DER-VET Task Force

ESIC Working Group 1: Grid Services and Analysis

Udi Helman | Helman Analytics
Miles Evans | EPRI
Andrew Etringer | EPRI
Halley Nathwani | EPRI
Giovanni Damato | EPRI

March 4, 2020

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- To only do business on certain terms and conditions;
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- To divide markets or technologies;
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Agenda

- Market Report
- User Guide Walkthrough
- Full Release Logistics

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Market Report

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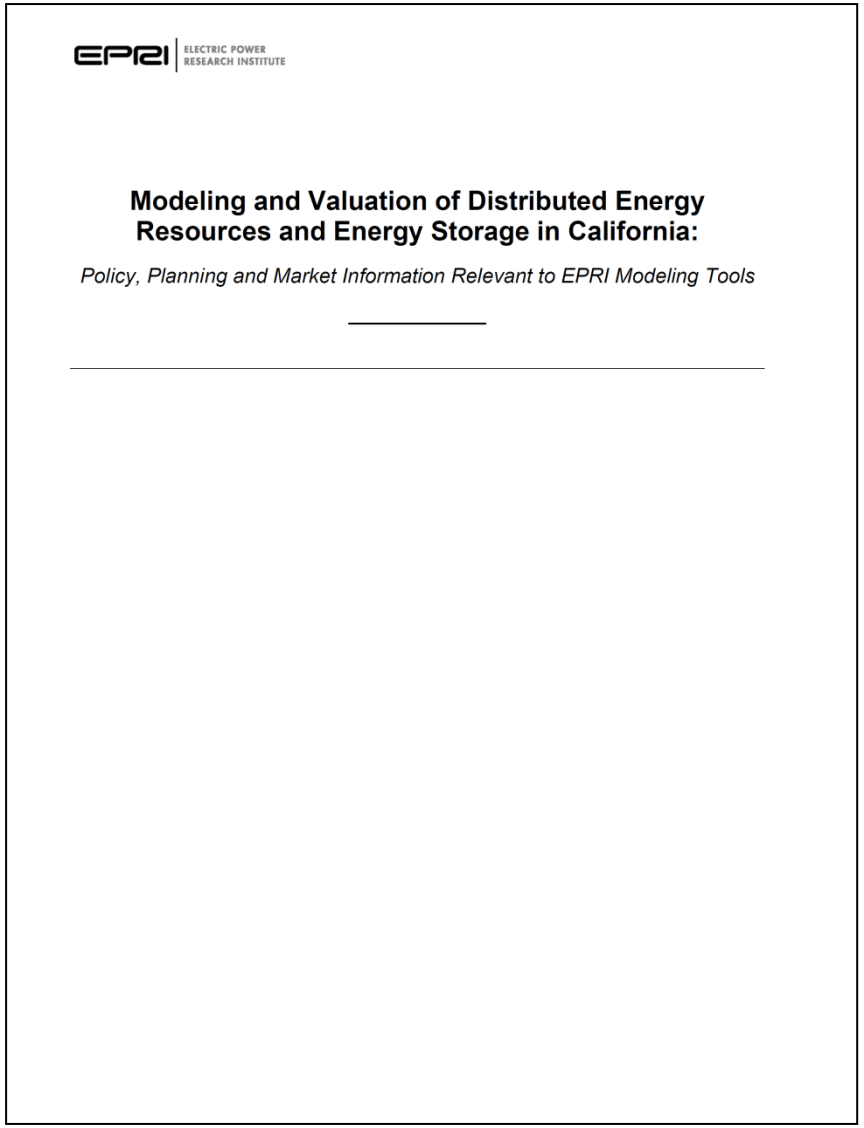
- ~300 pages of policy, program and wholesale market details relevant to DERVET™ and StorageVET™ models (and other similar models)
- Will be free to download on DERVET and EPRI websites
- Intended as “living document” which can evolve in response to user recommendations


EPRI ELECTRIC POWER RESEARCH INSTITUTE

Modeling and Valuation of Distributed Energy Resources and Energy Storage in California:

Policy, Planning and Market Information Relevant to EPRI Modeling Tools

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Contents

1. Introduction and overview
2. Resource domains and applications
3. Background on the California power sector
4. California policy and planning framework for DER and energy storage
5. Resource valuation by California entities
6. Distributed energy generation and hybrid policies and programs
7. DER aggregation policies and programs, including demand response

