2015 September ETIC Tour
NorthWestern Energy
Battery Storage Project

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NorthWestern Energy – Demand Side Management Engineer

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Todays Presentation

- Battery Storage Project Update
  - Project and System Description
  - Testing
  - Integration

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NorthWestern Energy Cost

Equipment Description	Cost
Smart Switch	$36,000
Concrete Pad	$5,000
ISP Monthly	$81/ Month
Electrical Service – Net Meter Demand Monthly Average	$131/ Month

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Battery Storage System

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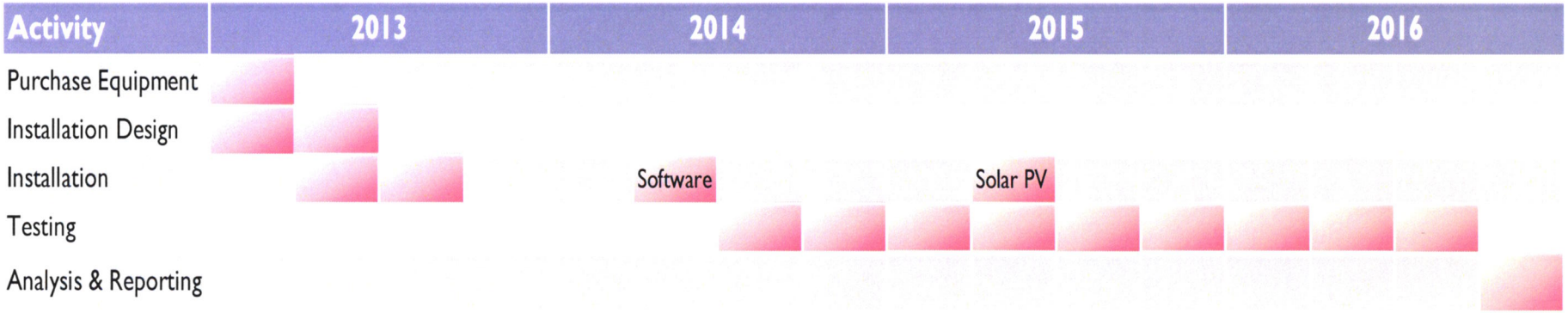
Project Description

Schedule



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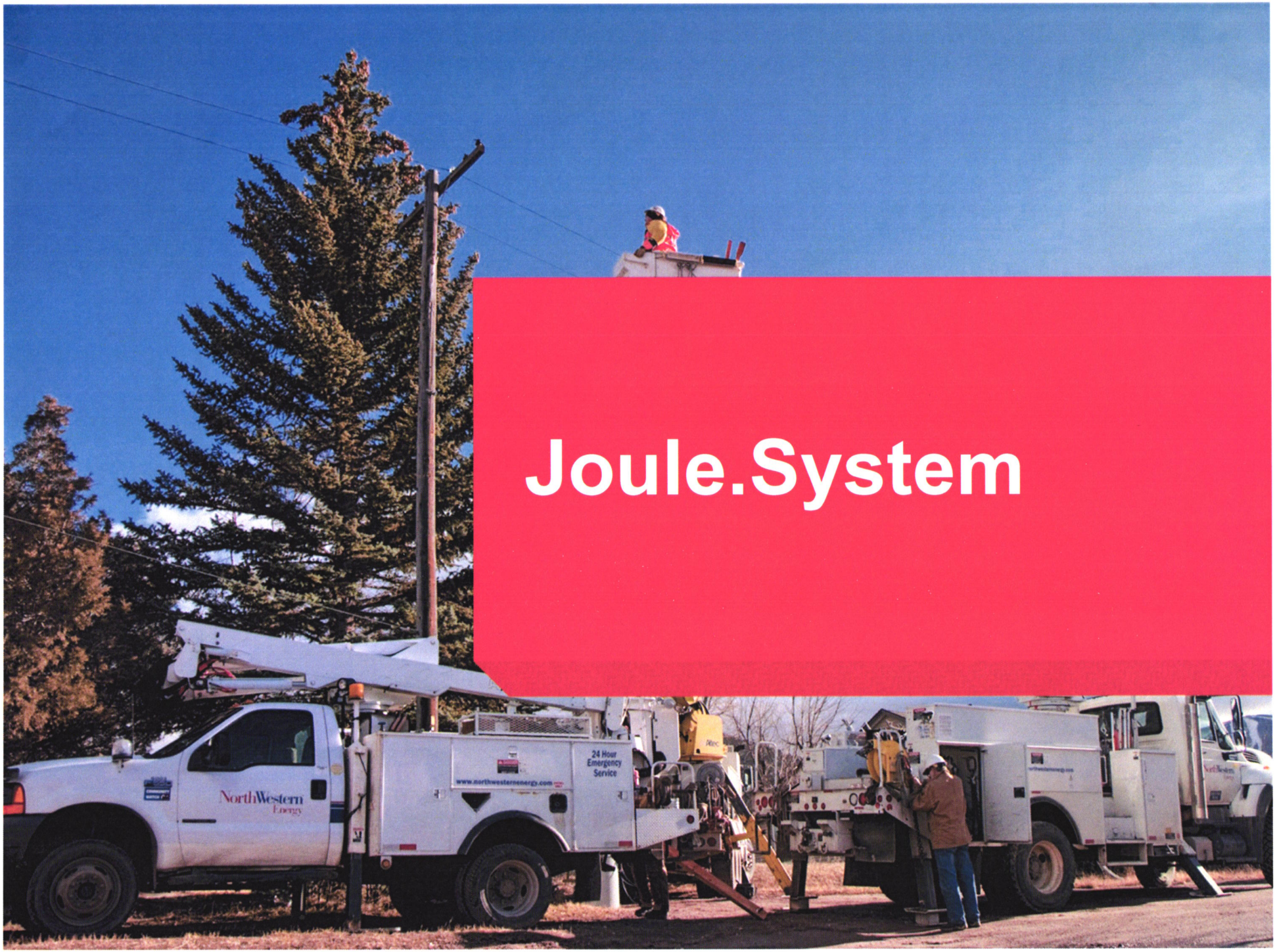

