Morgan Lewis

Distributed Generation: Benefits, Challenges, and the Future

Thursday, September 18, 2014, 1:00 pm Eastern

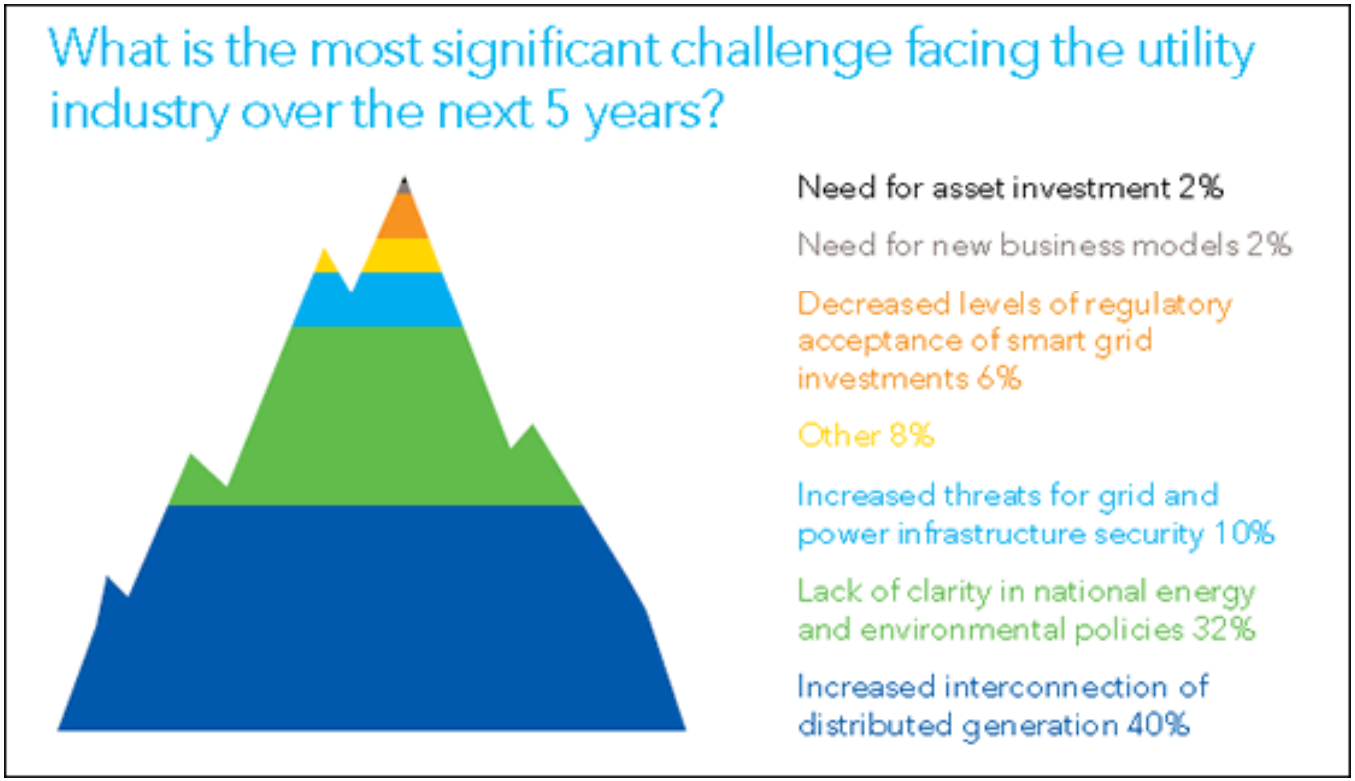
Panelists: Floyd L. Norton, IV and Levi McAllister

Overview

- Background
- Net Metering
- Operational Issues
- Cost Issues
- Jurisdiction
- Proposed Reforms
- Impact on Utilities

Distributed Generation: Background

Background:
What is Distributed Generation?

