Energy Exchange℠

CONNECTING THE FUTURE

AUGUST 2-6, 2021

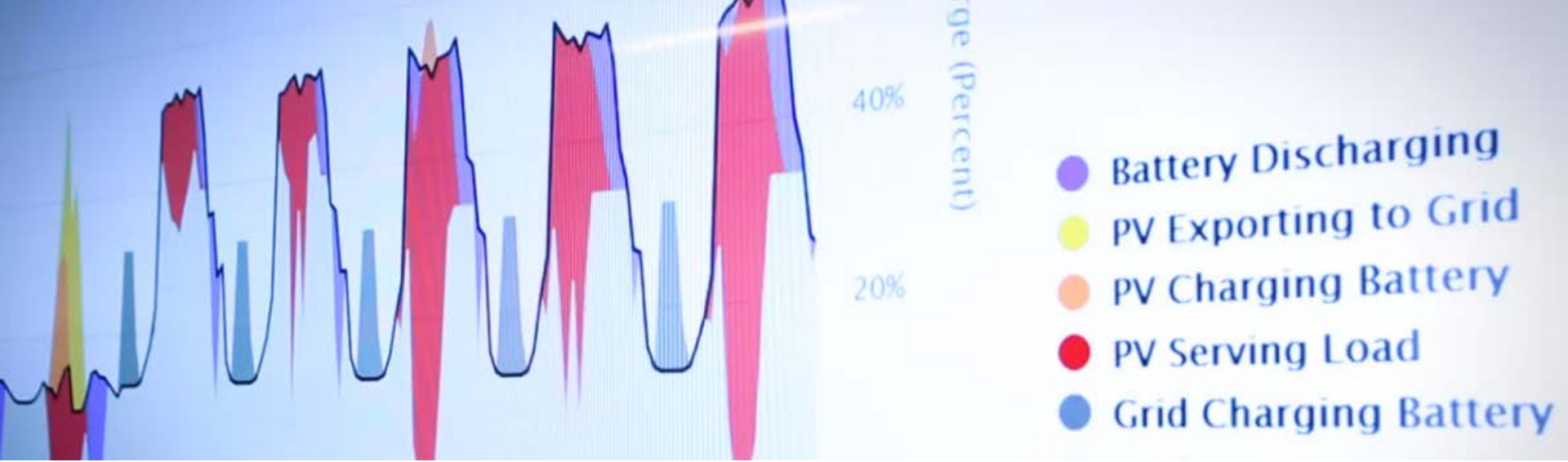
Evaluating Distributed Generation Cost and Resilience with REopt Lite

Kate Anderson

Chief of Staff

Energy Systems Integration Directorate

National Renewable Energy Laboratory



REopt Lite Web Tool Transforms Complex Decisions Into Actionable Results

- The free, publicly available web tool guides investment in economic, resilient energy technologies
- Transforms complex decisions into actionable results for building owners, utilities, and industry
- Integrating CHP enables analysis of hybrid CHP (CHP + PV, wind, and/or storage)
- Open Source API access to the tool enables analysis at scale

Will Distributed Energy Work for Your Site?