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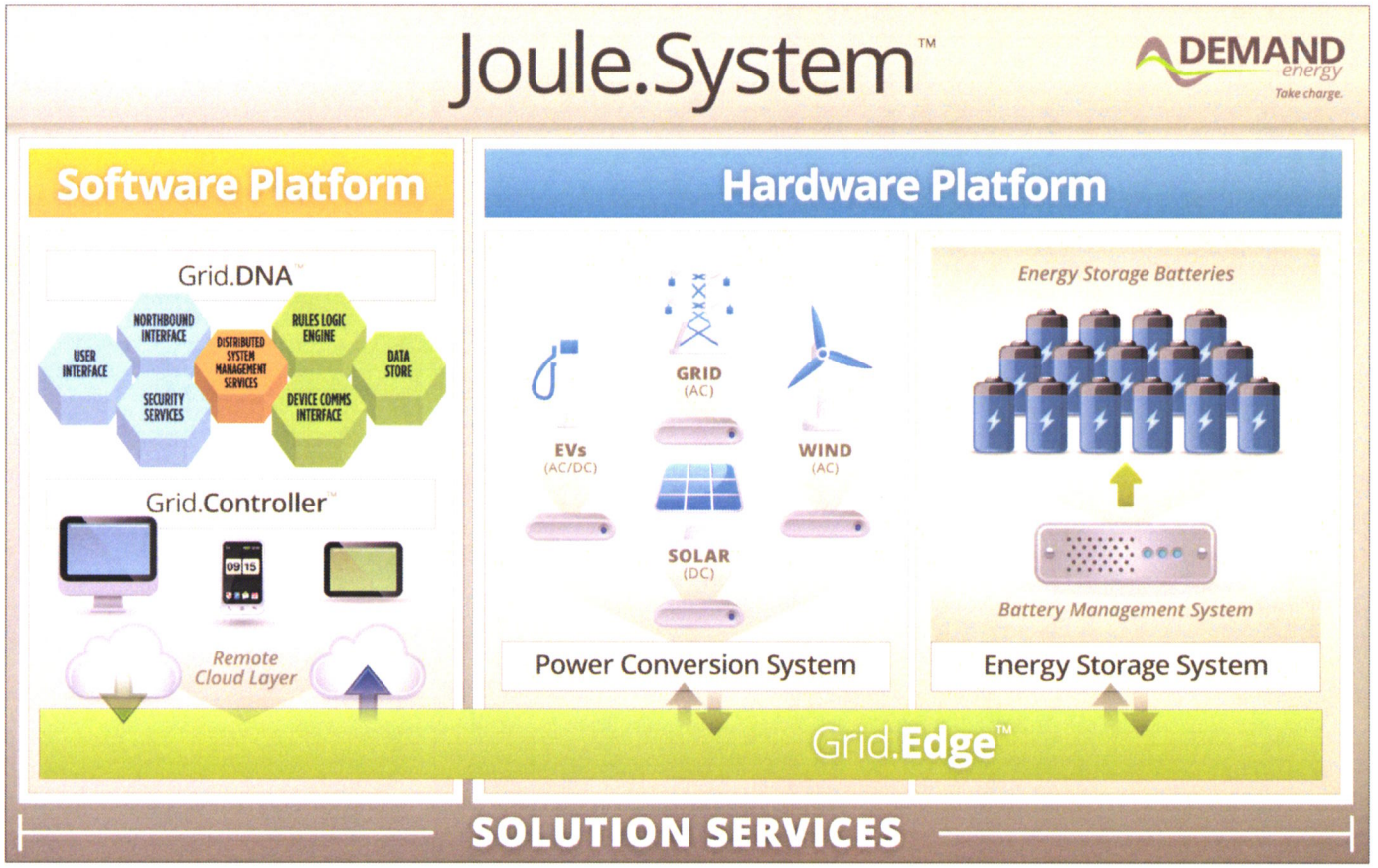
System Description