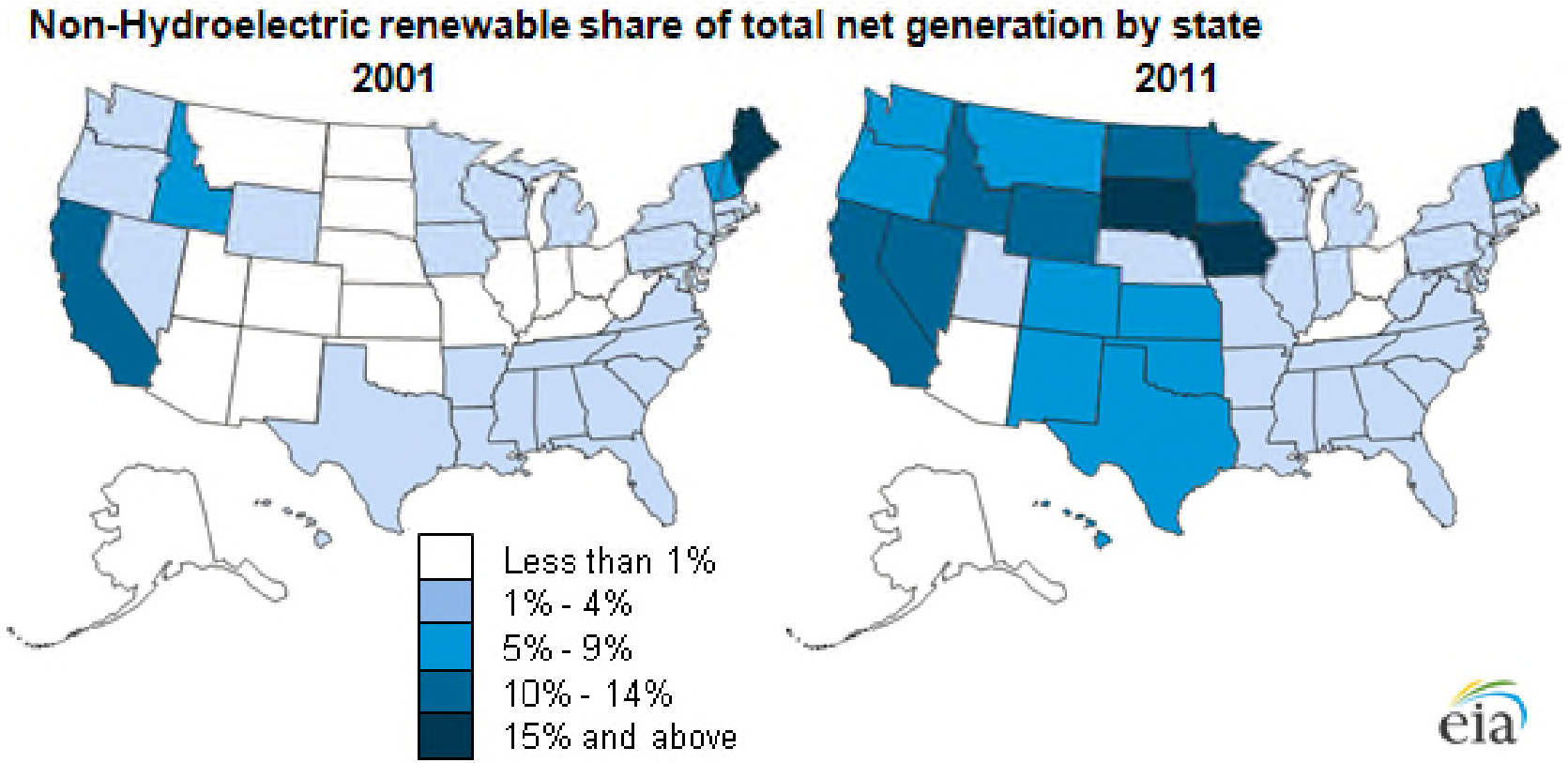


Source: www.dnvgl.com

Background:
What is Distributed Generation?

- Power generation at the point of consumption
  - Also referred to as decentralized energy
- Typically produced by small scale generating technologies that are connected to the electric power grid
  - These technologies are referred to as distributed energy resources.
- Includes cogeneration and small power production.
  - Currently, renewable energy projects are the prime example of distributed generation.

Background:
What is Distributed Generation?



Source: www.eia.gov

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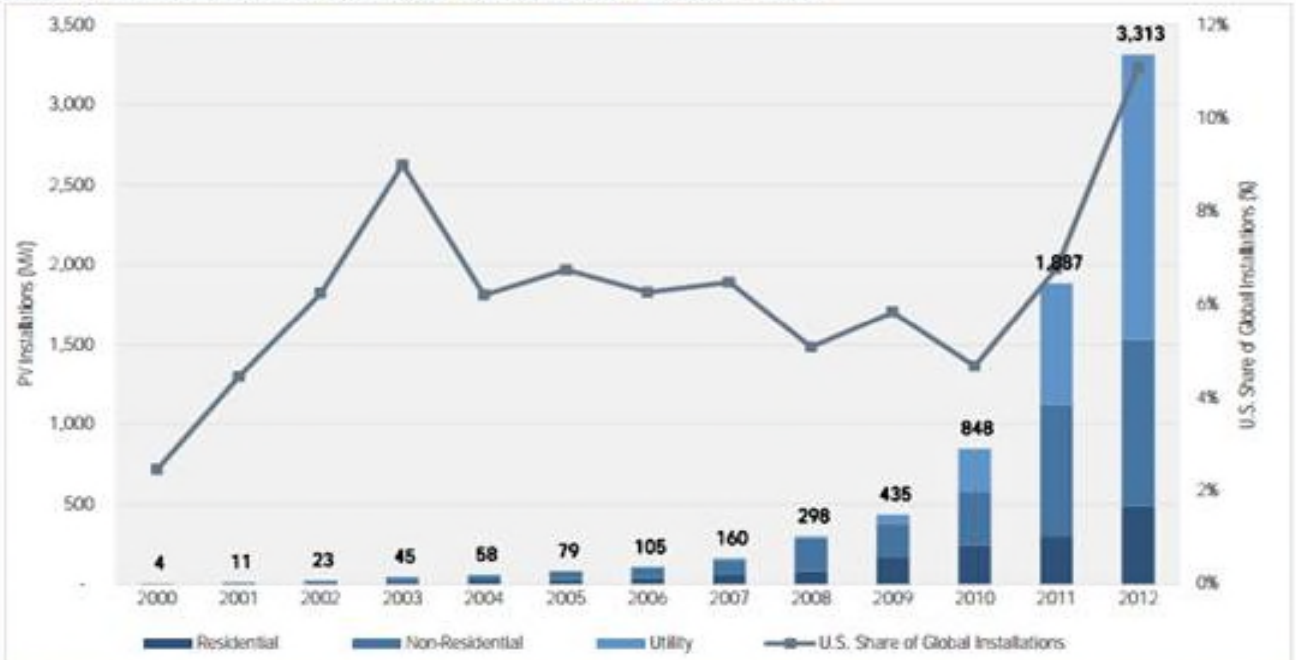
Background:
What is Distributed Generation?

