# Renewable electricity: State-level Issues and Perspectives

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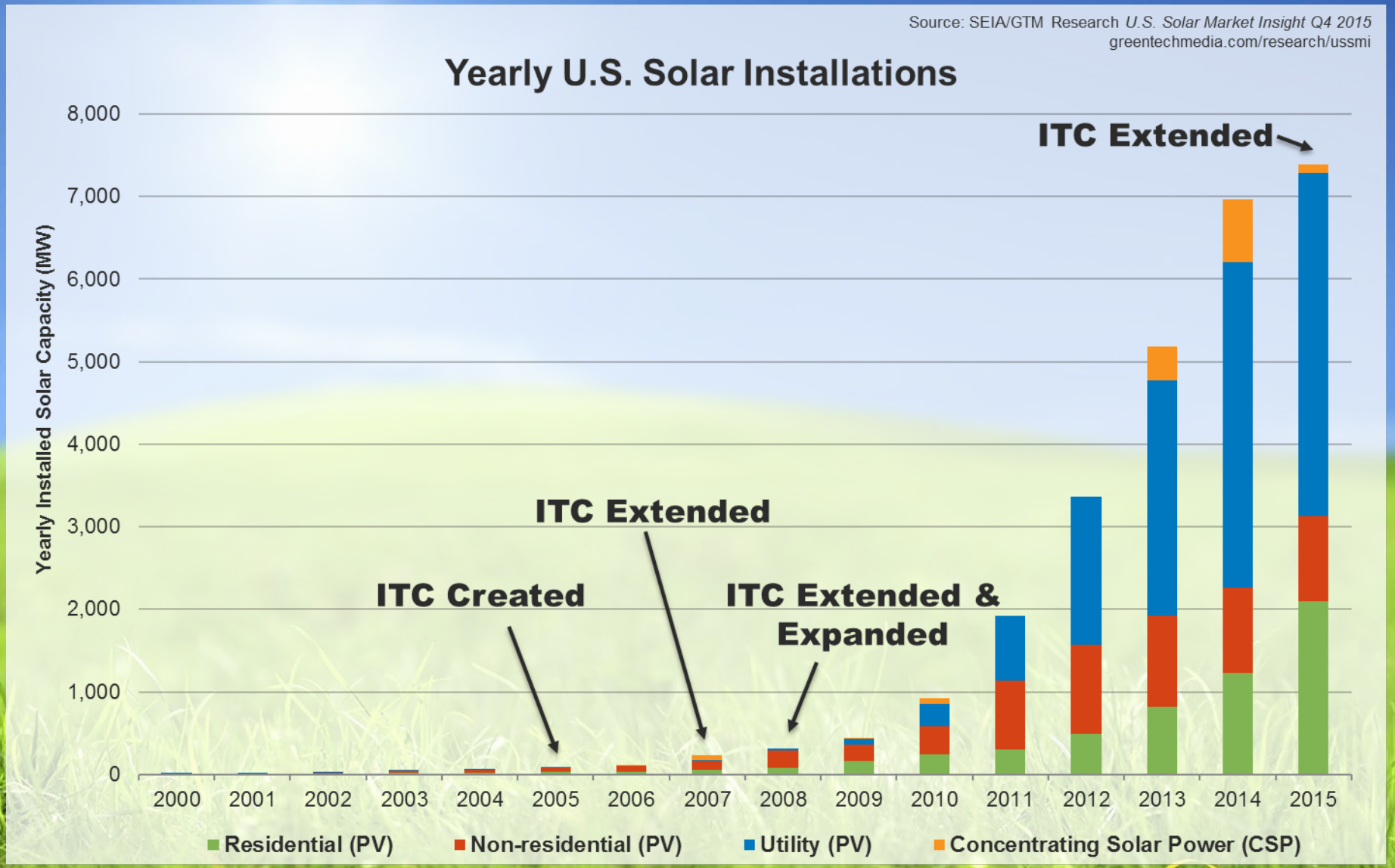
# About SEIA

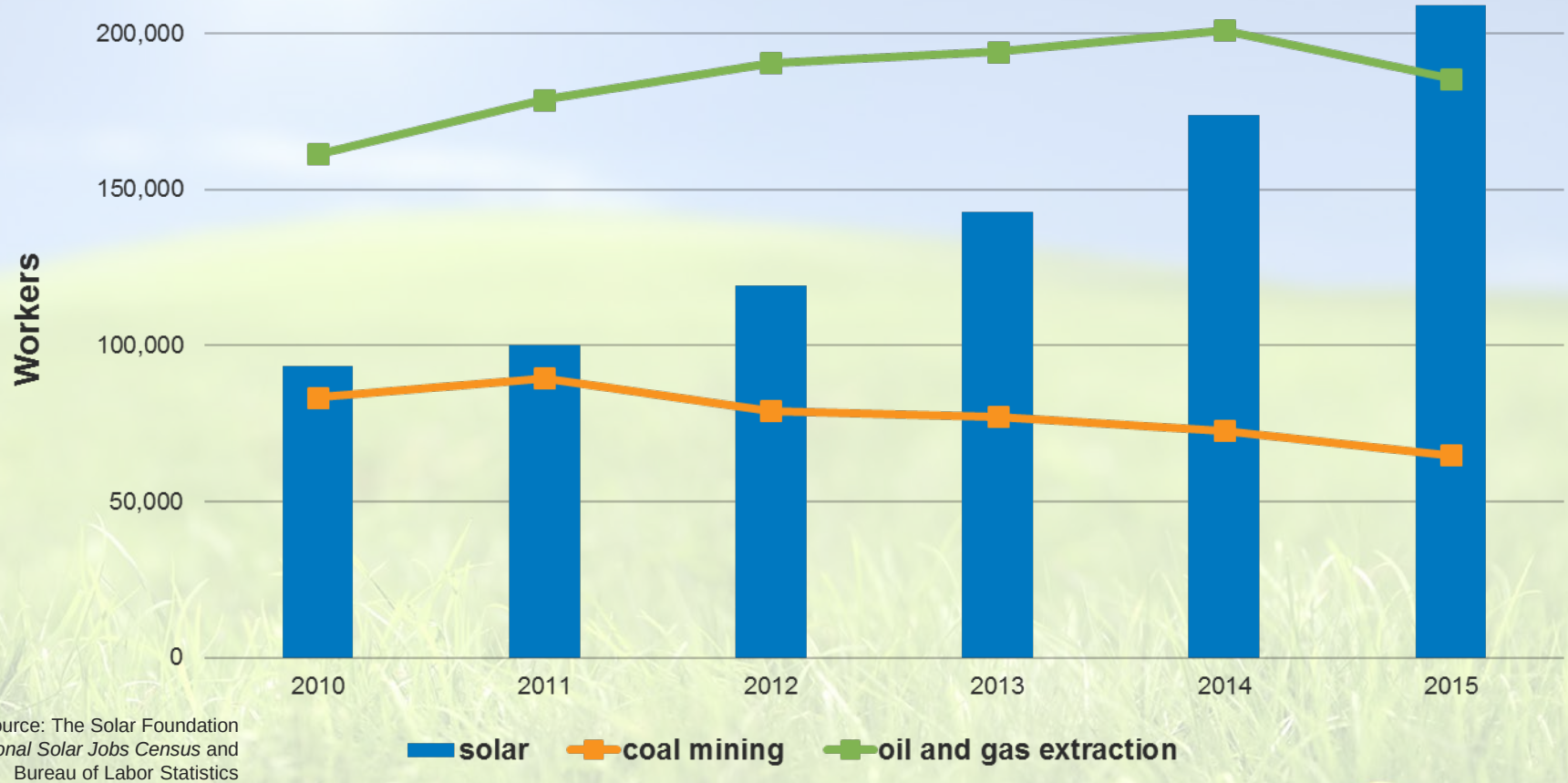
- U.S. National Trade Association for Solar Energy
  - Founded in 1974
  - 1,000 member companies from all 50 states
- Our Mission: Build a strong solar industry to power America
- Our Goal: 100 gigawatts of solar capacity by 2020

