SOLAR ENERGY TECHNOLOGIES PRORAM

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

The Parker Ranch installation in Hawaii

The federal role in advancing solar technologies

Tuesday, December 08, 2009

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Office of Energy Efficiency and Renewable Energy Technology Portfolio

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Electric Power Generation

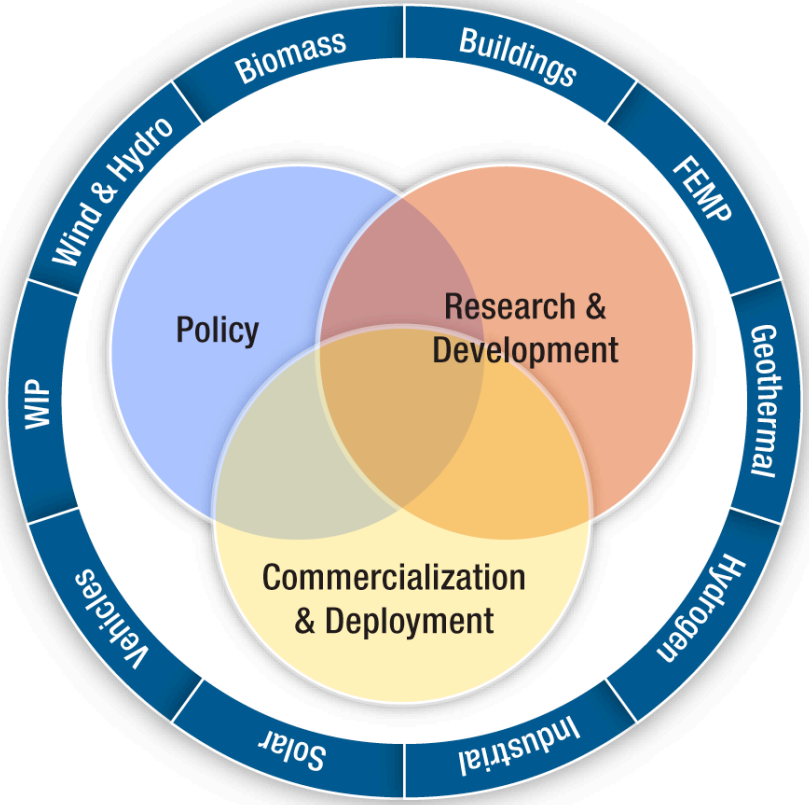
- Geothermal
- Solar
- Wind & Hydropower

Advanced Transportation

- Biomass
- Fuel Cells
- Vehicles

Energy Efficiency

- Buildings
- Industrial
- Federal Energy Management
- Weatherization and Intergovernmental



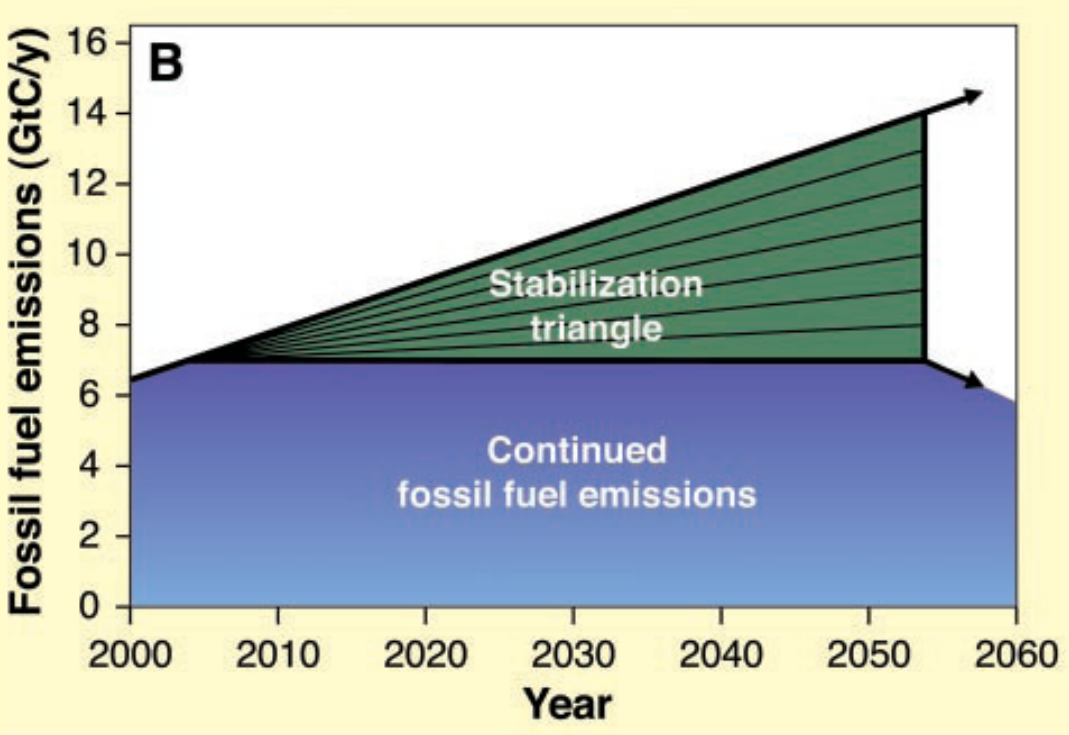
MISSION STATEMENT

Develop cost competitive clean energy technologies and practices and facilitate their commercialization and deployment in the marketplace to strengthen America's energy security, environmental quality, and economic vitality.

Scale of the challenge to address climate change

- Increase fuel economy of 2 billion cars from 30 to 60 mpg.
- Cut carbon emissions from buildings by one-fourth by 2050—on top of projected improvements.
- With today's coal power output doubled, operate it at 60% instead of 40% efficiency (compared with 32% today).
- Introduce Carbon Capture and Storage at 800 GW of coal-fired power.