U.S. PV Installations and Global market Share, 2000 - 2012



Installations (MWdc)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Residential	1	5	11	15	24	27	38	58	82	164	246	302	488
Non-Residential	2	3	9	27	32	51	67	93	200	213	336	826	1,043
Utility	0	3	2	3	2	1	0	9	16	58	267	760	1,781
Total Installations	4	11	23	45	58	79	105	160	298	435	848	1,887	3,313

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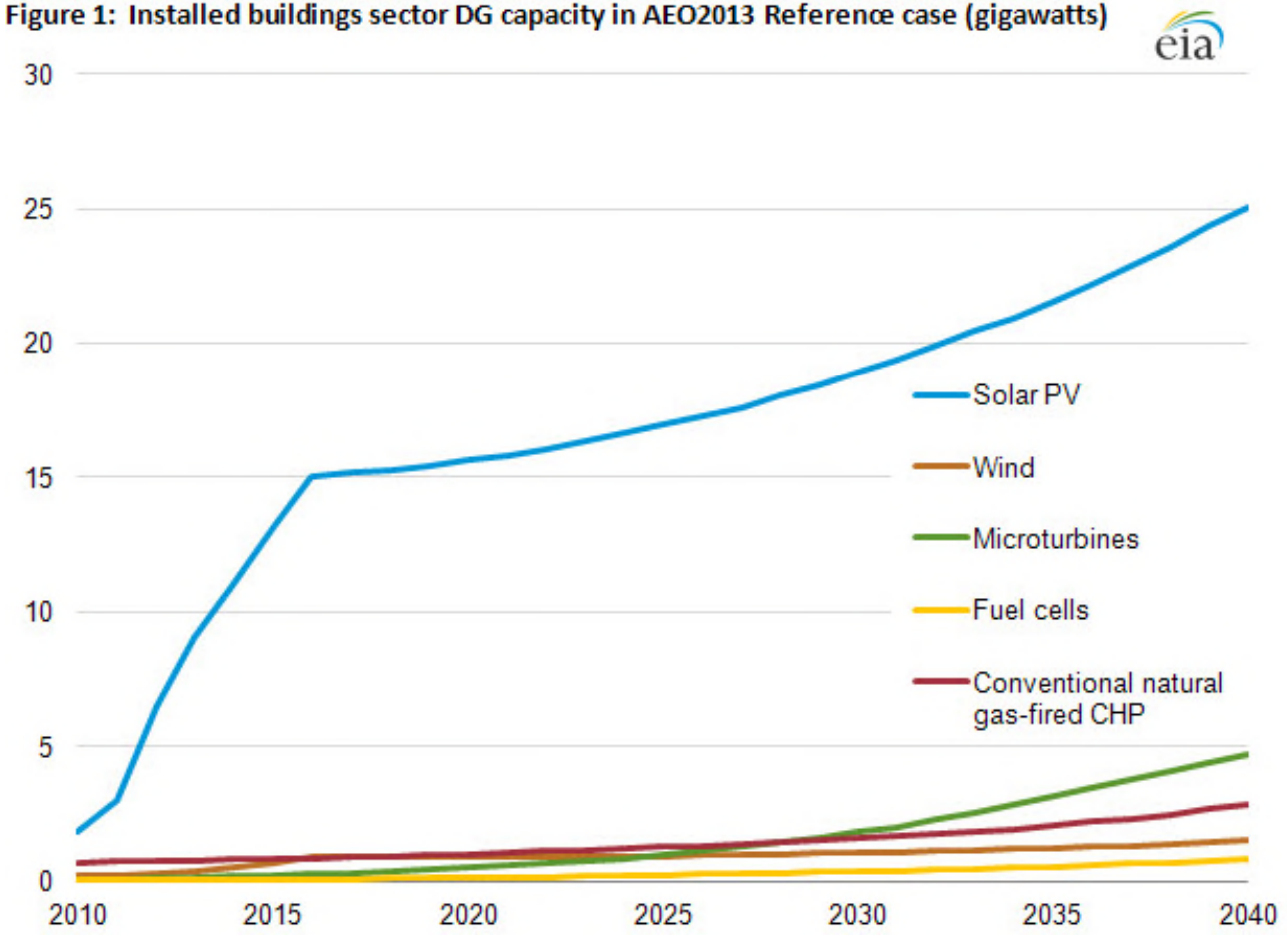
Background:
What is Distributed Generation?

Figure 1: Installed buildings sector DG capacity in AEO2013 Reference case (gigawatts)