# Solar Growth with the ITC



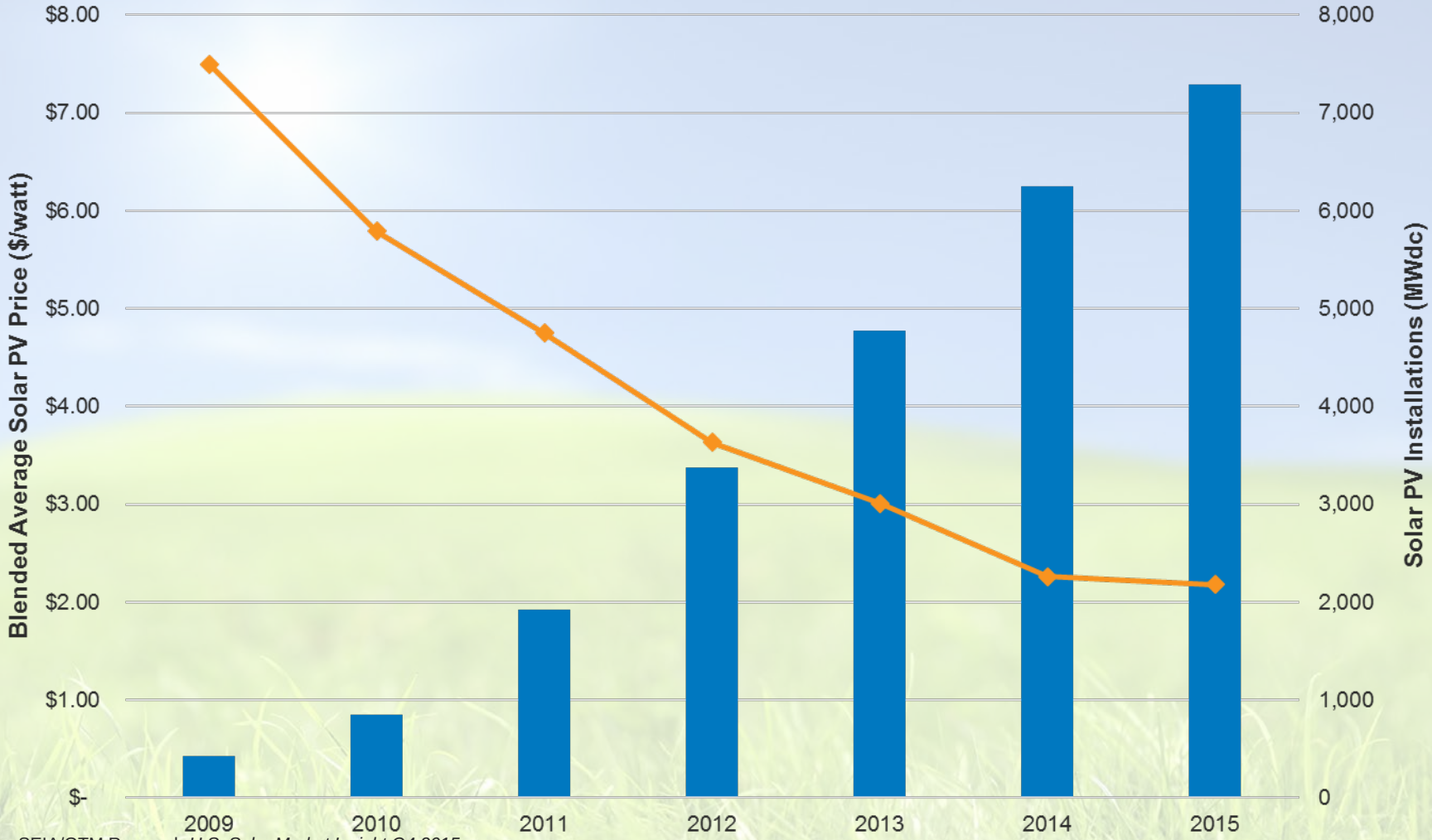
# Solar as an Economic Engine

- Nearly 209,000 American workers in solar – more than double the number in 2010 – at more than 8,000 companies




Source: The Solar Foundation *National Solar Jobs Census* and Bureau of Labor Statistics

# Growth in Solar led by Falling Prices



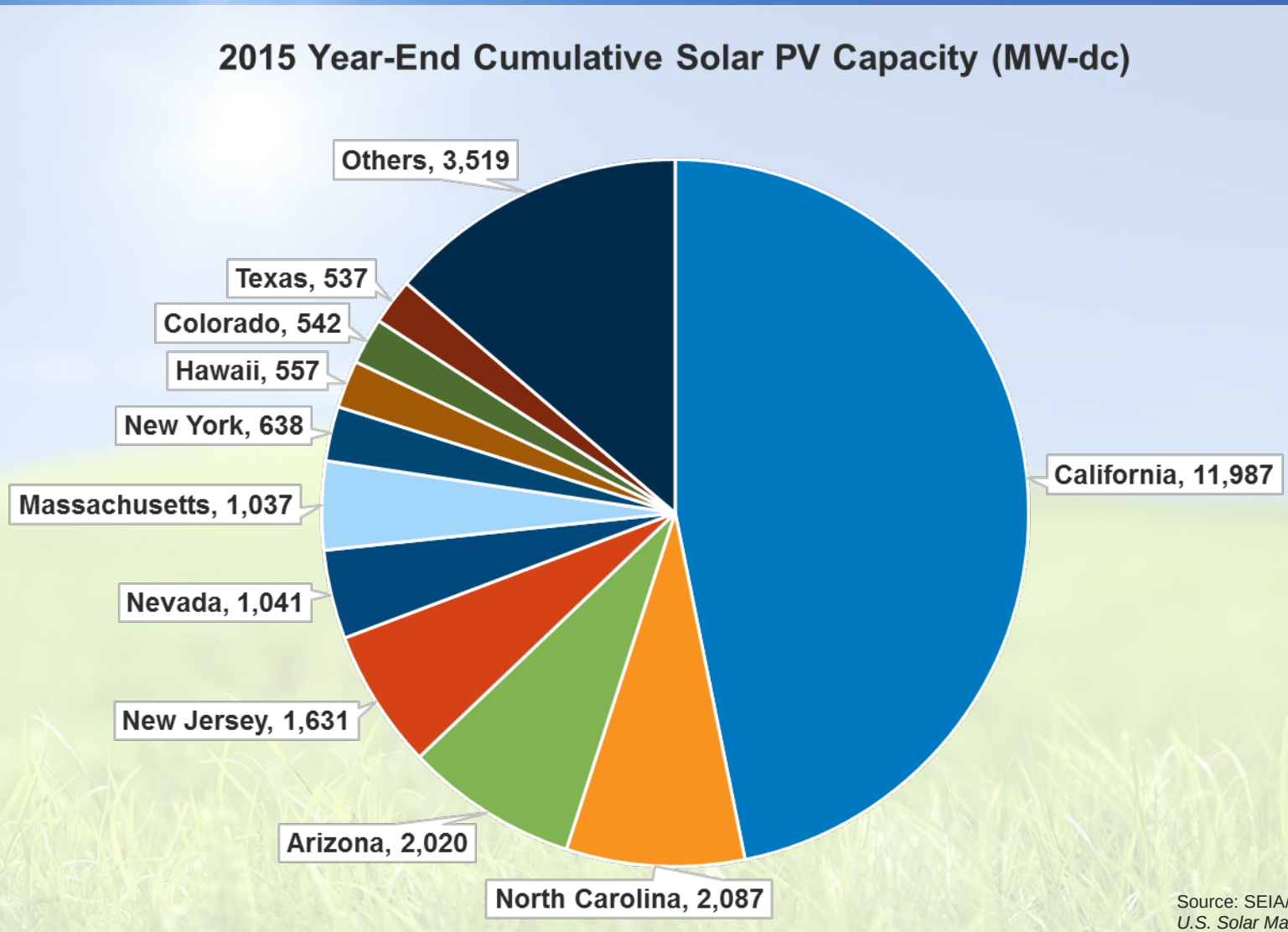

Source: SEIA/GTM Research *U.S. Solar Market Insight Q4 2015*
greentechmedia.com/research/ussmi
Lawrence Berkeley National Laboratory, *Tracking the Sun*

# U.S. Solar Market Through Q1 2016

- **7.5 GW of solar installed in 2015**
  - 19% growth in Photovoltaic (PV) market over 2014
  - Compound annual growth rate of 58% since 2010
- **Over 29 GW of total solar capacity installed**
  - Generates enough electricity to power 5.7 million homes
- **Solar prices dropped 3% in 2015 from 2014**
  - Price drop accelerated in Q1 2016, down 12% y/y
  - Prices have dropped over 70% since 2006
  - Utility-Scale PPAs now signed for $0.03 - $0.05/kWh
- **Solar has reached 1% of total generation**
  - Up from 0.1% just 5 years ago
  - Expected to hit 3.5% by 2020
- **In Q1 2016, hit 1 million solar installations**
  - Will hit 2 million installs in just 2 years