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Existing and already contracted BESS which offer electric power services, 2012-2023

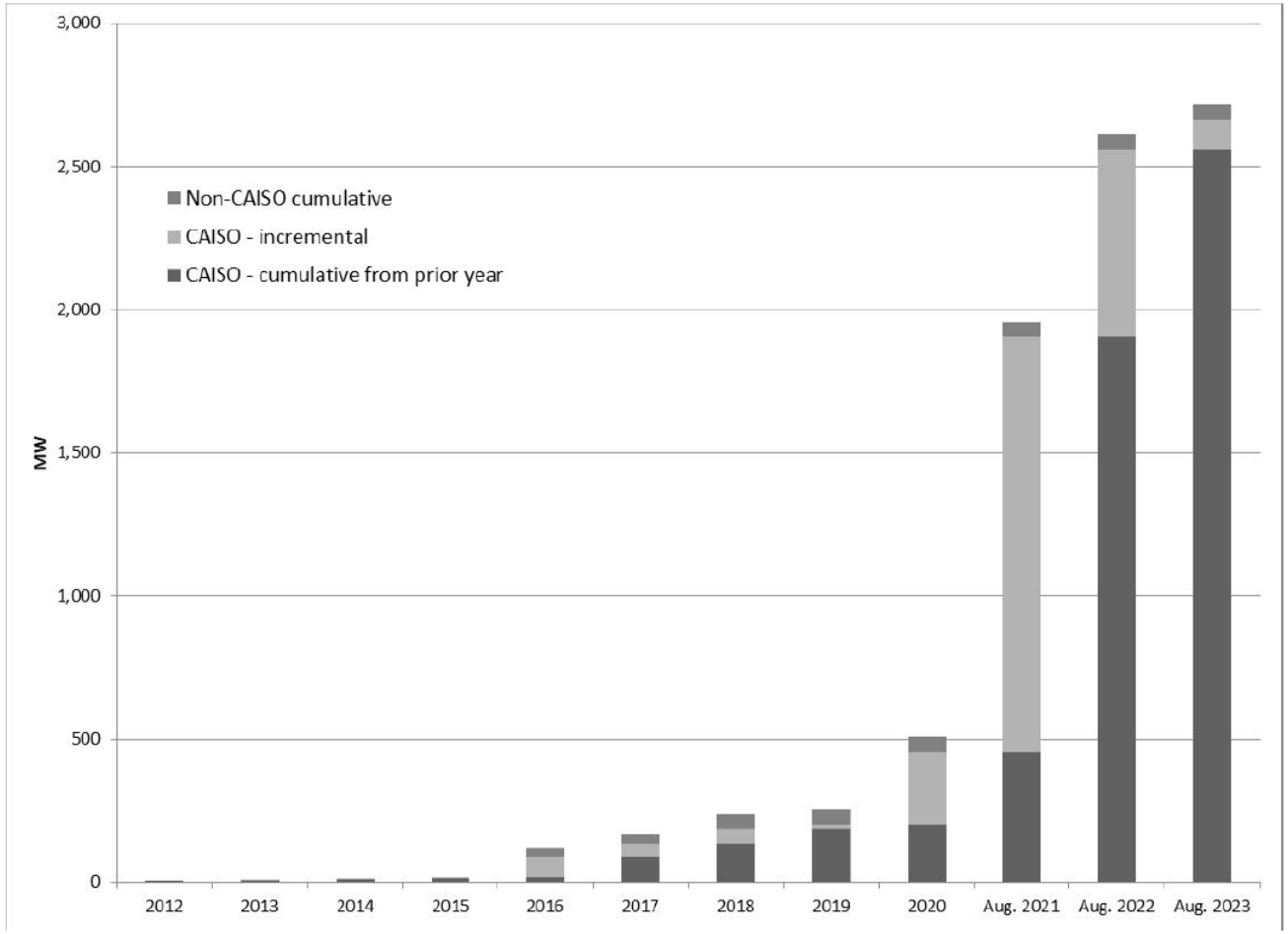

Figure 3-1
Existing and already contracted battery energy systems which offer electric power services, by installed capacity (MW), 2012- 2023