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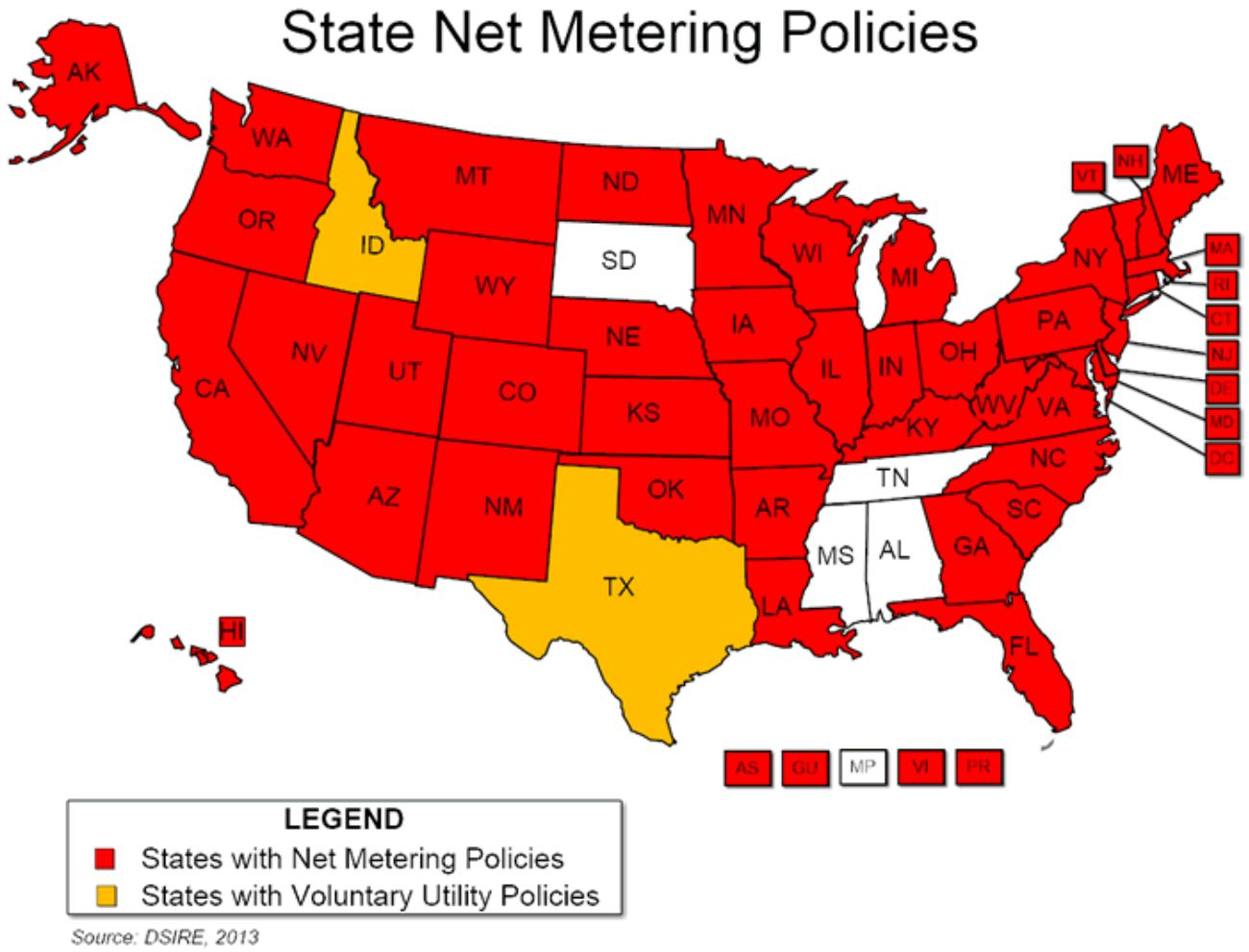
Background:
Distributed Generation and Net Metering

- Net metering programs give distributed generation customers a credit for excess electricity they sell to a utility, usually at the retail rate.
  - In effect, the meter runs backwards during the portion of the billing period when the customer produces more power than it needs.
  - Because the retail rate includes delivery costs, a retail rate-based credit allows the distributed generation customer to avoid some of these costs.
- Net metering has promoted an increase of distributed generation.

Background: Distributed Generation and Net Metering

- Types of Net Metering
  - Conventional net metering: allows a property owner to connect a generating source to single meter, such as a house or building.
  - Aggregated net metering: allows a property owner with multiple meters on one property or adjacent properties to implement net metering.
    - Examples: Group of university buildings or adjacent farm properties.
  - Virtual net metering: allows a property owner with multiple meters to distribute net metering credits to different individual accounts.
    - Examples: Condominium owners or owners of non-adjacent properties.
  - Community net metering: allows multiple users to purchase shares in a single net metered system located on-site or off-site.
    - Example: Residents in a community buying shares in a medium-sized solar array.

Background:
Distributed Generation and Net Metering



Source: http://www.ncsl.org

Background: Distributed Generation and Net Metering

- Under FERC precedent, no wholesale sale occurs unless a net metering participant makes a net sale of energy over the billing period.
  - *Sun Edison, LLC*, 129 FERC 61,146 (2009), *granting reh'g*, 131 FERC 61,213 (2010); *MidAmerican Energy Co.*, 94 FERC 61,340 (2001).
- FERC applied a one-month netting period.
  - "Where a net metering participant (i.e., the end-use customer that is the purchaser of the solar-generated electric energy from SunEdison) does not, in turn, make a net sale to a utility, the sale of electric energy by SunEdison to the end-use customer is not a sale for resale, and our jurisdiction under the FPA is not implicated."

