



ACEEE – GIWH Panel

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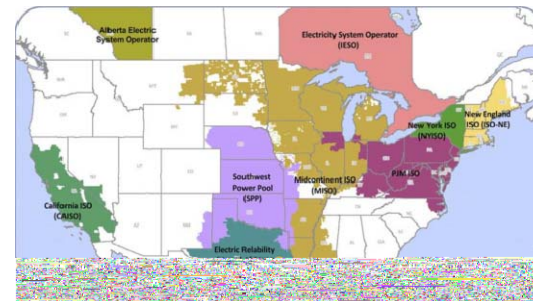
GIWH Status and Challenges

- Opportunity
 - Basic Research and Demonstrations in Process
 - Utility Wide Standards Emerging
 - Requirements
 - Locational and Experimental
 - 80/20 Rule not apparent
- Value
 - Multiple Value Propositions
 - Inability to Monetize Value
- Limited Markets
 - High Base Rate & Electrical Islands
 - Balancing Authorities
 - ISOs

Capacity Offset (Traditional)
Energy Offset (Peak/ OffPeak)
Reserves
Regulation
Frequency

Eaton Opening Remarks

- Manufacturer of Products and Solutions
- EAS Direct to Utility
- Product Requirements
 - Mass Market
 - Standard Product Offering
 - 50,000 for break even
 - Long-Life Product/ Solution
 - ROI (Utility and Eaton)



It takes a community to create a market

Value - Utility Side GIWH Value & ROI

Category	Capacity (Traditional)	Energy Offset (Peak/ OffPeak)	Reserves	Regulation	Frequency Response	Total Annual Value
Annual Value	\$ 64.08	\$ 201.60	\$ 46.80	\$ 126.00	\$ 43.20	
Existing Market Offerings						
Capacity Offset (Traditional)	●					\$ 64.08
Energy Offset (Peak/ OffPeak)		●				\$ 201.60
Emerging Offerings						
Energy Offset with Reserves		●	●			\$ 248.40
Energy Offset with Regulation		●		●		\$ 327.60
Energy Offset with Frequency		●			●	\$ 244.80

- Capacity Offset
 - Retrofit Market
 - DR Ready WH
- Energy Offset
 - Nightly Charging
 - TOU / CPP
- Combination Offerings
 - Balancing Authority
 - New ISO Programs Required

Financial Analysis (10 Year)	NPV	NPV Invested	Annual ROI	Break Even Year
Existing Market Offerings				
Capacity Offset (Traditional)	\$15	\$468	0.3%	10
Energy Offset (Peak/ OffPeak)	\$279	\$ 1,095	2.6%	8
Emerging Offerings				
Energy Offset with Reserves	\$514	\$1,358	3.8%	7
Energy Offset with Regulation	\$1,111	\$1,358	8.2%	5
Energy Offset with Frequency	\$487	\$1,358	3.6%	7

Notes:

- Existing w/o GIWH Infrastructure
- "Average" Market Conditions

Markets – ISO DR Program Comparison

GIWH Markets				
Market	Capacity	Energy	Reserve	Regulation
AESO		•	•	
CAISO		•	•	
ERCOT	•			
IESO		•		
ISO-NE	•	•	•	
MISO	•	•	•	
NBSO	•	•	•	•
NYISO	•	•		
PJM	•	•	•	•
SPP				
ISO Count	6	8	6	2
Programs	11	19	9	3

Filters:

- Resource Type
- Aggregation Allowed

IRC Database

Programs (53)

Attributes (46)

- ISO/RTO Product
- Product / Service Features
- Deployment
- Market Participant Roles
- Communication Tech
- Event Timing
- Telemetry
- After The Fact Metering
- Performance Evaluation