Technology Costs & Incentives

Utility Cost & Consumption

RE Resource

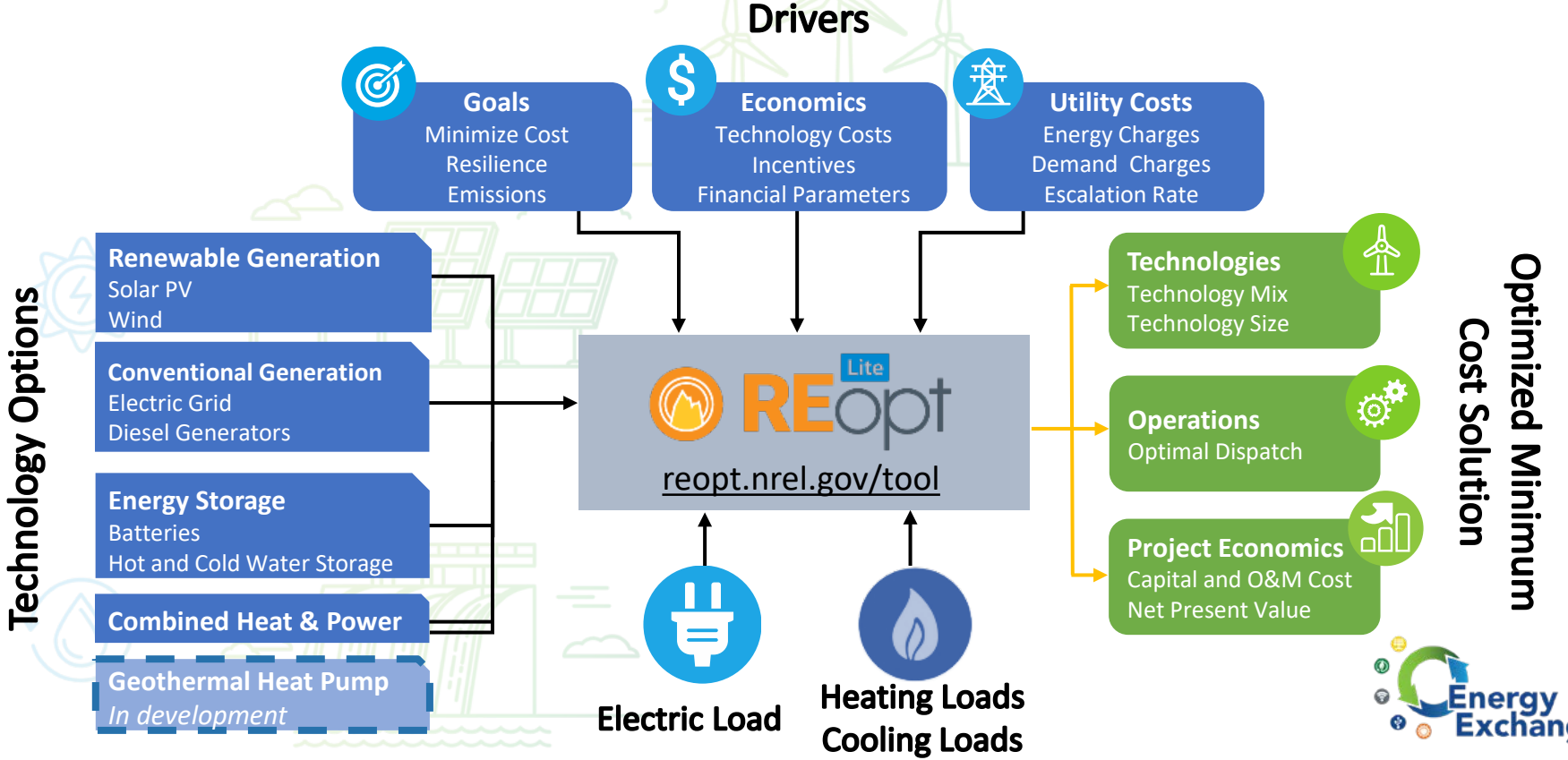
Financial Parameters

Resilience Goals

Many factors affect whether distributed energy technologies can provide cost savings and resilience to your site, and they must be evaluated concurrently.