Distributed Generation: Operational Issues

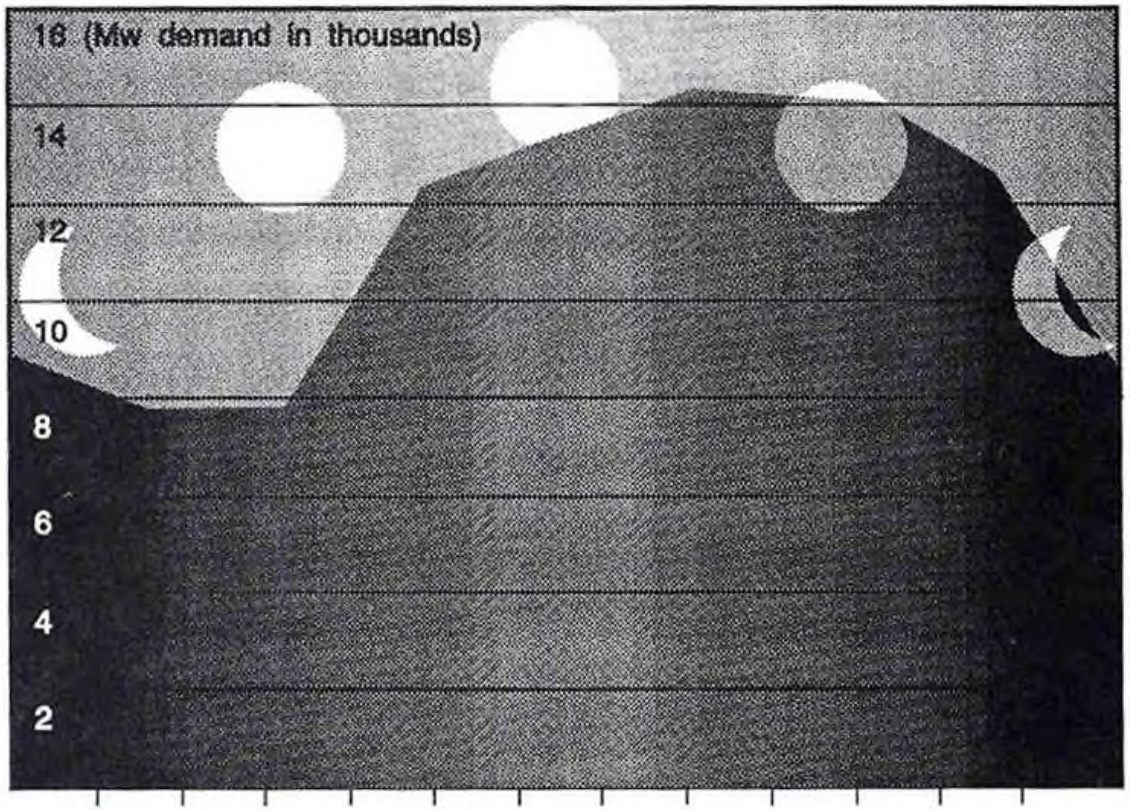
Distributed Generation: Operational Issues

- Increased emphasis and reliance on distributed generation can produce operational benefits. Examples include:
  - Promote electric system reliability
  - Reduce peak power requirements
  - Provide ancillary services, including reactive power
  - Enhance grid security

Distributed Generation: Operational Issues

- Increased emphasis and reliance on distributed generation can produce operational concerns that must be addressed.
  - Variability in distributed generation may not provide sufficient stability and grid support.
    - Conventional generation resources will be required to ramp up and down at levels and in timeframes that the generation may not be able to accomplish. (*i.e.* "Duck Curve")
    - The distribution electric system is designed for one-way power flows, and distributed generation relies on multiple points of two-way power flows if the distributed generation output is not used to serve local load.
  - Safety and "Islanding" – The condition in which a distributed energy resource continues to power a location even though electrical grid power from the electric utility is no longer present.
    - Islanding can be dangerous to utility workers, who may not realize that a circuit is still powered, and it may prevent automatic re-connection of devices

Distributed Generation: Operational Issues and the Duck Curve



Courtesy Pacific Gas and Electric

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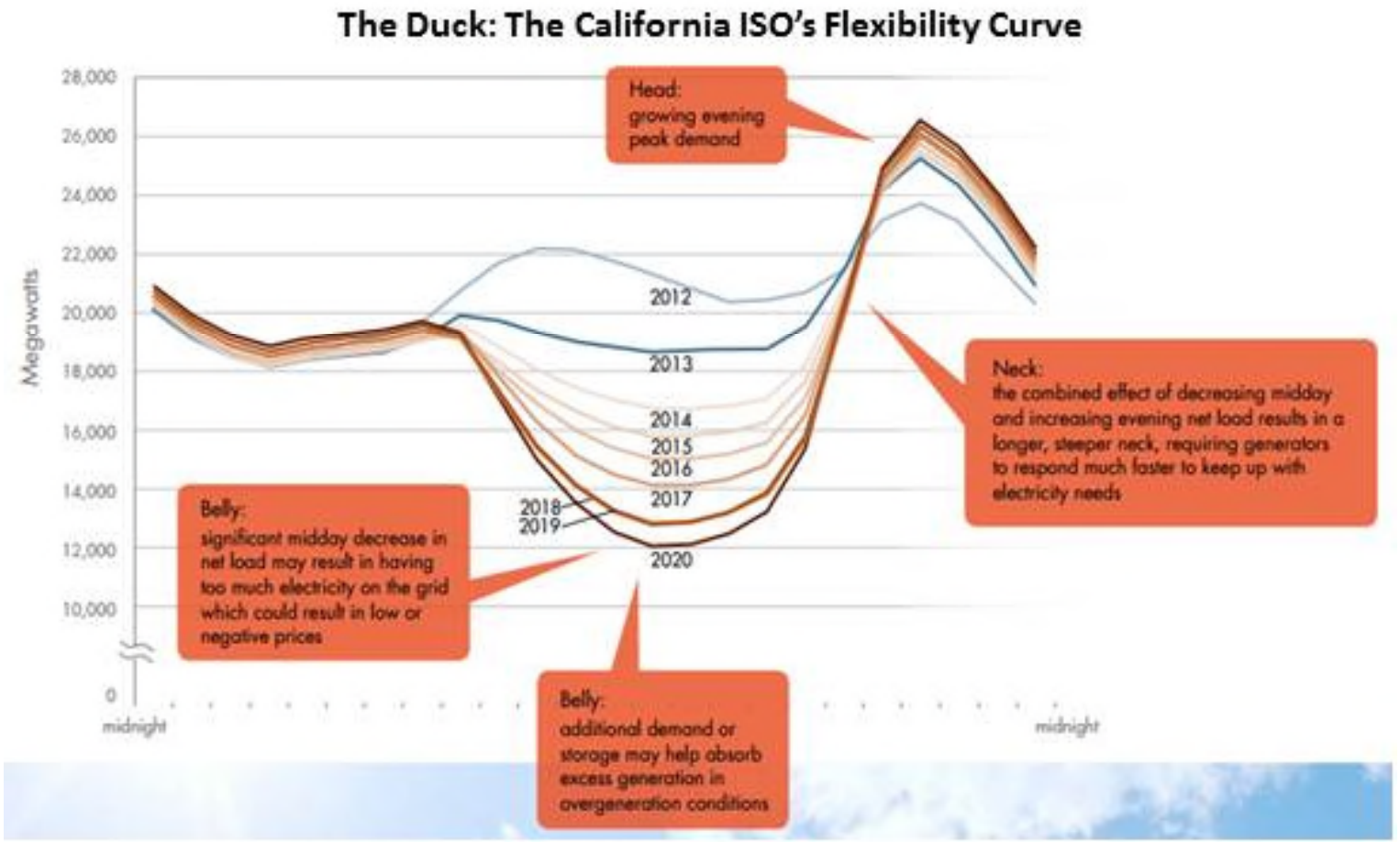
Distributed Generation: Operational Issues and the Duck Curve



