Hybrid Energy Resource Optimizer (HERO)

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NEXTera® Analytics

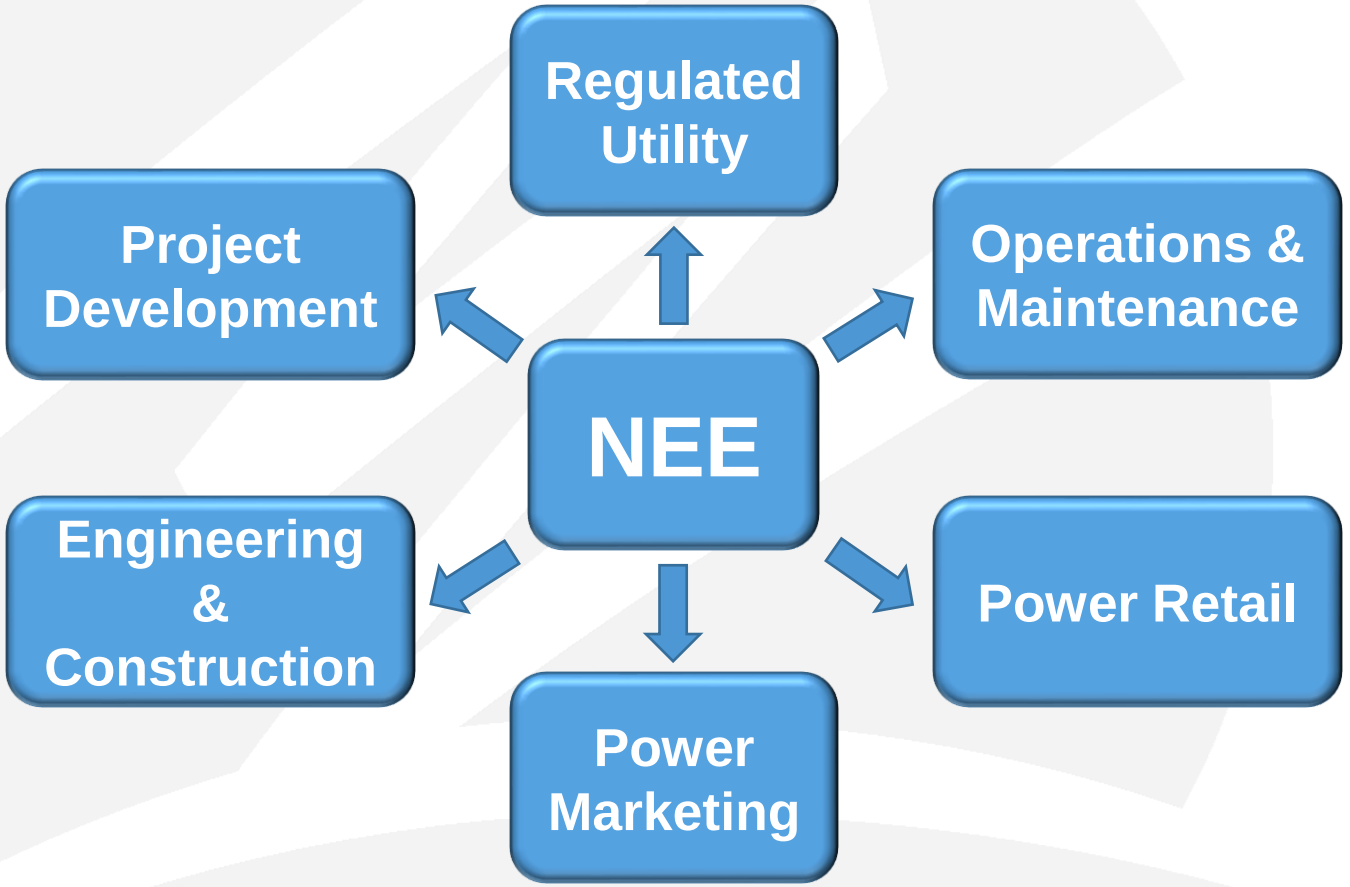
Research & Development

Agenda

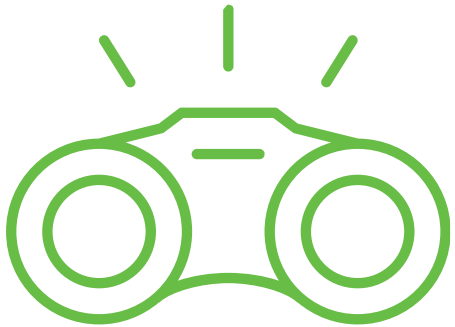
- Company Overview
- HERO Platform
- Operational Examples

NextEra Energy: Overview

- 15,000+ employees
  - NextEra Analytics ~120 scientists, statisticians, and engineers
- Operate renewables in 31 US states and 4 Canadian provinces
- 17 GW of wind and solar



NEA helps NEE find, design, and operate energy resources.