- Demand Energy Technology

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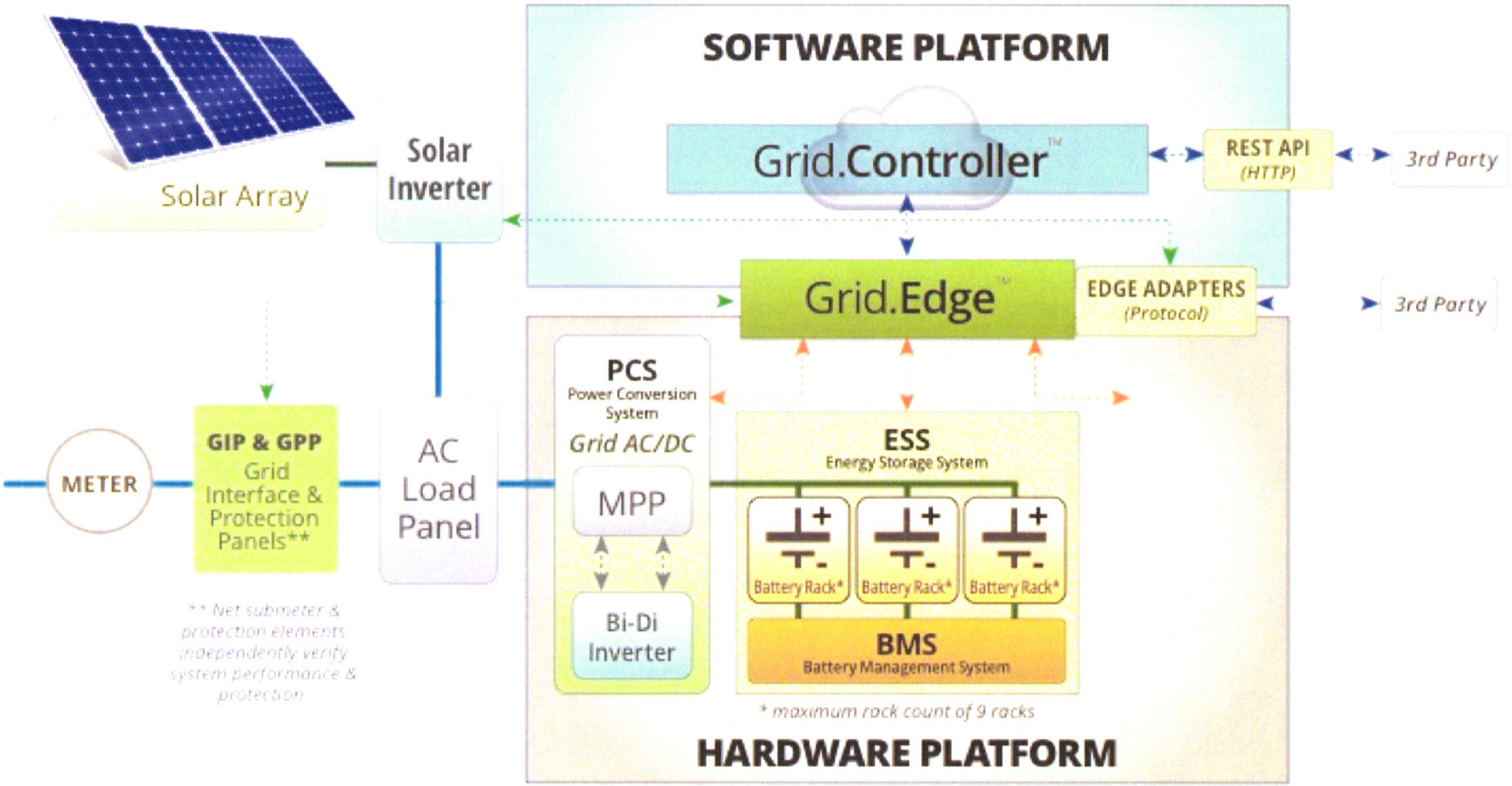
System Description