(the ISO's *Building A Sustainable Energy Future; 2014-2016 Strategic Plan*)

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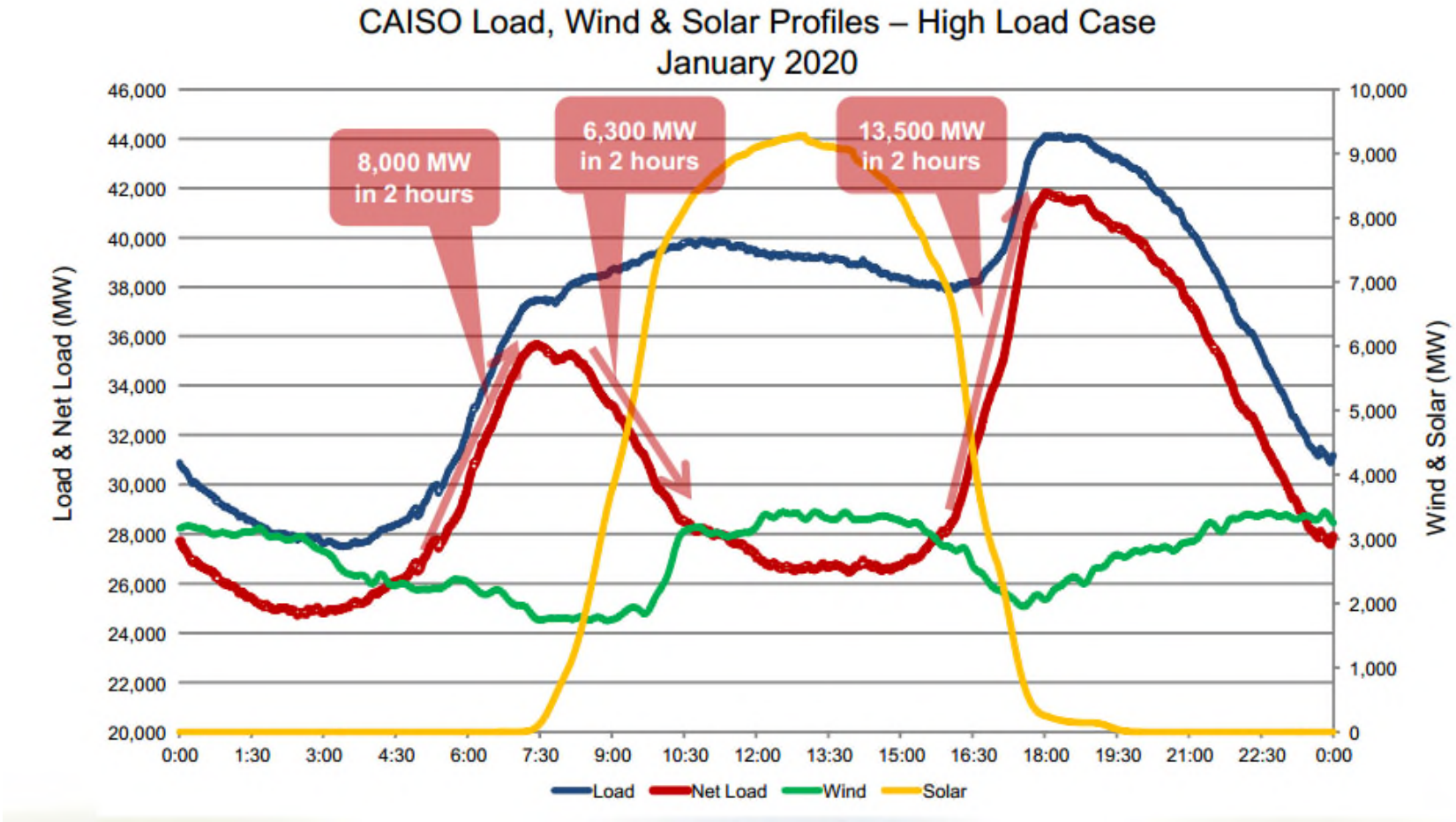
Distributed Generation: Operational Issues and the Duck Curve



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Distributed Generation: Operational Takeaways

