

# Overview of Utility Challenges and Responses to Distributed Solar Energy

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# How Solar is Dramatically Changing Utility Planning

“Planning is bringing the future into the present so that you can do something about it now.” –*Alan Lakein*

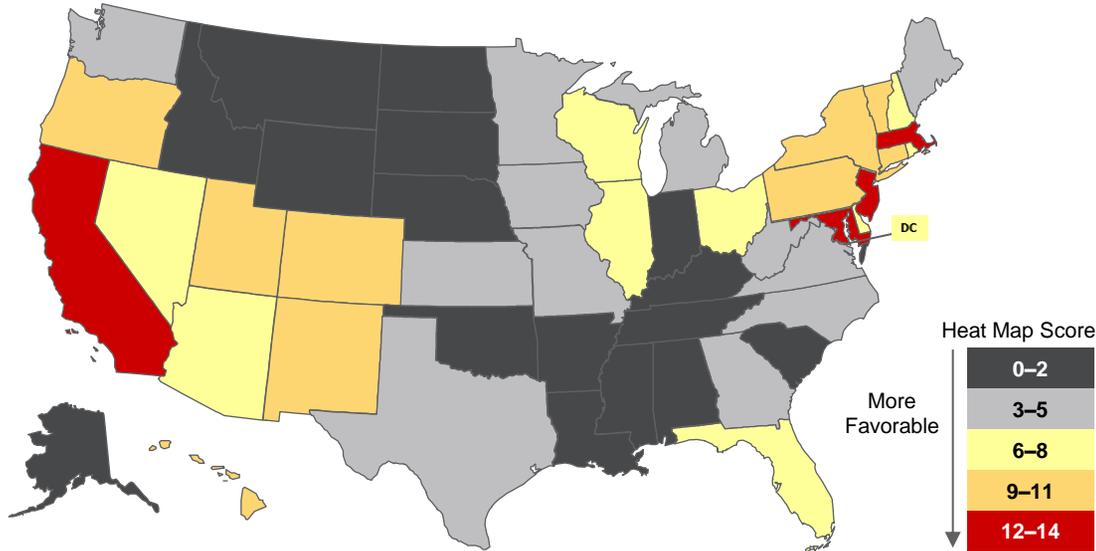
## Key planning questions:

- How big is it?
- How will it impact us?
  - Operationally
  - Financially
- What should we do about it to create the best outcome?



# ScottMadden Distributed Solar Resource Heat Map

## Distributed Solar Market Attractiveness: The Heat Map



- Distributed resources have different odds of success, or at least competitiveness, based upon a number of factors. ScottMadden examined the distributed solar market and regulatory environment to develop a multi-factor approach to identify attractive distributed solar markets
- Where jurisdictions are “more favorable” on more factors (e.g., easier interconnection; third-party solar power purchase agreements (PPAs) permitted; net metering; lower differential between utility-supplied power and installed solar PV), they scored higher on the heat map
- This scoring system is based on an assessment of the data, but is by nature, subjective. Stakeholders can adjust the criteria and weights according to their own point of view on the market opportunities

### Key Takeways

- **Solar Today, Microgrids Tomorrow:** This heat map looks primarily at solar, but other distributed resources will be somewhat similar in footprint
- **The Coasts Are the Most:** As one might expect, California, the Southwest, and some of the Mid-Atlantic states appear to be the most favorable for distributed generation, including “hotspots” on both coasts that are high-cost and renewable-friendly, such as California, Massachusetts, and New Jersey
- **Grid Infrastructure Charges Could Slow Development:** Moves to recoup the fixed costs of grid infrastructure may slow the pace of development; high penetrations of distributed resources could require additional upgrades, increasing costs and thereby potentially adding to this effect
- **Customer Adoption Wildcard:** It is still unclear which and how many customers will embrace distributed generation
- **Utility Business Models Are Implicated:** The greatest opportunities for disruption of the traditional utility business model are in “hotter,” higher-scoring jurisdictions