Find

the best locations for developing wind, solar, and storage projects

customers that could be getting more from the market

Design

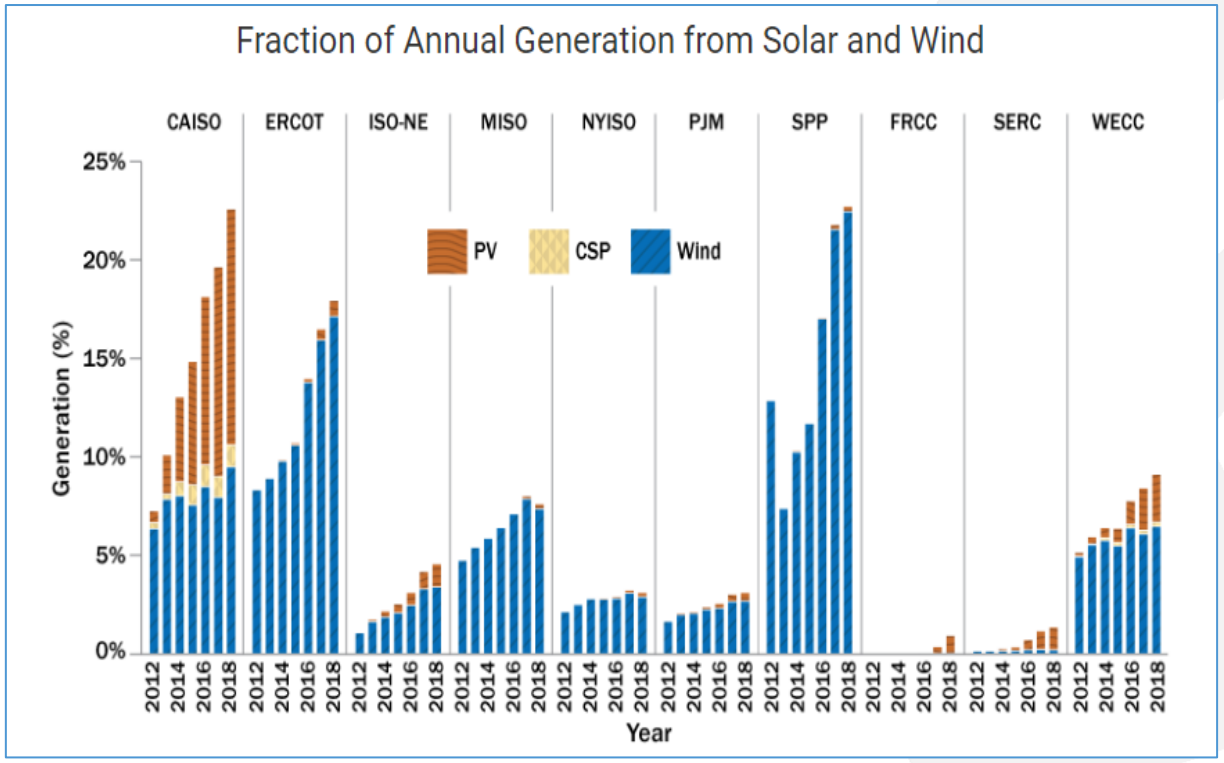
energy resources customers need for the future