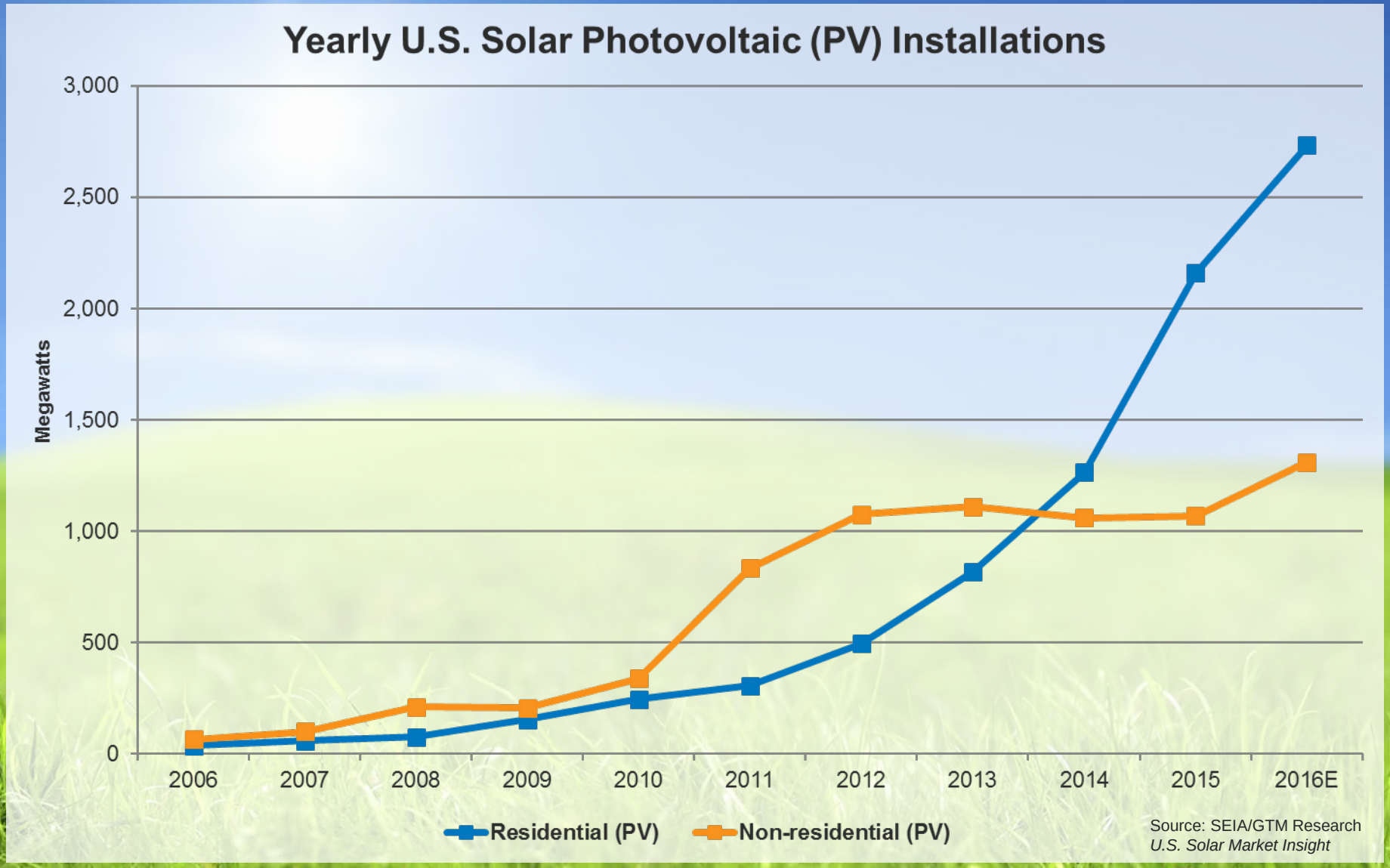
Source: SEIA/GTM Research
*U.S. Solar Market Insight*