- AC Coupled Storage + Solar

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Energy Storage System

Parameter	Value
Total system capacity (KW):	50KW
Total system capacity (KWH):	400KWH @ 50% DoD
AC system max current (@480VAC):	<75A RMS @ >.8 Power Factor
Solar Integration:	10 kW (AC Coupled)
System DC voltage range (VDC):	<600VDC (420-588 typical)
System Conversion Efficiency:	80% roundtrip
System data connection:	Ethernet/IP (Cat5)

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Inverter

Parameter	Value	Parameter	Value
Inverter Technology:	High-frequency PWM	AC Frequency:	50/60 Hz
DC Voltage:	280-600 vdc standard	Weight:	990 lbs
Max Input Power (Discharge):	105kW	AC Voltage:	480 VAC
Max Output Power (Charging):	95kW	Harmonic Distortion:	Current<5%, Volt.<3%
Power Factor Range:	0 to 1.0	Peak Efficiency:	96%

Standards Compliance: IEEE 1547/UL1741

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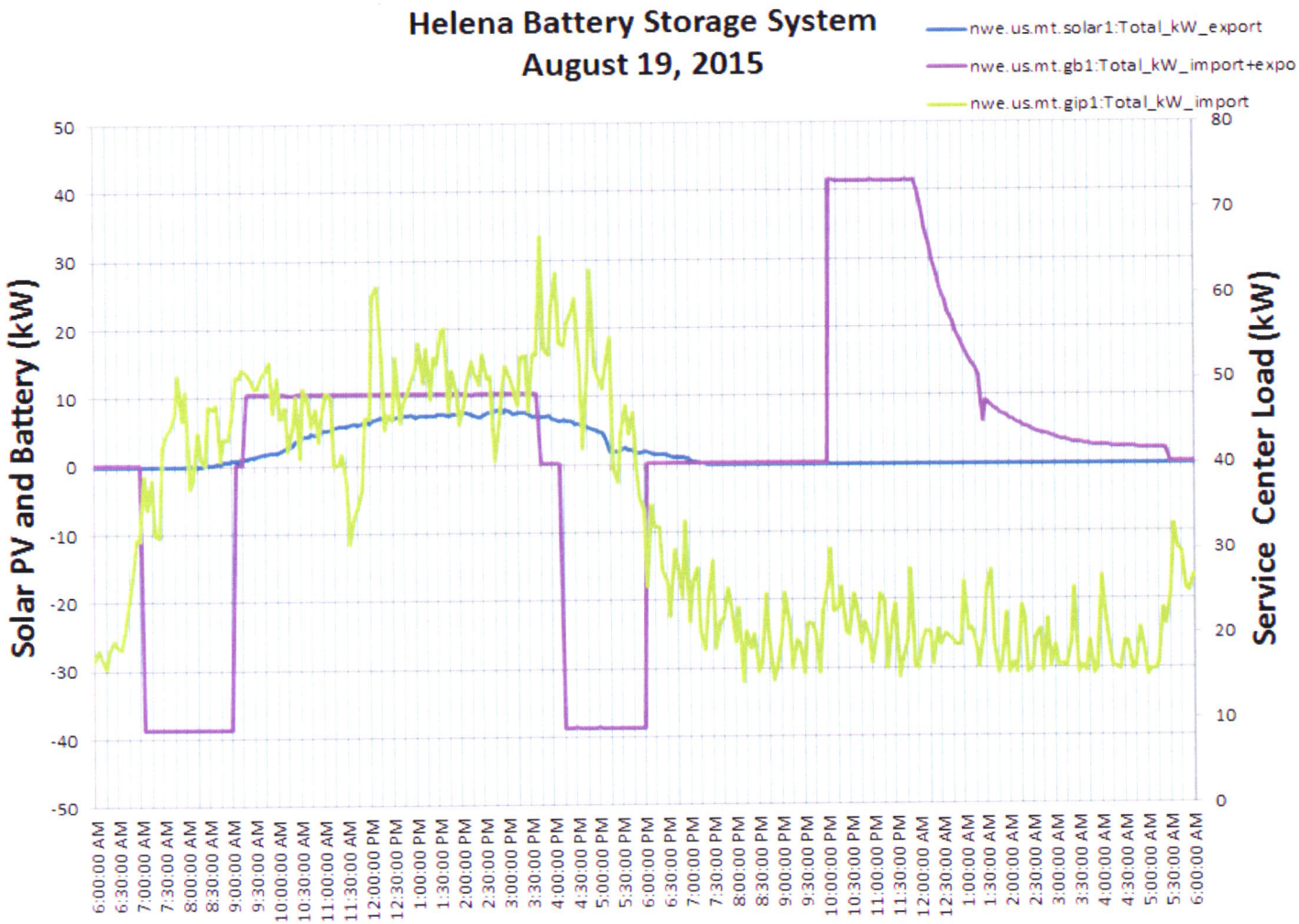
Testing