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CEC research reports on microgrids and other data on specific projects are organized for easy reference

Report title	Description	Publication year and reference
Constructing a Microgrid for a Wastewater Treatment Facility	Detailed case study of creating a microgrid incorporating solar and storage at a wastewater treatment plant in Santa Rosa, Sonoma County.	2019 [74]
Solar Emergency Microgrids for Fremont Fire Stations	Detailed case study of microgrid installed at three fire stations in Fremont.	2019 [75]
Making a Microgrid From Legacy Systems—Las Positas College Microgrid	Detailed case study of improved microgrid operations at Las Positas College.	2019 [76]
A Novel, Renewable Energy Microgrid for a California Healthcare Facility	Detailed case study of microgrid at a Kaiser Permanente healthcare facility in Richmond.	2019 [77]
Demonstrating a Secure, Reliable, Low-Carbon Community Microgrid at the Blue Lake Rancheria	Detailed case-study of a microgrid which supports an American Red Cross evacuation center and a six-building campus for the Blue Lake Rancheria Tribe and the surrounding region in Humboldt County.	2019 [78]
Microgrid Analysis and Case Studies Report: California, North America, and Global Case Studies	Brief case studies and surveys of 9 microgrids in California, 10 elsewhere in North America, and 7 in other countries, including costs and benefits.	2018 [79]
Final Report for the Integrated Solar PV, Vanadium Redox Flow Battery, and Microgrid Demonstration Project	Detailed case study of a microgrid which incorporates solar vanadium redox flow batteries at the U.S. Naval Facilities Expeditionary Warfare Center's (EXWC's) Mobile Utilities Support and Equipment (MUSE) Facility, located at the Naval Base Ventura County	2017 [80]
CERTS Microgrid Demonstration with Large-Scale Energy Storage and Renewables at Santa Rita Jail	Detailed case study of a microgrid demonstration at Santa Rita Jail.	2014 [81]
Borrego Springs Microgrid Demonstration Project	Detailed case study of San Diego Gas &Electric microgrid project at Borrego Springs.	2014 [82]

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Contents (*cont.*)

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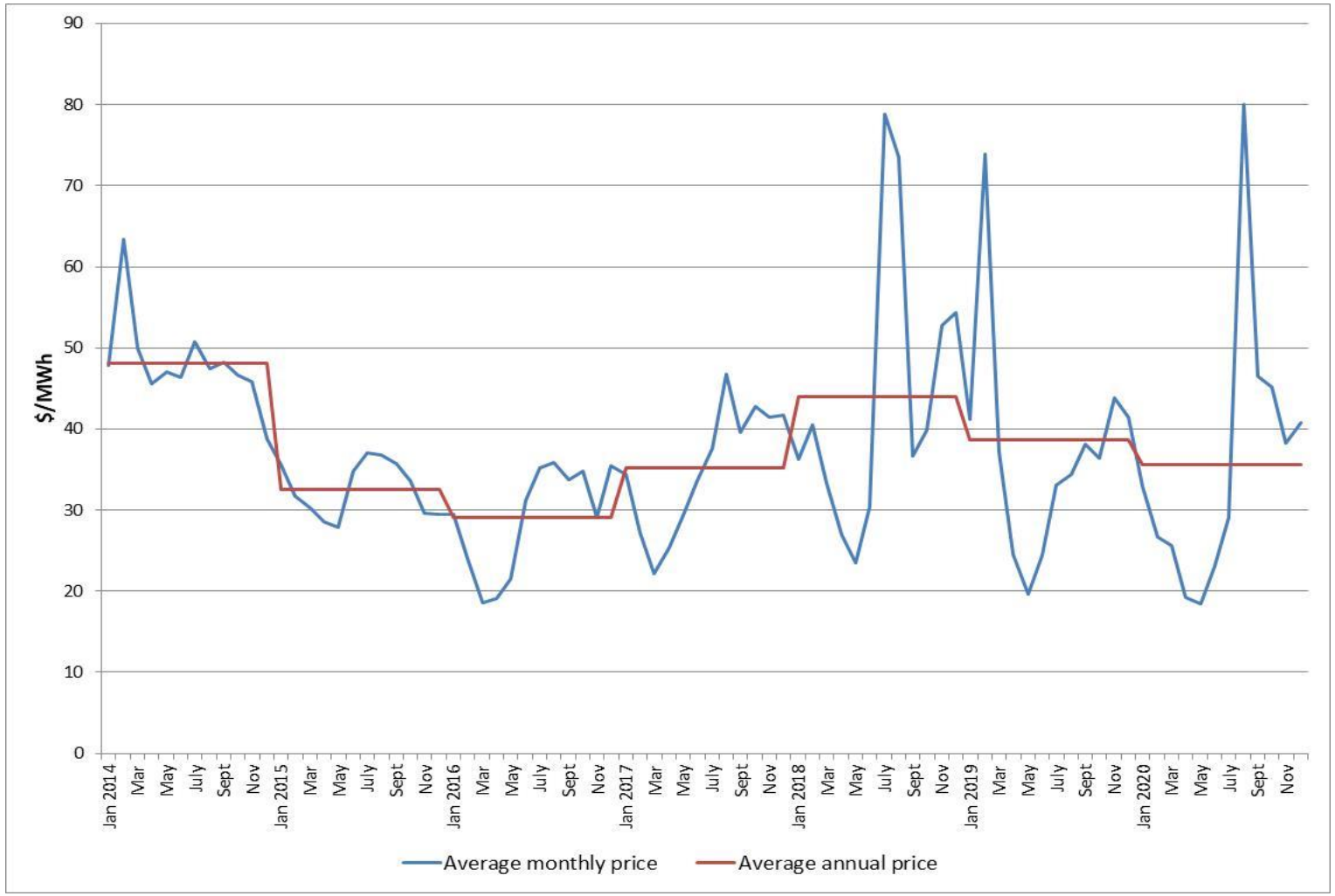
Southern California average monthly and annual day-ahead energy prices, 2014-2020