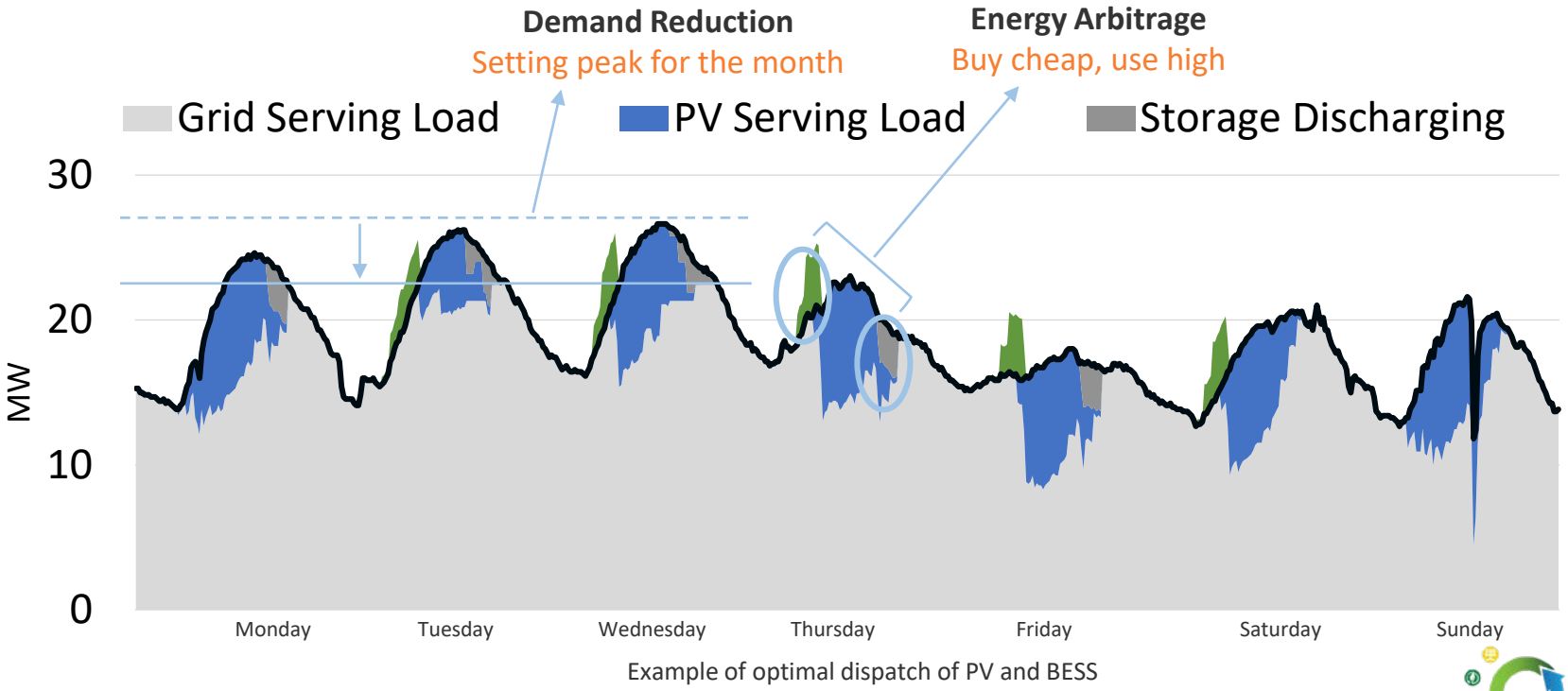
REopt Lite: Free Web Tool to Optimize Economic and Resilience Benefits of DERs

Formulated as a mixed integer linear program, REopt Lite provides an integrated cost-optimal energy solution.



How Does REopt Lite Work?

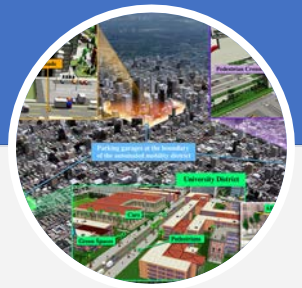
REopt Lite considers the trade-off between ownership costs and savings across multiple value streams to recommend optimal size and dispatch



Example of optimal dispatch of PV and BESS

REopt Lite Provides Solutions for a Range of Users

Researchers, developers, building owners, utilities, and industry



What is the optimal size of DERs to minimize my cost of energy?

How do I optimize system control across multiple value streams to maximize project value?

