

Exhibit to Agenda Item #1

Provide the Board external and internal presentations on the **2030 Zero Carbon Plan: Long Duration Energy Storage (LDES) & Battery Energy Storage System (BESS) Strategy.**

Board Strategic Development Committee and Special SMUD Board of Directors Meeting

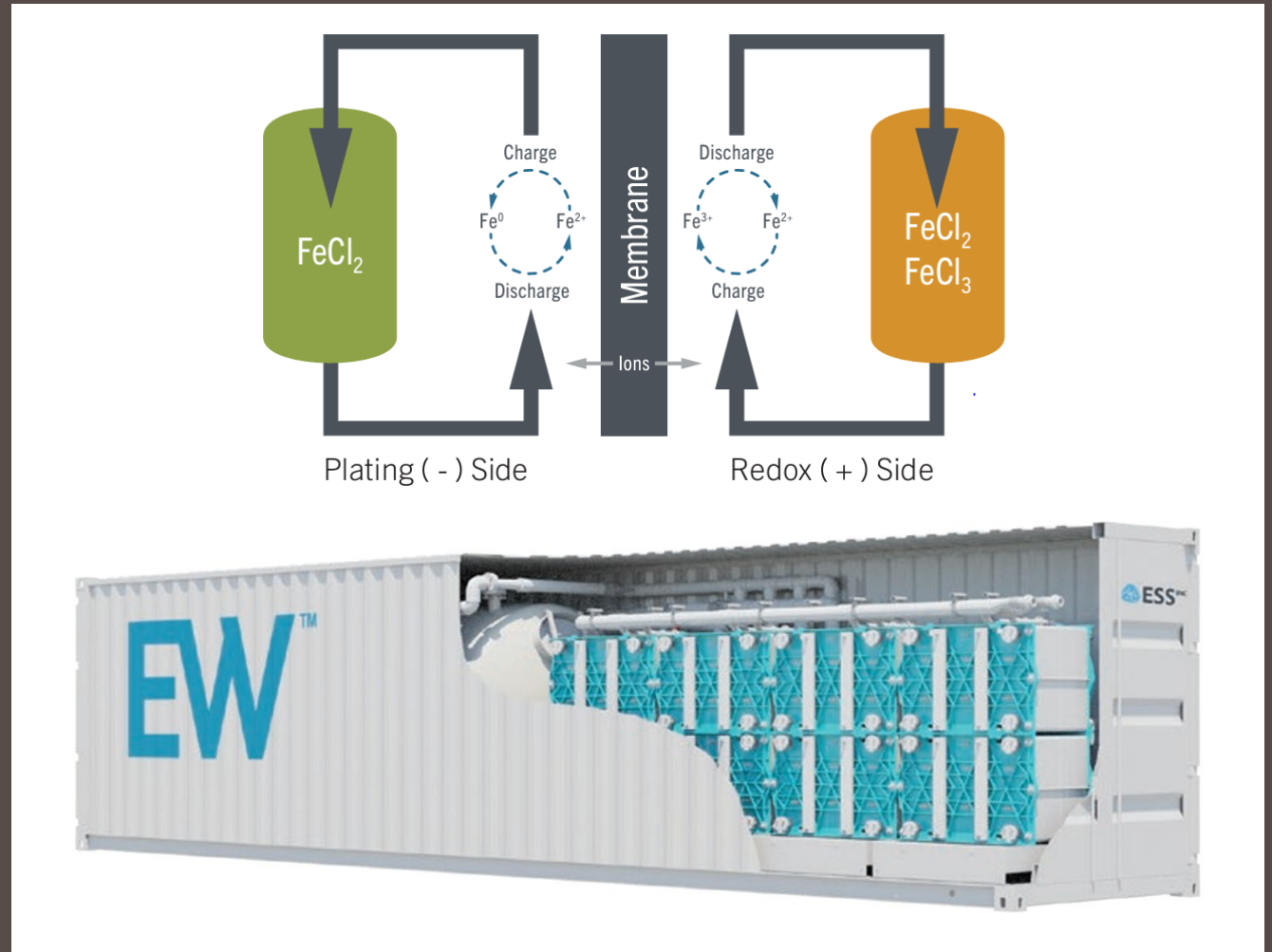
Tuesday, April 9, 2024, scheduled to begin at 6:00 p.m.