- Install 1 million 2-MW wind turbines.
- Install 3000 GW-peak of Solar power.
- Apply conservation tillage to all cropland (10X today).
- Install 700 GW of nuclear power.



Source: S. Pacala and R. Socolow, "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technology", Science 13 August 2004, pp.968-972.

Time Constants for Change

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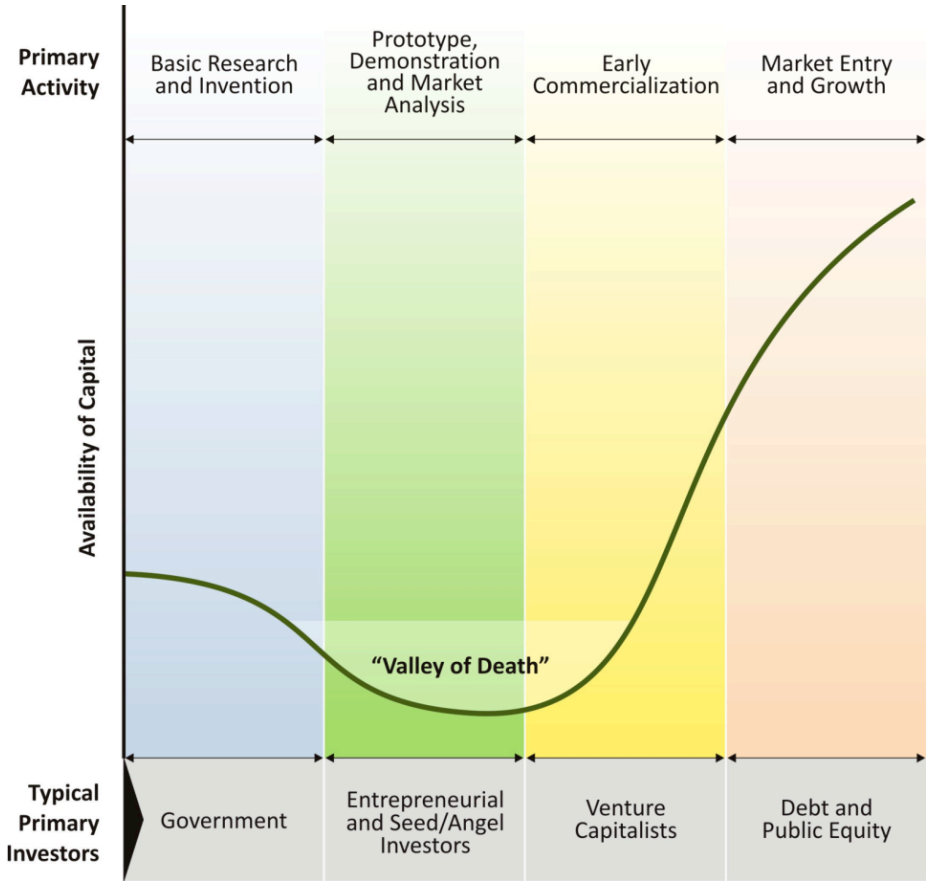
- Political consensus building ~ 3-30+ years
- Technical R&D ~10+
- Production model ~ 4+
- Financial ~ 2++
- Market penetration ~10++
- Capital stock turnover
  - Cars ~ 15
  - Appliances ~ 10-20
  - Industrial Equipment ~ 10-30/40+
  - Power plants ~ 40+
  - Buildings ~ 80
  - Urban form ~100's

- Lifetime of Greenhouse Gases ~10's-1000's
- Reversal of Land Use Change ~100's

Problem for Cleantech Entrepreneurs: How to cross the "Valley of Death"



- Significant government and university sources for Basic R&D – venture capital and public markets available for growth and expansion.
- Cleantech requires significant capital required for Prototype, Demonstration, and Market Validation.
- Cleantech is material intensive - requires higher capital levels than IT, biotech, or software.
- Cleantech subject to significant market risk due to government policy.
- Present economic and financial conditions have constrained conventional funding and "widened" the valley.

Significant need for new and novel sources of capital and partnerships to accelerate Cleantech through commercialization

DOE programs address the technology innovation and capital needs across the development pipeline