IFM SCE Load Aggregation Point (LAP) prices

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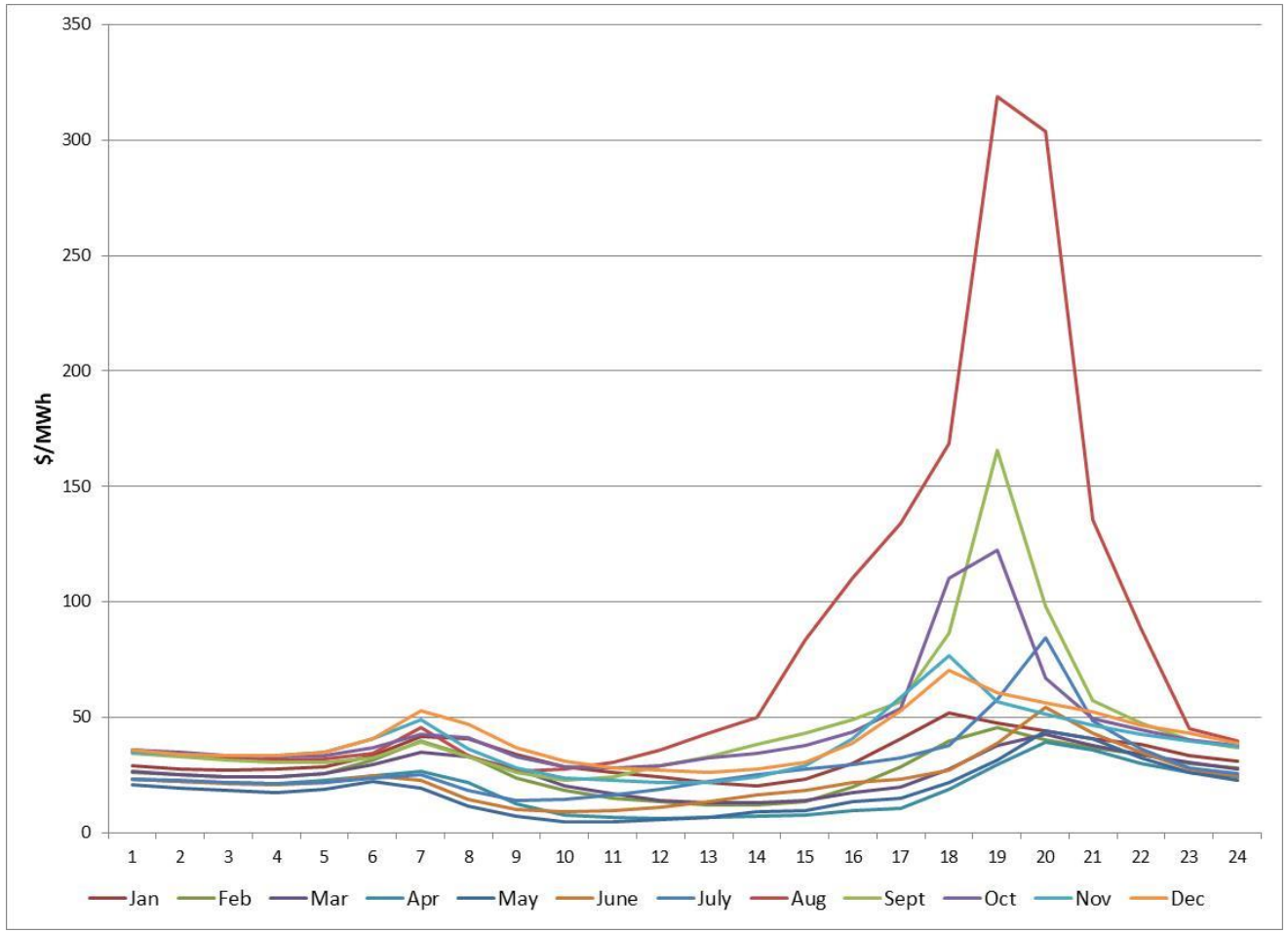
Southern California hourly average energy prices by month, 2020



