding remote monitoring & control at distribution substations by leveraging infrastructure replacement programs
- Regulatory compliance with all applicable standards
Optimization and Operational Excellence

- Market Optimization
  - Balancing Authority of Northern California’s (BANC) implementation of California Independent System Operator’s (CAISO) Energy Imbalance Market (EIM) - Phase II
  - Extended Day Ahead Market (EDAM) Stakeholder Process
  - Redesign of the Commodity Risk Management Process
  - Renewable Portfolio Standard (RPS) Optimization

(SD-2, 3, 9)

Potential Future Annual Net Returns of $8M – $23M
Risk Mitigation

- Wildfire Mitigation Plan
  - Upper American River Project (UARP) Easement Widening
  - Light Detection and Ranging (LiDAR) Vegetation Management
  - UARP Fuels Reduction
  - State Responsibility Area (SRA) Hardening (Non-Expulsion equipment)
  - Pilot to underground a distribution line within the UARP
  - Pilot covered distribution conductors
  - Drone pilot for tower inspections within the UARP

- Tertiary Control Center
  - Utilize existing facilities to mitigate risks and reduce costs
  - On-going repairs of existing Control Centers to allow operations to continue

(SD-6)

(SD-17)
Embracing the Future

- Foundational technology for the future
  - Advanced Distribution Management System (ADMS)
  - Distributed Energy Resource Management System (DERMS)

- Pursue new net revenue opportunities
  - Operationalize the California Mobility Center (CMC)
  - Leverage existing partnerships and new opportunities
    - Open Systems International (OSI) ADMS/DERMS
    - Explore electrification and distributed energy resources
      - Electric Vehicle (EV) Charging Infrastructure as a Service
Embracing the Future

- Integrated Resource Plan
  - Implementation of Board adopted IRP
    - Implement new and expanded programs to increase building and transportation electrification
    - Completion of the integrated Distribution Resource Plan (iDRP)
  - Energy Storage
    - Develop and gain approval for AB 2514 storage target recommendation for 2021-2023
    - Build 4MW battery storage system at Hedge
    - Investigate additional battery storage opportunities, like Natomas
Embracing the Future

- Building Electrification
  - Expand Residential/Commercial Building Electrification offerings
  - Research to address challenges of heat pump water heating for central/multi-family systems
  - Research load flexibility & technologies to mitigate grid and customer panel impacts from electrification
  - Policy influence both at local and statewide level, including building codes, to support market transformation
    - Mayor’s Climate Commission
    - Statewide Fuel Substitution Working Group

(SD-2, 4, 5, 7, 9, 10)
Embracing the Future

- Transportation Electrification
  - Support Medium & Heavy Duty Electrification
  - Low-Income/Disadvantaged Communities (DAC) Sustainability Projects
    - E-Mobility Hubs, including Del Paso Heights
    - Support Electric Vehicle (EV) charging installation for Sacramento Metropolitan Air Quality Management District’s Clean Cars 4 All Program
  - EV Education & Workforce Development
  - Managed EV Charging Research
    - Residential Electric Vehicle Supply Equipment (EVSE) Dispatch
  - School Bus Vehicle to Grid
Energy Operations
2020 Proposed Budget

- Keeping the Lights On
- Optimization/Operational Excellence
- Risk Mitigation
- Embracing the Future
- Allocated Costs

2019 Forecast 2019 Budget 2020 Proposed
O&M $88.4 $84.9 $109.3
Public Good $15.7 $20.0 $24.3
Capital $8.6 $11.4 $9.1

November 6, 2019
Board Finance & Audit Committee Meeting and Special
SMUD Board of Directors Meeting - Budget 2020
### Energy Operations

#### Commodity Budget – Key Assumptions

<table>
<thead>
<tr>
<th></th>
<th>2019 Budget</th>
<th>2020 Proposed</th>
<th>Proposed vs. Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail Sales to Customer (GWh)</td>
<td>10,348</td>
<td>10,258</td>
<td>(90)</td>
</tr>
<tr>
<td>Peak System Demand (MW)</td>
<td>2,855</td>
<td>2,850</td>
<td>(5)</td>
</tr>
<tr>
<td>Supply to Meet All Sales (GWh)</td>
<td>10,835</td>
<td>10,740</td>
<td>(95)</td>
</tr>
</tbody>
</table>

#### 2019 Budget vs. 2020 Proposed

- **Retail Sales to Customer (GWh):**
  - 2019: 10,348 GWh
  - 2020 Proposed: 10,258 GWh
  - Proposed vs. Budget: (90)

- **Peak System Demand (MW):**
  - 2019: 2,855 MW
  - 2020 Proposed: 2,850 MW
  - Proposed vs. Budget: (5)

- **Supply to Meet All Sales (GWh):**
  - 2019: 10,835 GWh
  - 2020 Proposed: 10,740 GWh
  - Proposed vs. Budget: (95)