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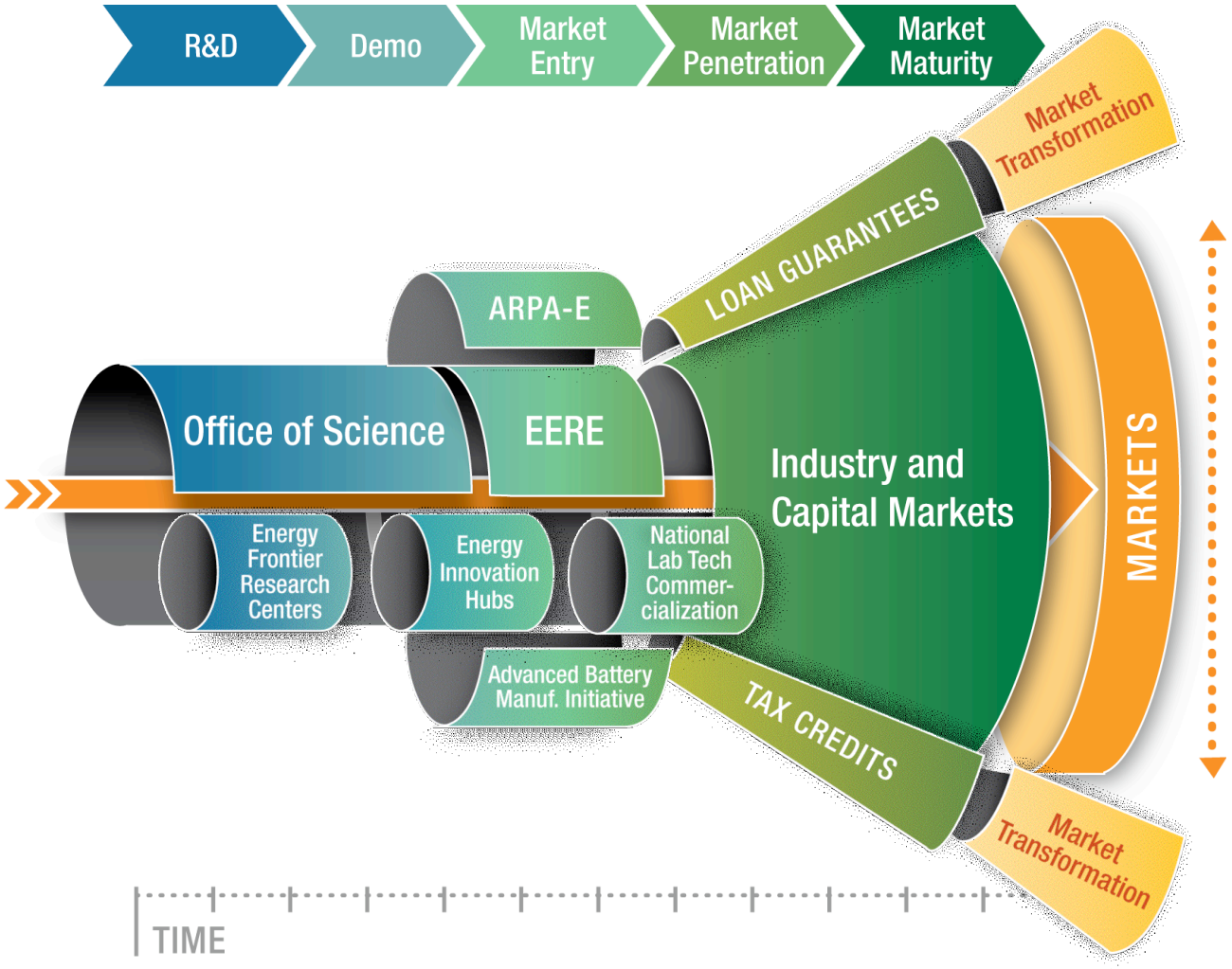
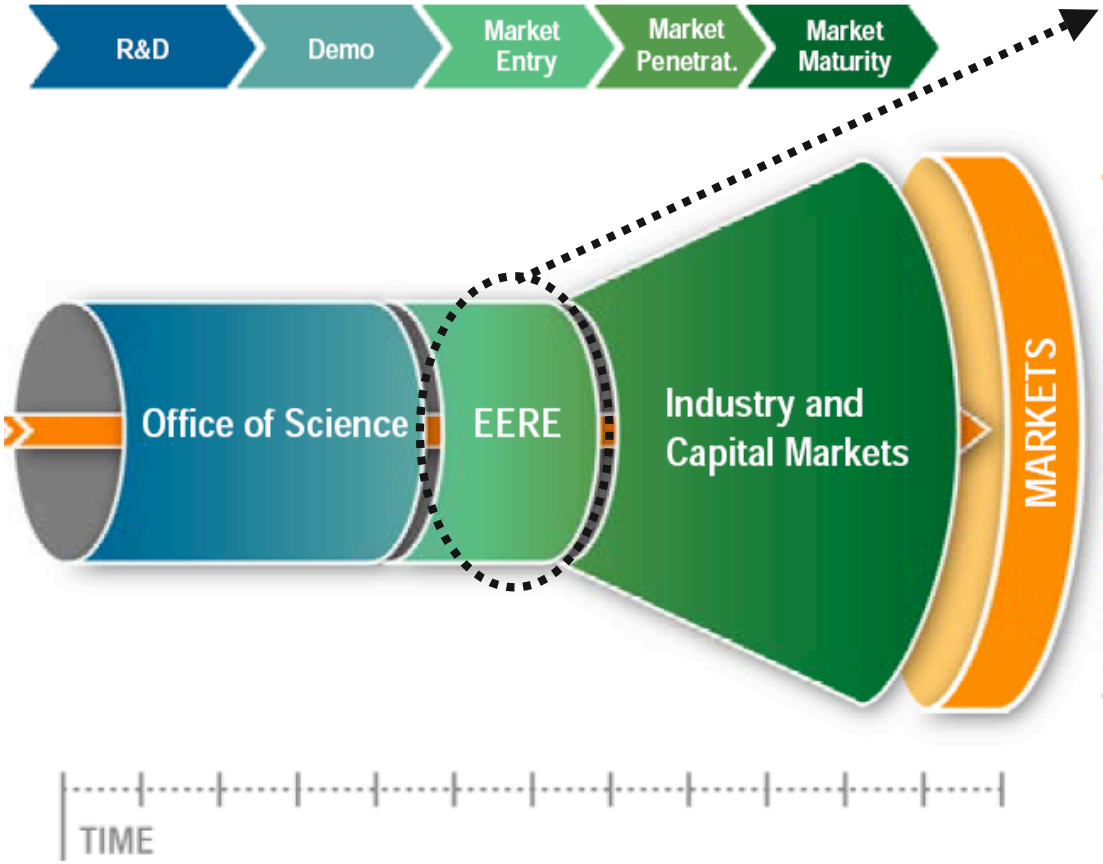


U.S. Department of Energy

Annual Budget: $27 Billion (FY09)



Office of Energy Efficiency and Renewable Energy (EERE)

Annual Budget: $1.9 Billion (FY09)

10 Programs

Energy Efficiency

- Building Technologies
- Weatherization & Intergovernmental
- Industrial Technologies
- Federal Energy Management
- Vehicles

Renewable Energy

- Wind & Hydropower
- Biomass
- Geothermal
- Hydrogen, Fuel Cells & Infrastructure
- and ….

