Sizing DER for BTM Bill Reduction

Usecase 1 – DER-VET Application

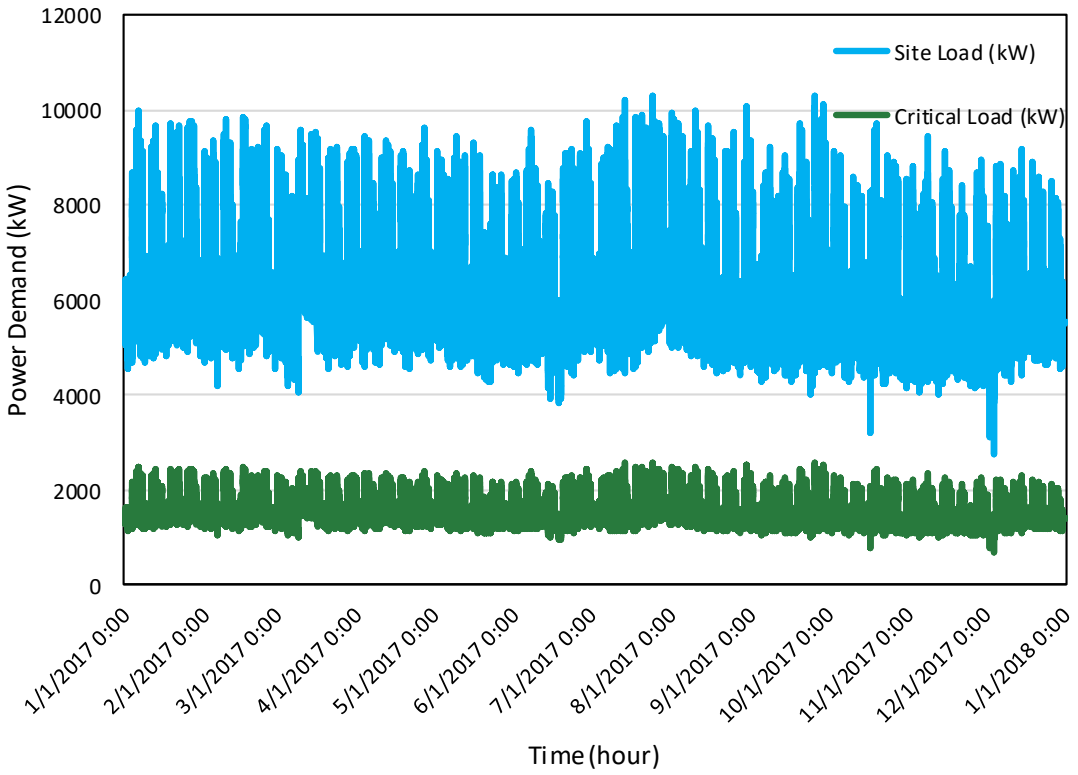
Overview

- Usecase1 - Size BTM DER
  - Primary objective – Customer bill reduction during grid connected days
  - Secondary objective – Support critical load during grid outage
- Input
  - Annual load profiles (both critical load & site load), PV insolation profile and utility tariff
  - DER Parameters (unit capital cost, O&M expense, battery efficiency)
- Output
  - DER mix and size
  - New customer bill and improvements

Site Input Data and Assumptions

Customer Load Description

- Annual site and critical load profile at hourly resolution for simulation year 2017



- The peak load demand is 10.2 MW
- Peak Critical load is 2.55 MW. It is 25% of the site load.