- Currently providing load support to the Helena Division Building
  - Charge/discharge cycling of batteries
  - Added solar PV system for charge cycle in spring

Testing



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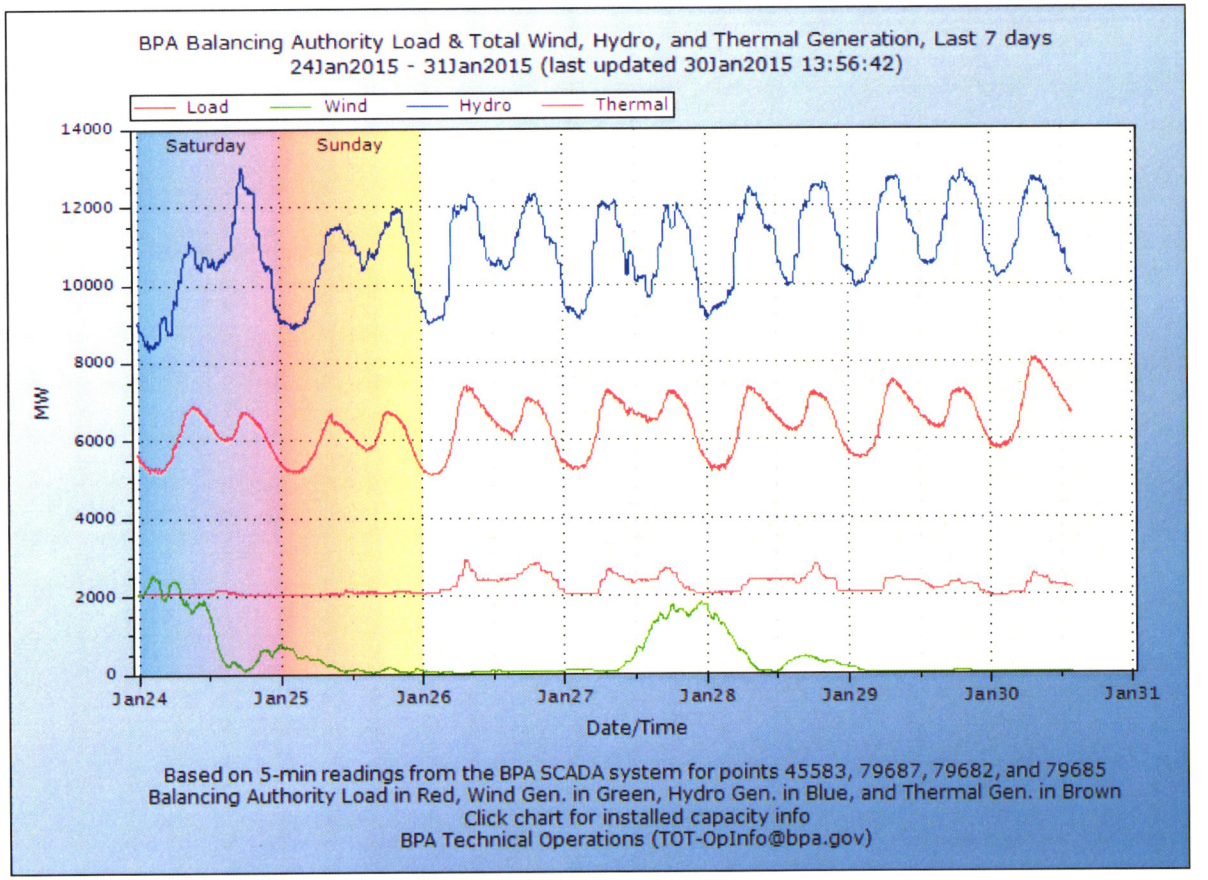
Testing

MANAGING STORAGE

- Store Energy at night off-peak
- Split the discharge of the system to coincide with 2 hours of morning peak and 2 hours of evening peak.
- Operation could be seasonal
- Summer operation would be from 4 pm to 8 pm to align with summer peak.



