

# DER-VET Task Force

04/06/2023

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- Advise or try to influence others on their business decisions (except to the extent that they are already public);
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- To divide markets or technologies;
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- To the use, promotion or endorsement of particular vendors, contractors, consultants or products.

# Webcast and Recording Notification

- The webcast is being recorded along with all Q&A. Your participation provides consent to that recording.
  
- As a result, please make sure your phone is on mute throughout the webcast unless speaking. Do not place your phone on hold.

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# Agenda

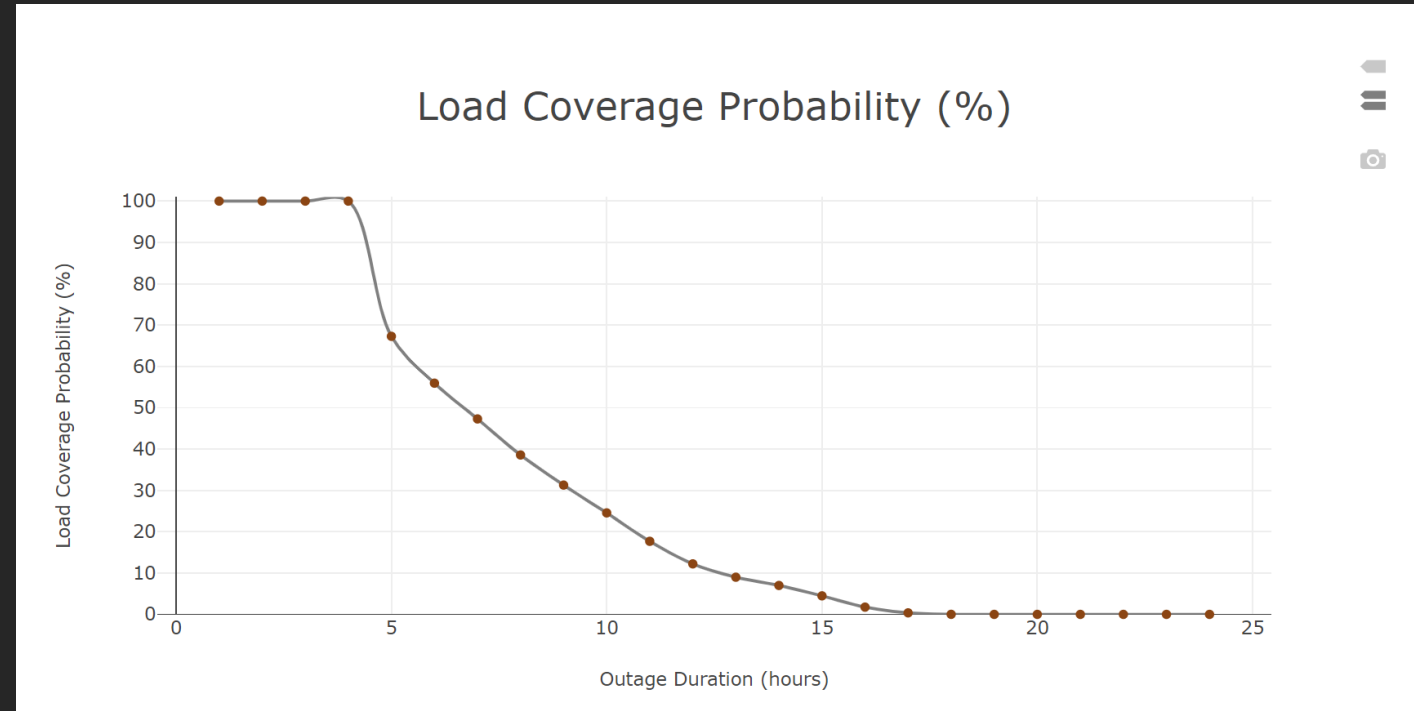
- Reliability Recap
- Simulating Power Outages with User-Defined Constraints
- ... and Demo!