Utility Tariff Structure and Charges

Utility's Demand Charge and Energy Charges

Season	Period	Hours
Summer	On Peak	12:00 – 18:00 (Weekdays)
	Mid Peak	8:00 – 12:00 & 18:00 – 23:00 (Weekdays)
	Off Peak	All other hours
Winter	Mid Peak	8:00 – 23:00 (Weekdays)
	Off Peak	All other hours

Summer			Winter		Demand Charge
On Peak	Mid Peak	Off Peak	Mid Peak	Off Peak	
$0.262392/kWh	$0.086152/kWh	$0.049672/kWh	0.062392/kWh	$0.054152/kWh	$7.016/kW

DER Parameters

- ES Parameters

Parameter	Value
Size	To be sized by DERVET
Li Ion Capital Cost	$800/kW + $250/kWh
Fixed O&M	$10/kW-yr
Round Trip Efficiency	91%

- PV parameters
  - 1MW PV plant – PV size is known
  - PV yearly irradiance profile is given as an input (kW/rated kW)
  - PV location –tied to the AC side of the grid

Before the Microgrid (Base Case) Electricity Bill

Annual Base Case Electricity Bill (2017)

Energy Cost	Demand Charge	Total Bill (Energy +Demand charge)
$4,065,918	$823,149	$4,889,067

20 Year Present Value (2017-2036)

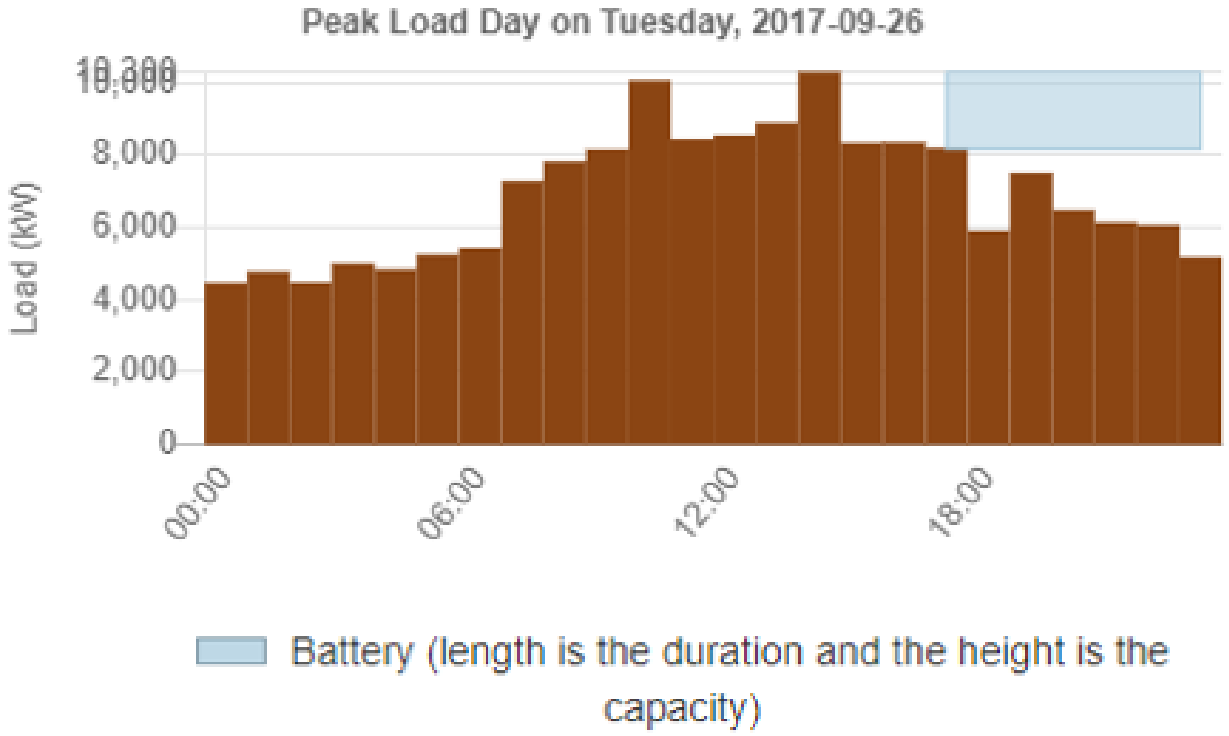
Inflation	Discount Rate	20 Year Present Value (2017-2036)
2.2%	6%	($66,666,609)*

**Negative value represents a cost*

DER-VET Results and Discussion

Design Summary

For the given load and PV profile, DER-VET finds an optimal Energy storage size – **2.12 MW, 6 hr**