# Long-Term Drivers for Distributed Solar Energy

## Long-Term Outlook and Drivers for Distributed Solar

Driver	2014	2024	Notes
State Renewable Portfolio Standards			<ul style="list-style-type: none"> <li>Early compliance and slow growth in retail sales will limit impact of renewable portfolio standards in the future</li> <li>Proposed carbon rules could reinvigorate state RPS policies</li> </ul>
Financial Incentives			<ul style="list-style-type: none"> <li>Federal investment tax credit (ITC) for solar <a href="#">slated to decrease</a> from 30% to 10% in 2017;</li> <li>State and utility incentives are declining as technology costs continue to decline</li> </ul>
Installed Costs			<ul style="list-style-type: none"> <li>Installed costs continue to decline as the solar industry reduces soft costs (e.g., permitting, customer acquisition, etc.)</li> </ul>
Net Metering			<ul style="list-style-type: none"> <li>Net-metering policies are being challenged as concerns over cross-subsidization between customers continue to grow</li> </ul>
Interconnection			<ul style="list-style-type: none"> <li>Interconnection policies are well established and not expected to change dramatically</li> </ul>
Retail Electricity Prices			<ul style="list-style-type: none"> <li>Retail electricity prices continue to rise, creating a favorable environment for solar energy</li> </ul>
Utility Knowledge			<ul style="list-style-type: none"> <li>Utilities continue to gain operational experience integrating and managing distributed resources</li> </ul>
Customer Preference			<ul style="list-style-type: none"> <li>Customers continue to express interest in programs or options that offer access to renewables at reasonable premiums or discounts to retail electricity rates</li> </ul>
Smart Grid/Microgrids			<ul style="list-style-type: none"> <li>Advancements in distribution automation and a growing interest in microgrids will facilitate the implementation of distributed resources, including solar energy</li> </ul>

 Favorable drivers
  Neutral drivers
  Driver will hinder or slow growth

**The U.S. market has experienced strong growth in distributed generation, dominated mostly by solar photovoltaic (PV). The long-term outlook for distributed solar PV is positive which will lead utilities to consider how to interact with these new resources**

- Using net-metered generation as a proxy for the broader distributed generation market, data show that more than 92% of net-metered generation capacity is solar PV
- Solar installed costs have fallen and continue to fall. Additionally, new business models, including third-party sales and emergence of community solar are accelerating deployment
- While economics are expected to be the driver, proposed carbon rules may breathe new life into policy impetus behind renewables in general and solar distributed generation. Renewable capacity additions increase the denominator and may be a cost effective part of attainment for many
- The recent spike in distributed generation raises operational, business, and ratemaking challenges for utilities. However, for solar companies, there will be opportunities to partner with utilities as this market continues to grow

Sources: EIA, GTM Research, Database of State Incentives for Renewable Energy, EEI