# Reliability Recap

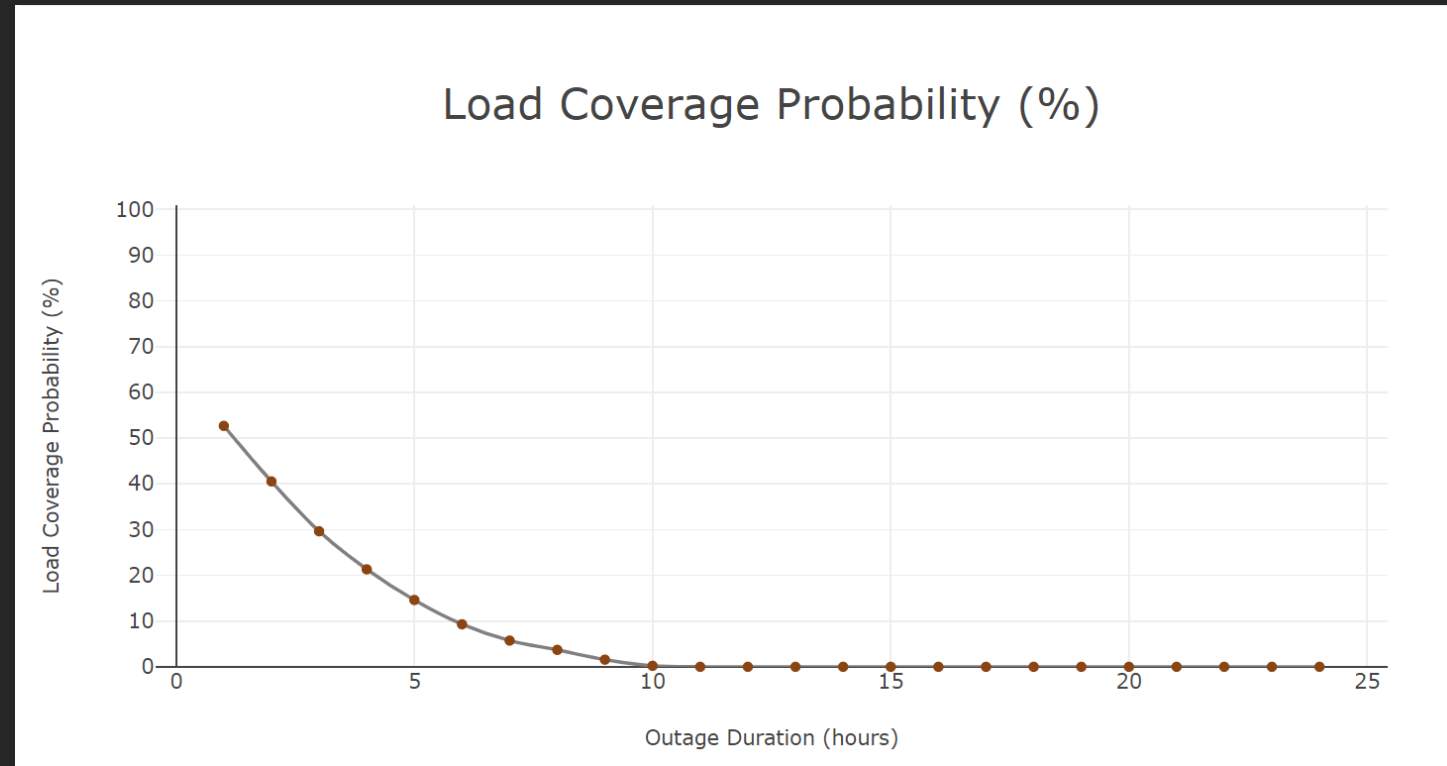
# Design and Operate for Reliability

- Ensures DER are large enough to cover any outage that lasts up to the target duration
- Ensures storage is operated to retain enough SOC to cover any outage



# Post-Facto Reliability

- DER is sized and operated purely for maximum financial benefit and to meet other constraints
- Load coverage percentage is calculated after the optimization – it does not influence the optimization







# Simulating Power Outages with User-Defined Constraints

# Simulating Power Outages with User Defined Constraints



DER-VET's User-Defined Constraints allows end users to model specific operation, events, and value streams distinct from those already included in the software tool's set of features.



This is done by allowing users to set minimum and maximum constraints on specific system simulation variables such as: Interconnection Import and Export; Storage State of Energy



These constraints are conditions that the optimization problem are guaranteed to adhere to, though attempting to enforce contradicting constraints will cause a solution to be infeasible.