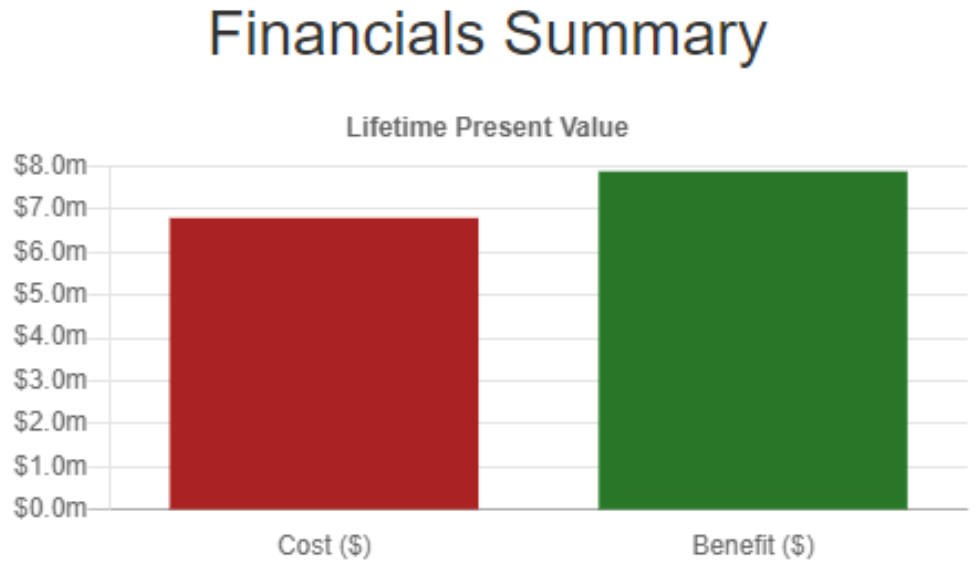


Financial Summary – 20 Year Net Present Value

Comparing with baseline case, costs and benefits of DER investment are summarized below,

CAPEX & OPEX Costs (PV & ESS)	Total Bill Savings	Net Present Value
($6,793,319)*	$7,879,017	$1,085,698

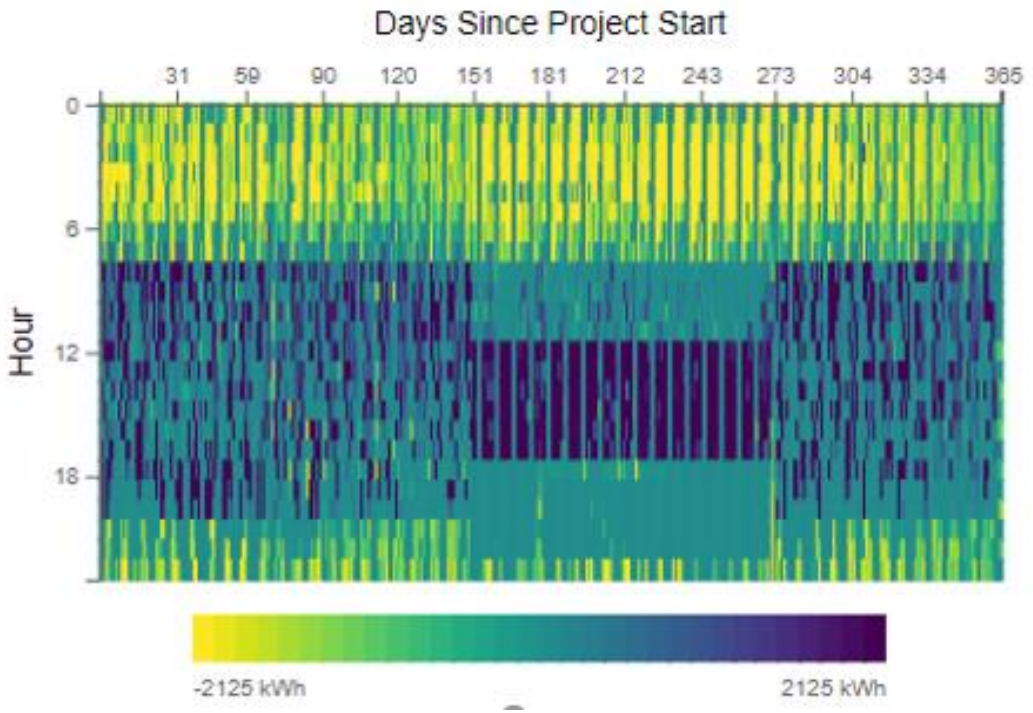
NPV of the designed microgrid is positive on a 20 year time scale