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Other Possible Integrations

Type	Description
Stand Alone Storage	Grid.Balancer baseline architecture
PV/Storage	DC Coupled, grid isolated PV, New sites
	AC Coupled, Existing PV sites
	Hybrid AC/DC Coupled, Existing PV Site +New PV/Storage
Back-up Power	Standby, Soft failover >1 sec.
	Distributed Generator Integration
PV Back-Up Power	AC Coupled Storage + Solar
	DC Coupled Storage + Solar; no fuel, extended outage support
	Hybrid AC/DC Coupled System; with generator integration
Microgrid	DC Coupled PV, Total Loads
	Grid Connected, Net-Zero or Off-Grid
Networked System	Multiple Grid.Balancer systems managed in aggregate

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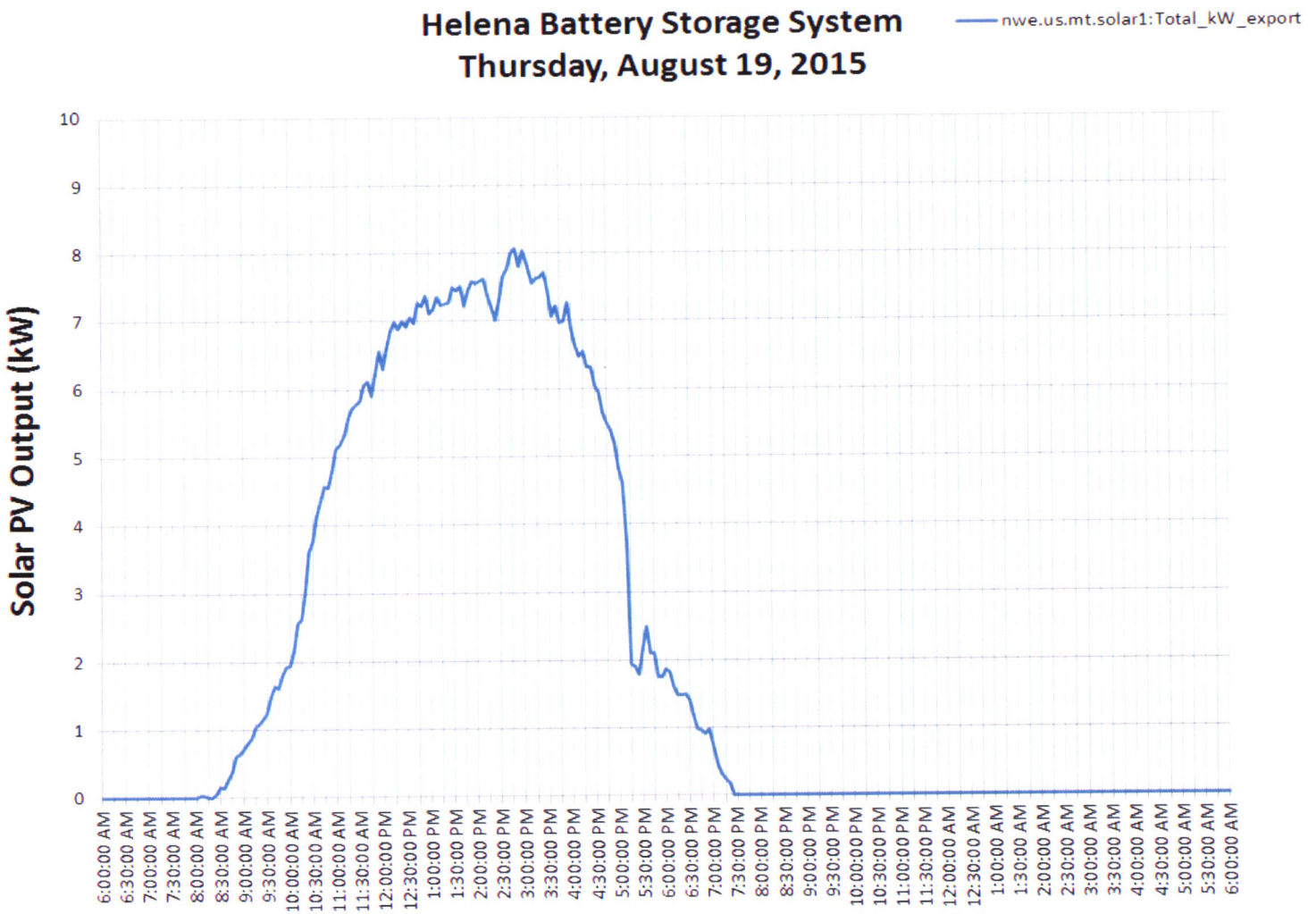
Solar PV Plots – Sunny Day