IFM SCE Load Aggregation Point (LAP) prices

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Storage energy time-shift value ($/kW-year) calculated using the EPRI tools

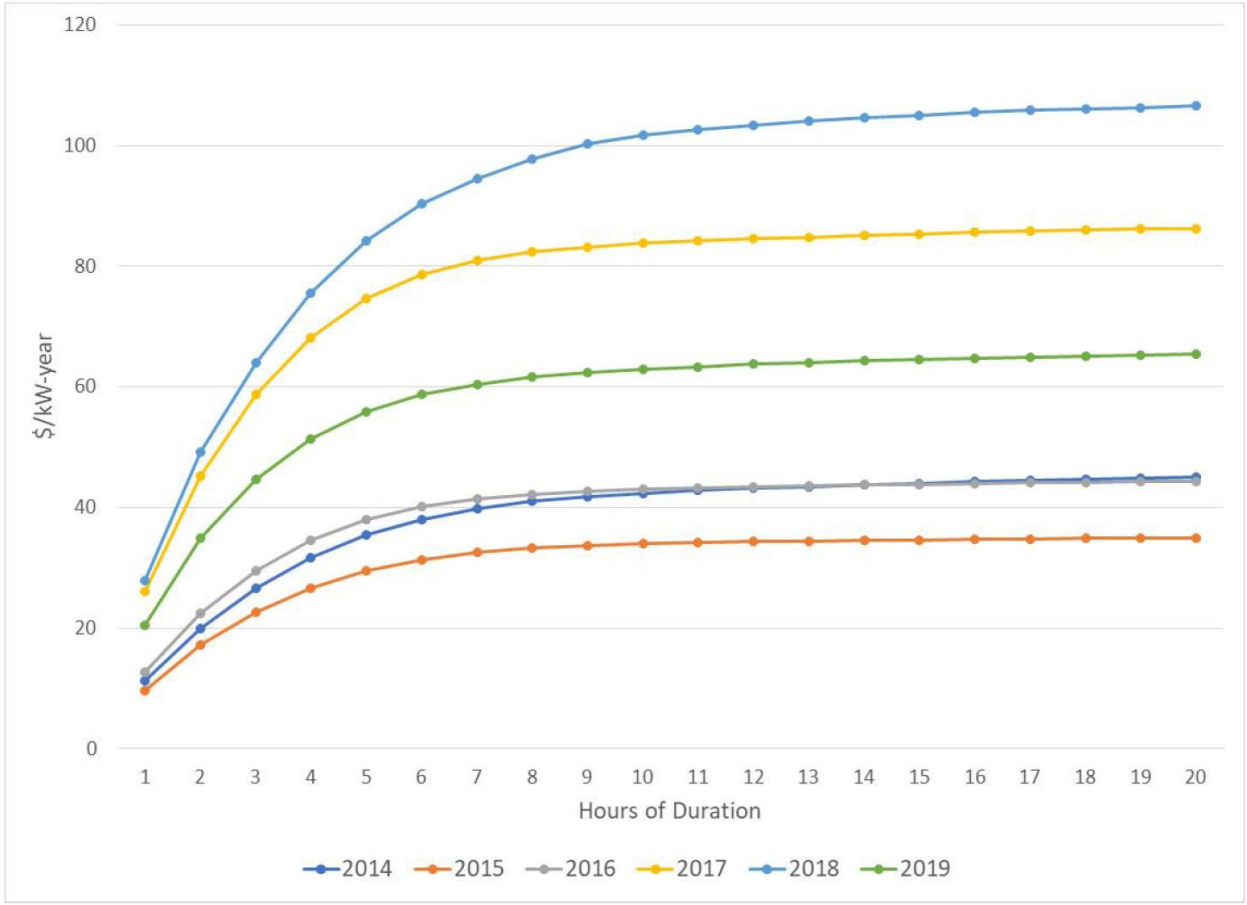

Figure 18–6
Annual energy time-shift value ($/kW-year) calculated with StorageVET™ using SCE IFM DLAP hourly prices, 2014-2019

85% roundtrip efficiency

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User Guide

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EPRI's storage WIKI User Guide

- Will be available online with the full release of DER-VET
