RAP | Energy solutions for a changing world

Making Energy Energy Efficiency, Demand Response and Distributed Generation Count as Grid Resources

NASEO Annual Policy Conference
Fairmont Hotel, Washington DC

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February 5, 2014

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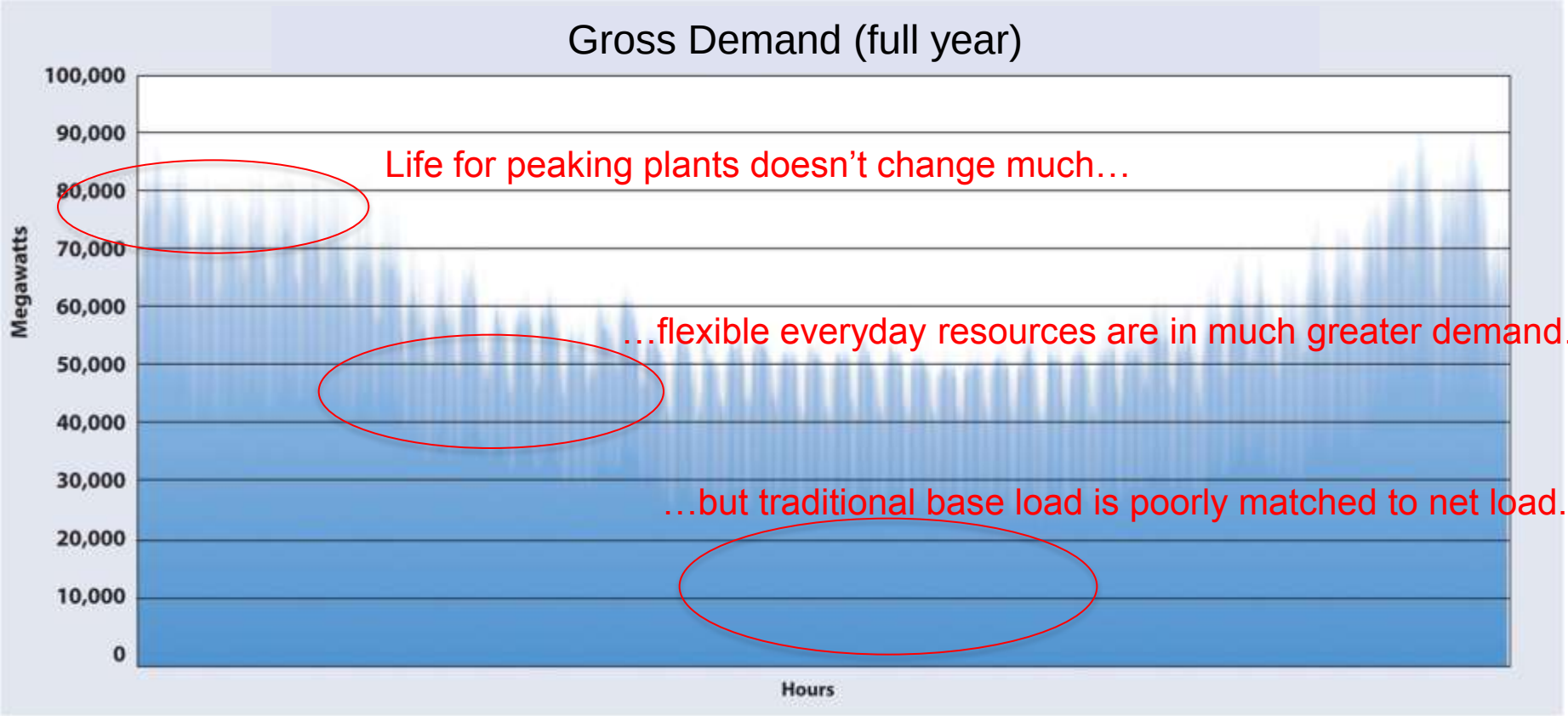
We are in a Transition to a Transactive Grid

- Step 1: EE, DR and DG as load modification
- Step 2: EE, DR and DG capabilities as a resource
- Step 3: Establishing tariffs and markets to access capabilities
- Step 4: Building the infrastructure: Getting capabilities reflected in planning