# U.S is becoming a 50 state market

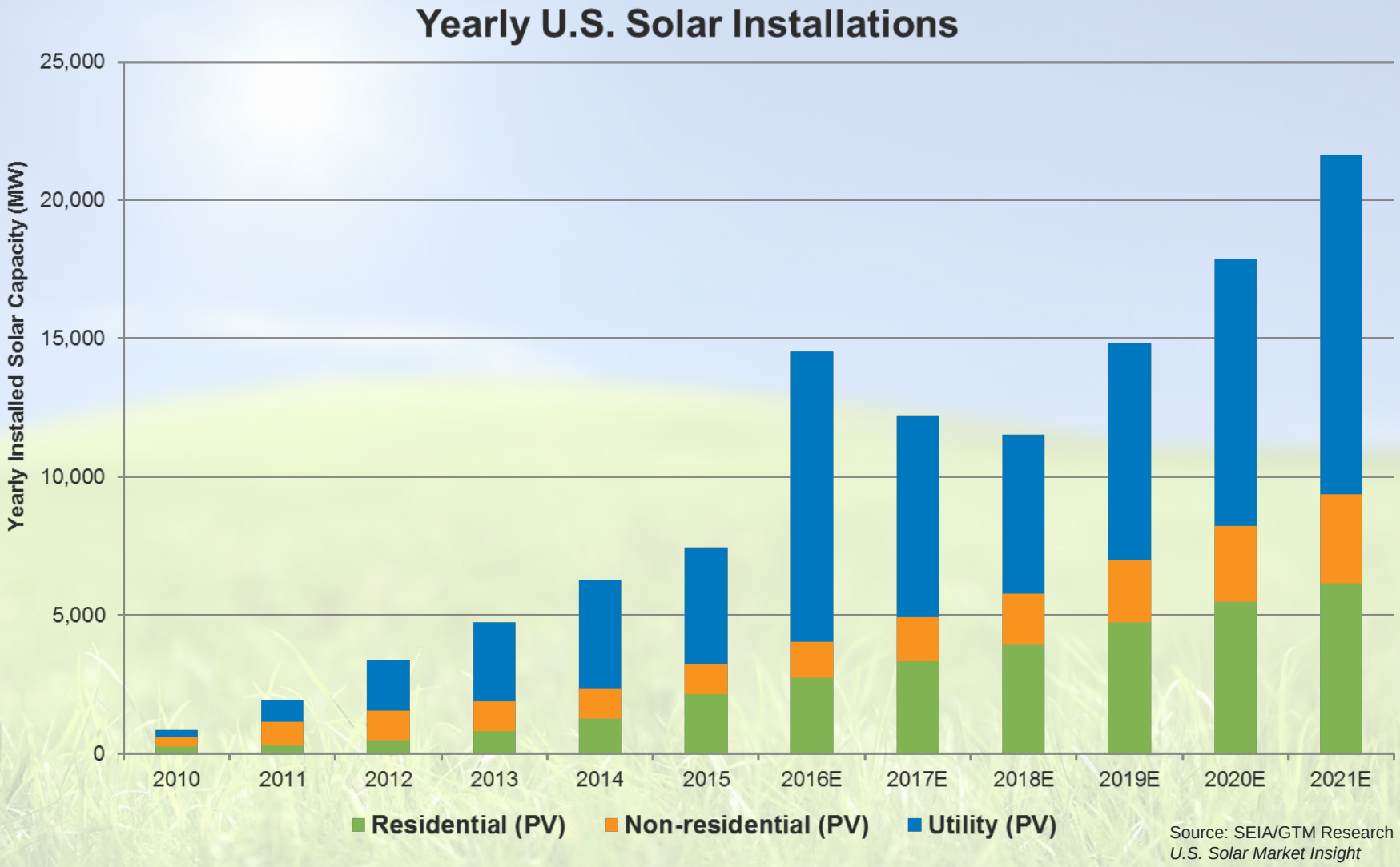



Source: SEIA/GTM Research
*U.S. Solar Market Insight*

# Residential & Commercial (Distributed)



# U.S. Solar PV Forecast- Q1 2016




Source: SEIA/GTM Research
*U.S. Solar Market Insight*

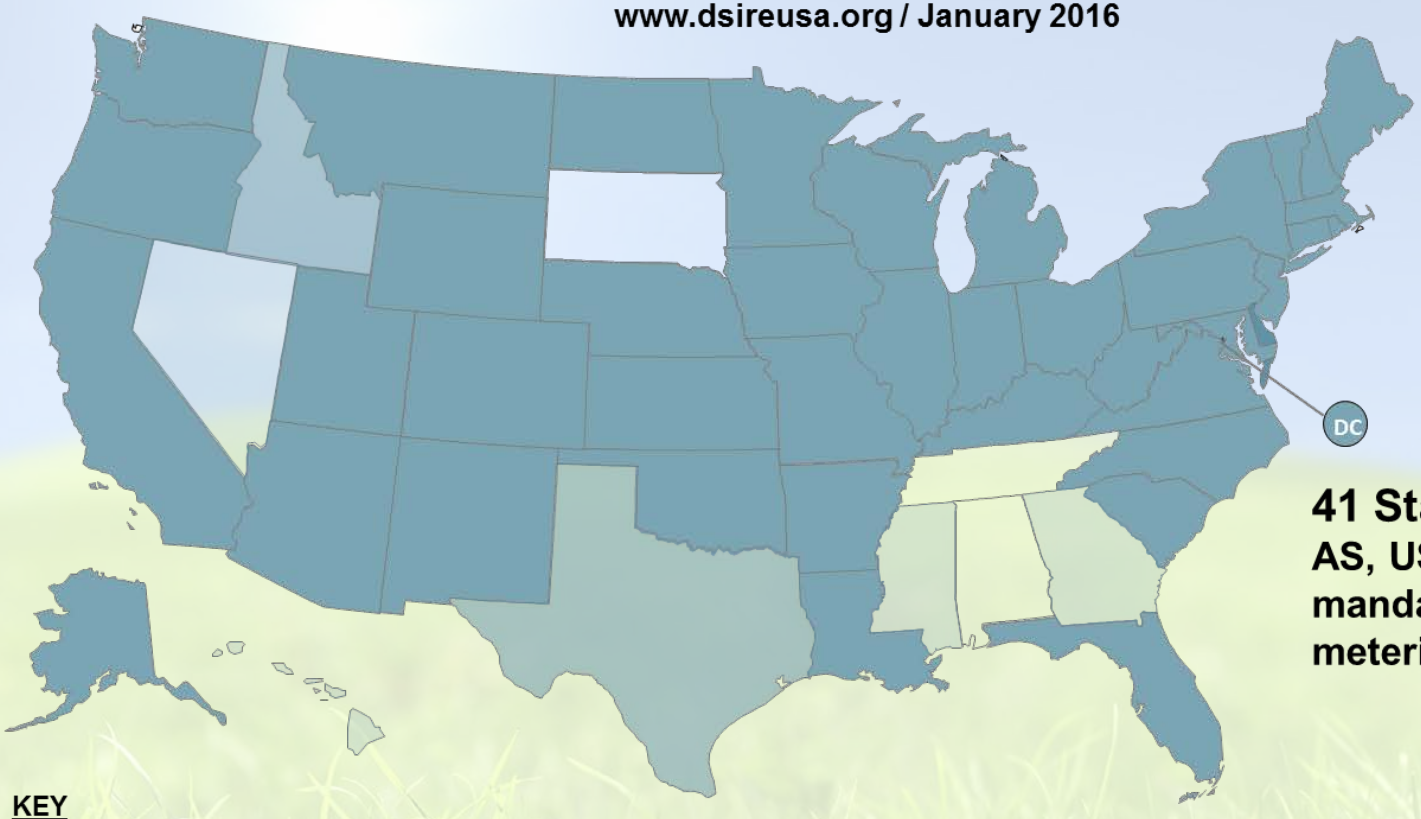
# *2016* SEIA State Policy Priorities

- **Priority states**:
  - CA, CO, NV, NY, MA, NJ, TX, Southeast (GA, FL, NC), Midwest
- **What does SEIA do in these states?**
  - We work in state legislatures and state regulatory agencies, promoting policies that make the states safe for solar
- **Policies? Like what?**
  - Clean Power Plan: ensure that states incorporate solar in their plans to comply with the CPP
  - Renewable Portfolio Standards (RPS): require utilities to deliver a certain amount of power from renewable generation (wind, solar, geothermal)
  - Net Metering: require utilities to allow rooftop solar customers to sell surplus solar production back to the grid (generally at retail rates)
  - Tax policy: state tax credits (similar to the federal ITC), tax abatements, property tax exemptions, etc
  - Incentives: rebates or other pay-downs to decrease up front cost of solar system or increase the savings over time

# Net Metering, Rate Design & DER Valuation

## Net Metering

www.dsireusa.org / January 2016




**41 States + DC, AS, USVI, & PR have mandatory net metering rules**

**KEY**

- State-developed mandatory rules for certain utilities (41 states + DC+ 3 territories)
- No statewide mandatory rules, but some utilities allow net metering (2 states)
- Statewide distributed generation compensation rules other than net metering (4 states + 1 territory)

**U.S. Territories:**

| | |
|---|---|
| AS | PR |
| VI | GU |

# DG Costs & Benefits

*Annual Net Benefits of 2017-2019 NEM Rooftop Solar Deployments*

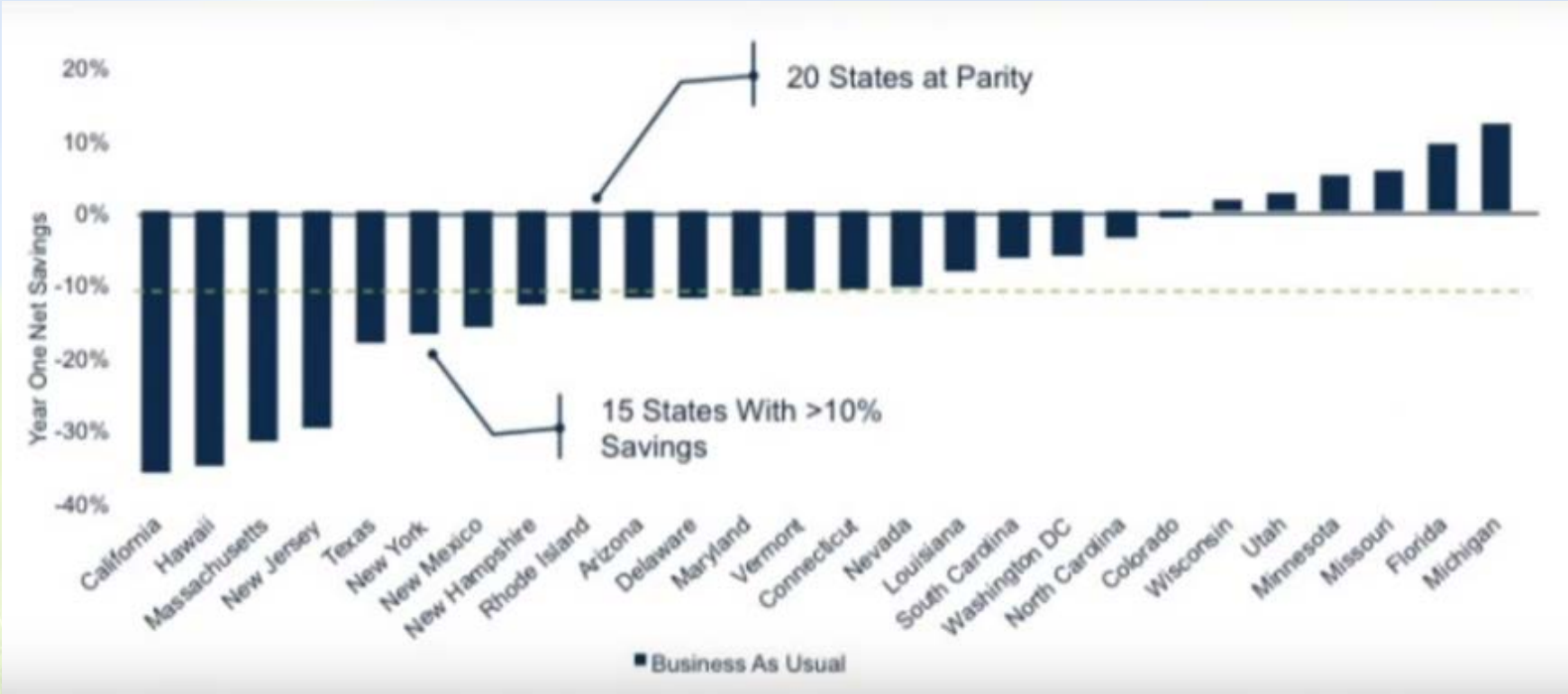
| Type | Benefit and Cost Category | Net Benefits (Excl. Environmental) | Net Benefits + Environmental |
|---|---|---|---|
| | | *2015 Levelized cents/kWh* | |
| **Benefits** | Energy | 3.7 | Same |
| | Line Losses | 0.4 | Same |
| | Generation Capacity | 2.6 | Same |
| | Ancillary Services | 0.1 | Same |
| | Transmission & Distribution Capacity | 2.8 | Same |
| | $CO_2$ Regulatory Price | 0.9 | Same |
| | Voltage Support | 0.9 | Same |
| | Criteria Pollutants | Not included | 0.1* |
| | Environmental Externalities | Not included | 1.7* |
| | **Total Benefits** | **11.4** | **13.2** |
| **Costs** | Program Costs | 0.1 | Same |
| | Integration Costs | 0.2 | Same |
| | Participant Bill Savings | 9.5 | Same |
| | **Total Costs** | **9.8** | **9.8** |
| | **Total Net Benefits** | **1.6 cents/kWh** | **3.4 cents/kWh** |

Source: Sola

*More recent academic studies estimate the criteria pollutants cost to be up to 5 cents/kWh[22] and the social cost of carbon to be as high as 12 cents/kWh in Nevada.[23]

# Net Metering

- **Under current NEM rules, distributed generation solar at grid parity in 20 states**




Source: Shayle Kann, GTM Research
*U.S. Solar Market Insight* Conference
Keynote: *The Future of Solar*

# Solar Moving Beyond Traditional Markets: Distributed Generation

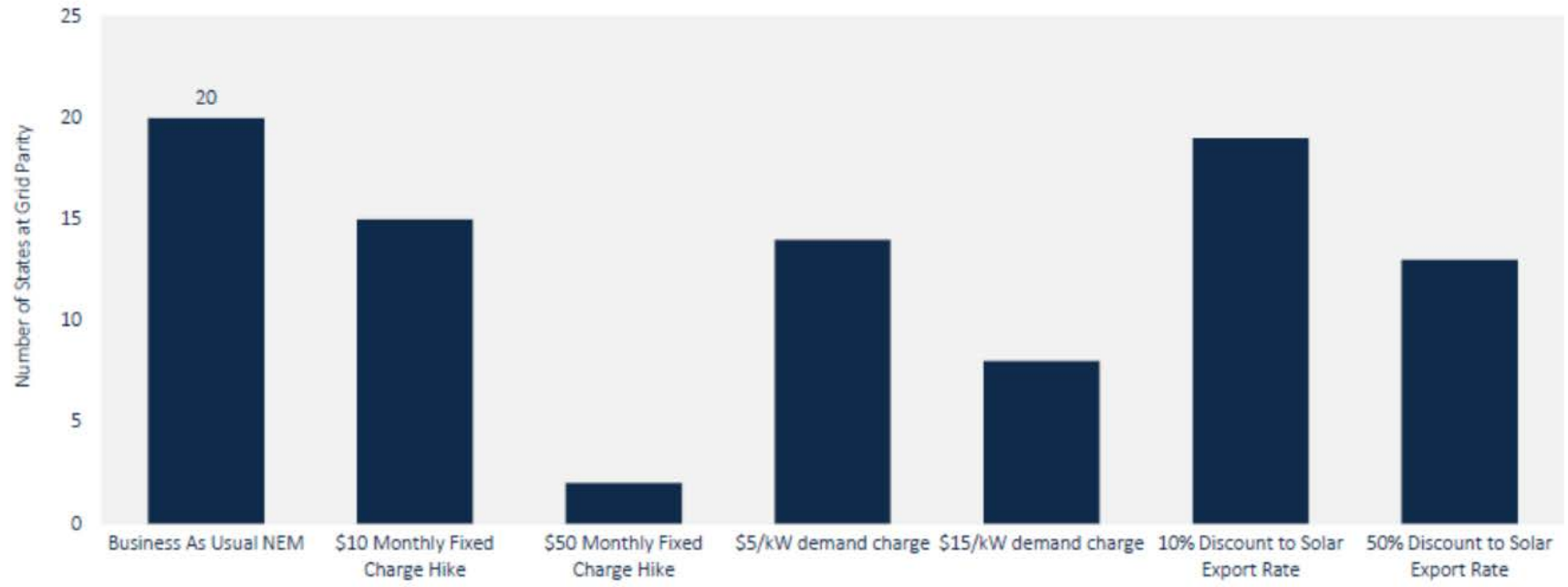
| Top 10 DG States by Absolute Growth | | | | |
|---|---|---|---|---|
| | State | 2011-15 DG MW | 2016-2020 DG MW | DG Growth |
| 1 | California | 3,880 | 13,234 | 9,353 |
| 2 | New York | 510 | 2,711 | 2,201 |
| 3 | Massachusetts | 937 | 2,256 | 1,319 |
| 4 | Maryland | 306 | 1,111 | 805 |
| 5 | Connecticut | 185 | 912 | 727 |
| 6 | New Jersey | 1,132 | 1,683 | 551 |
| 7 | Texas | 113 | 598 | 486 |
| 8 | Florida | 106 | 574 | 468 |
| 9 | Minnesota | 28 | 472 | 444 |
| 10 | Vermont | 55 | 399 | 345 |

| Top 10 DG States by % Growth | | | | |
|---|---|---|---|---|
| | State | 2011-15 DG MW | 2016-2020 DG MW | DG % Growth |
| 1 | South Carolina | 8 | 172 | 2097% |
| 2 | Minnesota | 28 | 472 | 1579% |
| 3 | Indiana | 9 | 130 | 1348% |
| 4 | Virginia | 19 | 208 | 1003% |
| 5 | Michigan | 15 | 151 | 936% |
| 6 | New Hampshire | 23 | 222 | 868% |
| 7 | District of Columbia | 15 | 136 | 796% |
| 8 | Delaware | 32 | 271 | 752% |
| 9 | Illinois | 22 | 180 | 731% |
| 10 | Vermont | 55 | 399 | 632% |

Source: SEIA/GTM Research

Source: SEIA/GTM Research
*U.S. Solar Market Insight*

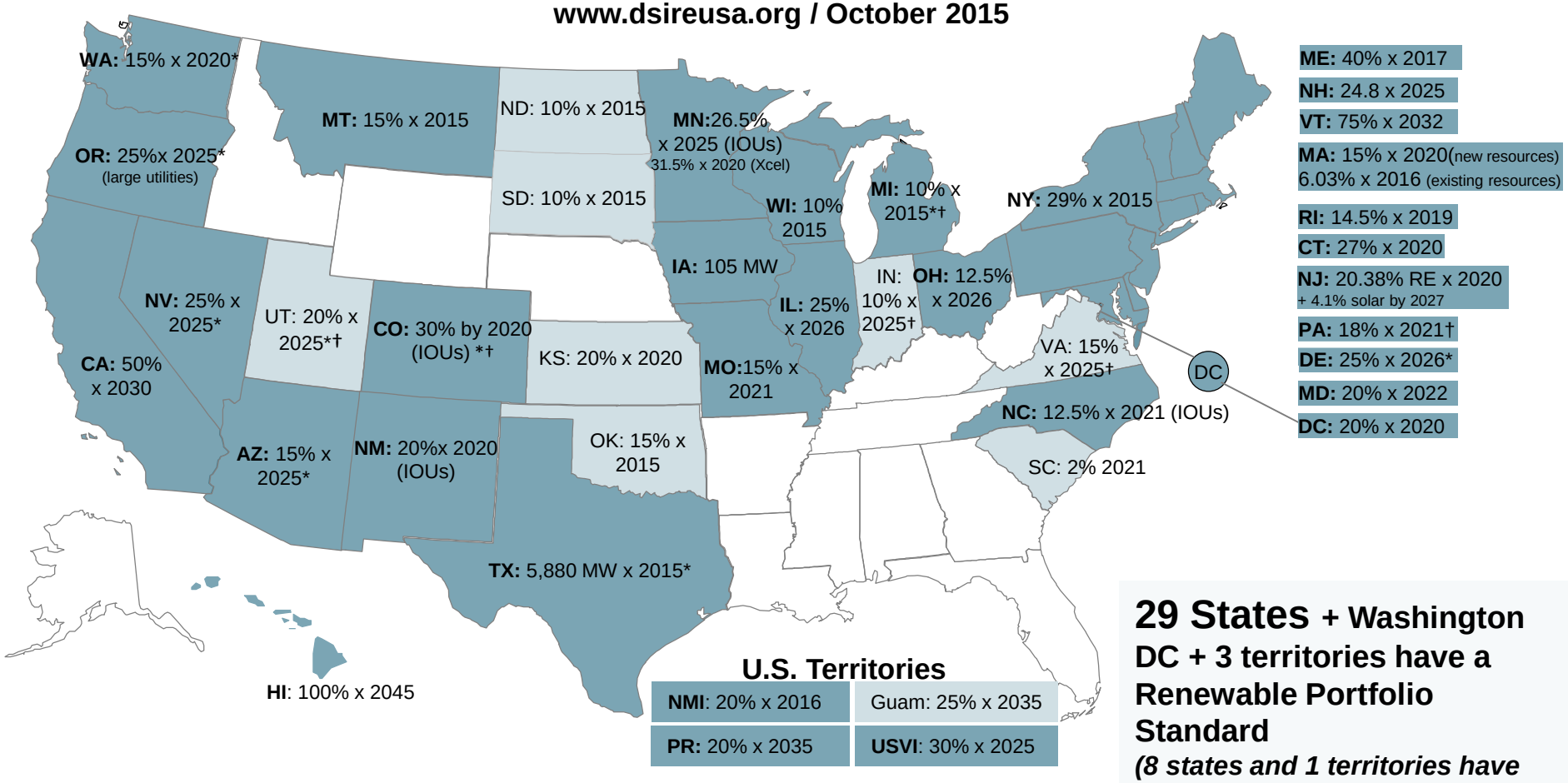
# How do NEM & rate design reforms affect “grid parity”?



DSIRE® | NC CLEAN ENERGY TECHNOLOGY CENTER | U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

# Renewable Portfolio Standard Policies

**www.dsireusa.org / October 2015**




**ME:** 40% x 2017
**NH:** 24.8 x 2025
**VT:** 75% x 2032
**MA:** 15% x 2020(new resources) 6.03% x 2016 (existing resources)
**RI:** 14.5% x 2019
**CT:** 27% x 2020
**NJ:** 20.38% RE x 2020 + 4.1% solar by 2027
**PA:** 18% x 2021†
**DE:** 25% x 2026*
**MD:** 20% x 2022
**DC:** 20% x 2020

## U.S. Territories

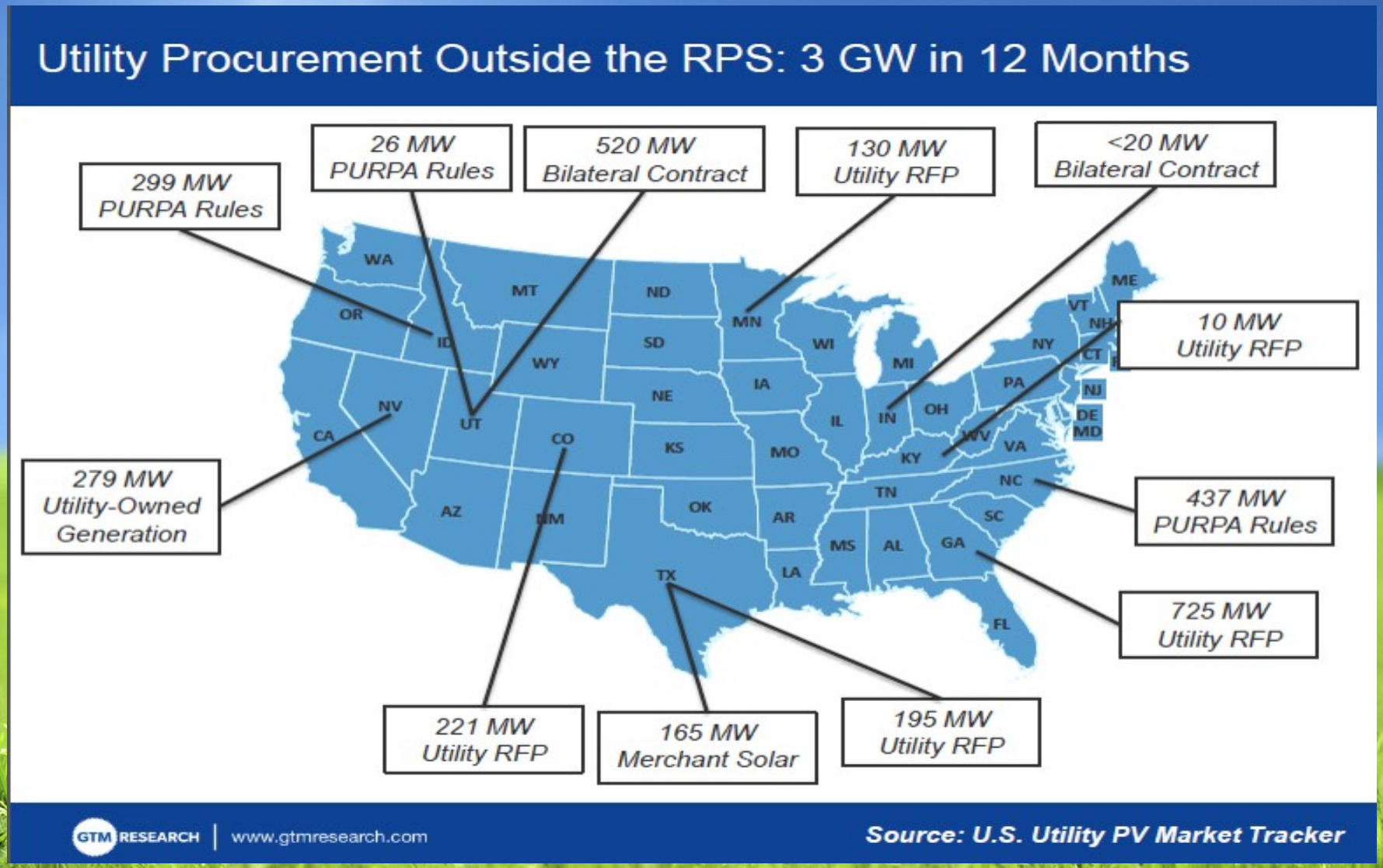
| | |
|---|---|
| **NMI**: 20% x 2016 | Guam: 25% x 2035 |
| **PR:** 20% x 2035 | **USVI**: 30% x 2025 |

**29 States + Washington DC + 3 territories have a Renewable Portfolio Standard**
***(8 states and 1 territories have renewable portfolio goals)***

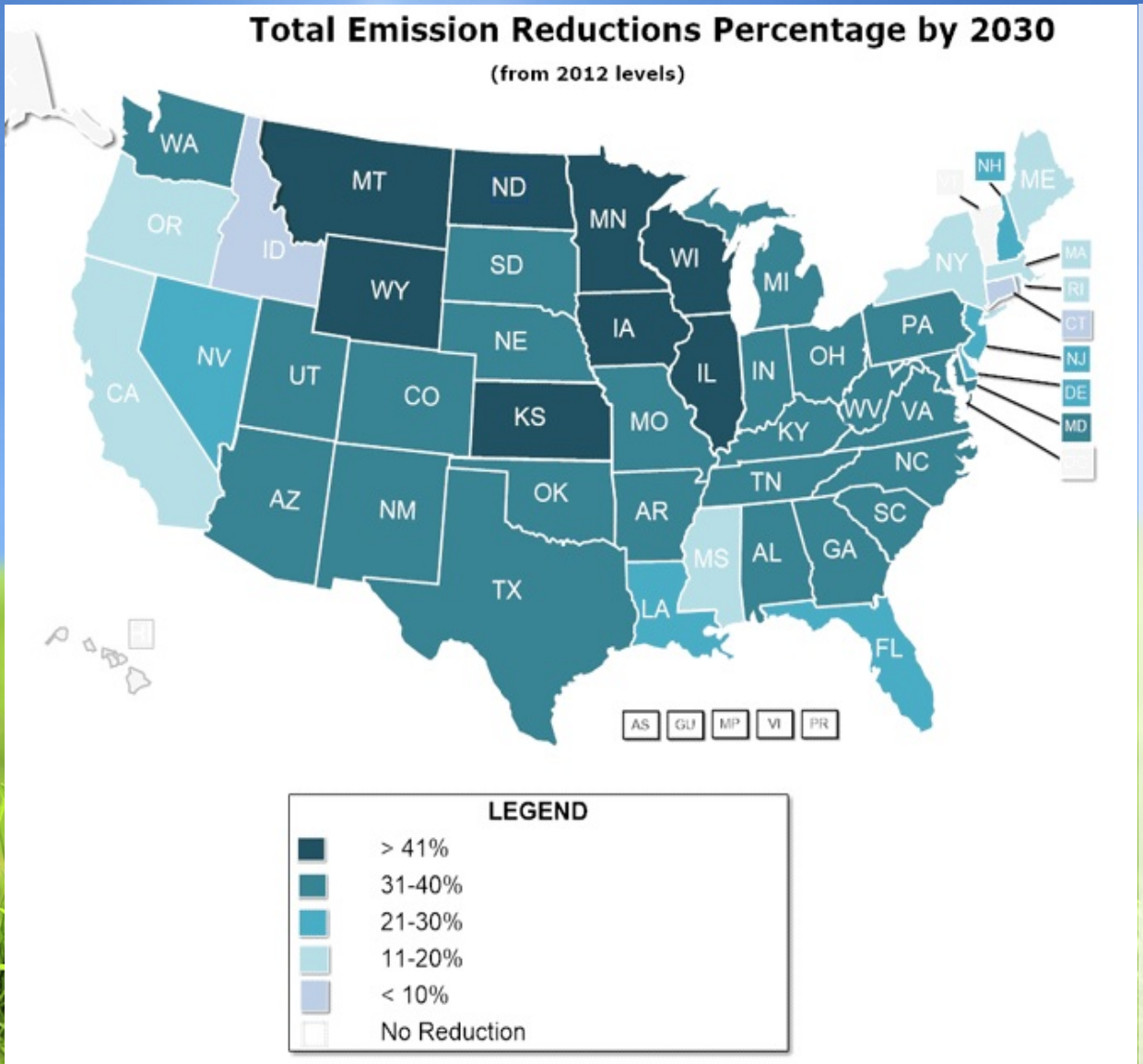
Renewable portfolio standard
Renewable portfolio goal

* Extra credit for solar or customer-sited renewables
† Includes non-renewable alternative resources

# Industry Trends: Non-RPS Procurement



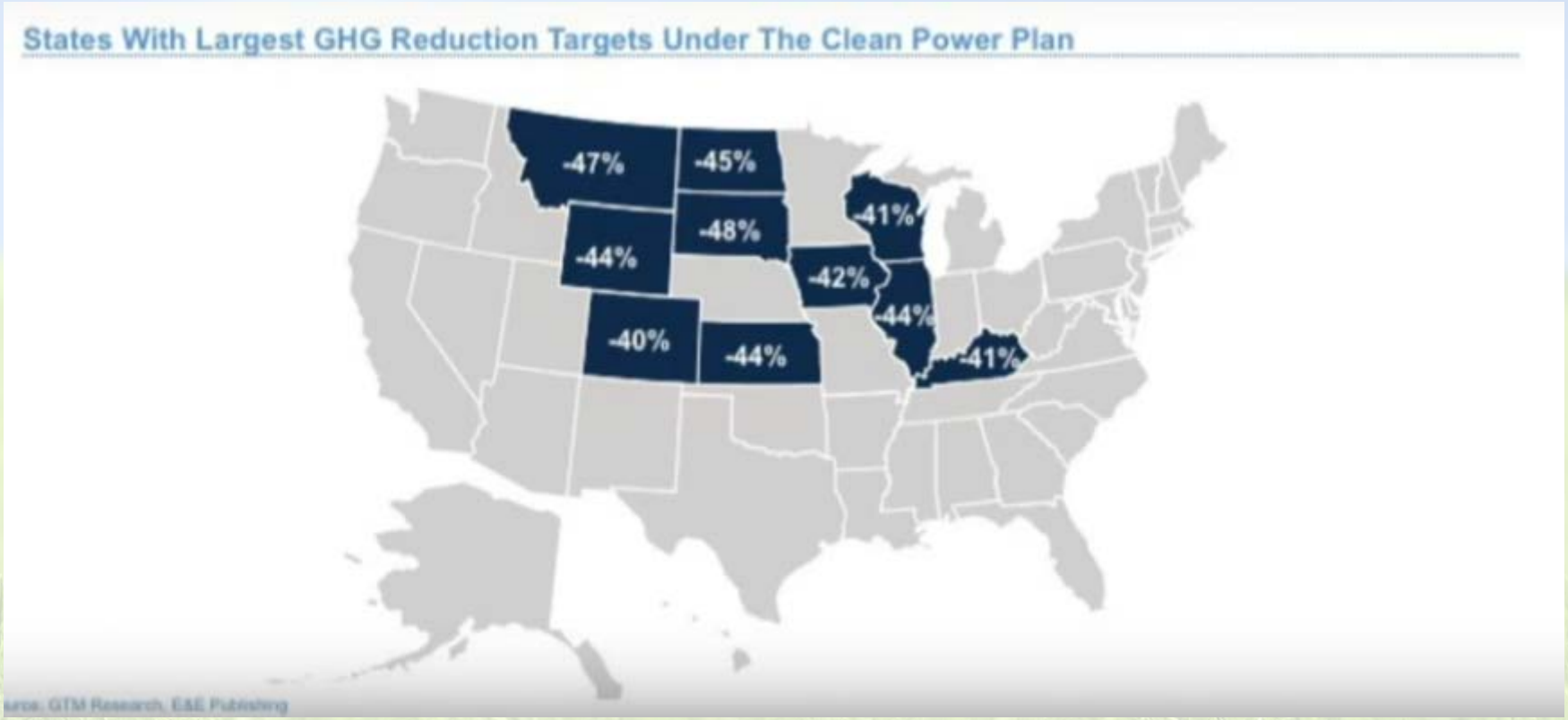
# Clean Power Plan - Opportunity




- CPP will drive 20 GW of additional capacity by 2030
- Will open up solar markets in additional states
- **SEIA is focused on Southeast & Midwest**
  - State targets > 35%
  - States planning SIPs
  - Open new markets
  - Cross over with other SEIA policy priorities
  - Regional approach allows efficient use of resources
- CPP Mechanisms could include:
  - RPS expansions (CA, IL, MI)
  - IRP (GA, CO)
  - Other utility RFP (TN, VA)
  - Utility ownership (AL)
  - Community Solar (MN, CO)

# Clean Power Plan

- CPP will drive 20 GW of additional capacity by 2030
- Will open up solar markets in additional states
  - Already seeing procurement in preparation for CPP




Source: GTM Research, EPA

# Solar Moving Beyond Traditional Markets: Utility-Scale

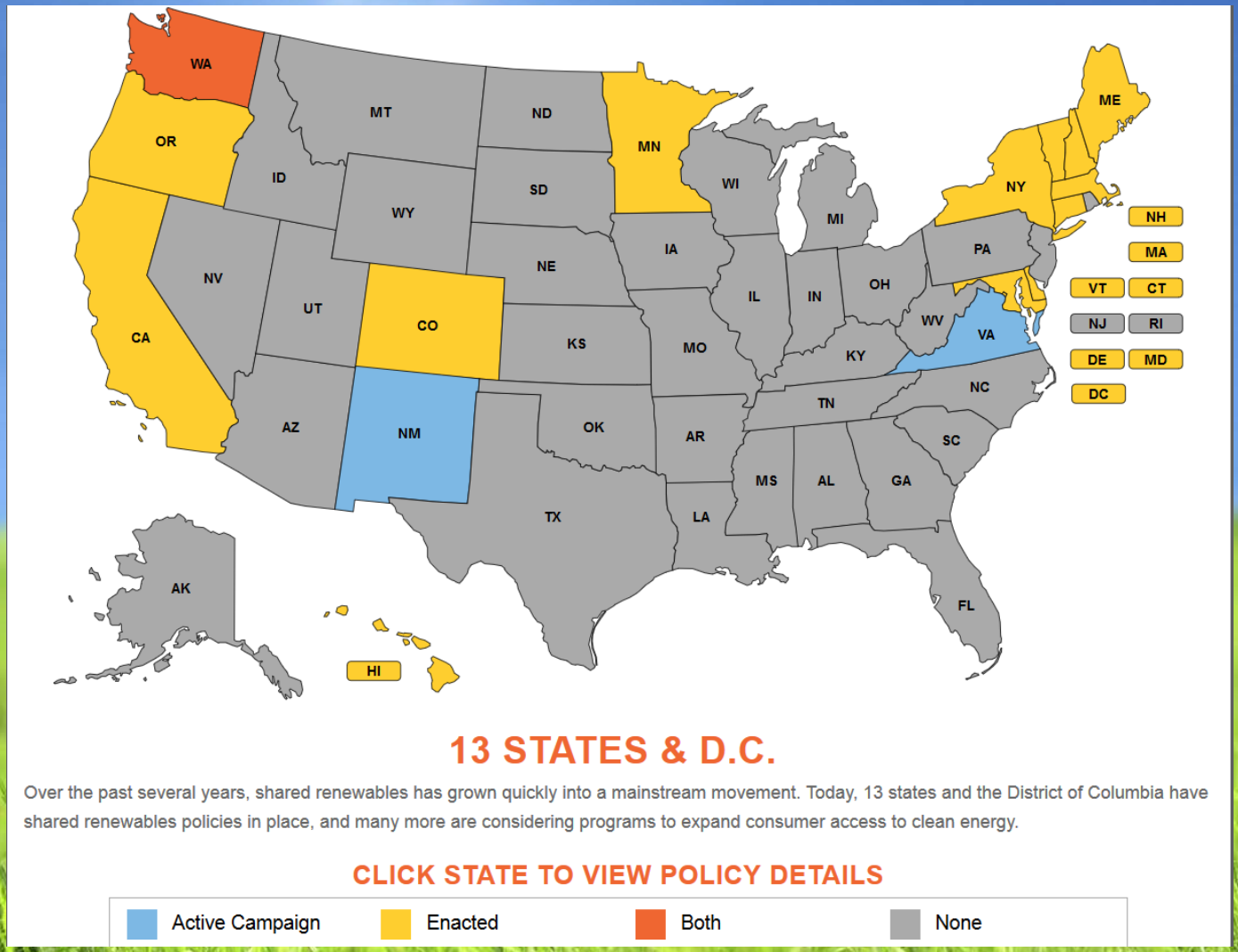
| Top 10 Utility-Scale States by Absolute Growth | | | | |
|---|---|---|---|---|
| | State | 2011-15 Utility-Scale MW | 2016-2020 Utility-Scale MW | Utility-Scale Growth |
| 1 | Texas | 394 | 4,233 | 3,840 |
| 2 | California | 7,179 | 10,407 | 3,229 |
| 3 | Utah | 194 | 1,466 | 1,272 |
| 4 | Nevada | 777 | 1,978 | 1,201 |
| 5 | Florida | 21 | 1,173 | 1,152 |
| 6 | Georgia | 339 | 1,392 | 1,054 |
| 7 | New Mexico | 250 | 1,287 | 1,037 |
| 8 | Oregon | 26 | 1,042 | 1,016 |
| 9 | Colorado | 162 | 956 | 794 |
| 10 | Virginia | 2 | 750 | 748 |

| Top 10 Utility-Scale States by % Growth | | | | |
|---|---|---|---|---|
| | State | 2011-15 Utility-Scale MW | 2016-2020 Utility-Scale MW | Utility-Scale % Growth |
| 1 | Washington | 0.0 | 142.4 | - |
| 2 | Iowa | 0.0 | 68.0 | - |
| 3 | Louisiana | 0.0 | 33.7 | - |
| 4 | New Hampshire | 0.0 | 12.5 | - |
| 5 | Virginia | 2.1 | 750.4 | 36414% |
| 6 | Minnesota | 2.3 | 682.6 | 29578% |
| 7 | Michigan | 1.3 | 333.5 | 26372% |
| 8 | South Carolina | 3.7 | 525.2 | 14095% |
| 9 | Florida | 20.9 | 1,173.0 | 5511% |
| 10 | Oregon | 26.3 | 1,041.8 | 3861% |

Source: SEIA/GTM Research

Source: SEIA/GTM Research
*U.S. Solar Market Insight*

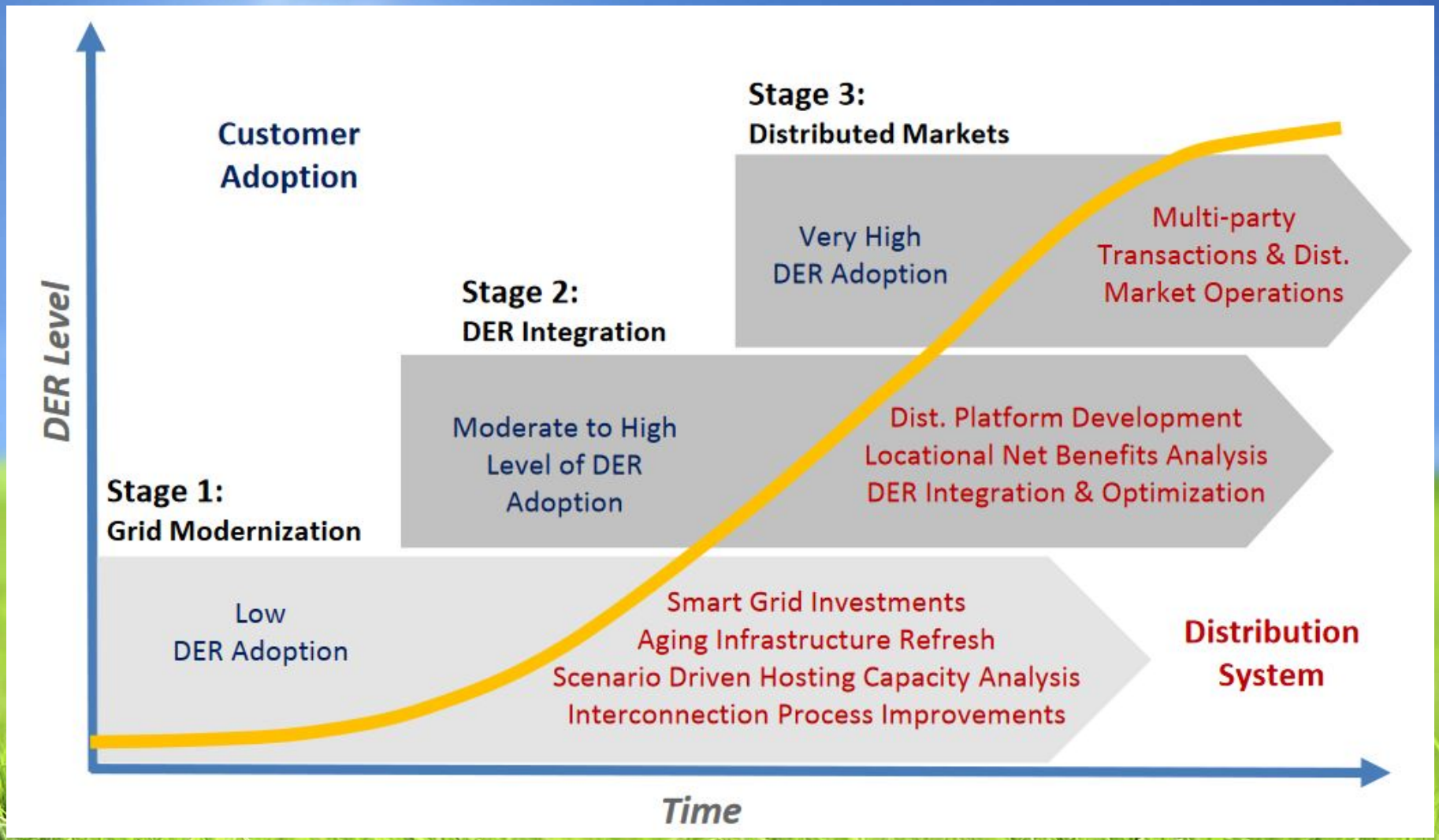
# Community Solar: A Sweet Spot?




- 13 states & DC have adopted shared or community solar programs
- Expands solar access to more customers
  - Multi-family
  - Shaded roof
  - Low & moderate income
  - Poor credit
- Multiple business models, including utility ownership

Source: http://www.sharedrenewables.org/community-energy-projects/

# Grid Modification & Integration issues



# Thank You