Solar Energy Technologies Program (SETP)

Annual Budget: $175 Million (FY09)

~20 Staff (incl. contractors)

Annual funding continues to increase

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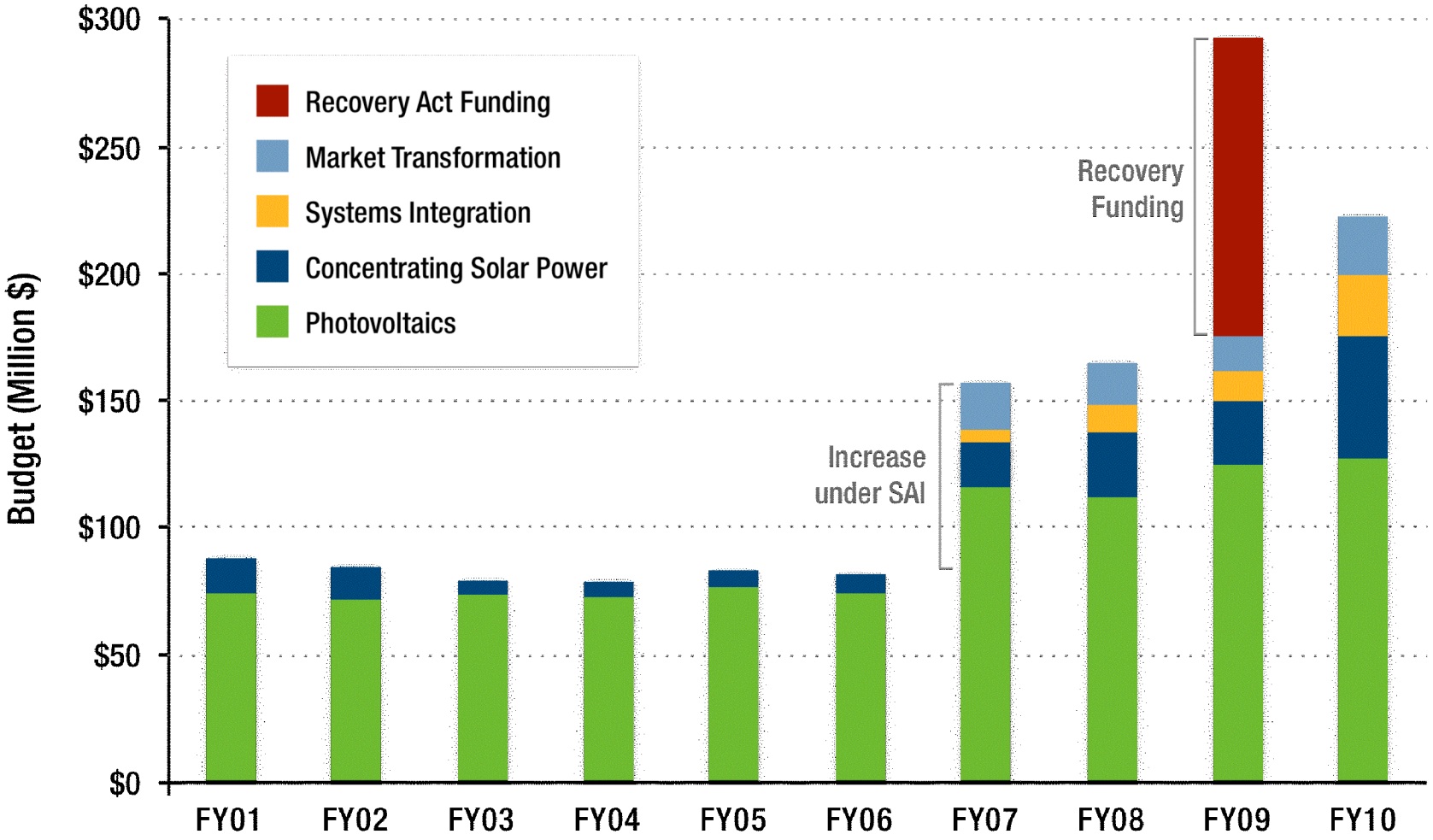

Our mission is to accelerate the wide-spread adoption of solar electric technologies across the United States

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Photovoltaics (PV)

Distributed Generation
- on-site or near point of use -

DOE SETP

Market Transformation
Grid Integration

Concentrating Solar Power (CSP)

Centralized Generation
- large users or utilities -

The SETP is focused on enabling high penetration of solar energy technologies and achieving grid parity by 2015 cost reduction goals

