

# GridSolar, LLC The GridSolar Pilot Project for Grid Reliability

Sierra Club of Maine

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# Electric Grid Reliability: The Problem



#### Grid Reliability is generally a Peak Load Problem



• ME Turnpike Analogy



Electric Grid Reliability: Potential Solutions



- Transmission Solution Build more Transmission to bring power from away <u>into</u> the Region
- Non-Transmission Alternative or "NTA" Solution
   Manage Load and develop new Distributed Generation within the Region



### Yesterday's Electric Grid







Large Central Generating Stations designed to serve 24 x 7 industrial loads using high voltage transmission lines and centralized dispatch control



### **Tomorrow's Electric Grid**





Distributed Energy Resources located near commercial loads that are weather sensitive (more peaked) using distributed control technologies



### **Smart Electric Grids**





# **Contrasting Visions**

Utility Vision in which peak load is met by large generating facilities located far from load requiring expensive transmission systems

GridSolar Vision in which peak load is met through a smart electric grid using energy efficiency, DR, smallscale distributed solar generation and other resources located close to load



### **Boothbay Pilot**



Radial nature of electric service and local distribution circuits on the Boothbay peninsula defines the electrical region for the Pilot Project – Total Peak load – Approx. 30 MW.

50 KM 50 Miles





## Boothbay Harbor, Maine





# Shock and Sag

- When a Reliability Event
  Occurs, the electric grid has two responses:
  - "SHOCK" frequency and voltage responds immediately, which can cause power failure.
  - "SAG" power flows on specific lines and circuits exceeds carrying capacity causing them to overheat and sag. If sag exceeds clearance, they will short causing power failure.



# **Boothbay Pilot**

### Hybrid Solution

- CMP Voltage Support investments to address instantaneous response issues – "SHOCK"
- NTA Options Manage thermal conditions on conductor feed into the region – "SAG"
- Benefit Avoid \$18 million upgrade to CMP Sub-Transmission Line serving the region.



# **Pilot Design**

- Term 3 Years, option to 10 Years
- Need up to 2 MW of NTA Resources
  - modular, can scale with load

#### • NTA Types – <u>Target</u> 250 kW each

- Efficiency
- Renewable DG (125 kW Solar)
- Non-renewable DG (preference net zero CO2)
- Demand Response
- Competitive Bids PUC approves all contracts
- Cost are recoverable in utility rates



### **NTA Resources**

kW	RFP I	RFP II	Totals	Pct. \$/kW M
Conservation	237 0	111 3	348 3	19% \$10.47
Solar	168.8	106.8	275.6	15% \$13.19
BUGS	500.0	0.0	500.0	27% \$20.63
Demand Response	0.0	250.0	250.0	13% \$57.65
Battery	0.0	500.0	500.0	27% \$75.99
Totals	905.8	968.0	1,873.8	100%



# GridSolar Ops Center - Portland

### o Dispatch (SCADA) System

- Direct/Cellular Link to Active NTAs
- Data loggers at Passive NTAs

#### Command Interface

- CMP dispatch: load, location, duration
- GridSolar: define & issue dispatch order
  Automated, failsafe backup
- Real time monitoring & data logging
- CMP collect data at substations



### Boothbay Pilot – Response



Actual and Reconstituted Loads on August 11, 2016 for CMP's Boothbay Circuit 209



### Boothbay Pilot – Response



Response of Passive and Active Distributed Energy Resources – August 11, 2016



\$75.75 Million

GS Rev.Req.

\$5.87

Million

\$1.75 Million

### **Comparative Costs**





## Findings/Conclusions

- 1. NTAs can provide the same degree of grid reliability at less cost than transmission solutions
- While Transmission Costs keep going up and up and up – NTA costs are going down and down and down
- 3. We are currently utilizing only a tiny fraction of the capabilities of CMP's increasingly smart electric grid
- Public policies should encourage not discourage customer installation of Distributed Energy Resources



## Last Thought ...

DO NOT underestimate how difficult it will be to implement the lessons learned from the Boothbay Pilot

The barriers utilities will erect – while not insurmountable – are very formidable ... e.g. NYS REV, CMP – Net Metering



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