- The GUI will have direct links to the online User Guide
  - Will reduce clutter in the GUI
  - Will allow users to gain knowledge available in the User Guide

- Will receive updates as needed
- FAQ page

- Case studies will have separate WIKI pages.

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Snapshot from EPRI's storage WIKI

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Energy Storage Research at EPRI

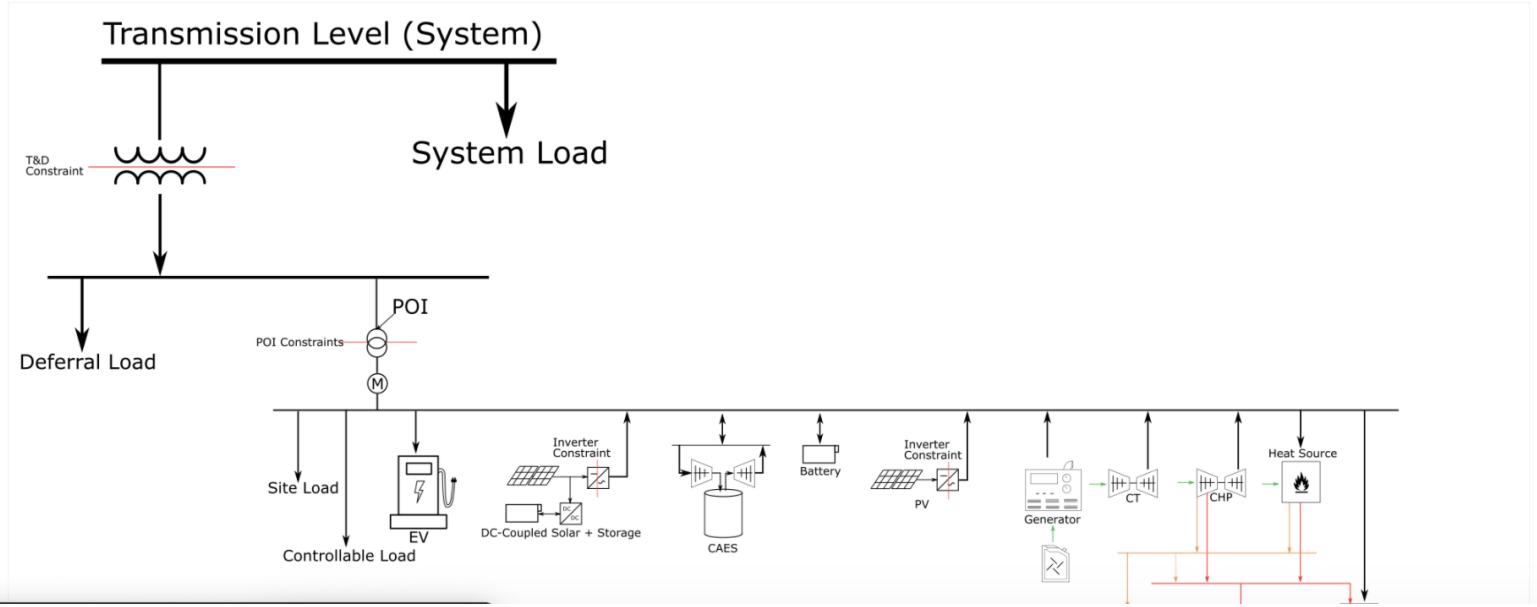
- Research Topics
  - Roadmap: 2025
  - Analysis Case Studies
  - Performance Foresight
  - Technologies
- Additional Resources
- Tools