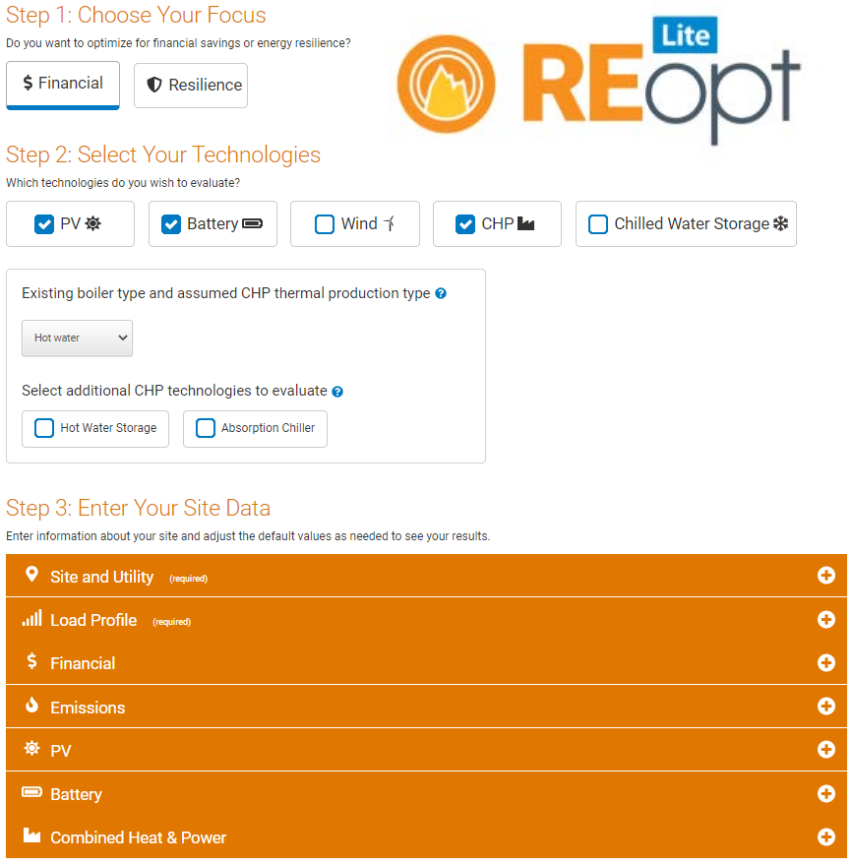
Where do market opportunities for DERs exist? Now and in the future?

What will it cost to meet a sustainability or on-site generation goal?

What is the most cost-effective way to survive a grid outage spanning 1 day? What about 9 days?

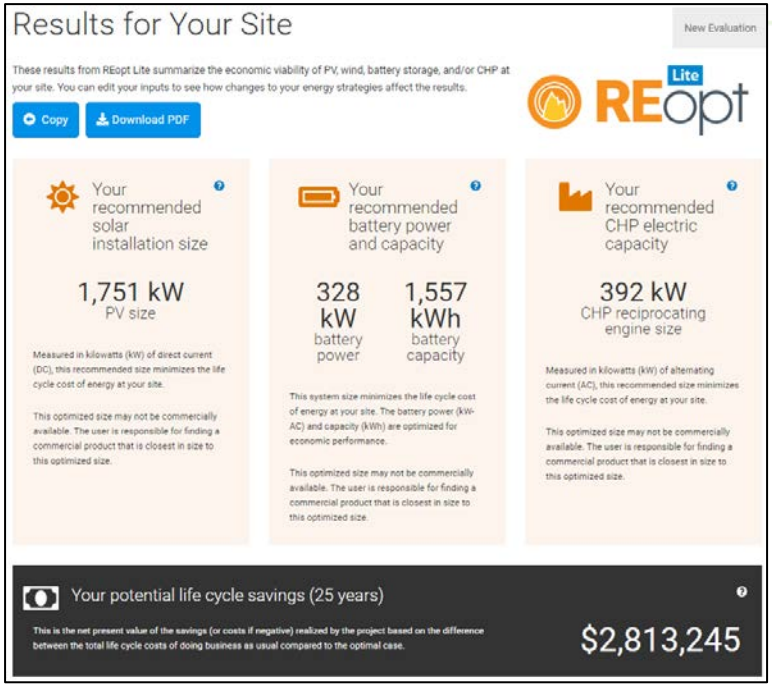
REopt Lite

- REopt Lite is a web tool that offers a no-cost subset of NREL's more comprehensive REopt model
- Financial mode optimizes technology sizes and dispatch strategy to minimize life cycle cost of energy
- Resilience mode optimizes technology mix to sustain critical load during grid outages and to minimize life cycle cost of energy
- To access REopt Lite: https://reopt.nrel.gov/tool