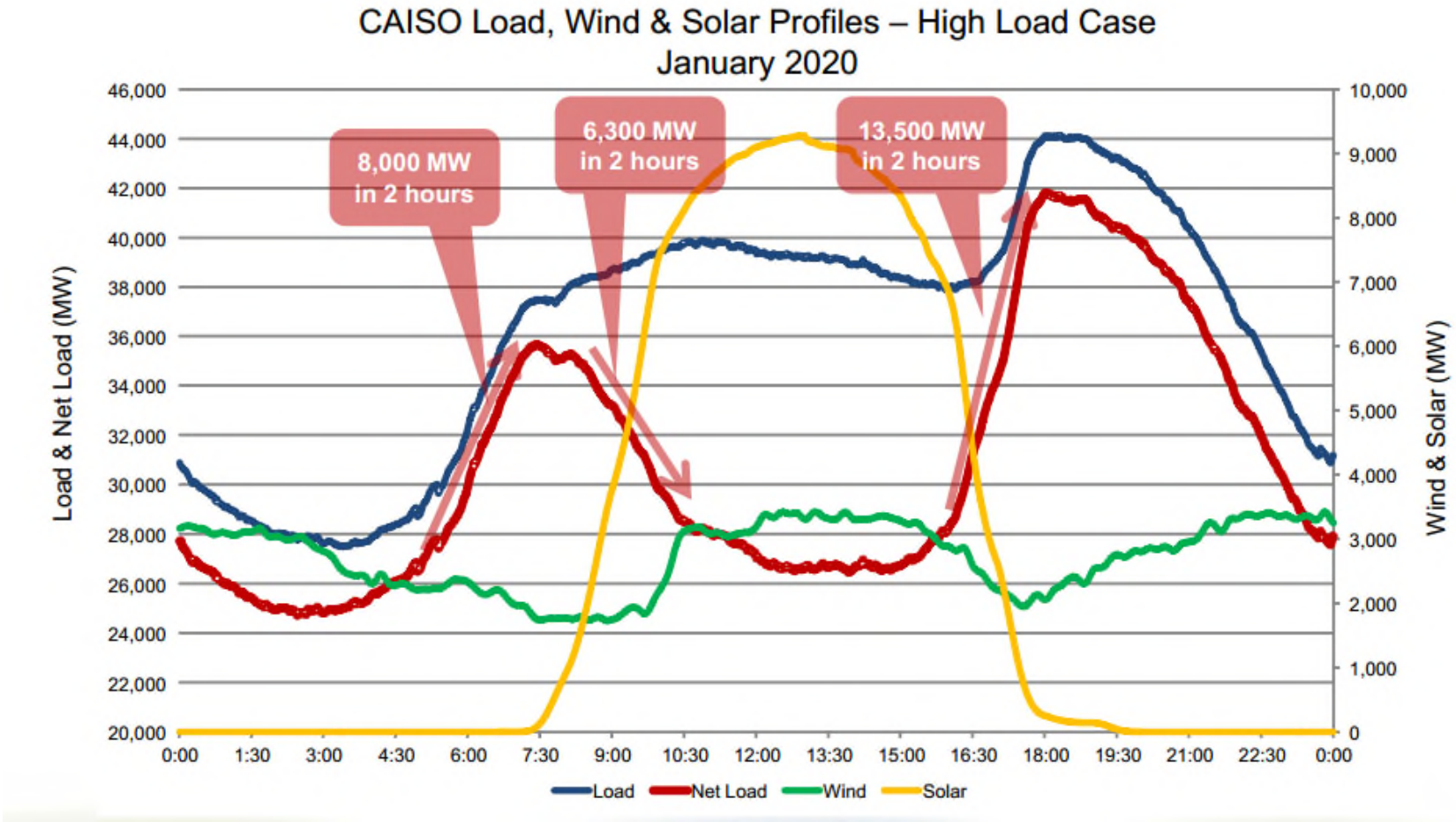
- Increased reliance on distributed generation requires conventional resources with ramping flexibility and the ability to start and stop multiple times in a day.
- Steps must be taken to mitigate the risk of overgeneration.
  - This risk is most often evident prior to the morning and evening upward ramp period because long-start resources must operate at a minimum level in order to ramp up even if the output is not needed during the minimum operating period.
- Islanding detection schemes must be in place in order to avoid threats to personal safety.

Distributed Generation:
Cost Issues

Cost Issues

- Increased distributed generation could produce a revenue shortfall for utilities.
  - Distributed generation customers are compensated when they provide excess power to the grid.
  - Other retail customers could subsidize the customers with distributed generation.
- Utilities will need to make capital investments to ensure the grid operates in a stable manner as more distributed generation resources are deployed onto a system originally designed for one-way power flows.
- Utilities may not be able to recover their costs if units are only running after steep ramp up periods.

Distributed Generation: Cost Issues



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Cost Issues

- Utilities have struggled to sufficiently address these issues.
- In November 2013, the Arizona Corporation Commission voted 3-2 in favor of allowing Arizona Public Service (APS) to impose a $0.70 per kW per month charge on solar net metering customers.
  - APS argued that the charge was necessary to offset the cost the growing number of solar systems passed on to non-solar ratepayers. The utility said that net metering customers, which are able to claim credit on excess power fed back into the grid, effectively shift the cost of maintaining the grid on to ratepayers that do not use solar.
- The fee is expected to hit solar users to the tune of around $5 per month.

Cost Issues

- APS has sought to mitigate adverse cost impacts through an ownership-leasor proposal that it has submitted to the Arizona Corporation Commission in July 2014.
  - Under the proposal, APS would own and install solar panels on residential rooftops at no cost to the customer.
  - APS would retain ownership of the energy generated and, in return, provide a monthly $30 credit to the residential customer.
  - APS wants to install 20 megawatts of residential solar on about 3,000 homes next year. It would choose locations where peak power is needed most and control power flows remotely.
  - The proceeding is pending before the Arizona Corporation Commission.