#### Energy Sources

**2019 Budget**
- **Thermal:** 46%
- **Large Hydro:** 14%
- **ST Contracts and Other:** 11%
- **Renewable LT Contracts:** 18%
- **SMUD Renewable:** 11%

**2020 Proposed**
- **Thermal:** 43%
- **Large Hydro:** 13%
- **ST Contracts and Other:** 8%
- **Renewable LT Contracts:** 22%
- **SMUD Renewable:** 14%
Energy Operations  
Commodity Budget – Key Assumptions

To meet the supply needs, the costs are:

<table>
<thead>
<tr>
<th>Cost (Million)</th>
<th>2019 Budget</th>
<th>2020 Proposed</th>
<th>$ Change Proposed to Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Cost</td>
<td>$232.0</td>
<td>$239.3</td>
<td>7.4</td>
</tr>
<tr>
<td>Transmission Cost</td>
<td>$30.5</td>
<td>$30.9</td>
<td>0.4</td>
</tr>
<tr>
<td>Gas Cost</td>
<td>$185.6</td>
<td>$203.9</td>
<td>18.3</td>
</tr>
<tr>
<td><strong>Total Commodity Cost</strong></td>
<td><strong>$448</strong></td>
<td><strong>$474</strong></td>
<td><strong>$26</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Commodity Price</th>
<th>2019 Budget</th>
<th>2020 Proposed</th>
<th>$ Change Proposed to Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Green Power (Contract Price $/MWh)</td>
<td>$79.03</td>
<td>$74.71</td>
<td>($4.32)</td>
</tr>
<tr>
<td>Average Brown Power (Market Price $/MWh)</td>
<td>$37.86</td>
<td>$35.20</td>
<td>($2.67)</td>
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<tr>
<td>Biogas Purchases (Contract Price $/mmBtu)</td>
<td>$10.63</td>
<td>$10.65</td>
<td>$0.02</td>
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<tr>
<td>Average Brown Gas (Market Price $/mmBtu)</td>
<td>$3.06</td>
<td>$2.94</td>
<td>($0.12)</td>
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</table>
Total SMUD Public Good budget is $98.9M (including rate subsidy). Board authorization amount is $69.1M ($35.8M Customer/Community Business Unit, $24.3M Energy Operations Business Unit and $9M Enterprise Business Unit).
## Energy Operations
### Energy Efficiency Portfolio Board Goals

**Goal: SD-9 Resolutions, 2007 - 2013**

<table>
<thead>
<tr>
<th>Year</th>
<th>GWh Saved</th>
<th>GWh Goal</th>
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<tbody>
<tr>
<td>2008</td>
<td>115</td>
<td>107</td>
</tr>
<tr>
<td>2009</td>
<td>148</td>
<td>127</td>
</tr>
<tr>
<td>2010</td>
<td>154</td>
<td>143</td>
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<tr>
<td>2011</td>
<td>176</td>
<td>166</td>
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<tr>
<td>2012</td>
<td>175</td>
<td>169</td>
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<tr>
<td>2013</td>
<td>174</td>
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<td>2014</td>
<td>180</td>
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<tr>
<td>2019</td>
<td>161</td>
<td>158</td>
</tr>
<tr>
<td>2020</td>
<td>156</td>
<td>156</td>
</tr>
<tr>
<td>2021</td>
<td>156</td>
<td></td>
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**Goal: SD-9, 2015**

- 1.5% of Sales: 164, 161, 155, 156, 157, 157, 158, 158, 157, 164, 159, 158
Transmission Agency of Northern California (TANC)

- Created in 1984 as joint powers agency.
- Project Manager and majority owner (87%) of California Oregon Transmission Project (COTP – 500KV transmission line from Captain Jack to Tracy).
- Membership consists of 15 Northern California Public Agencies.
  - SMUD is 38.5% participant in TANC, its share increasing due to the layoff with Santa Clara and Northern California Power Agency (NCPA) member agencies that was effective July 1, 2014.
- 2020 TANC COTP/SOTP Budget = $47.5M / SMUD share = $18.0M (2019 Budget = $47.0M / SMUD share = $17.4M).
  - COTP O&M and Agency Administration cost increase
  - Slight reduction in Debt Service
  - Included as part of the SMUD Power Budget
Balancing Authority of Northern California (BANC)

- Created in May 2009 as joint powers agency.

- Membership includes: SMUD, Modesto Irrigation District (MID), City of Redding, City of Roseville, City of Shasta Lake and Trinity PUD.

- Provide Balancing Authority (BA) functions for members.

- BANC went operational in May 2011.

- 2020 “Base” BANC Budget = $2.3M / SMUD share = $1.6M (2019 Budget = $2.3M / SMUD share = $1.6M) (Does not include EIM costs)
  - Included in the Grid Operations budget