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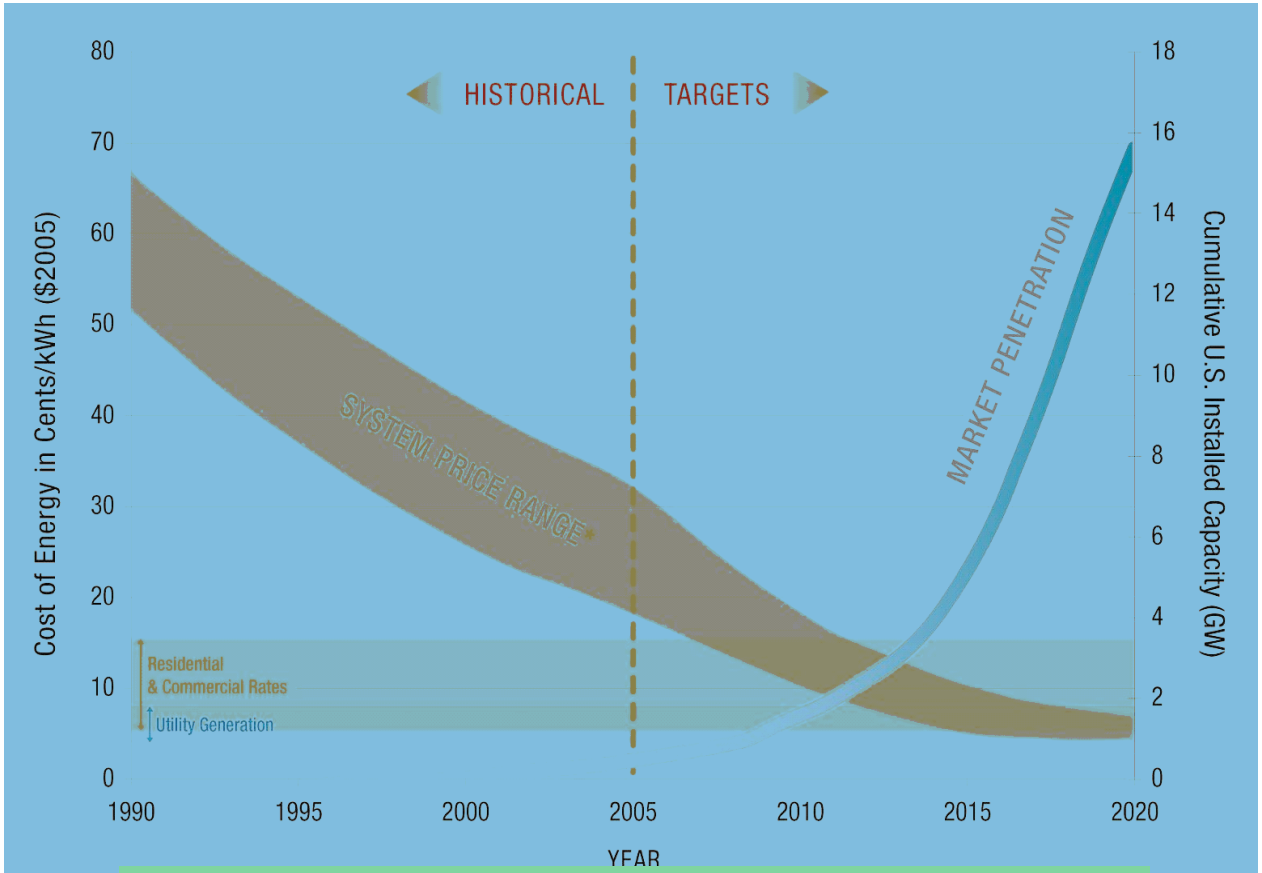

Market Sector	Current U.S. Market Price Range (¢/kWh)	Cost (¢/kWh) Benchmark 2005	Cost (¢/kWh) Target 2010	Cost (¢/kWh) Target 2015
Residential	5.8-16.7	23-32	13-18	8-10
Commercial	5.4-15.0	16-22	9-12	6-8
Utility	4.0-7.6	13-22	10-15	5-7

LCOE varies strongly with insolation, market, and financing

Almost 2x difference between Phoenix mortgage and Kansas HELOC (15 vrs 26¢/kWh)

Fortunately there exists strong product differentiation

DOE sees multiple technology pathways to meet grid parity by 2015

Aim is to allocate funds to maximize and accelerate penetration in a dynamic and differentiated market

The Solar Program's pipeline approach aims to balance near and long term research

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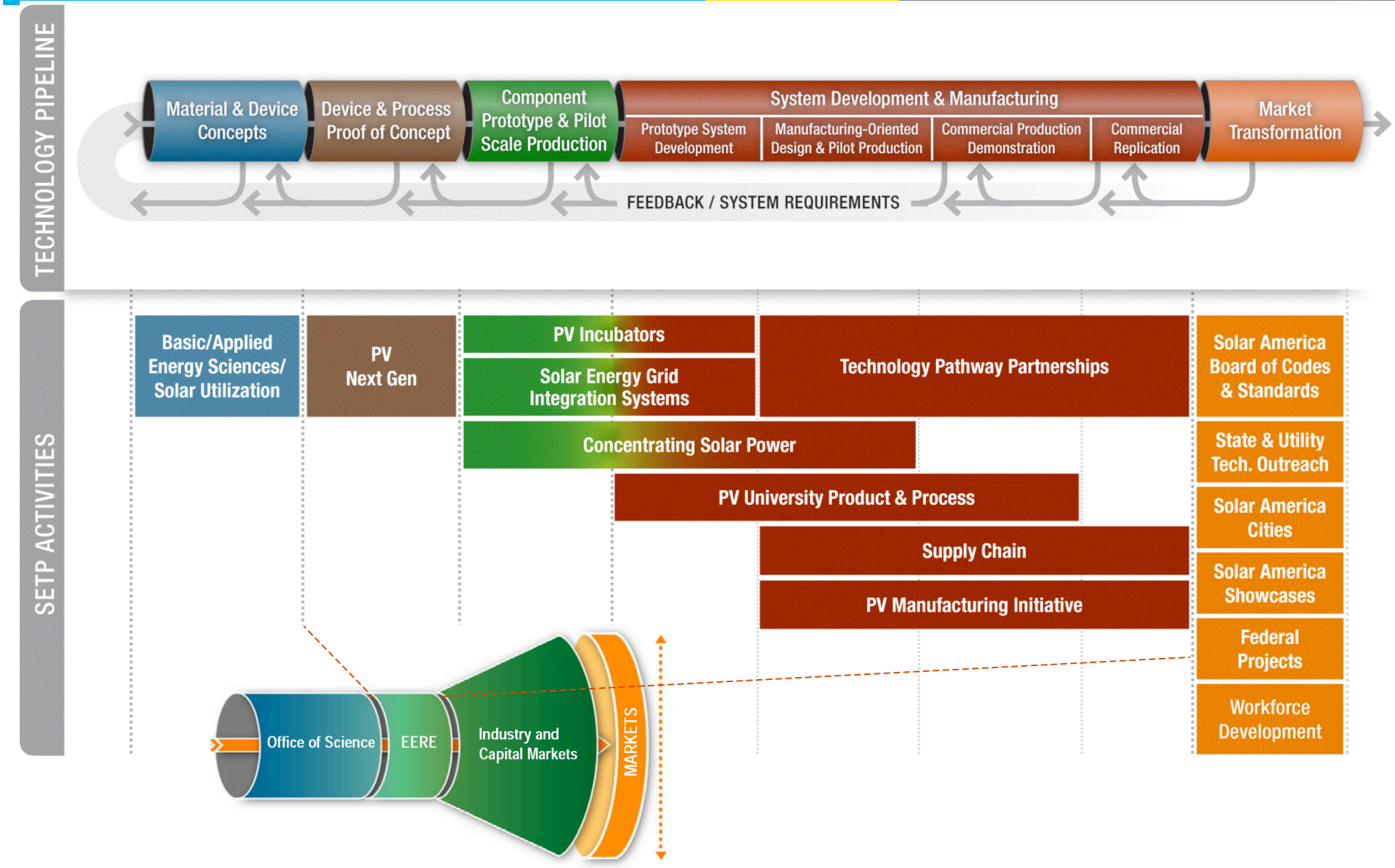
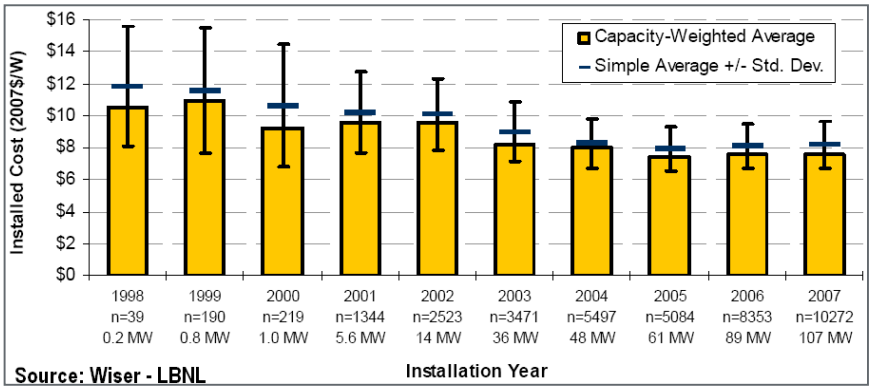
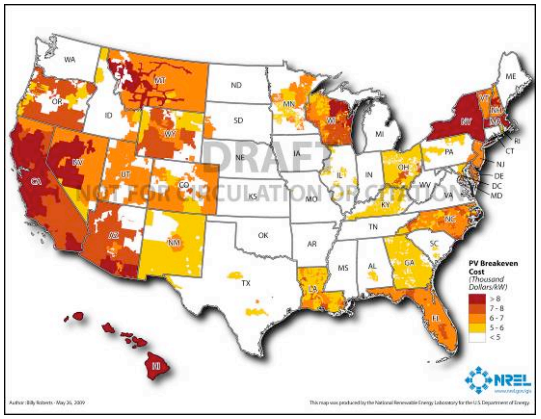


Analysis efforts are monitoring progress, projecting growth, and exploring potential.

Open PV Mapping Project: Compellation of over 50,000 PV systems (and counting) to inform analysts, installers, policy, and customers.



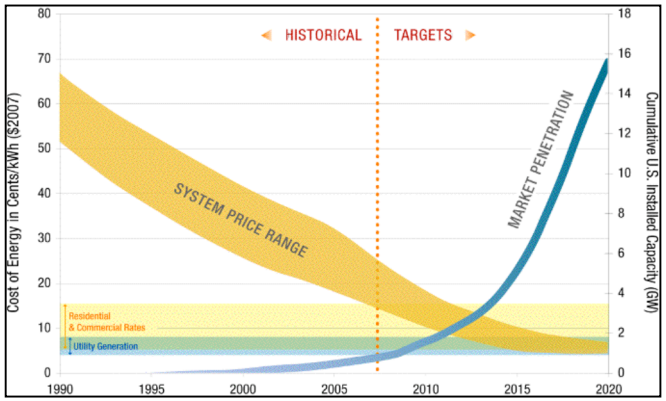


Regional Levelized Cost Analysis. Merging installed price, solar resource, localized subsidies, and retail rates/structures to assess the geographic parity potential.

Publication on methodology and current parity assessment – Dec. 2009

PV Vision Report: Over 100 leading solar experts are exploring the 2030 potential of solar energy in the U.S. Preliminary analysis suggests a possibility of up to 20% of electricity generation from solar technologies..

Publication – 1H 2010



Renewable Portfolio Standards (RPS)

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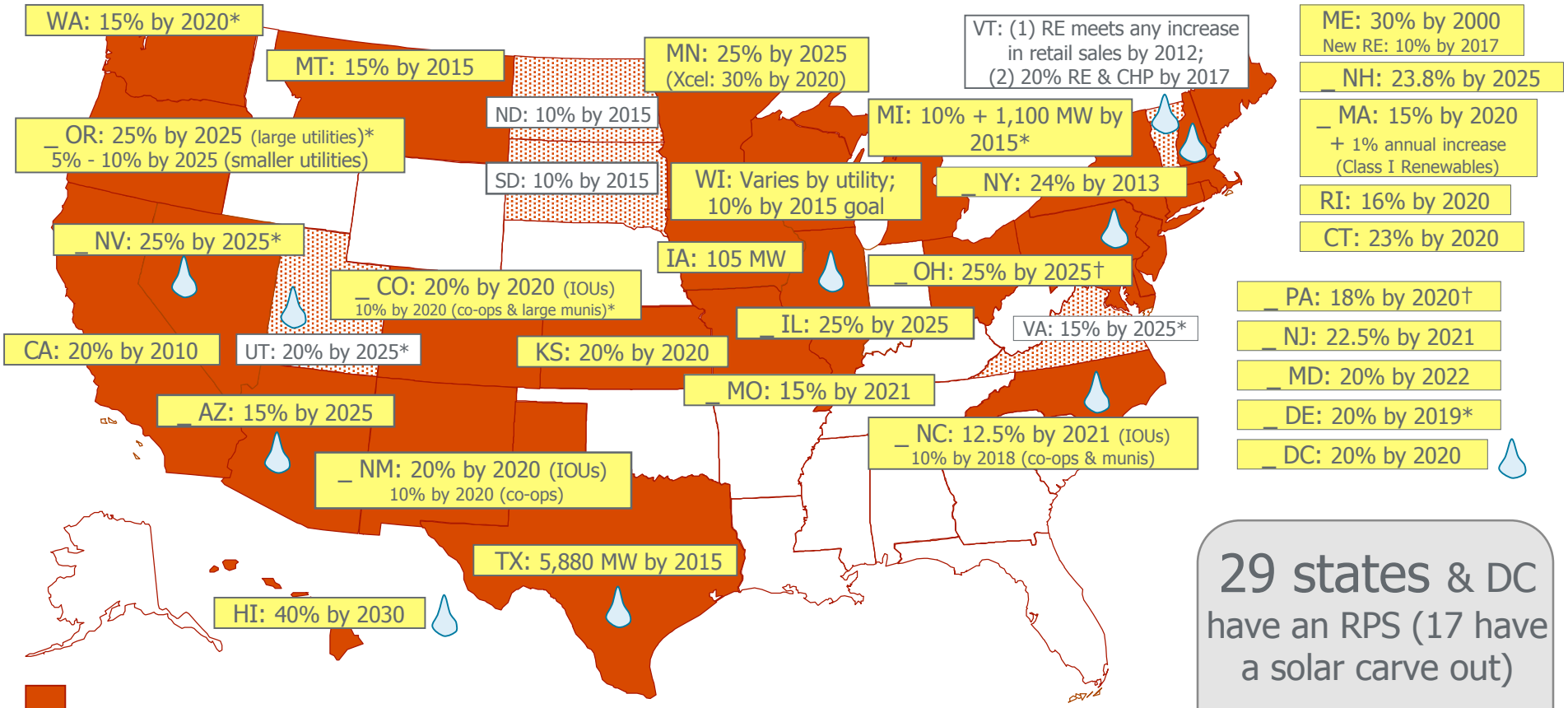
www.dsireusa.org / September 2009



29 states & DC have an RPS (17 have a solar carve out)

5 states have goals

State renewable portfolio standard

State renewable portfolio goal

Solar water heating eligible

Minimum solar or customer-sited requirement

* Extra credit for solar or customer-sited renewables

† Includes separate tier of non-renewable alternative resources

State policies such as Renewable Portfolio Standards (RPS) may become a significant driver of PV adoption

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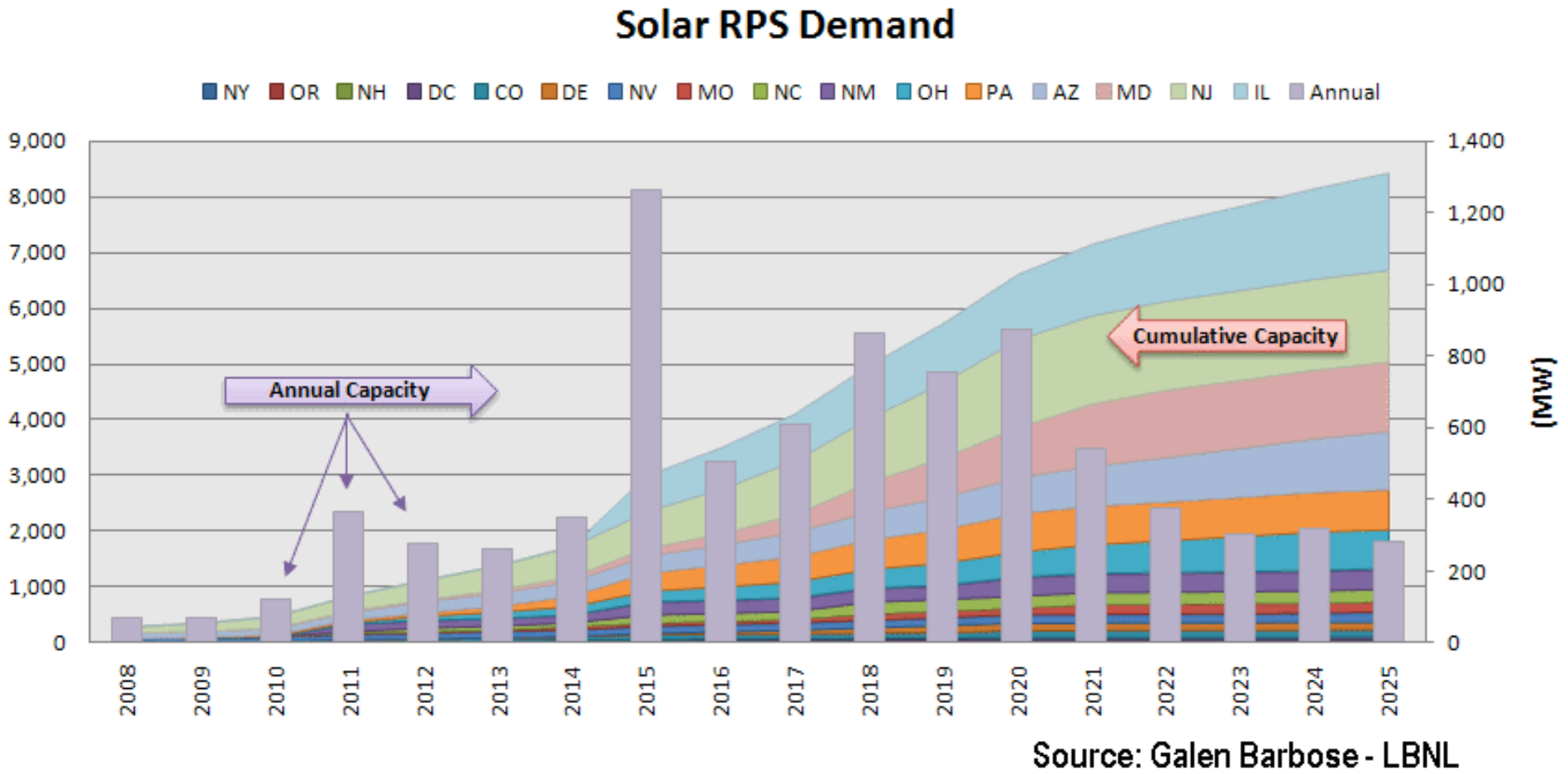

- Likelihood of a national RPS, FIT, carbon policy, etc. remain uncertain.

- High retail electric rates combined with state $/W rebate programs remain the biggest driver of PV adoption (e.g. California and New Jersey).

Solar in the US has tremendous promise

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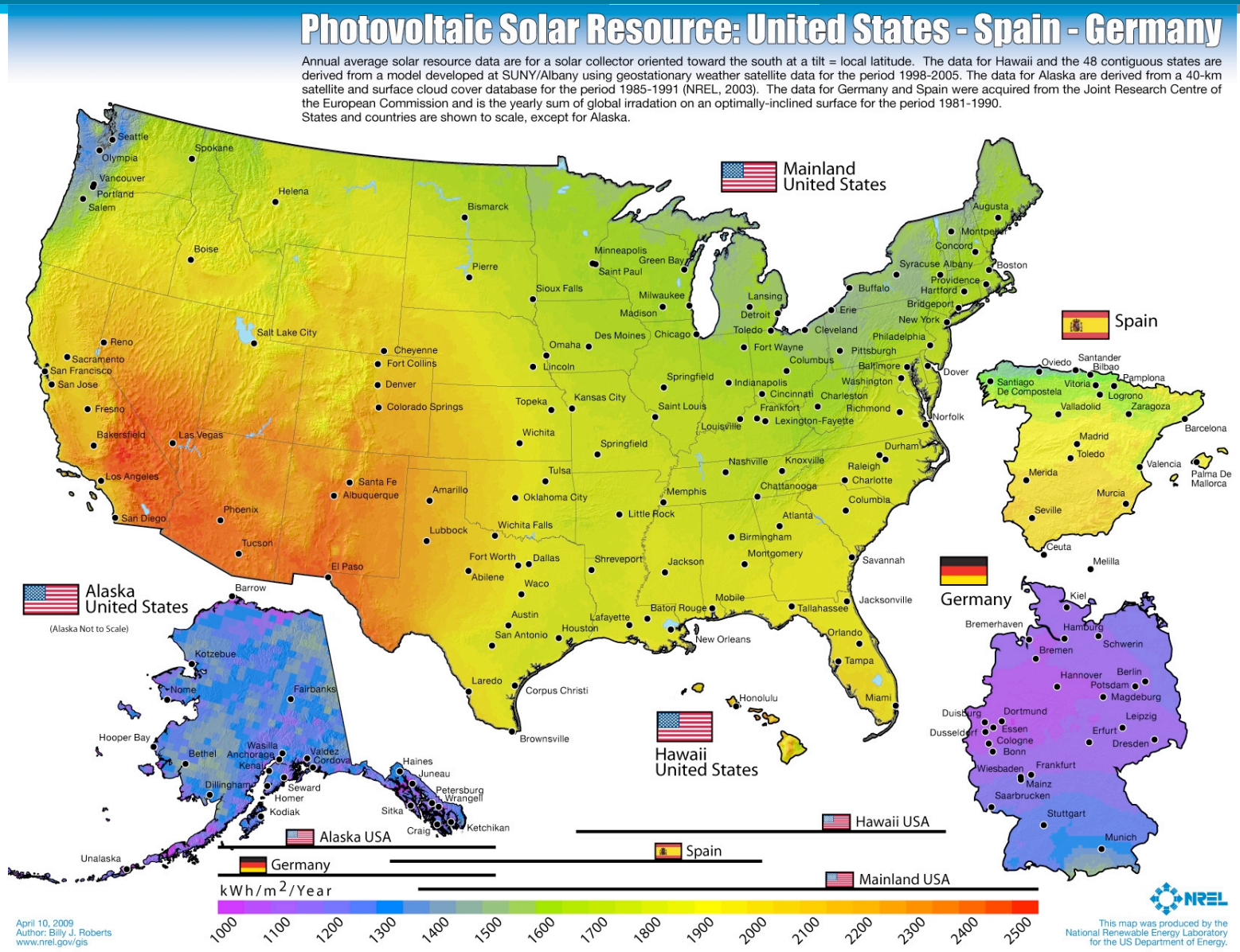

Thank You

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