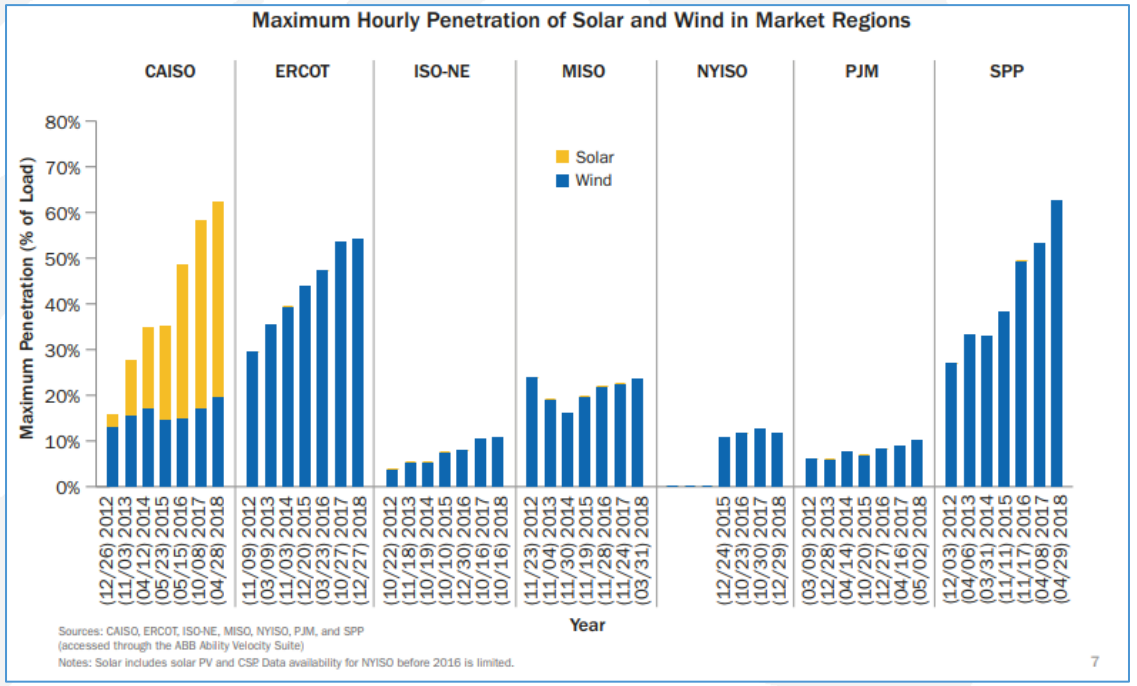
Operate

fleets to get the most from the market

at peak performance to maximize revenue and renewable energy

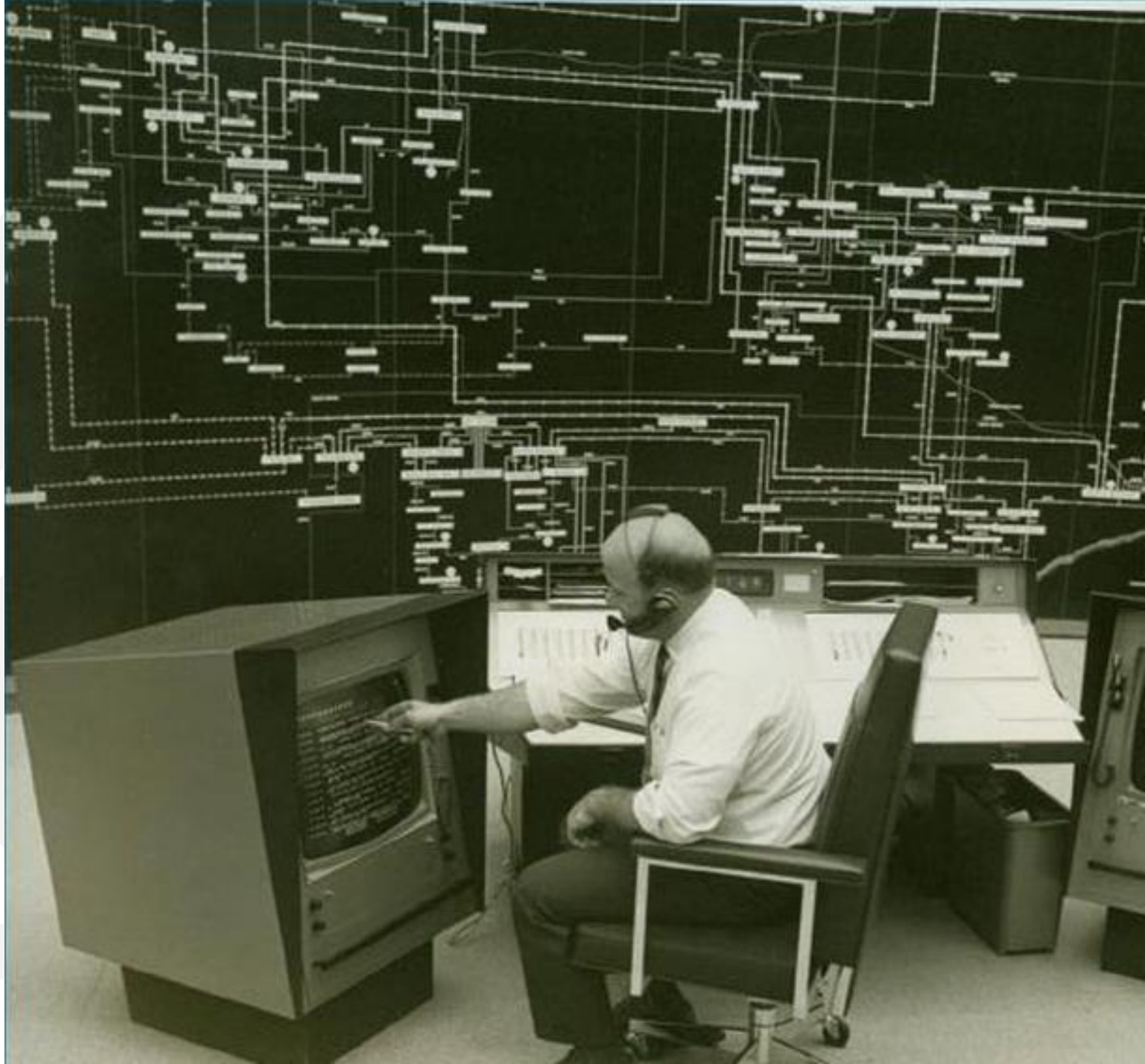
Renewable penetration is at record highs across power systems.





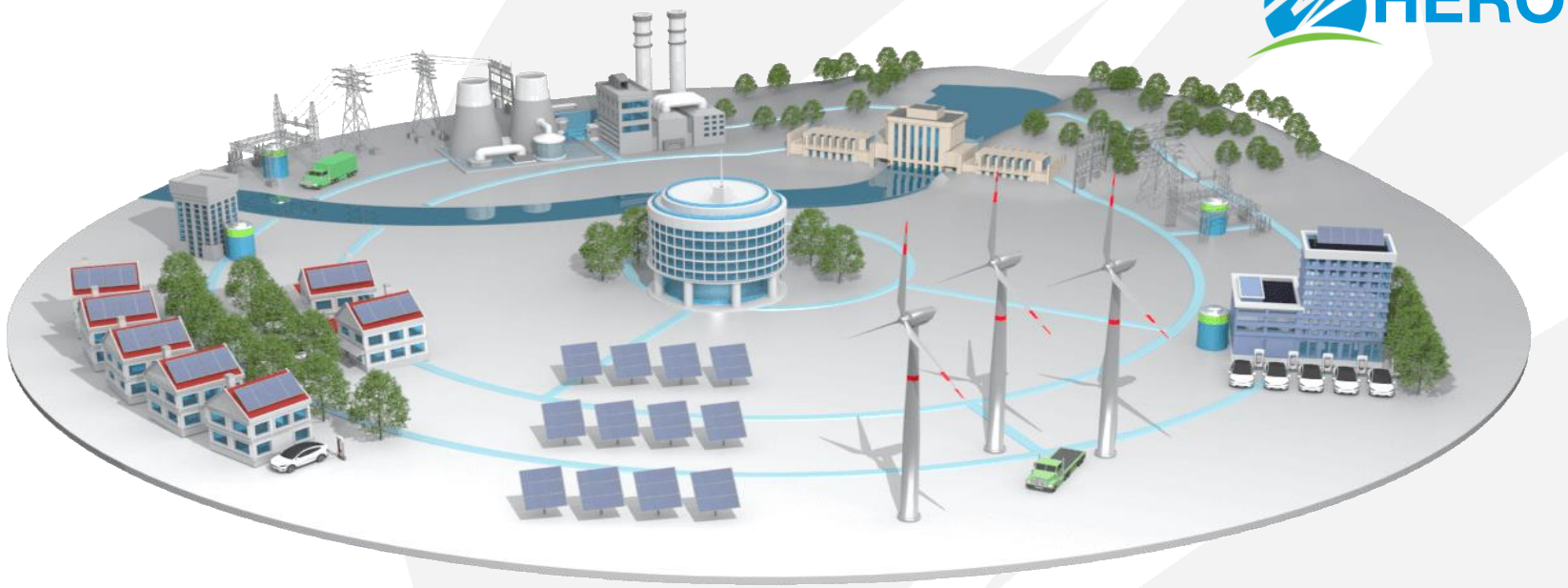
1) 2018 Renewable Energy Grid Integration Data Book; NREL; February 2020

In the past, the primary sources of variability and uncertainty were generator outages and the weather-driven load.



The rise of hybrid renewables and DERs creates an opportunity for a new class of energy management tools

HERO



Connect **Forecast** **Optimize** **Enhance**

HERO

HERO's capabilities are modular, flexible, and scalable and can be configured based on asset type and market.