DER VET User Guide

User Guide and Technical Documentation for the Distributed Energy Resources Value Estimation Tool (DER-VET™)

DER-VET provides a free, publicly accessible, open-source platform for calculating, understanding, and optimizing the value of distributed energy resources (DER) based on their technical merits and constraints. An extension of EPRI's StorageVET® tool, DER-VET supports site-specific assessments of energy storage and additional DER technologies—including solar, wind, demand response, electric vehicle charging, internal combustion engines, and combined heat and power—in different configurations, such as microgrids or standalone resources. It uses load and other data to determine optimal size, duration, and other characteristics for maximizing benefits based on site conditions. Customers, developers, utilities, and regulators across the industry can apply this tool to inform project-level or broader decisions based on sound technical understanding and unbiased cost-performance data.

DER-VET was developed with funding from the California Energy Commission. EPRI plans to support continuing updates and enhancements.



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Snapshot from EPRI's storage WIKI

Energy Storage Research at EPRI

Research Topics
- Roadmap: 2025
- Analysis Case Studies
- Performance Foresight
- Technologies

Additional Resources

Tools

DER VET User Guide/Installation

< DER VET User Guide

The installation process for DER-VET is designed to be very straightforward for most users. If you downloaded DER-VET from www.der-vet.com and intend to use DER-VET's graphic user interface (GUI), then the default installation instructions below are most likely to be right for you. If you downloaded DER-VET from www.github.com, intent to modify the DER-VET source code, integrate it with other software directly, or wish to use a commercial optimizer (e.g. GUROBI), then the 'Installing from Source' section will be most applicable.

Contents [hide]

Installation Instructions

Windows Default Installation (**most Windows users**)

The version of DER-VET that is available on www.der-vet.com comes with an installer which does all of the heavy lifting.

1. Download the DER-VET setup script for Windows from www.der-vet.com
2. Save the setup script ('DER-VET Setup x.x.x.exe') to the location you want to install DER-VET
3. Execute the setup script by double-clicking on its icon

The setup script should run and install DER-VET fully. It will make a shortcut in the directory where you ran the setup script. This shortcut will execute the DER-VET program and open a fully-functional GUI.