SMUD Headquarters Building, Auditorium

Utility Scale Battery Energy Storage Systems

Update on ESS Iron Flow Battery Partnership

- Phased partnership entered with ESS in September 2022
- Phase 1 build target of 4 MW, >24 MWh Long Duration Energy Storage (LDES)
- Phase progression upon achieving reliability, performance, and cost targets supporting SMUD's Zero Carbon Plan



Energy Warehouse Progress (Phase 1a)



- Six Energy Warehouses installed at Hedge Power Academy solar & battery site (~0.5 MW, ~2.5 MWh)
- Site acceptance testing & troubleshooting in progress
- Connection for visibility & control established with Distribution System Operations (DSO)
- Finalizing Battery Energy Storage System (BESS) for commissioning testing with DSO



Energy Center Progress (Phase 1b)

Energy Center – Higher energy density than Energy Warehouse



- Procurement for Phase 1b Engineering, Procurement, and Construction (EPC) following approval.
 - Upon successful commission of Energy Warehouse's
 - Design undergoing fire code review.
- Phase 1b: Add ~1.8 MW, ~13 MWh to existing interconnection

Update on McClellan BESS

- 75 MW x 4hr BESS (300 MWh)
- Transmission and Distribution Option Connection
 - Supports Distribution Reliability
 - ~90% on Transmission to supports financial & reliability guardrails
- 2 substations:
 - 1 x North and 1 x South Parcel
- Unique design to match typical substation standards (three 25 Megavolt Ampere (MVA))
- Target Commercial Operations Date (COD) 2026/7



Customer-Sited Battery Energy Storage Systems

Customer Battery Storage Status

Residential Solar & Battery Storage (as of March 2024)			
	# of Customers	# of Batteries	MW of Storage
Total	1640	2190	10.7
Tesla		1273	6.4
Non-Tesla		917	4.3
MEOP+/VPP Enrollments	75	101	0.5

Solar & Storage Customers by Rate Category	
S&SR	
Tesla	366
Non-Tesla	276
NEM/Other	
Tesla	506
Non-Tesla	492
Total	1640

Zero Carbon Plan and Program Context

- My Energy Optimizer Partner + Virtual Power Plant (VPP) program implemented in mid-2023 with Swell as the program administrator and aggregator
 - Tesla batteries are currently the only Original Equipment Manufacturer (OEM) with the Open Automated Demand Response protocols and Application Program Interface (ADR and API) capabilities to qualify for VPP participation and events
 - Addition of other battery OEMs is on the roadmap for the program and Swell over the coming year
- ZCP trajectory estimated ~4,000 batteries in market by 2024
 - Sacramento market is behind with higher than anticipated battery and installation costs combined with current high interest/financing rates/terms
- Participation in VPP program requires enrollment on S&SR
 - Currently a difficult financial proposition for existing Net Energy Metering (NEM) customers
 - In contrast there are ~12,000+ solar customers on Solar & Storage Rate (S&SR) who do not have batteries

Battery Storage Acceleration Pathways

1. Single Family: My Energy Optimizer Partner+ Virtual Power Plant (VPP) Program Expansion
 - Engage with Tesla as the primary market shareholder and the battery system supported by Swell (program administrator and aggregator)
 - Negotiate bulk purchase with fixed/standardized pricing for batteries
 - Update and coordinate procurement, distribution, and deployment model
 - Increase program incentives (at least in the short term) in response to high RA market prices
 - Allow incentives for up to 2 batteries per site
 - Expand and support local installer network with standardized application through commissioning processes



Battery Storage Acceleration Pathways

2. Multi-Family Program Development & Deployment

- Accelerate and complete battery installation project at Chesapeake Commons (Wasatch property) with Sonnen
 - Phase 1 deployment with 100 batteries – 700kW total, 2.1MWh
 - Batteries in front of meter, SMUD owned and managed
 - SMUD to have full dispatch control of resource via DERMS/Itron-DERO
 - Primary contract is with Wasatch, but batteries (and solar) tied to individual units providing bill benefits & reliability
 - Test ability to unload service transformers and provide bulk RA capacity value



Battery Storage/VPP Additional Considerations

- Further expansion and acceleration of residential storage is a key element of the GRIP TA3 grant application
 - Potential for further funding to install ~10,000 batteries between 2025 and 2029 as a key element of the 2030 ZCP
 - Explore additional or alternative cost and ownership models based on outcomes from current expansion efforts
 - Can provide significant support for battery installations in DACs
- Expansion of Sonnen/Wasatch project and deployment model to additional multi-family properties
- Development and implementation of a battery storage VPP option for commercial customer applications