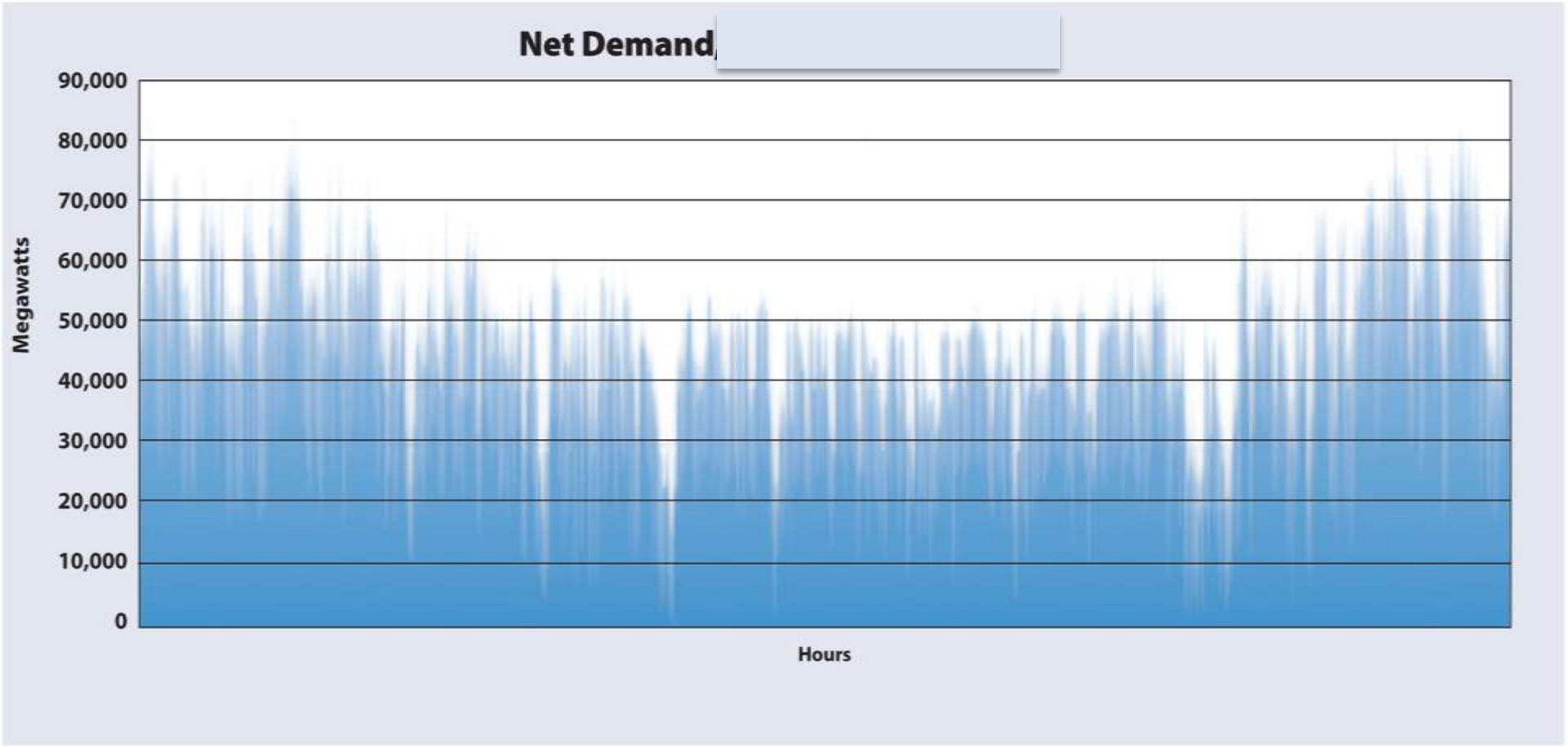
Step 1 Question

Are EE, DR and DG load modifications reflected in net need assessments?

Some capabilities will be needed less …



Load following and regulation needed more …



Step 2 Question

Are net needs well articulated and are EE, DR and DG capabilities recognized in the operational time frame?

"Demand Response as a Power System Resource," Synapse for RAP, May 2013

Table 11. Ancillary Services that may be Provided by Demand Response

Service	Service Description			
	Response Speed	*Duration*	*Cycle Time*	*Price Range* (Average, Max) $/MW-hr*
Normal Conditions				
Frequency Regulation	Online resources, on automatic generation control, that can respond rapidly to changes in frequency.			
	<30 seconds	*Seconds to Minutes*	*Seconds to Minutes*	
Regulating Reserve	Online resources, on automatic generation control, that can respond rapidly to system-operator requests for up and down movements; used to track the minute-to-minute fluctuations in system load and to correct for unintended fluctuations in generator output.			
	4 Seconds to 5 minutes	*Minutes*	*Minutes*	*$35-$40 $200-$400*
Load Following	Similar to regulation but slower. Bridges between regulation service and hourly energy markets. This service is performed by the real-time energy market in regions where such a market exists.			
	~10 minutes	*10 min to hours*	*10 min to hours*	-

Under Contingency Conditions

Contingency Conditions				
Spinning Reserve	Online generation, synchronized to the grid, that can increase output immediately in response to a major generator or transmission outage and can reach full output within 10 min.			
	Seconds to <10 min	*10 to 120 min*	*Hours to Days*	*$7-$7 $100-$300*
Non-Spinning Reserve	Same as spinning reserve, but need not respond immediately. Resources can be			
	<10 min	*10 to 120 min*	*Hours to Days*	*$3-$6 $100-$400*
Replacement or Supplemental Reserve	Same as supplmental reserve, but with a 30-60 min response time; used to restore spinning and non-spinning reserves to their pre-contingency status.			
	<30 min	*2 hours*	*Hours to days*	*$0.4-$2 $2-$36*

Step 3 Question

Are EE, DR and DG capabilities qualified to meet net needs in the operational time frame through markets and tariffs?

Follow up questions

1. Are the capabilities characterized?
2. Are the capabilities qualified through tariffs or markets?
3. What tariffs or markets need to be created?
4. Is M&V in place to verify the contributions?

Step 4 Question

Are EE, DR and DG capabilities reflected in planning models and processes?

What can Energy Offices do?

- Convene broad set of providers, procurers, stakeholders and government
- Provide data and information to regulators, planners and legislators on need, capabilities and markets
- Convene discussions on emerging infrastructure and resource technologies

Resources

- What Lies Beyond Capacity Markets? (RAP)
  http://raponline.org/document/download/id/6041
  http://raponline.org/document/download/id/4854
- Demand Response as a Power System Resource (Synapse for RAP)
  www.raponline.org/document/download/id/6597
- CAISO DR/EE Roadmap: Maximizing Preferred Resources
  http://www.caiso.com/Documents/DR-EERoadmap.pdf

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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