Distributed Generation: Jurisdictional Issues

Jurisdictional Issues

- Competing views exist regarding the jurisdictional reach of federal and state regulators over distributed generation.
  - One theory argues that states have jurisdiction to regulate distributed generation because the Federal Power Act carves out facilities used in local distribution.
  - Alternatively, FERC possesses jurisdiction for the entire amount of an on-site generator's output, which should be deemed a wholesale sale.

Jurisdictional Issues: Arguments for Federal Jurisdiction

- What about net metering as a basis for federal jurisdiction?
  - In another context addressing station power, the D.C. Circuit rejected the proposition that a netting interval can be used to determine how much energy is available at wholesale.
  - In a series of station power cases, the D.C. Circuit found that a netting interval is a kind of billing convention that determines how much a generator will be assessed for retail charges.
    - *Calpine Corp. v. FERC*, 702 F.3d 41 (D.C. Cir. 2012); *Southern California Edison v. FERC*, 603 F.3d 996 (D.C. Cir. 2010).
  - The station power cases do not directly confront whether energy generated by a net purchaser distributed generation resource amounts to a FERC-jurisdictional wholesale sale (i.e., the issue in FERC's *SunEdison* proceeding).

Jurisdictional Issues: Arguments for Federal Jurisdiction

- A generator's sale of electricity to the local utility company for resale by the utility constitutes a sale for resale in interstate commerce.
  - This is particularly true through a buy all/sell all metering and tariff mechanism established by a local utility.
- All aspects of wholesale sales are subject to federal regulation, regardless of the facilities used.
- Transmission on the interconnected national grid constitutes transmissions in interstate commerce.
- Wholesale sales at distribution level commingle with energy in interstate commerce.
  - Facilities used to serve wholesale and end-use customers are not necessarily distribution facilities subject only to state jurisdiction.

Jurisdictional Issues: Arguments for State Jurisdiction

- The FPA reserves to the states the authority to regulate wholesale sales of power by distributed generators for local consumption (i.e., intrastate).
- Distribution-level facilities and feed-in tariffs do not implicate FERC jurisdiction under the FPA because it excludes facilities used in local distribution and any unbundled retail service occurring over those facilities.
- Sales of power under distribution-level feed-in tariffs cannot be interstate commerce because the power sold does not enter the bulk transmission system or interstate commerce but remains on the state-regulated distribution system.
- A facility's potential to carry FERC-jurisdictional energy does not render it FERC-jurisdictional in all contexts

Jurisdictional Issues

- Former FERC Chairman Wellinghoff has proposed the concept of the distribution system operator – akin to a distribution level RTO.
  - Utilities can continue to own the grid but will not operate the distribution grid
  - Separate independent distribution system operators will operate the grid and will:
    - Maintain the safety and reliability of the distribution system
    - Provide fair and open access to the grid and information from the system
    - Promote appropriate market mechanisms
    - Oversee optimal deployment and dispatching of distributed energy resources

Distributed Generation: Proposed Reforms

Proposed Reforms: New York

- The New York Department of Public Service issued a staff report and proposal in April 2014 that proposes a transition:
  - From the traditional utility model of centralized generation, and
  - Toward a more decentralized electric grid that relies increasingly on energy efficiency, demand resources and distributed generation.
- The proposal recommends that utilities alter operations in order to become Distributed System Platform Providers (DSPPs).
  - DSPPs would actively manage and coordinate distributed energy resources and generate power from small resources that is brought onto the system.
  - The DSPP would serve simultaneously as the interface between retail customers as a whole and between retail customers and the NYISO.
- Comments on the proposal are due September 22, 2014.

Proposed Reforms: Hawaii

- In response to Hawaiian Electric Company's April 29, 2014 integrated resource plan submitted to the Hawaii PUC, state regulators issued several orders and proposals that would "create a 21st century generation system."
- "Today we are going to turn the corner on the energy transformation. There's no turning back. This is the most significant day for Hawaii and its energy future that we have ever had. The time for talk has ended; the time for action is upon us. The energy Rubicon has been crossed."
  - Governor Neil Abercrombie - Hawaii

Proposed Reforms: Hawaii

- The PUC recommends a four strategy approach:
  - Seek high penetrations of lower-cost, new utility-scale renewable resources
  - Modernize the generation system to achieve a future with high penetrations of renewable resources
  - Exhaust all opportunities to achieve operational efficiencies in existing power plants
  - Pursue opportunities to lower fuel costs in existing power plants
- Utilities will no longer be the sole source of electricity.
  - The PUC stated that it would consider whether it is in the public interest to preclude HECO from owning new generation.
  - According to the PUC, "HECO's "future role in power generation could evolve to include generation resource planning, third-party generation capacity procurement, fuel supply management and procurement, and power supply dispatch and operational optimization."
- Utilities will become the facilitator, integrator, and operator of a grid.
  - HECO "would no longer have a financial interest in the outcomes of future power generation development and investment decisions."

Distributed Generation:
Impact on Utilities

Impact on Utilities

- Variability of distributed generation poses challenges to utilities in maintaining system balance.
- Reduced energy sales by utilities threaten existing utility business models and policies.
- The “utility death spiral”
  - Continued defection from utilities to off-grid solutions that involve solar energy and storage.
  - Revenue loss makes it more difficult to meet fixed-cost obligations.

Questions / Comments

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