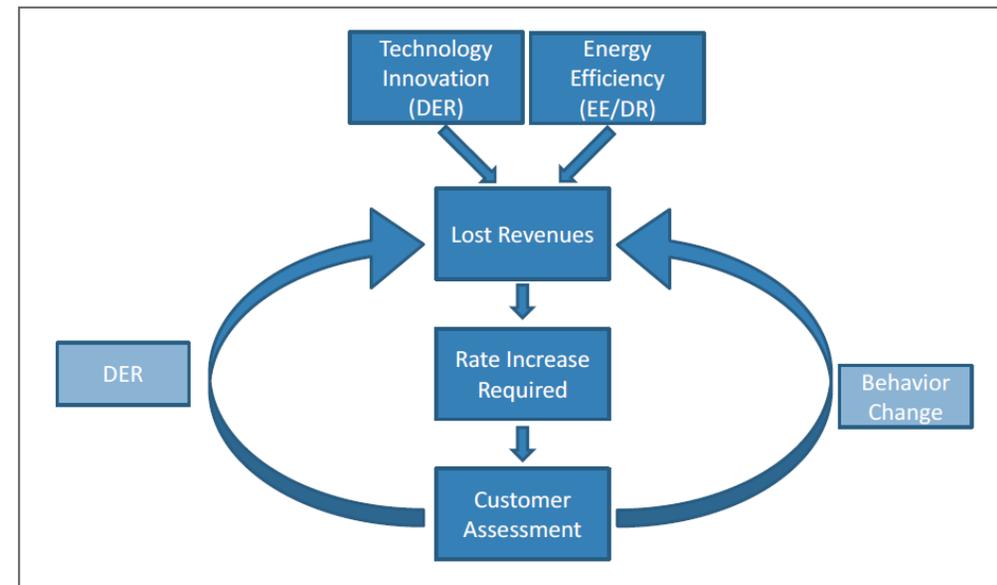
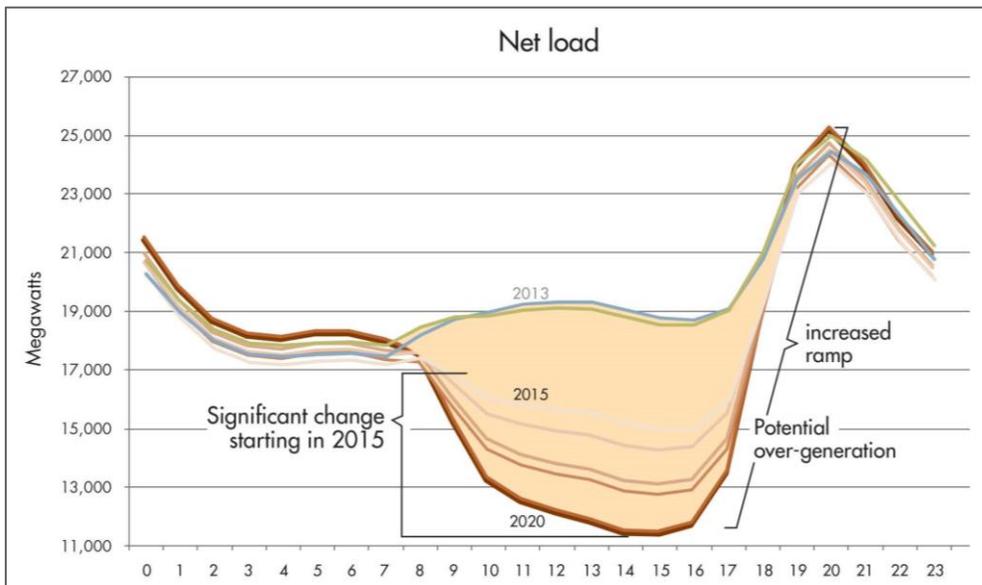
# Operational and Business Challenges for Utilities

## Operational Challenges

- Intermittency and forecast error requires balancing from other resources
- Steeper ramping as distributed solar comes on and off the grid will tax traditional resources (see “duck curve” below)
- Grid operator has limited insight or visibility into distributed generation performance, especially at the geo-temporal granularity required at higher penetration
- Distributed generation provides limited value supporting the grid under current IEEE Standard 1547 (e.g., voltage control)
- Emergence of bi-directional flow of power on radial designed systems; compounded by the intermittency of the resource

## Business Challenges

- Distributed generation contributes to a long-term decline in the growth of retail sales, difficult in a high fixed cost business
- Net metering allows customers to avoid paying for fixed costs embedded in volumetric rates
- Growth of distributed generation through state mandates and incentives erodes the regulatory compact and undermine wholesale market mechanisms
- Customers in growing numbers, including corporate customers, are demanding access to renewable resources or options



Note: Acronyms in graphics include distributed energy resource (DER), energy efficiency (EE), and demand response (DR)  
Sources: California ISO; Edison Electric Institute

# Current Utility Responses to Distributed Solar

Increasing Disruption to Regulated Utility

Type of Utility Involvement	Benefits	Challenges
Indirect (e.g., finance), outside of service territory	<ul style="list-style-type: none"> <li>Allows for participation in growing market and potential ROI through direct (energy revenues, RECs) and indirect benefits (tax credits, diversification)</li> <li>Facilitates an understanding of technology and market considerations</li> </ul>	<ul style="list-style-type: none"> <li>Technologies and regulations of outside service territory may not provide adequate knowledge transfer for future service territory installs</li> </ul>
Own/operate, outside of service territory		
Provide “green” options to customers	<ul style="list-style-type: none"> <li>Provides opportunity to gain first-hand knowledge of how to maximize resource value</li> <li>Understanding technology may provide ancillary benefits (e.g., voltage regulation)</li> <li>More likely to be eligible for rate recovery</li> </ul>	<ul style="list-style-type: none"> <li>Requires larger investment in capital and resources to acquire and manage</li> <li>Needs to be coordinated with other facets of the company</li> </ul>
Own/operate, inside of service territory		

**Choices are often different, inside vs. outside service territory.**

Sources: SNL, ScottMadden Research

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