Connect

- Secure Web API
- IOT Edge
- HVAC Systems
- EV/V2G Systems
- Inverters
- SCADA/PLC/OPC (Wind + Storage)
- Building Load

Forecast

- Load (Resi, C&I, ISO)
- Wind & Solar Generation
- Price
- Equipment Availability
- Weather
- Contracts

Optimize

- Demand Charge Management
- Contingency Reserve
- Hedging Strategies
- DART/ Energy Arbitrage
- Balancing
- Coincident Peak
- Frequency Regulation

Enhance

- Generation Entitlement
- Ops Report
- Reconfiguration
- Operational Assessments
- Digital Twins
- CWEOS

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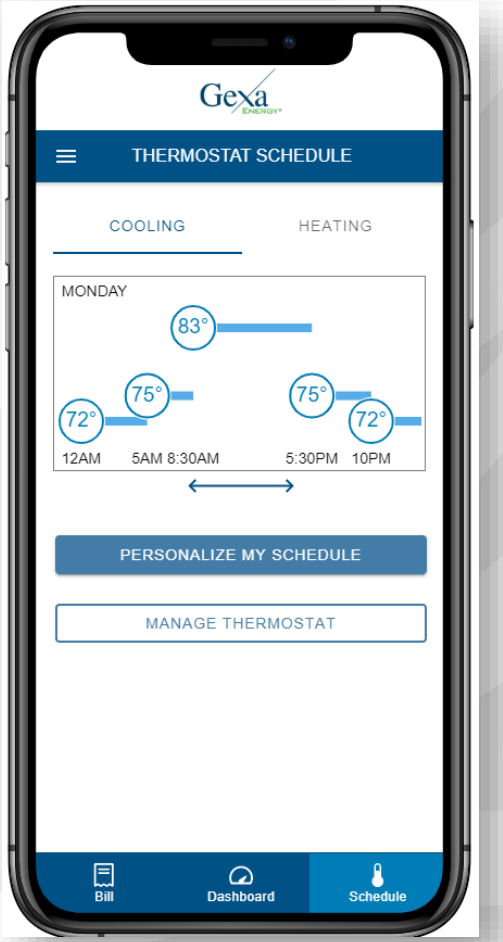

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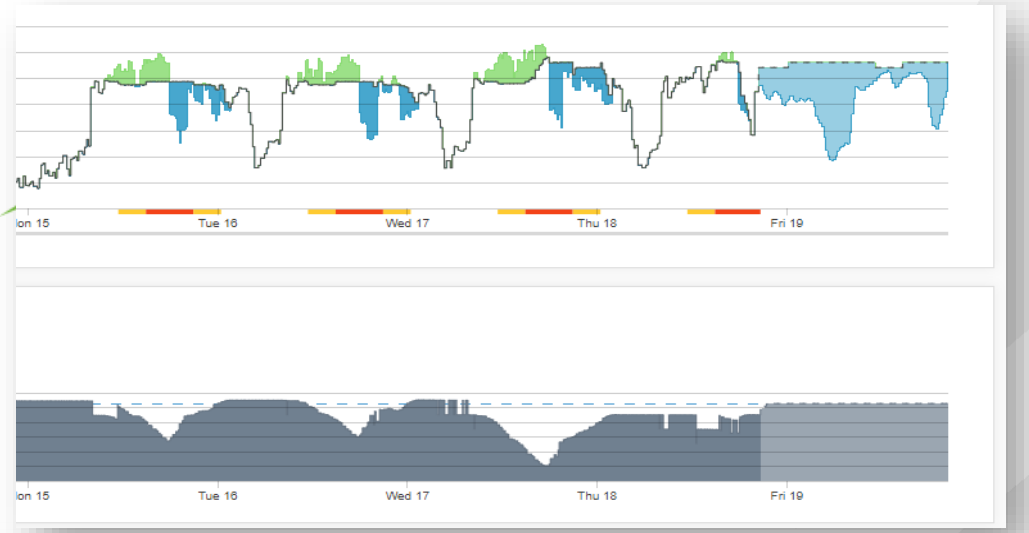
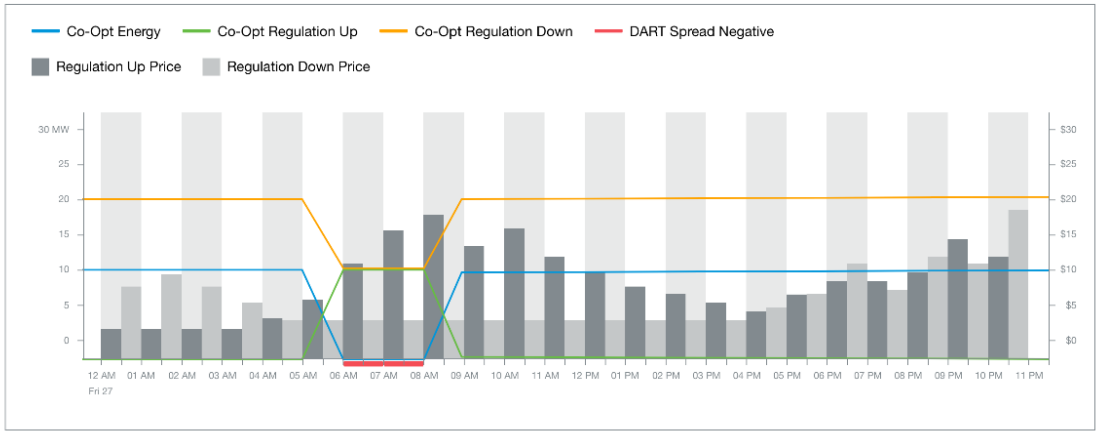




Forecast

Load
(Resi, C&I, ISO)