*Negative value represents a cost

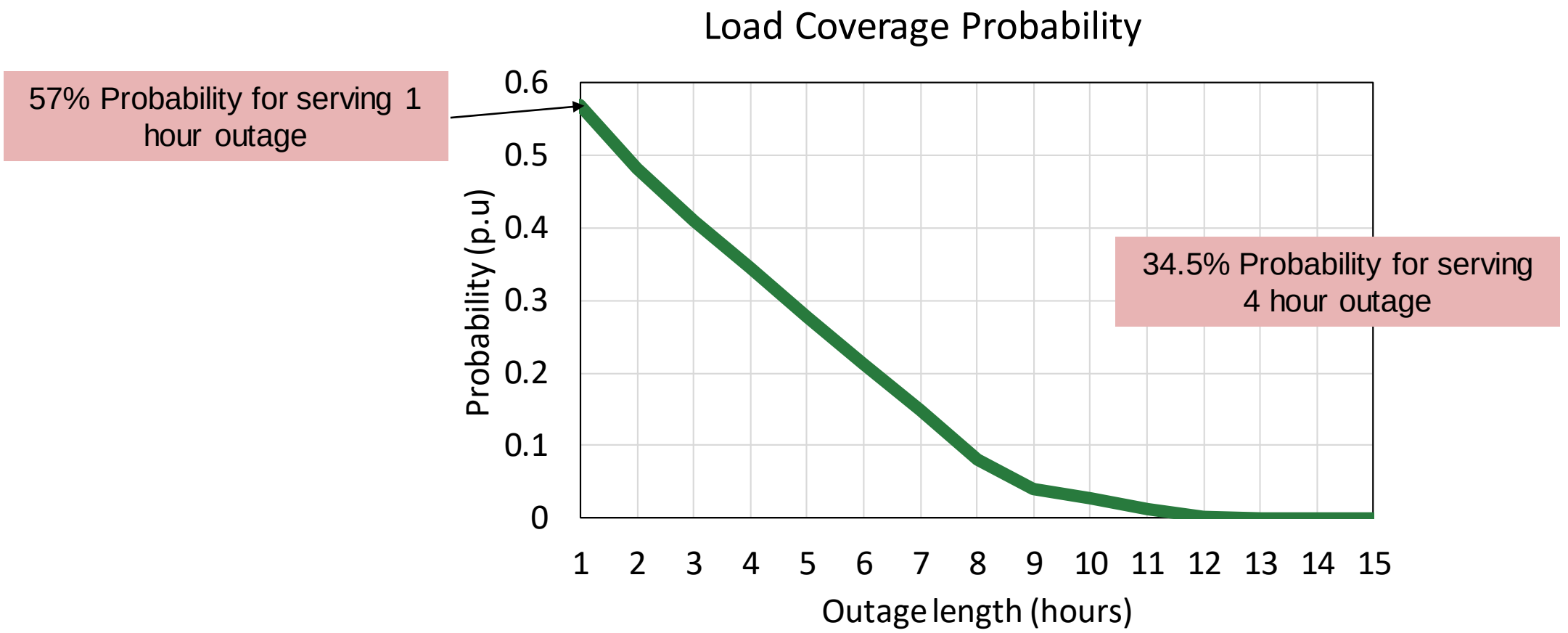
Dispatch Summary (Grid Connected Days)

The energy storage system charges during morning and late night and discharges in the afternoon



Reliability Summary

- Reliability of the designed microgrid is calculated during an outage



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