DR Reserves Programs

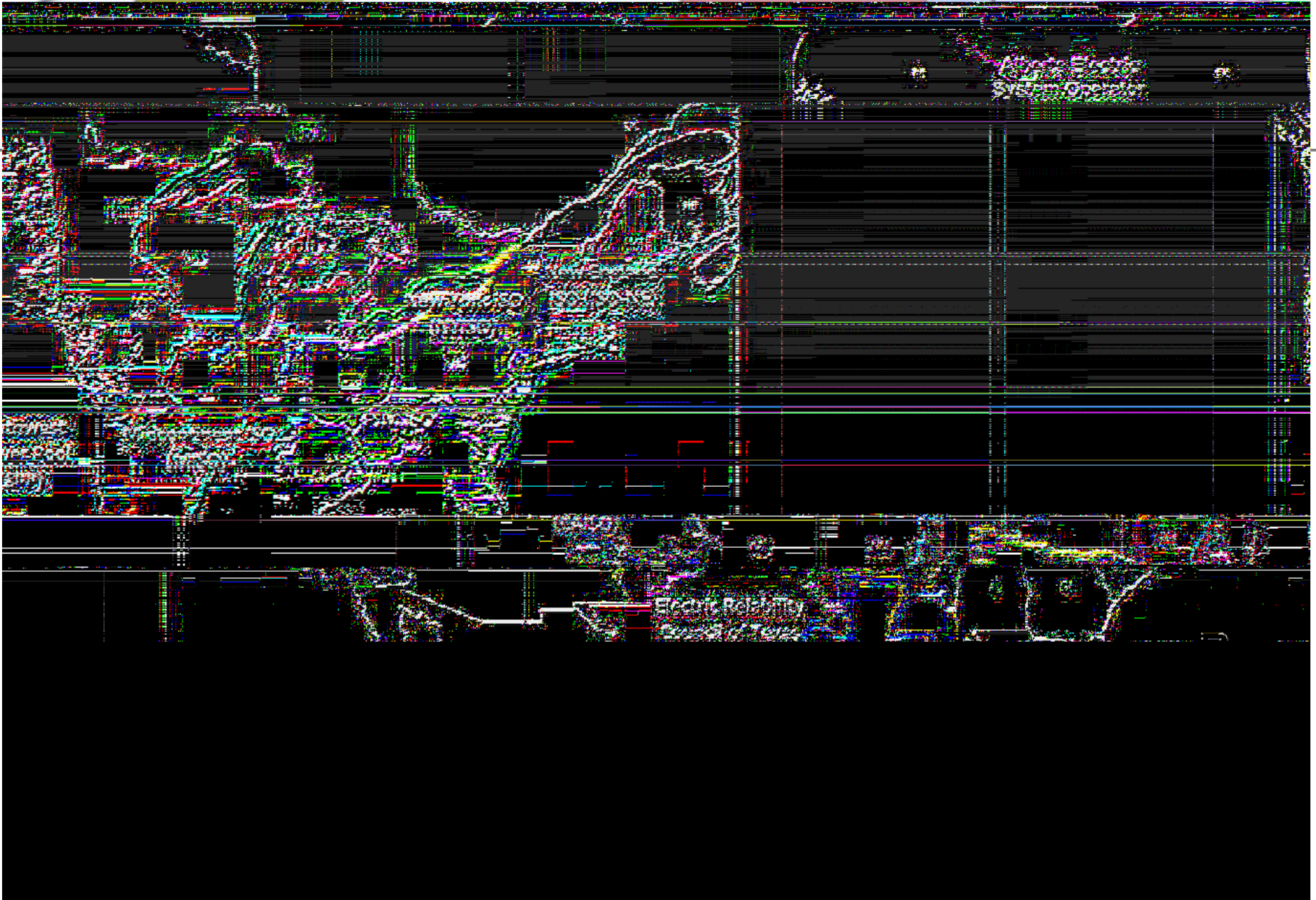
ISO/RTO Product / Service		Product / Service Features		Event Timing		
Region	Service Type	Minimum Eligible Resource Size	Advance Notification(s)	Telemetry Reporting Interval	Meter Accuracy	Meter Data Reporting Interval
AESO	Reserve	5 MW	None	4 Seconds	N / A	N / A
CAISO	Reserve	500 kW	Resource Start-Time	DPG 1 Min; CAISO EMS 4 Sec	± .25 %	5 Minutes
ISO-NE	Reserve	1 MW	None	10 Seconds	± 1/2 %	1 Hour
MISO	Reserve	1 MW	Day-Ahead	N / A	State Jurisdictional	5 Minute
NBSO	Reserve	100 kW	None	2 Seconds	± 0.2 %	5 minutes
NBSO	Reserve	100 kW	None	2 Seconds	± 0.2 %	5 minutes
NBSO	Reserve	100 kW	None	2 Seconds	± 0.2 %	5 minutes
PJM	Reserve	100 kW	real time	N / A	± 2 %	1 Minute
PJM	Reserve	100 kW	up to 2 hours	N / A	± 2 %	1 Minute

DR Regulation Programs (3)