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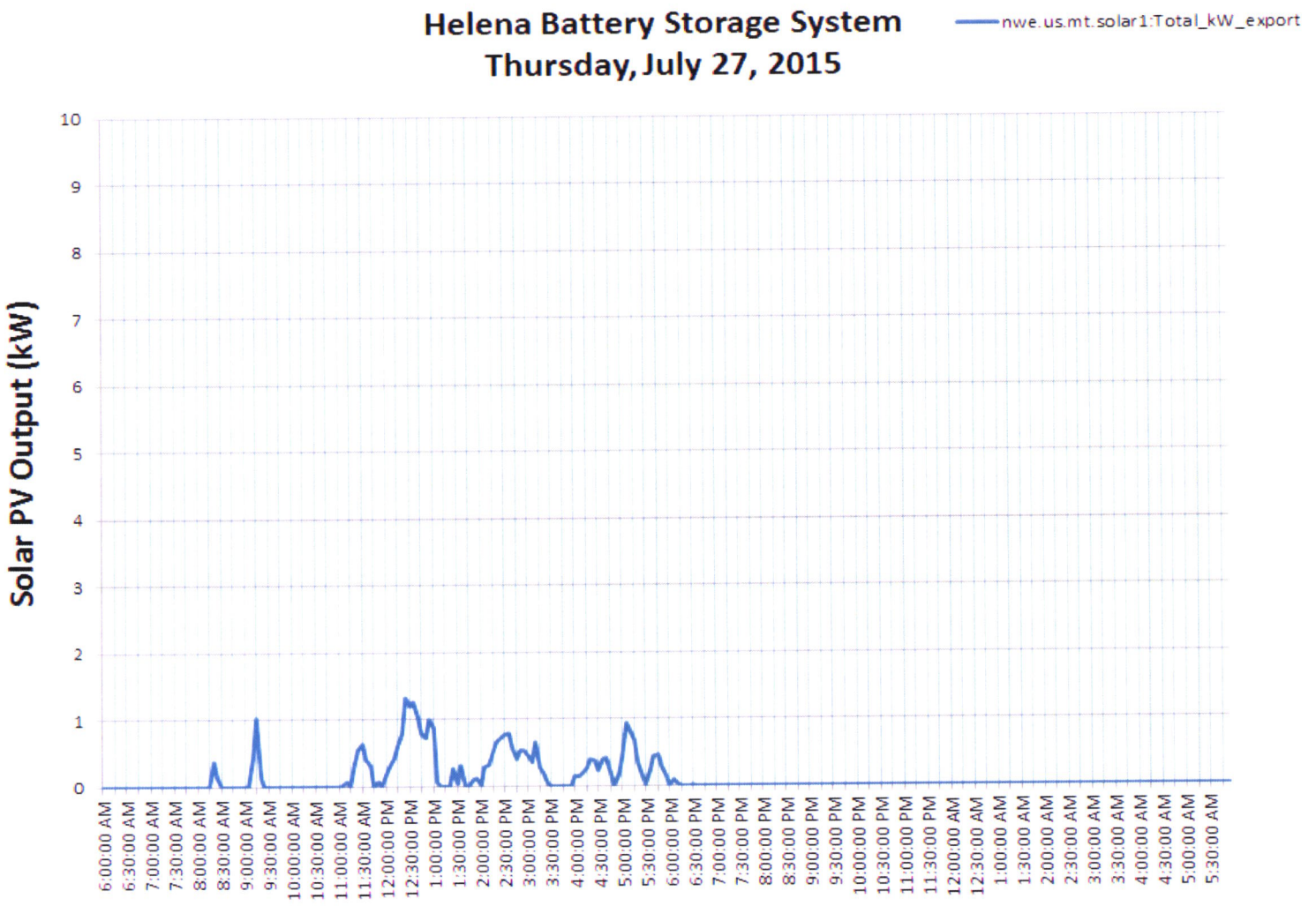
Solar PV Plots – Cloudy Day