Wind & Solar
Generation

Price

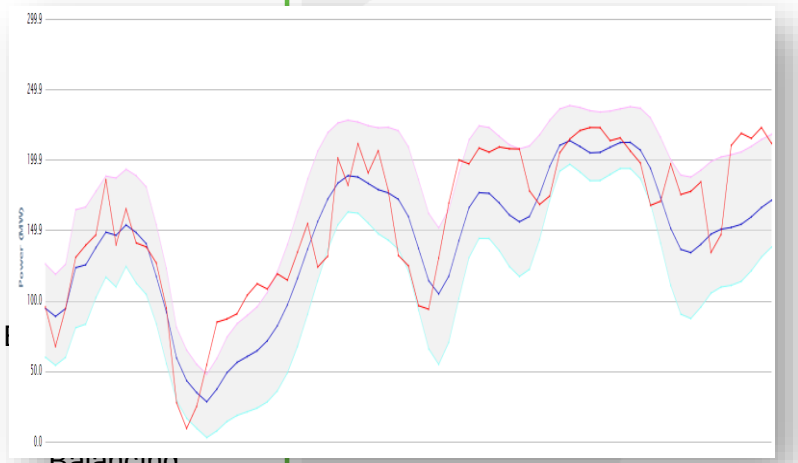
Equipment
Availability

Weather

Contracts

Optimize

Demand Charge
Management



Balancing

Coincident
Peak

Frequency
Regulation

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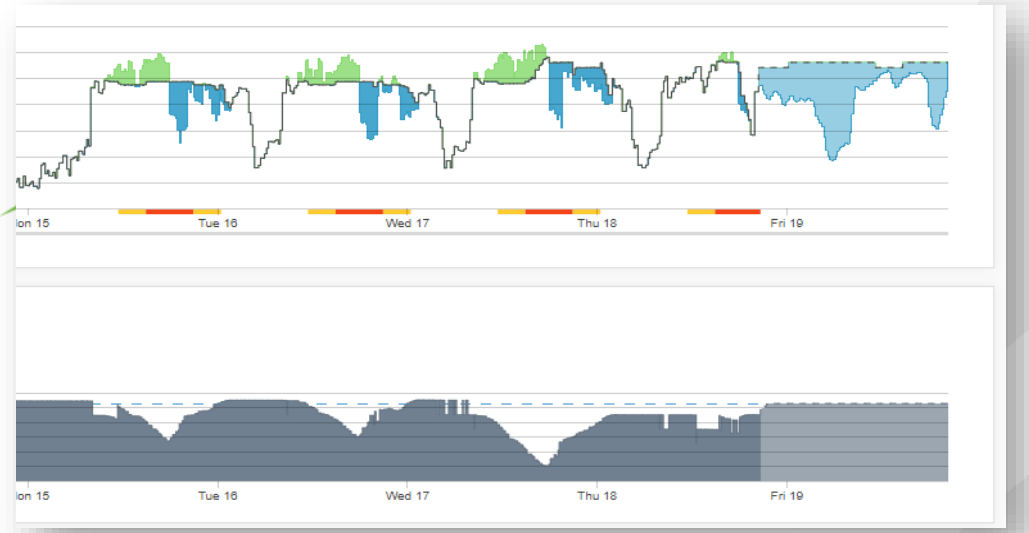