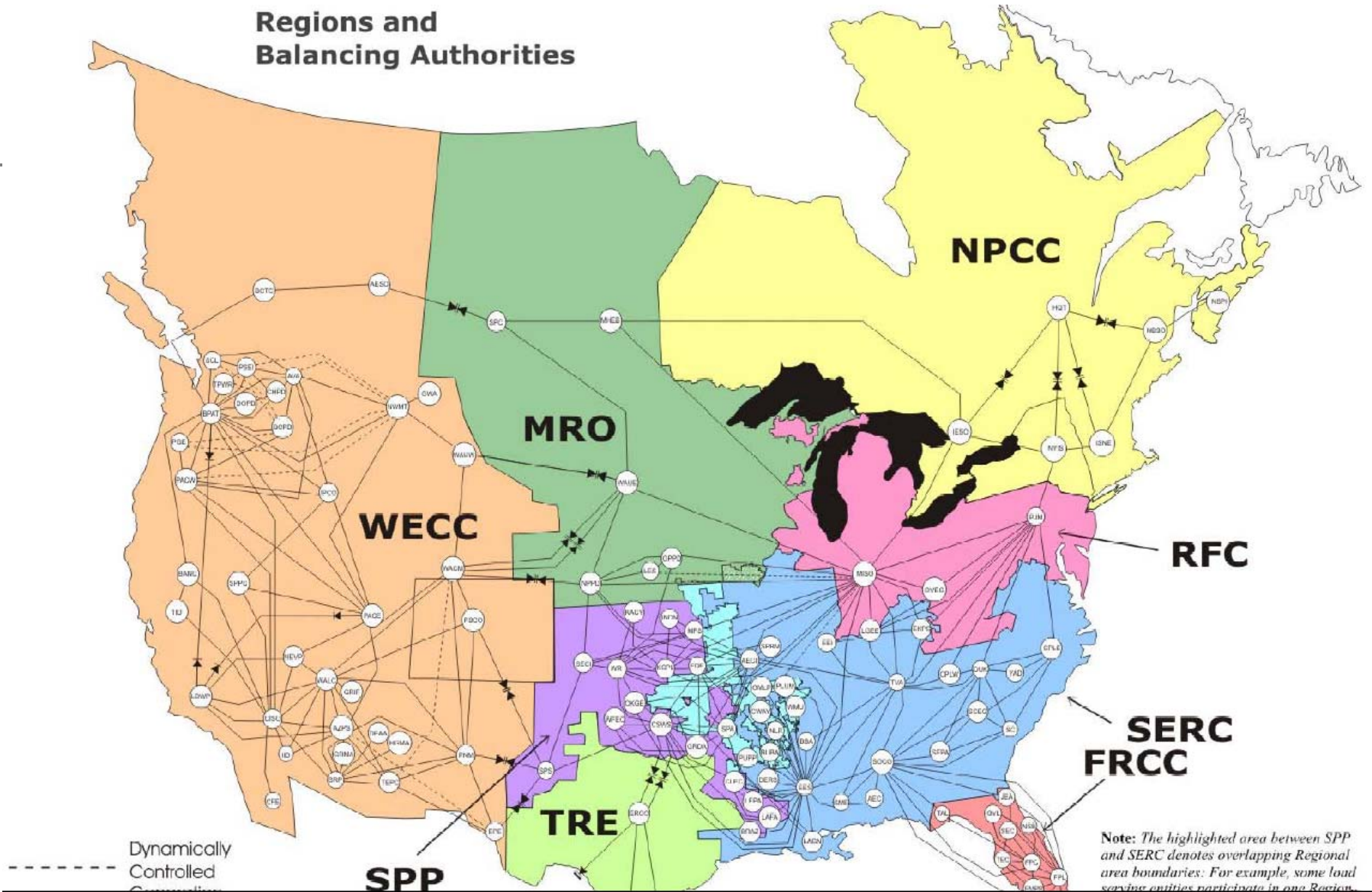
<i>ISO/RTO Product / Service</i>		<i>Product / Service Features</i>		<i>Event Timing</i>		
Region	Service Type	Minimum Eligible Resource Size	Advance Notification(s)	Telemetry Reporting Interval	Meter Accuracy	Meter Data Reporting Interval
NBSO	Regulation	100 kW	10 Minutes	2 Seconds	± 0.2 %	5 minutes
NBSO	Regulation	100 kW	None	2 Seconds	± 0.2 %	5 minutes
PJM	Regulation	100 kW	None	2-4 Seconds	± 2 %	1 Minute

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Regions and Balancing Authorities



NERC INTERCONNECTIONS