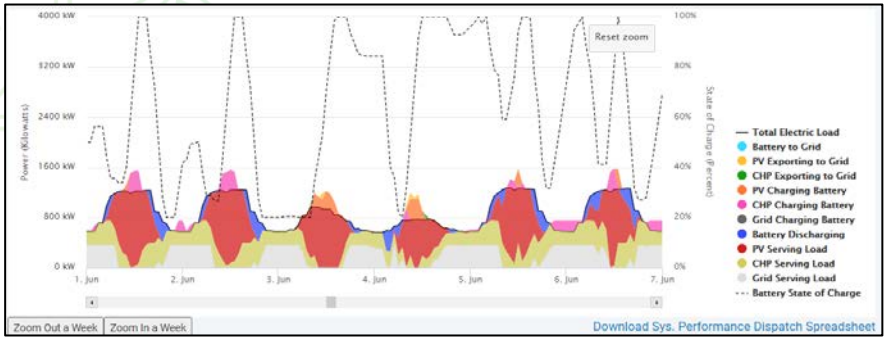


REopt Lite Key Outputs

System Size and Net Present Value



Hourly Dispatch



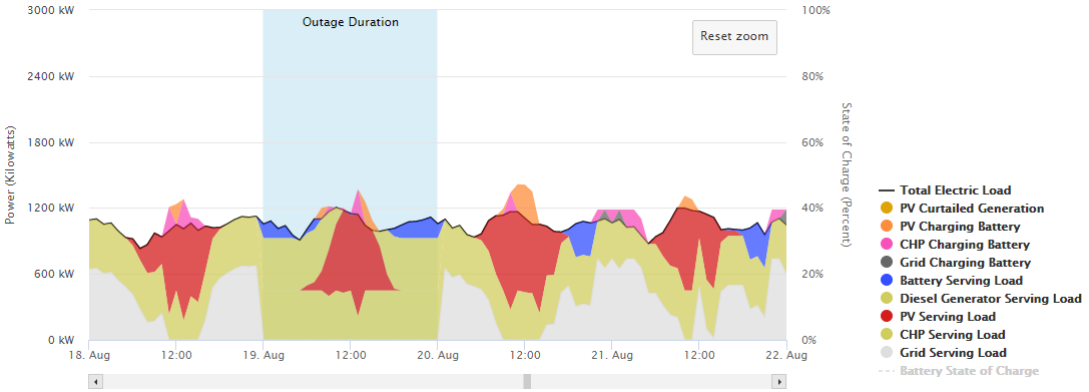
Detailed Financial and Energy Outputs

Summary Financial Metrics			
Total Upfront Capital Cost Before Incentives	N/A	$4,828,681	N/A
Total Upfront Capital Cost After Incentives	N/A	$3,070,132	$3,070,132
Lifecycle O&M and replacement costs, after tax	N/A	$1,399,584	$1,399,584
Total Life Cycle Costs	$15,056,424	$12,243,179	$2,813,245
Net Present Value	$0	$2,813,245	$2,813,245
Payback Period	N/A	5.56 yrs	5.56 yrs
PV Levelized Cost of Energy	N/A	$0.074	$0.074
Internal Rate of Return	N/A	16.23%	16.23%

Critical Infrastructure Resilience

- System designed to sustain 24-hour outage at wastewater treatment plant
- Free on-site biogas resource for CHP
- Adding hybrid CHP-PV-battery system provides economic savings and reduces diesel fuel use

	Diesel Only	Hybrid System
System Size	1204 kW Diesel generator	478 kW Diesel generator 1,508 kW Solar PV 203 kW; 1279 kWh Battery 448 kW CHP
Net Present Value	-$777,530	-$57,009
Diesel fuel used	2,021 gallons	660 gallons



Energy Exchange℠

- REopt Lite (tool and help manual): reopt.nrel.gov/tool
- REopt website (analysis services and case studies): reopt.nrel.gov/
- Send tool feedback and ask a question: reopt@nrel.gov

CONNECTING THE FUTURE

AUGUST 2-6, 2021

REopt Lite

This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding provided by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Federal Energy Management Program. The views expressed herein do not necessarily represent the views of the DOE or the U.S. Government. The U.S. Government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

NREL/PR-5C00-80541