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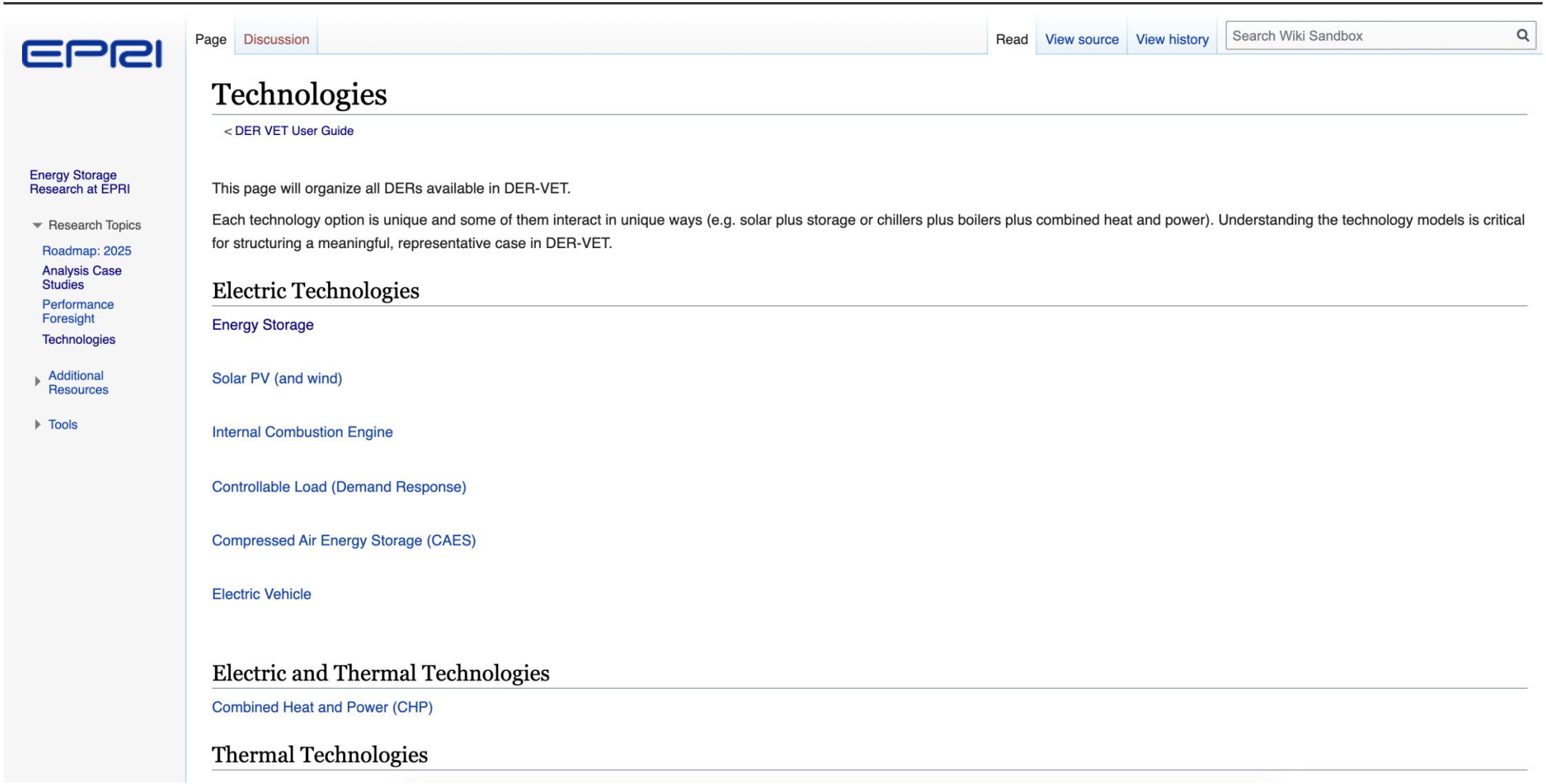
Snapshot from EPRI's storage WIKI



Page Discussion Read View source View history Search Wiki Sandbox

Technologies

< DER VET User Guide

Energy Storage Research at EPRI

- Research Topics
  - Roadmap: 2025
  - Analysis Case Studies
  - Performance Foresight
  - Technologies
- Additional Resources
- Tools

This page will organize all DERs available in DER-VET.

Each technology option is unique and some of them interact in unique ways (e.g. solar plus storage or chillers plus boilers plus combined heat and power). Understanding the technology models is critical for structuring a meaningful, representative case in DER-VET.

Electric Technologies

Energy Storage

Solar PV (and wind)

Internal Combustion Engine

Controllable Load (Demand Response)

Compressed Air Energy Storage (CAES)

Electric Vehicle

Electric and Thermal Technologies

Combined Heat and Power (CHP)

Thermal Technologies

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Full Release Logistics

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DER-VET Full Release

- March 31
  - www.der-vet.com
    - Surveymonkey beta tester sign up will be replaced with the DER-VET direct download link (GUI with installer)
  - DER-VET Github page will be set up and linked on the DER-VET website (python source code)
    - Similar to https://github.com/epri-dev/StorageVET
  - EPRI's technology transfer plan will continue
    - "Reference cases"
    - Online wiki user guide
      - As-built mathematical formulation

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DER-VET Full Release

- Webinars (see workshop announcement shortly)
- Videos
- Continued DER-VET Task Force Meetings

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