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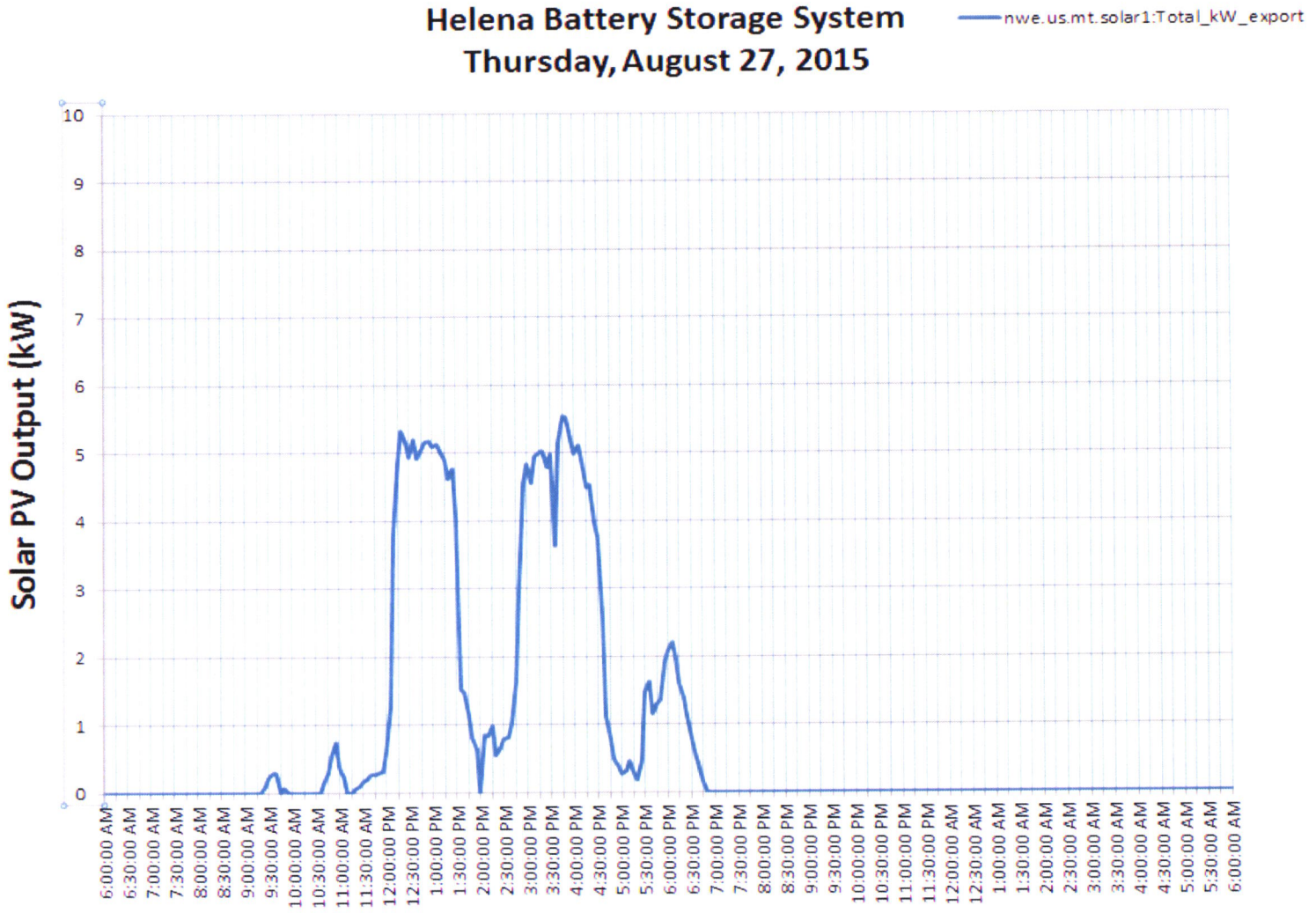
Solar PV Plots – Variable Day



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Battery Storage System

- Questions

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Battery Storage Tour

- Yard adjacent to Helena Division
- Hardhats and good walking shoes

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