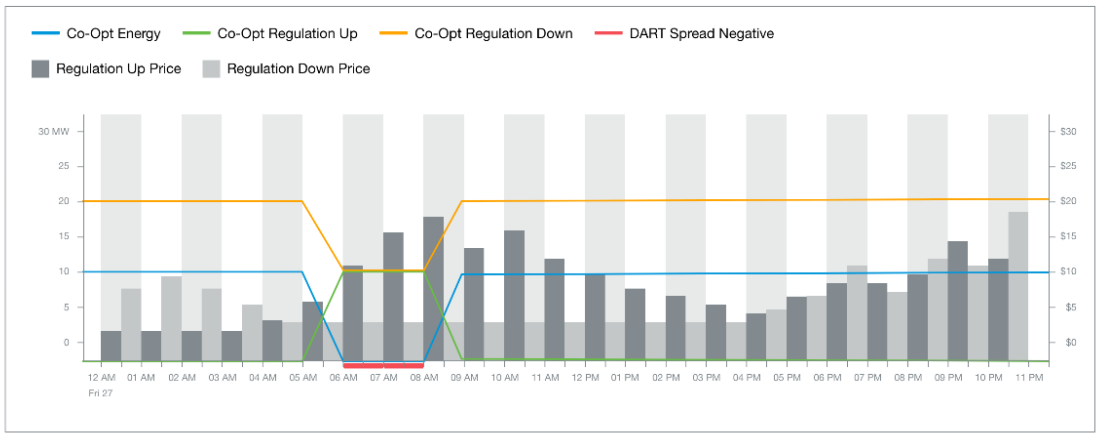

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- Price
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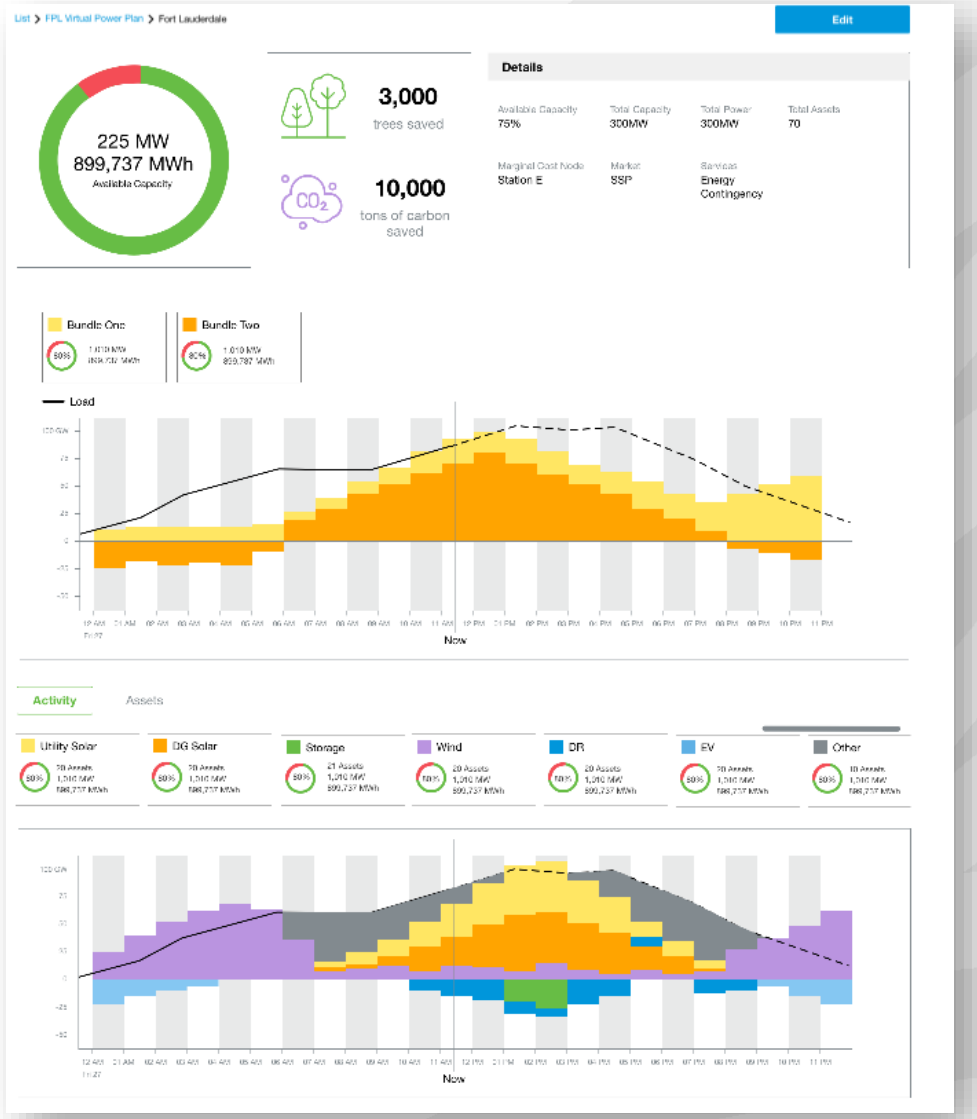