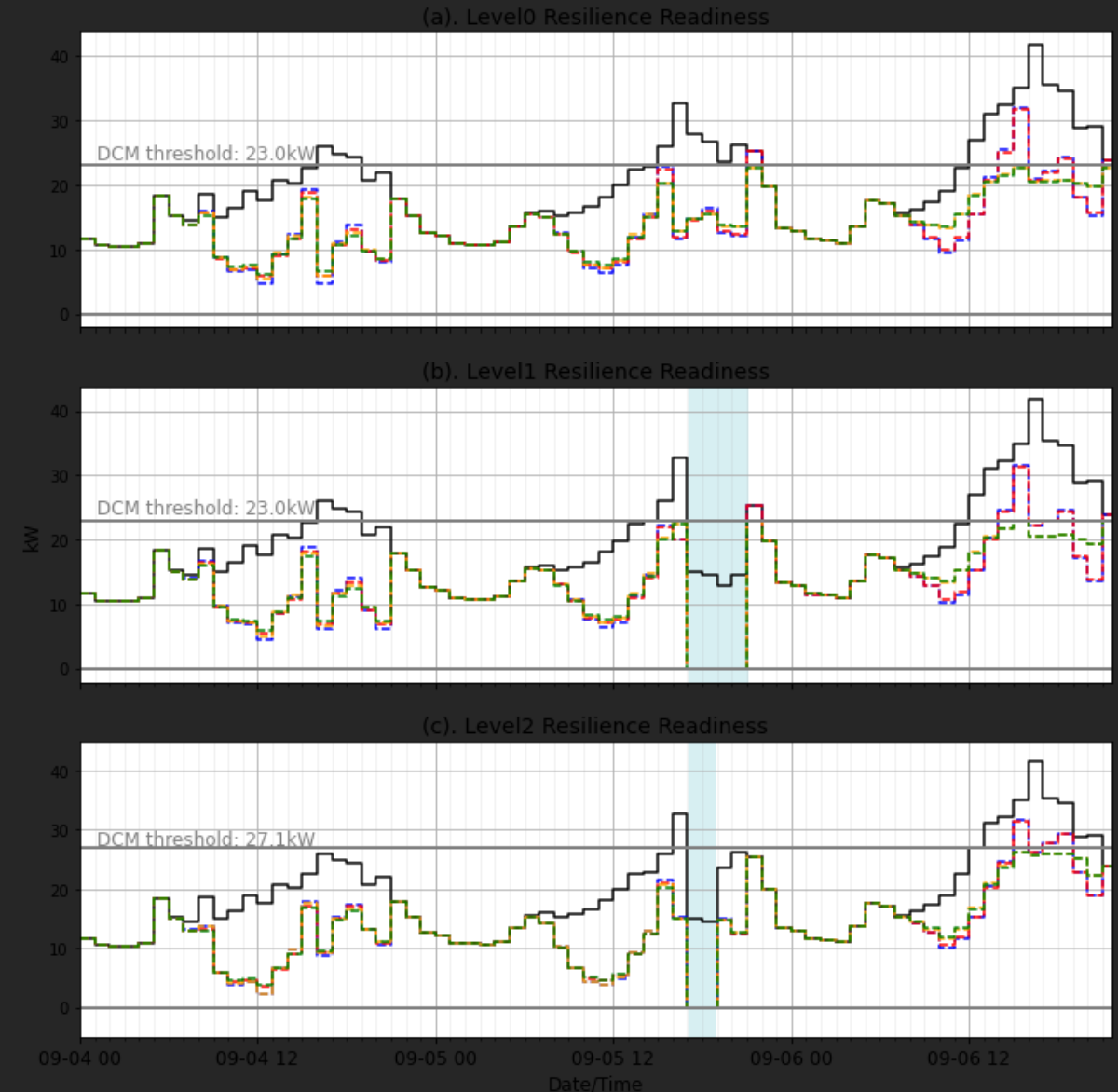


The end user may also define a financial reward for meeting all user-defined, scenario-specific constraints. This essentially acts as a custom value stream.

**User-defined constraints can be modified to simulate specific or unusual DER operation**

# Simulating Power Outages with User-Defined Constraints

- For many behind-the-meter customers, having the ability to ride through utility power outages with backup power plays a significant role in their decision to procure battery energy storage.
- Some insight can be gleaned from understanding how a storage system might need to operate in order to be prepared for a customer resilience event.
- We can simulate an outage by modeling it as time-dependent limits on maximum interconnection import and export.
- During the hours of outage, max import and export are set to zero; all other times, they are bounded by the scenario's default value.



# Simulating Power Outages with User-Defined Constraints

Datetime (he)	POI: Max Export (kW)	POI: Max Import (kW)	Site Load (kW)	Critical Load (kW)
2019-09-05 12:00	1900	-1900	18.08950601	9.443734359
2019-09-05 13:00	1900	-1900	19.90614123	10.84288163
2019-09-05 14:00	1900	-1900	22.47954257	12.80984887
2019-09-05 15:00	1900	-1900	22.85974947	12.86187508
2019-09-05 16:00	1900	-1900	25.9178741	14.69354705
2019-09-05 17:00	1900	-1900	32.6927178	17.51001064
2019-09-05 18:00	0	0	14.96773258	0
2019-09-05 19:00	0	0	14.62330211	0
2019-09-05 20:00	0	0	12.87086518	0
2019-09-05 21:00	0	0	14.56474638	0
2019-09-05 22:00	1900	-1900	25.33766407	0
2019-09-05 23:00	1900	-1900	19.84152957	0
2019-09-06 00:00	1900	-1900	13.3426703	0
2019-09-06 01:00	1900	-1900	12.85484076	0
2019-09-06 02:00	1900	-1900	11.55003576	0
2019-09-06 03:00	1900	-1900	11.3882929	0

**4-hour outage on 2019-09-05 from 5 PM to 9 PM:**  
no power is allowed to flow from or to the distribution grid  
the critical load becomes the site load during the outage



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