

More Solar, More Opportunity

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Principal, Clean Energy Works**

**Solar Powering Iowa 2016
Hosted by MREA & Grow Solar Partnership
March 24, 2016**

Headlines in Iowa

Developers plan 100MW solar energy project northeast of Fort Dodge, Iowa

Incentives spur solar energy growth in Iowa

Alliant Energy Seeks Proposals for Solar Assets in Iowa

Money-saving, solar-covered roof pops up in N. Liberty

More Iowa farmers turning to solar for energy needs

More Solar, More Opportunity

- Energy Revolution is Well Underway
- Leveraging Support to Accelerate Investment
- Hallmarks of Success on the Road Ahead

Revolution...Now

The Future Arrives for Five Clean Energy
Technologies – 2015 Update

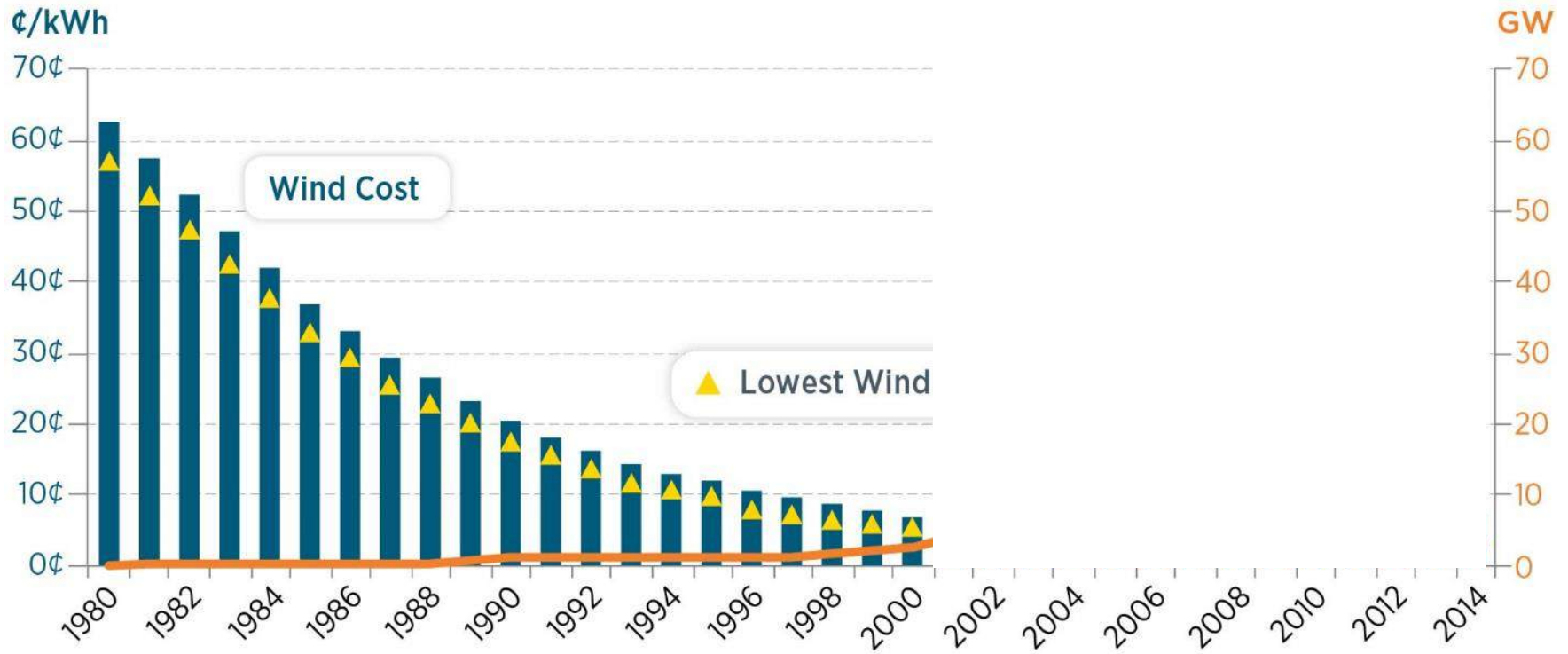
November 2015



U.S. DEPARTMENT OF
ENERGY

Innovation => Cost => Investment

Innovation => Cost => Investment



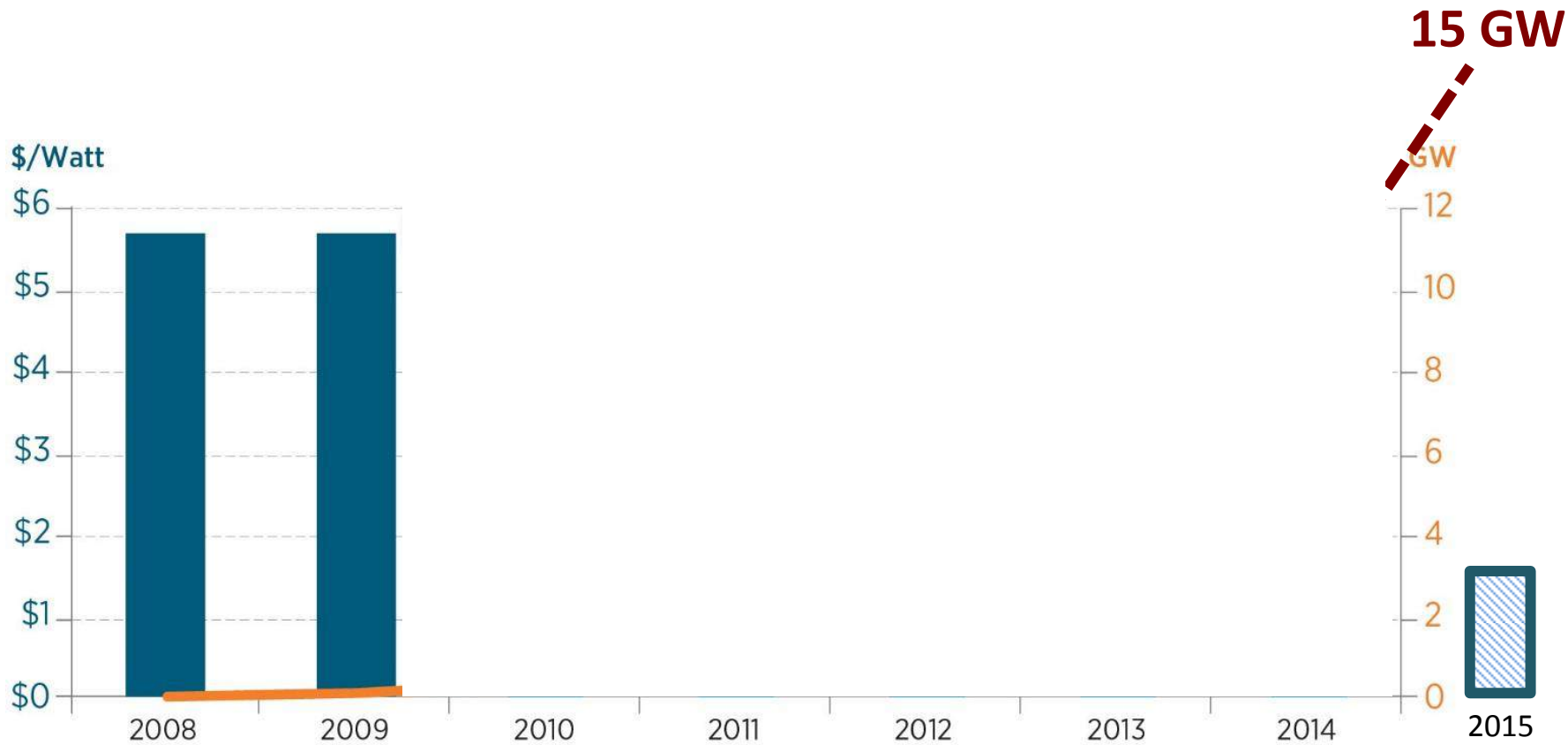
Innovation => Cost => Investment

From 2GW to 15GW:
7 years



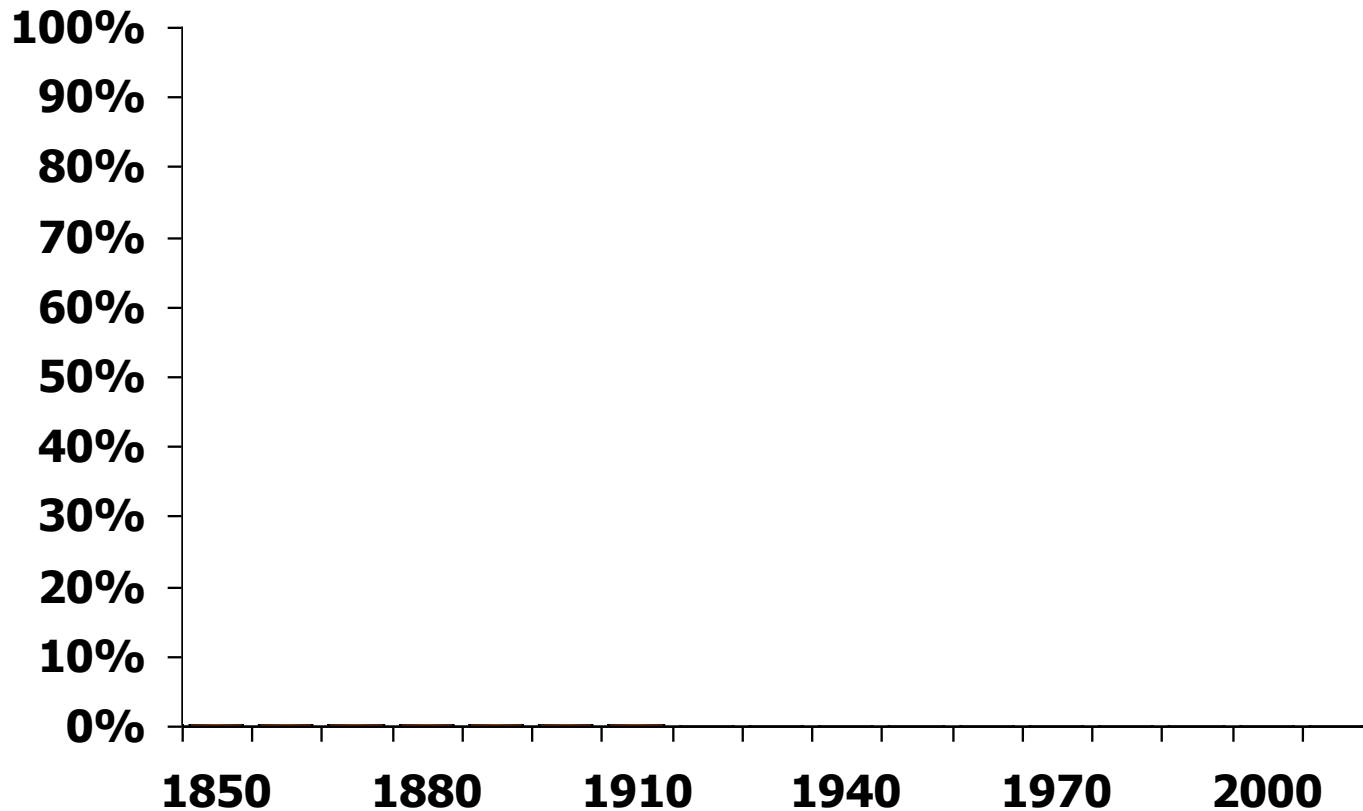
Innovation => Cost => Investment

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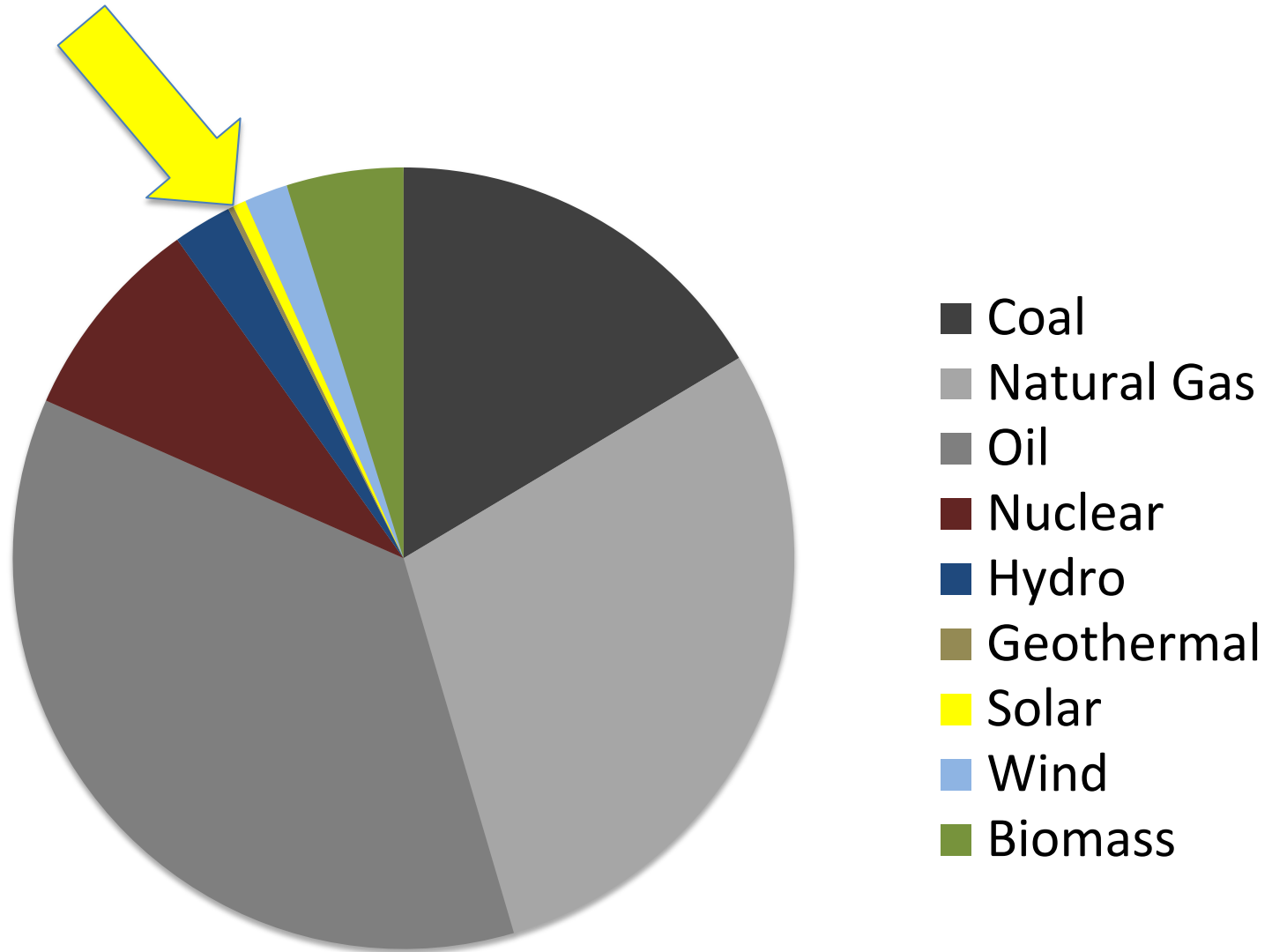


Energy supply changes on a decadal scale

US energy supply since 1850

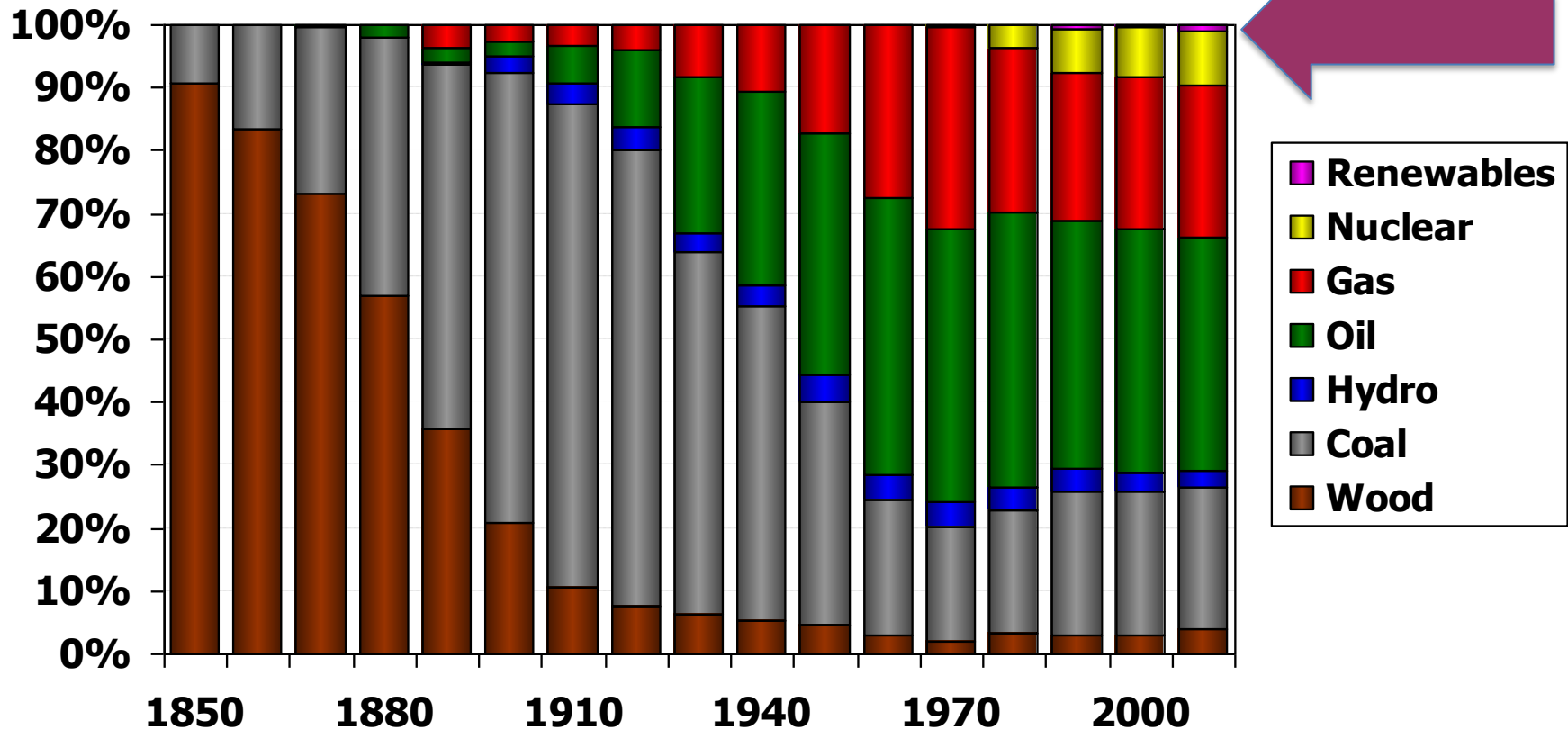


U.S. Energy Resource Portfolio in 2015

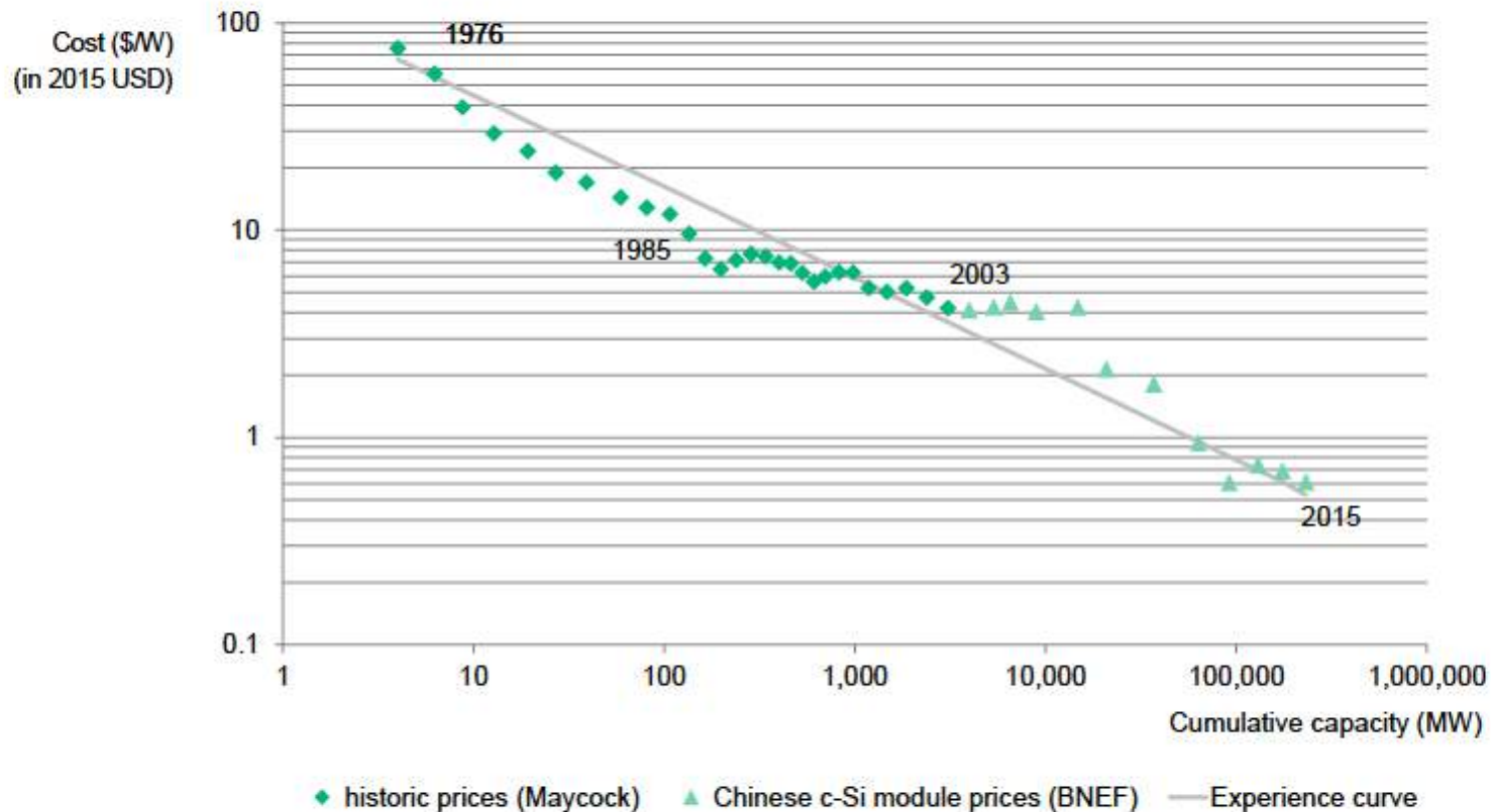


Growth Opportunity for a Generation

US energy supply since 1850



Economics: Price of solar modules and experience curve (\$/W as function of global cumulative capacity)



- For the past few decades, module pricing has generally followed the experience curve for costs.
- Prices tumbled in 2012 due to a buildup of manufacturing overcapacity, before ticking back up in 2013 as oversupply eased.
- In 2015, prices continued to slide, hitting their lowest level yet.

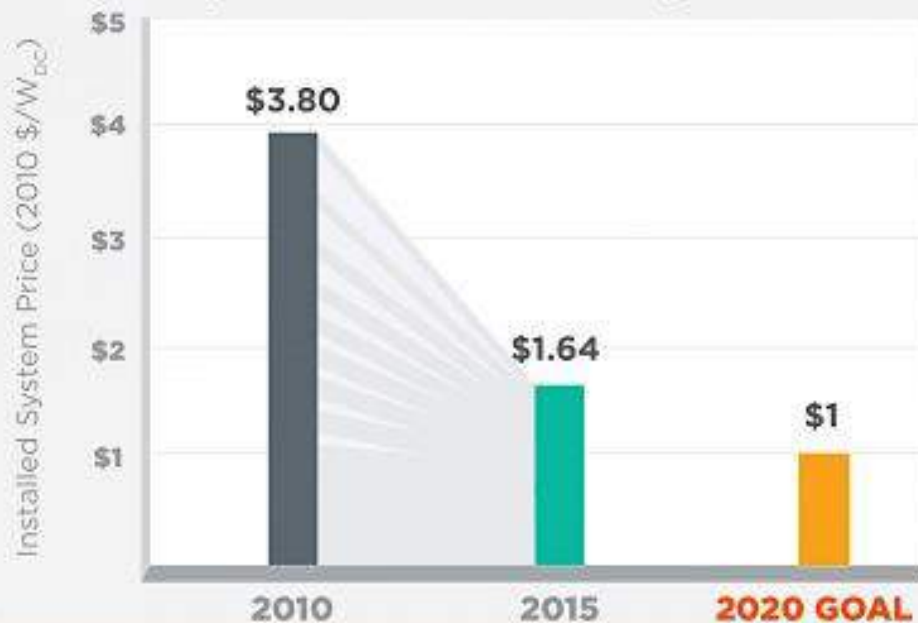
Source: Bloomberg New Energy Finance, Paul Maycock

Notes: Prices in 2015 USD.



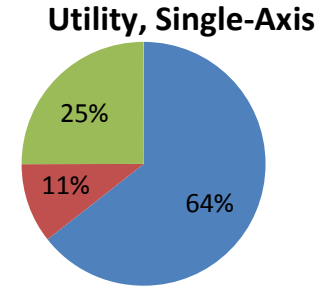
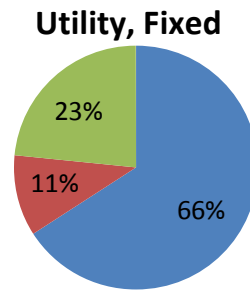
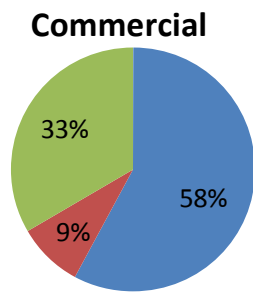
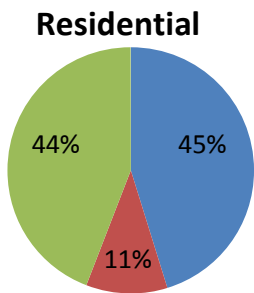
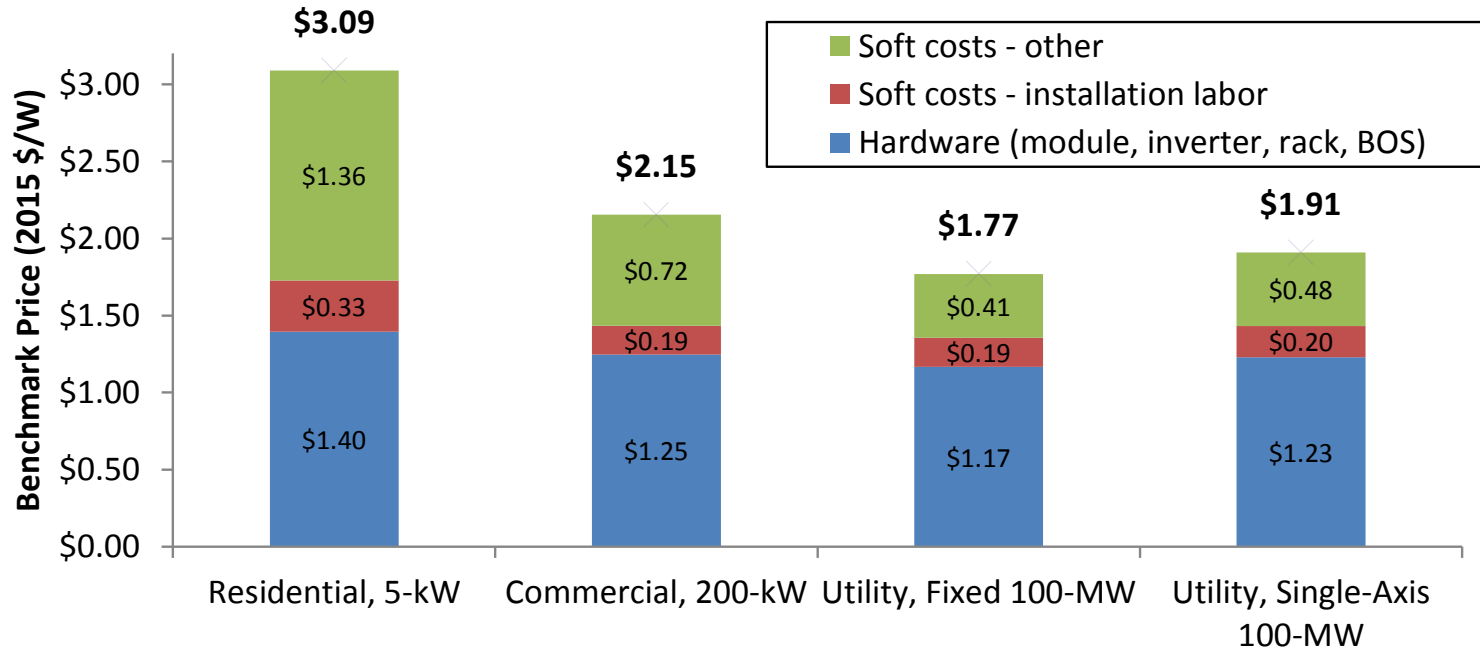
Solar Costs Fall towards the SunShot Initiative Goal

Utility-Scale Solar PV Pathway to SunShot



Soft Costs Can Yield Market Advantage

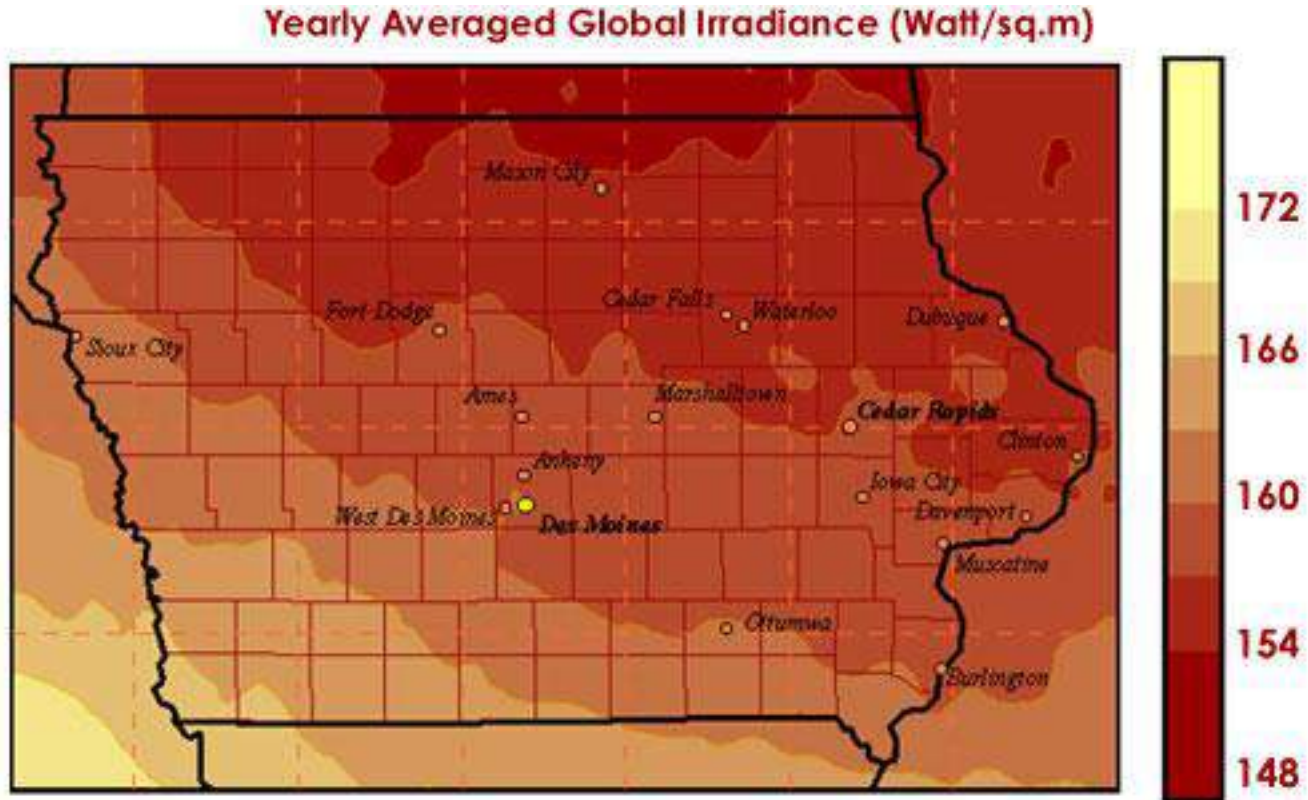
Benchmarked Prices and Price Breakdowns



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- Hallmarks of Success on the Road Ahead

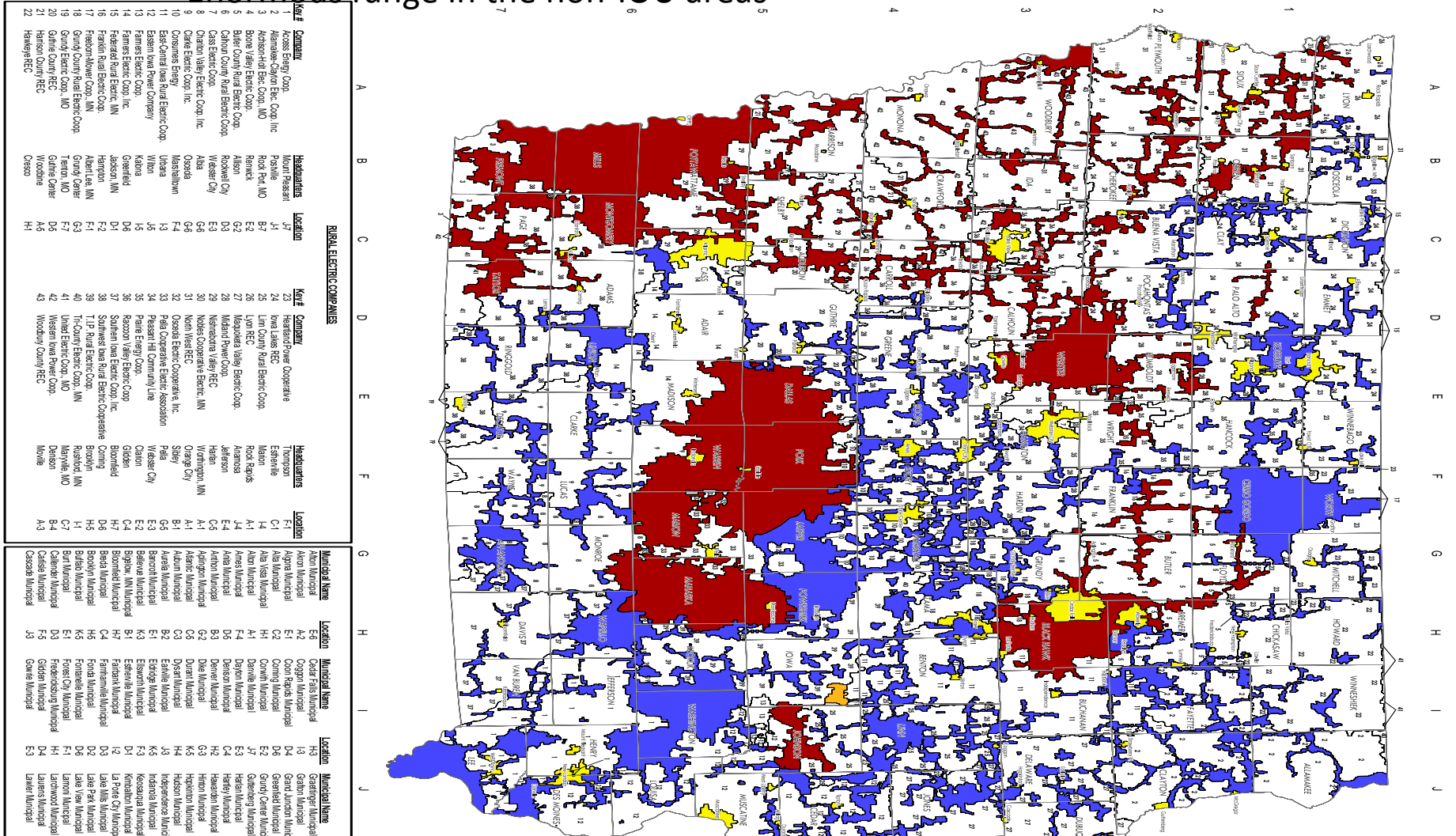
Iowa has a good resource base statewide....



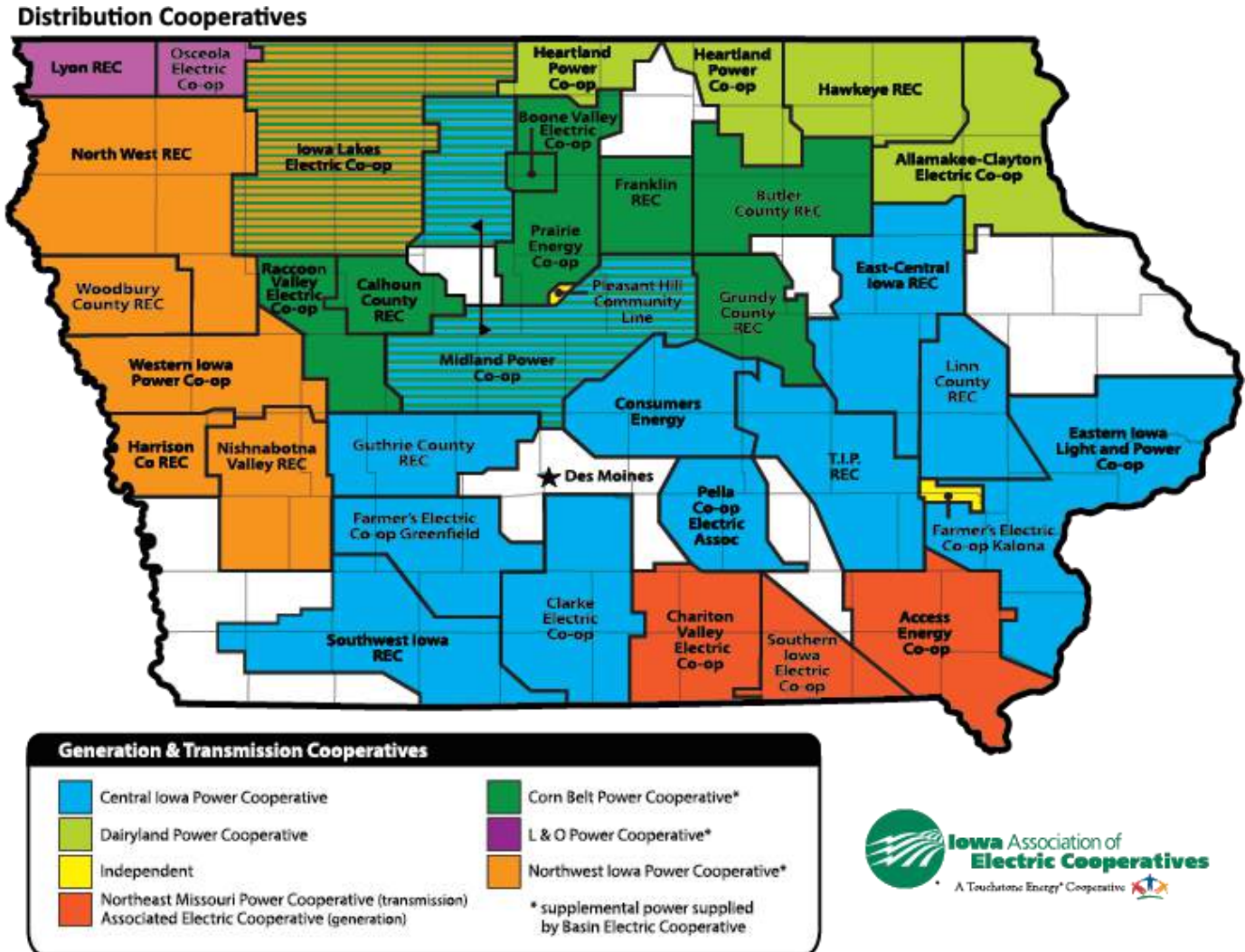
... so market conditions shape landscape of investment

Regulations shape conditions in IOU areas

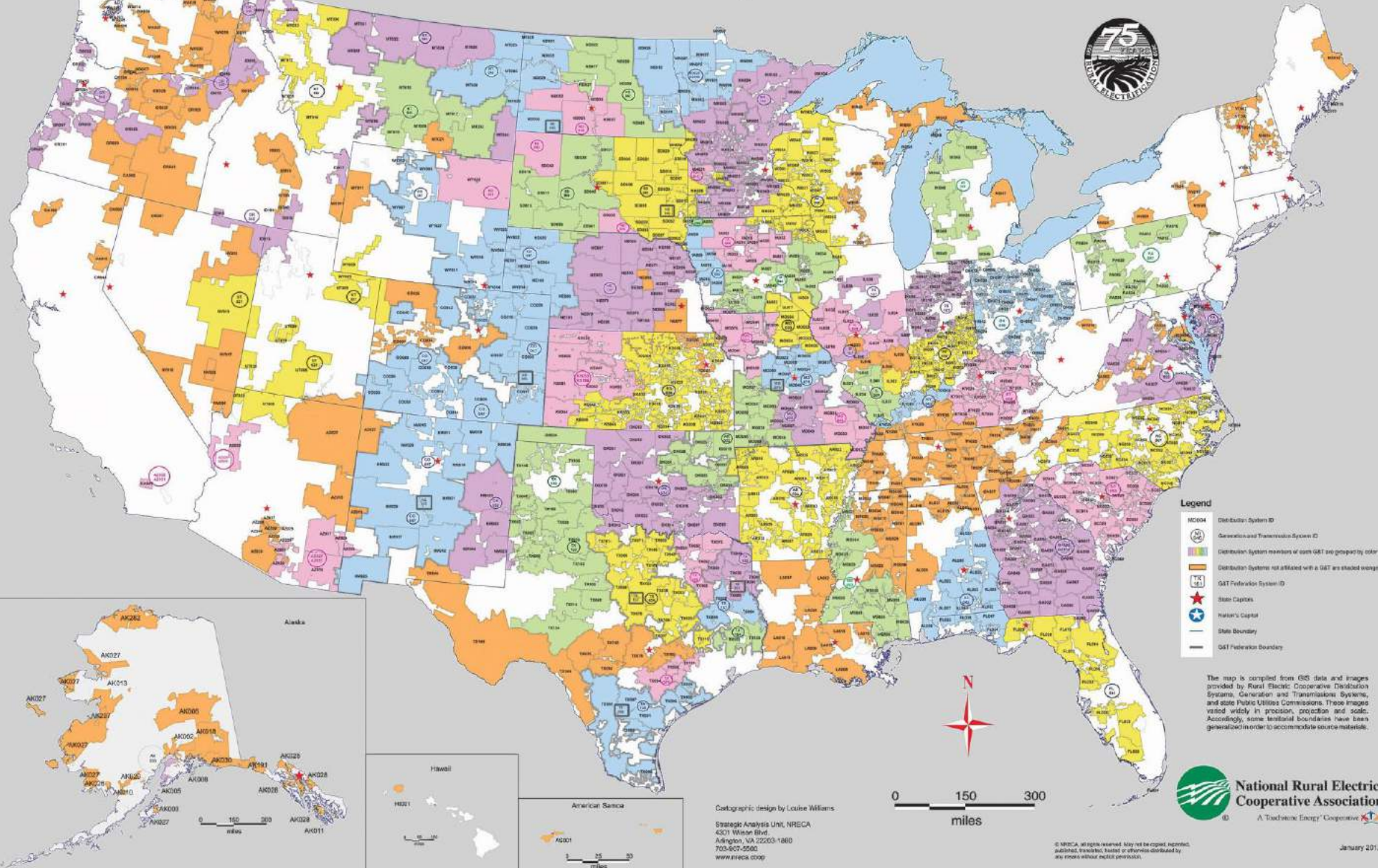
Enormous range in the non-IOU areas



Iowa Electric Cooperatives have extensive coverage



America's Electric Cooperative Network



- Legend**
- Distribution System ID
 - Generation and Transmission System ID
 - Distribution System members of each G&T are grouped by color
 - Distribution Systems not affiliated with a G&T are shaded orange
 - G&T Federation System ID
 - State Capitals
 - Nation's Capital
 - State Boundary
 - G&T Federation boundary

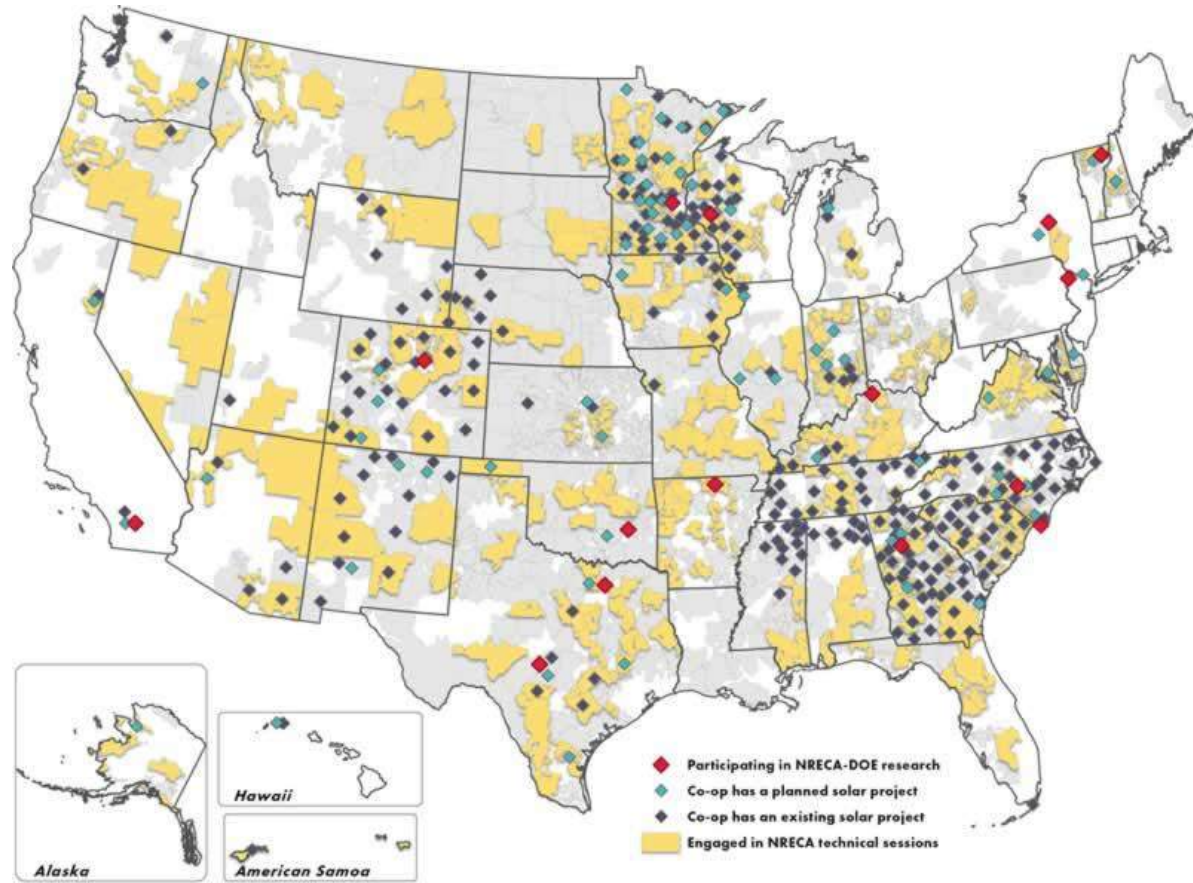
The map is compiled from GIS data and images provided by Rural Electric Cooperative Distribution Systems, Generation and Transmission Systems, and state Public Utilities Commissions. These images varied widely in precision, projection and scale. Accordingly, some territorial boundaries have been generalized in order to accommodate source materials.



Cartographic design by Louise Williams
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SUNDA initiative designed by & for co-ops



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NRECA Business and Technology Strategies



SUNDA Tools and Resources



Evaluation and Decision-Making



Project Management and Engineering



Business and Financial Models



Solar Communications Toolkit



Discounts Program



Participants and Deployments



Contacts



Cooperative Utility PV Manual

Supplement:
Project Manager's PV Quick Start Guide

February 2016



Solar Powering Conferences

- Solar Powering Iowa 2016
 - Pre-Conference Webinar
 - Pre-Conference Training Opportunities
 - Agenda & Presentations
 - Registration
 - Sponsors
- