

# STRATEGY AND ROADMAP FOR PV SYSTEMS IN THE UNITED STATES

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**of**

**APEC Expert Group on New and Renewable  
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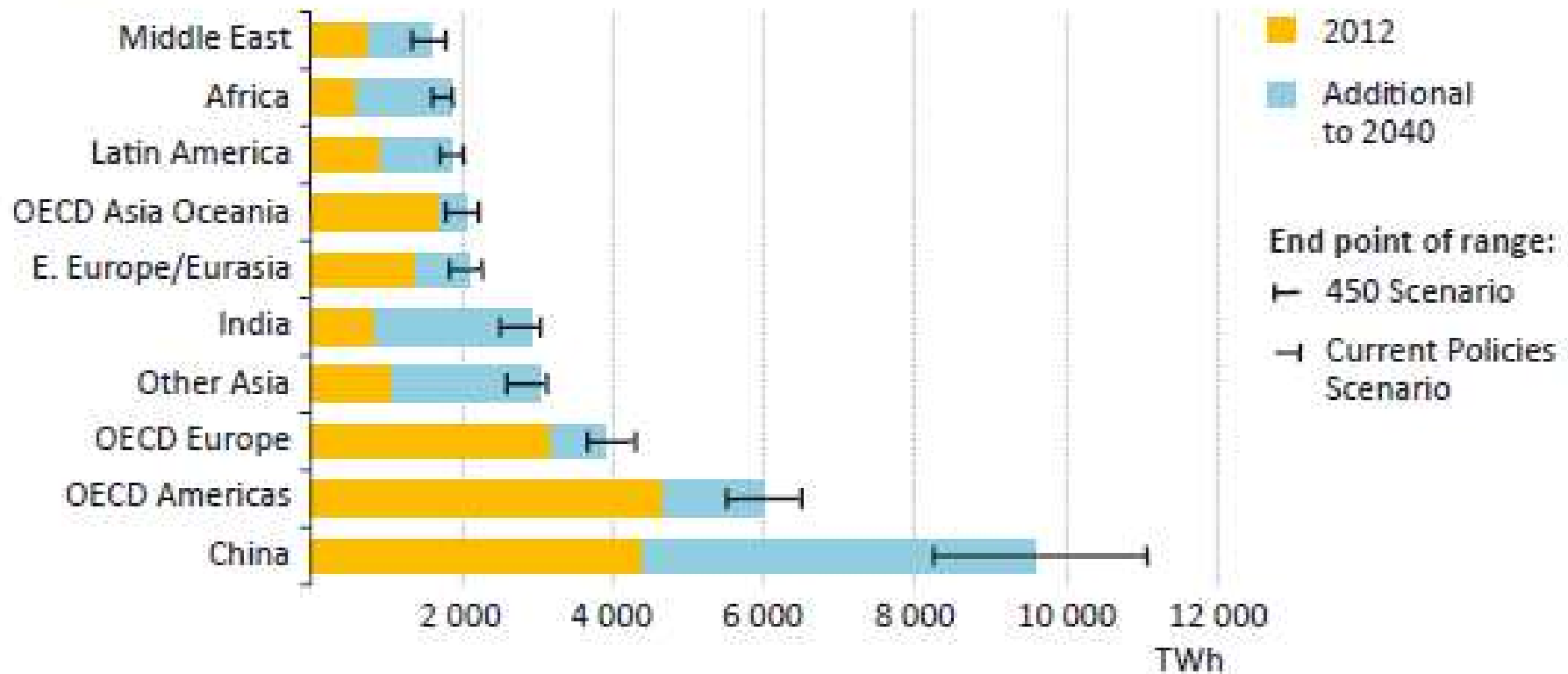
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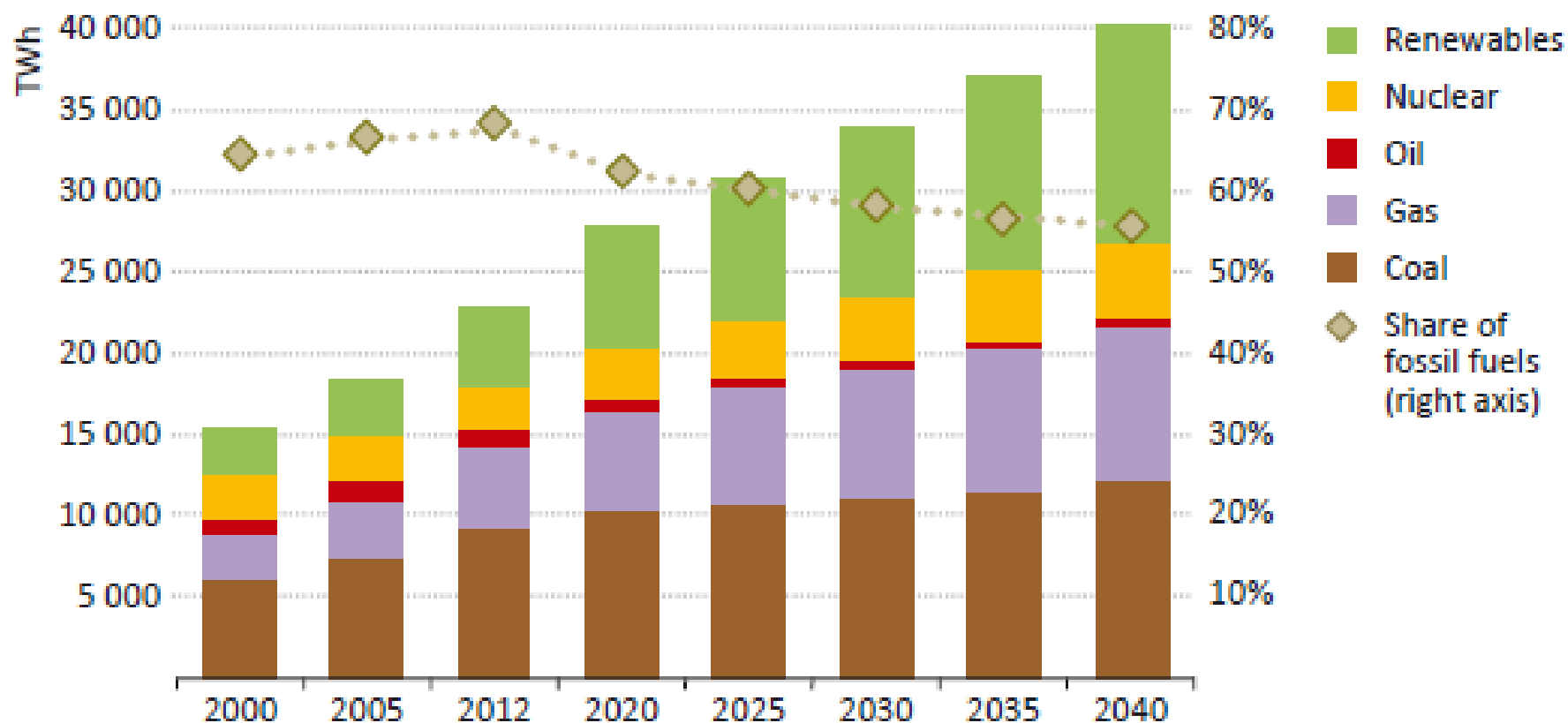
**Asia-Pacific  
Economic Cooperation**

**SOURCE:**  
**“WORLD ENERGY OUTLOOK 2014”**  
**(PUBLICATION OF INTERNATIONAL ENERGY ASSOCIATION (IEA))**

**Figure 6.1** ▶ Electricity demand by region in the New Policies Scenario



**Figure 6.8** ▶ **World electricity generation by source in the New Policies Scenario**



Source: IEA

## **NEW POLICY SCENARIO (SOURCE IEA)**

- **Energy policies to limit the long-term average global temperature rise to 2° C.**
- **Policies promoting renewable energy, energy efficiency, alternate fuels and vehicles.**
- **Commitment to reducing carbon emissions.**
- **Removal of inefficient fossil fuel subsidies.**



“.....we endorse the Energy Ministers’ aspirational goal to **double the share of renewables including in power generation by 2030 in APEC’s energy mix.** We affirm our commitment to rationalize and phase out inefficient fossil fuel subsidies that encourage wasteful consumption while still providing essential energy services.”

# U.S. DOE SOLAR ACTIVITIES

- **The Solar Energy Technology Office is in the DOE Office of Energy Efficiency & Renewable Energy**
  - The SunShot\* Initiative lays out a 10 year program (2010-2020) for production of grid connected PV power at 5-6¢/kWh without subsidy (Solar Grid Parity)

\*<http://energy.gov/eere/sunshot/2014-sunshot-initiative-portfolio-book>

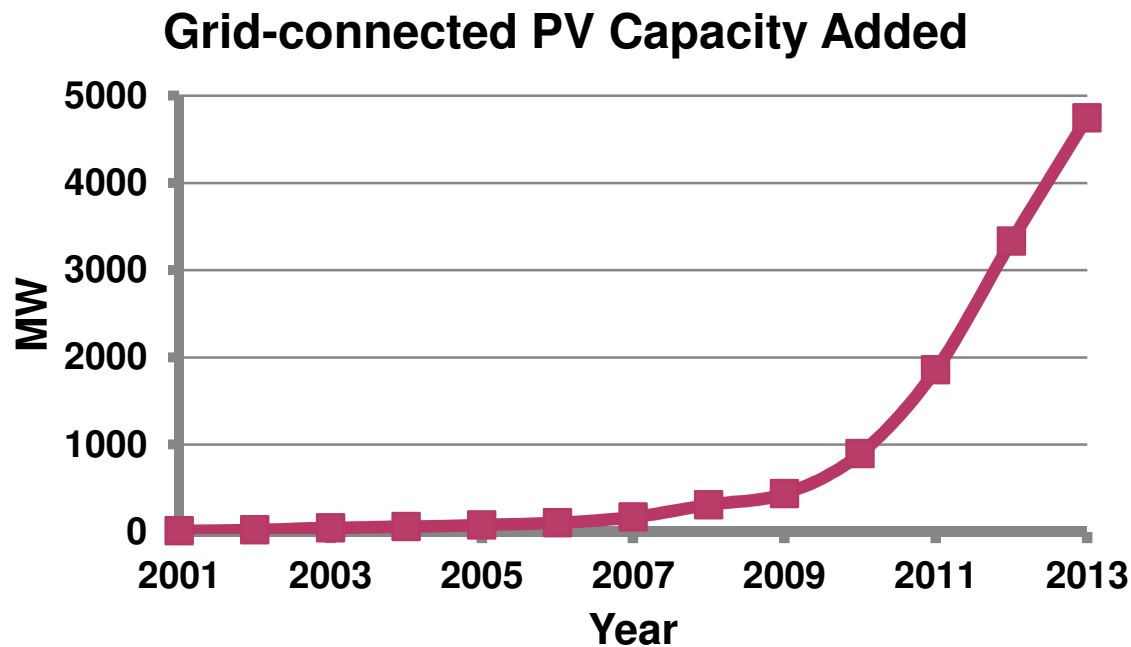
# U.S. DOE SOLAR ACT

- **The 2014 SunShot Grand Challenge Summit and Peer Review\* brought together more than 800 members of the solar energy community to review its 5 program areas:**
  - Photovoltaics
  - Concentrating solar power (CSP)
  - Balance of systems costs (soft costs)
  - System Integration
  - Technology to market

\*<http://energy.gov/eere/sunshot/events/sunshot-grand-challenge-summit-and-peer-review-2014>

# KEY FINDINGS (SOURCE: NREL - DOE)

- In 2013 in the United States, solar electricity was the fastest growing electricity generation technology, with cumulative installed capacity increasing by nearly 65 % from the previous year.



**PV capacity was 1% of the total capacity in 2013 and 0.5% of electricity generation**



# **DRIVERS FOR GROWTH**

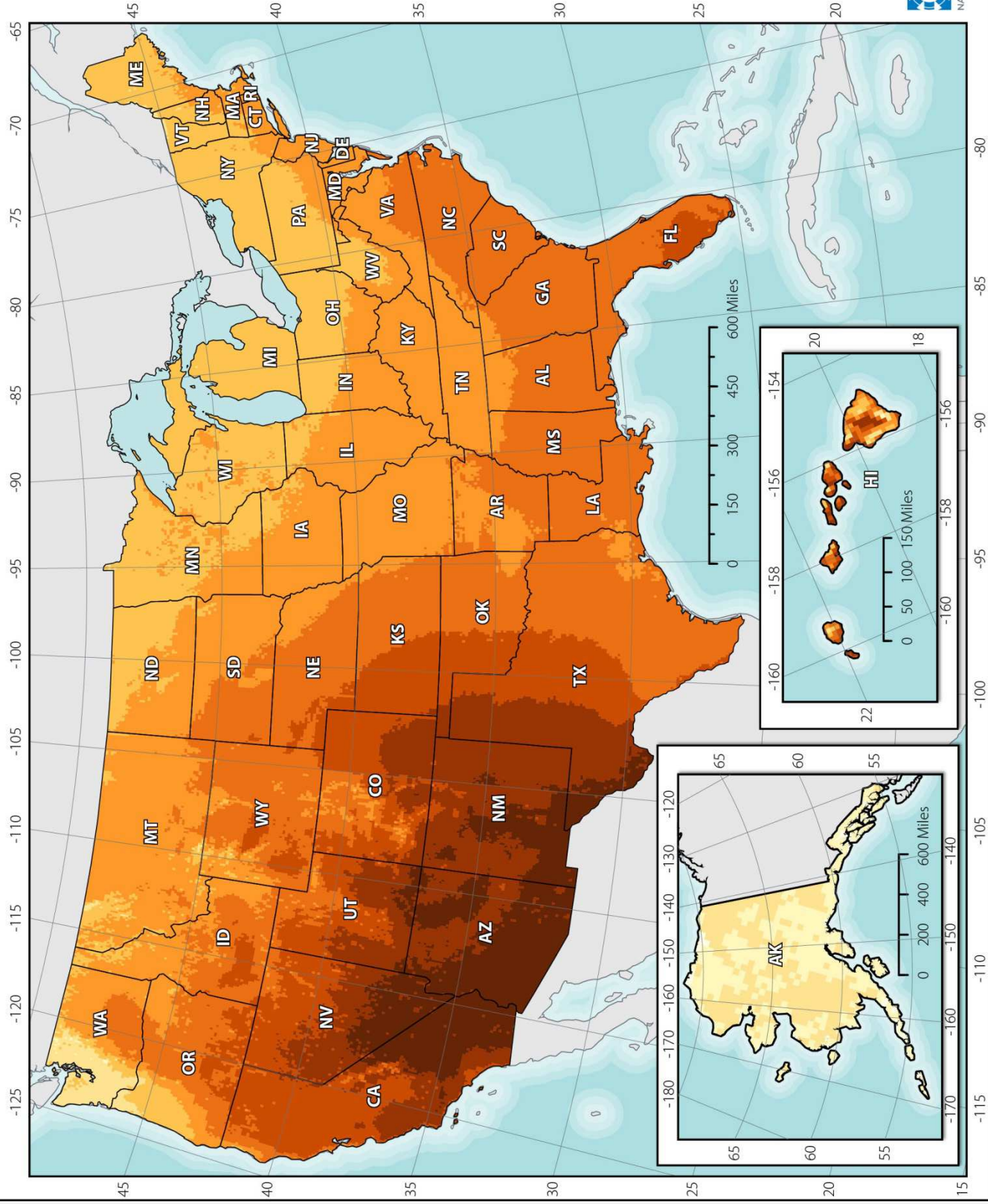
- **Reduced PV panel costs**
- **Reduced soft costs**
- **Availability of feed-in tariff**
- **State renewable portfolio standards**
- **Subsidies and tax credits**
- **High price of electricity**
- **Consumer awareness**

# TOP STATES FOR CUMULATIVE PV ELECTRICITY INSTALLED CAPACITY (2013) (NREL – DOE)

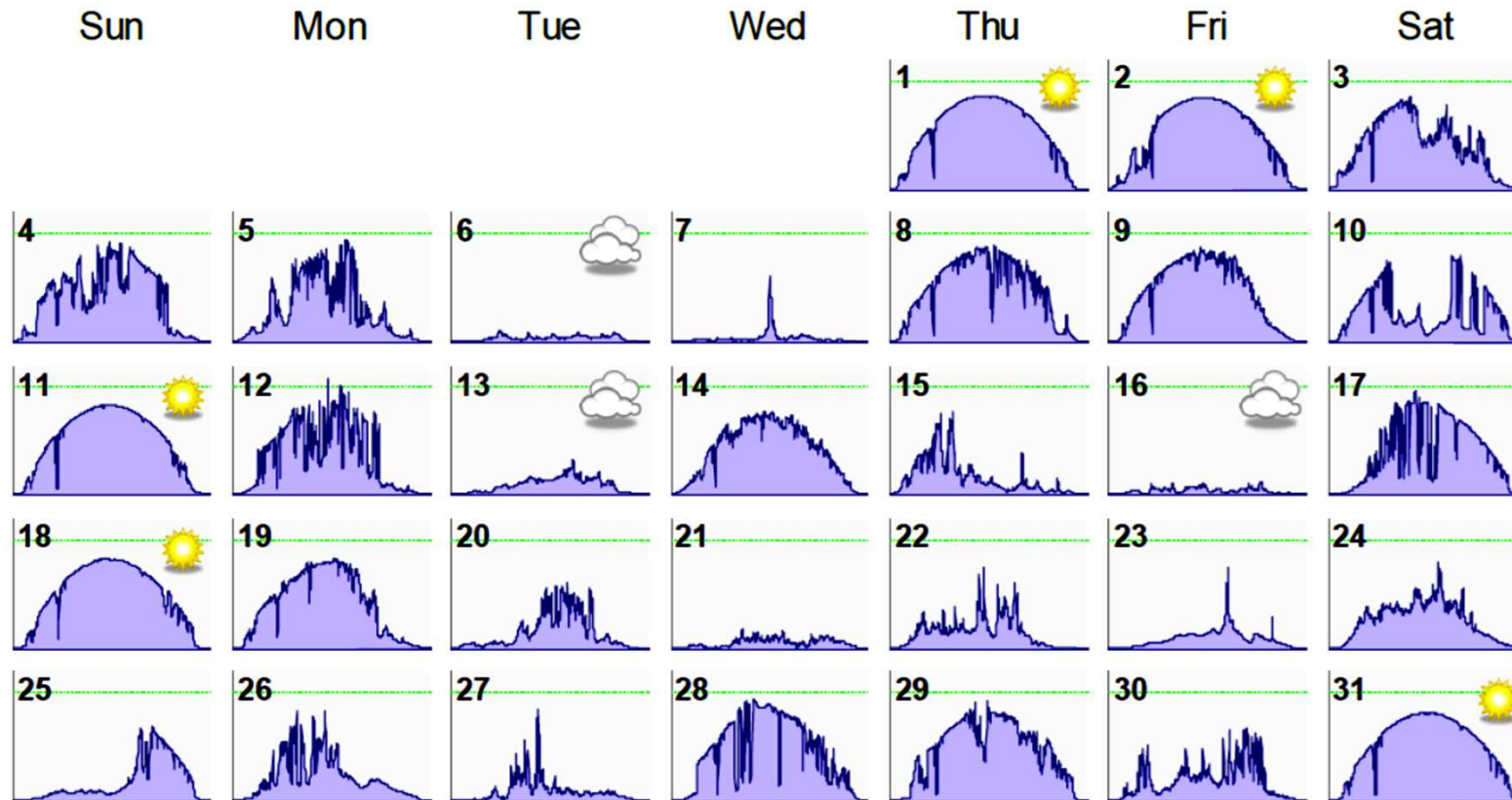


Solar PV <sup>1</sup>	
1	California
2	Arizona
3	New Jersey
4	North Carolina
5	Massachusetts

# Photovoltaic Solar Resource of the United States



# PV VARIABILITY



Source: K. Nicole, T. Key, C. Trueblood, “Distributed PV Monitoring: Highlights for PV Grid Integration Workshop”, EPRI, Tucson, Arizona, 2012.

# RESIDENTIAL SECTOR

- **Growth of rooftop solar PV installations**
  - California, Arizona, Hawaii
  - Consumer owned or leased
  - Utility or third party
- **Utility concerns**
  - Backwards power flow
  - Loss of revenues
  - Power flow fluctuations
  - High penetration
- **Policy issues**
  - Reduced feed-in tariff
  - Monthly connection charge

# NEW JERSEY "PSE&G SOLAR PANELS UTILITY POLES" BY MR. MATTÉ (WIKIMEDIA COMMONS)





## SUSTAINABLE CITY NETWORK

Best Practices for Leaders in Government, Education & Health

April 1, 2015

# Solar Panels Keep Paying for Themselves

Institutions, Businesses and Neighborhoods Find Ways to Get It Done

*By Andrea Hauser*

Solar power's fan base is growing.

As the solar power industry continues to grow and develop, early adopters agree that installing the panels was a great decision, whether on top of a private home, university building or city aquarium.

"We didn't have that cash, but we had a roof and we had a mission and we had an interest," said Mark Plunkett, the conservation manager for the Seattle Aquarium. The aquarium had a 49 KW solar array installed on the south-facing roof of its Pier 59 facility in the fall of 2013. The project was installed through the



# CONCLUSIONS

- **United States has seen very high growth in the solar PV sector in the last few years and it is expected to continue.**
- **Changes in subsidies, connectivity charges, and feed-in tariff could slow growth in rooftop PV installations.**
- **New technologies such as smart inverters, batteries, and smart grid; and reduction in hardware and soft costs will further accelerate PV deployment.**