Enhance

Generation Entitlement

Ops Report

Reconfiguration

Operational Assessments

Digital Twins

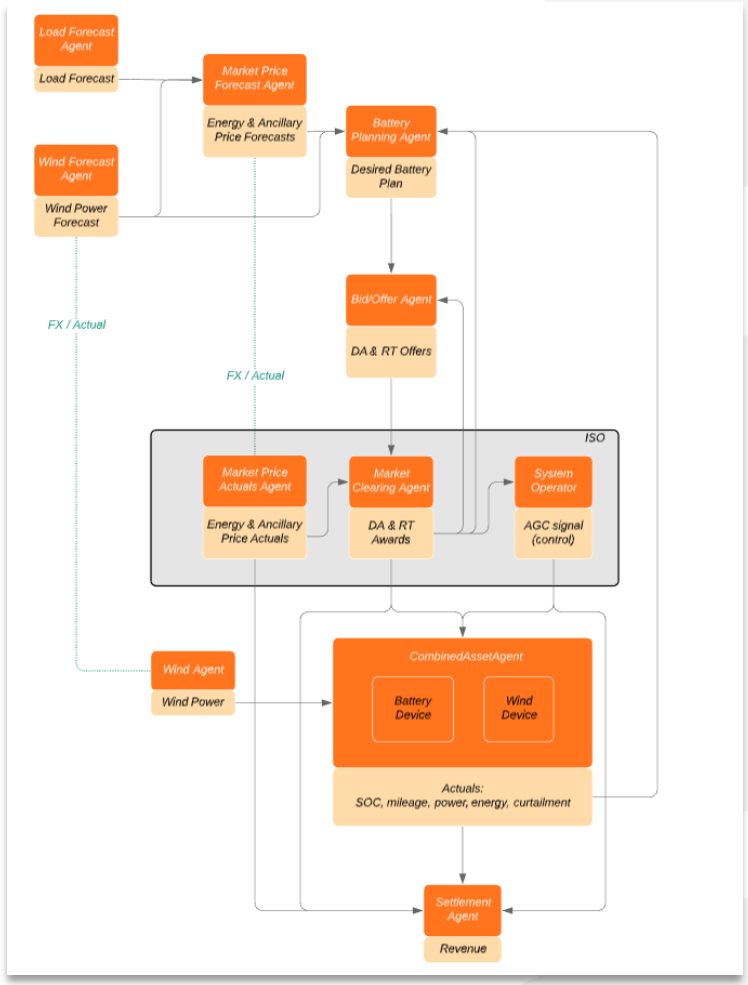
CWEOS

Hybrid Market Participation

NEXTera™ ENERGY MARKETING

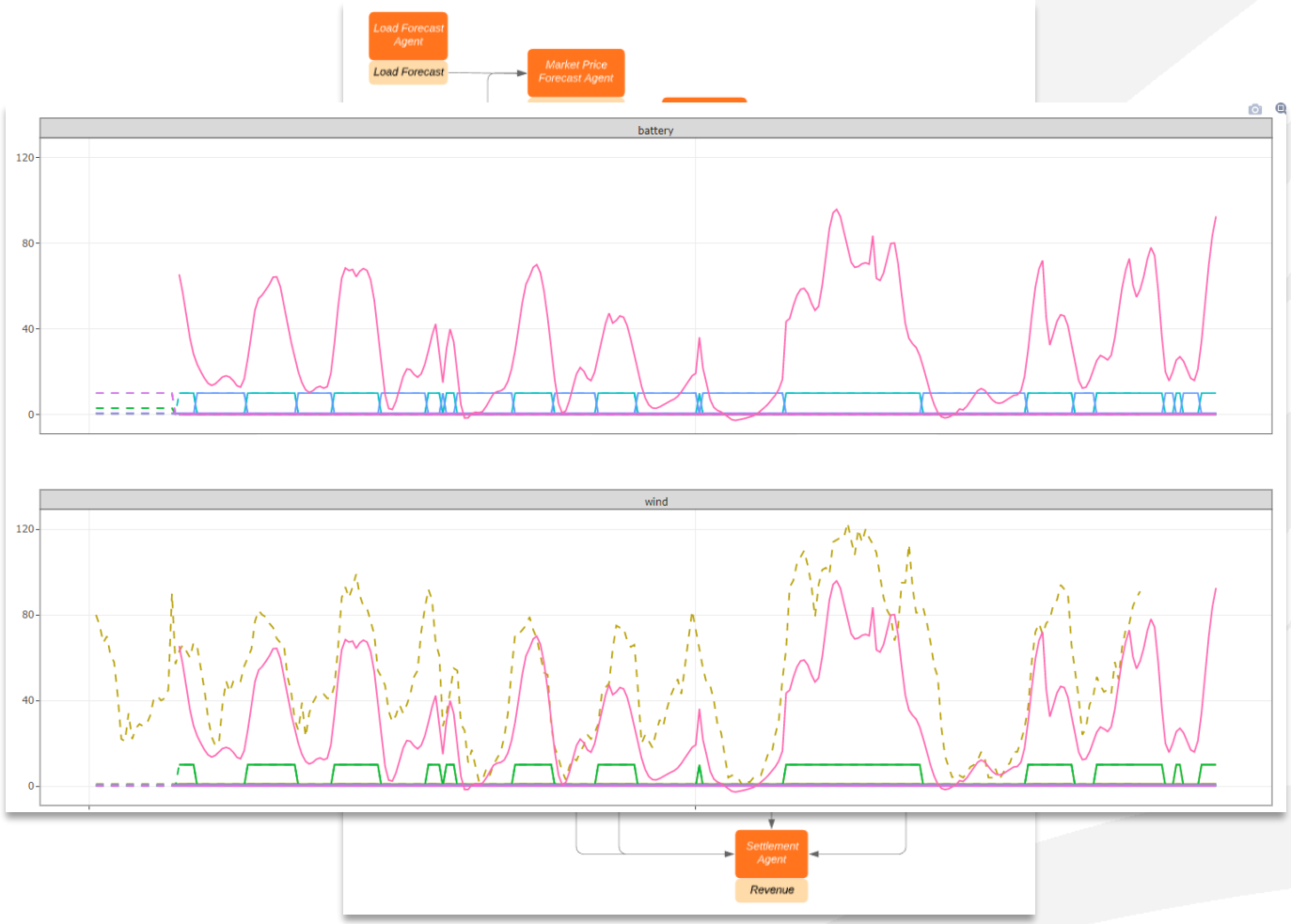
Capacity:	10MW/20MWh – Energy Storage 125MW – Wind
Assets:	1 x 10 MW/2hr Utility Scale Battery 59 x 2.1MW Wind Turbines
Use Cases:	Frequency Regulation Energy Arbitrage Spinning Reserve
Innovation:	Automated Optimized Bidding Common Generator Controls Integration

HERO In Production



- Forecast
- Optimization

HERO In Production

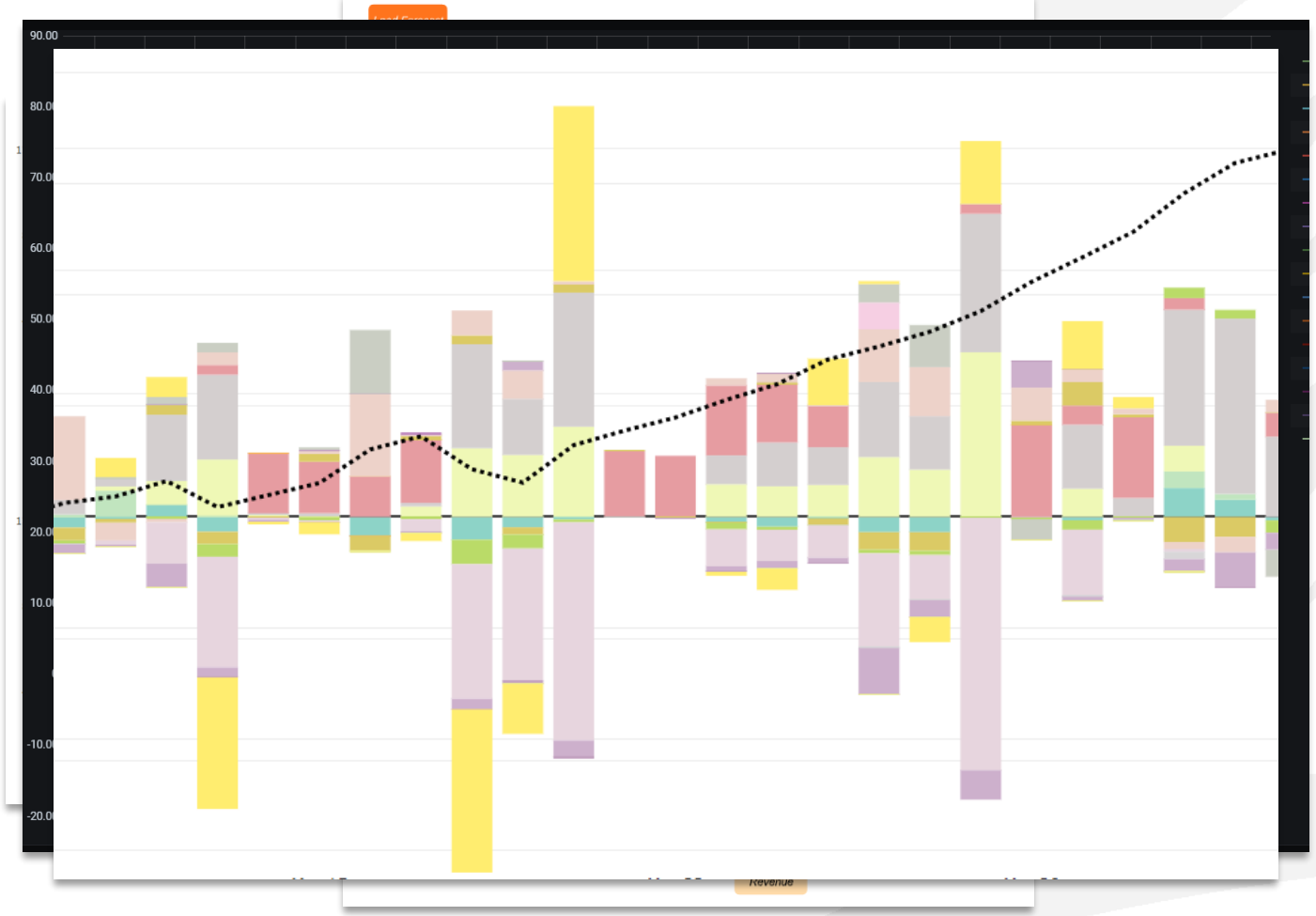


- Forecast
- Optimization
- Automated Offers

HERO In Production

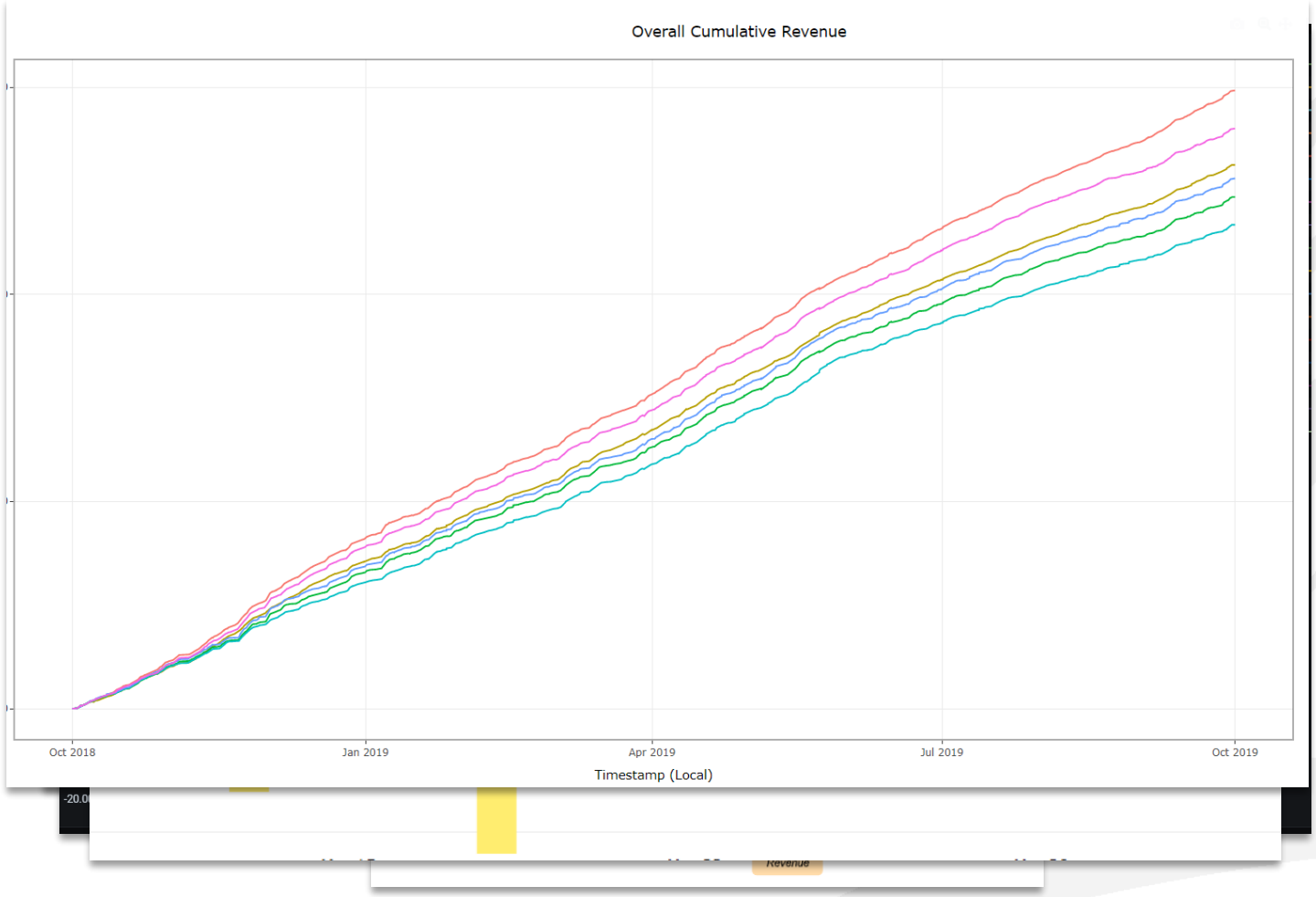
- Forecast
- Optimization
- Automated Offers
- Real Time Management

HERO In Production



- Forecast
- Optimization
- Automated Offers
- Real Time Management
- Settlement

HERO In Production



- Forecast
- Optimization
- Automated Offers
- Real Time Management
- Settlement
- Simulation

Virtual Power Plant

Capacity:	500MW/1150MWh
Assets:	1 x 409MW/2.2hr Utility Scale Battery 1 x 11.5MW/2hr Utility Scale Battery 1 x 10MW/4hr Utility Scale Battery 1 x 5MW/4hr Utility Scale Battery 2 x 30MW/2.5hr Utility Scale Battery 14 x 5kW/2hr Residential Storage 136 x Smart Thermostats 5 x 20kW/8hr EV Busses
Use Cases:	Capacity Firming Contingency Reserves Economic Dispatch Black Start Distribution Support
Innovation:	Aggregated marginal cost based dispatch Cooling-as-storage Vehicle to grid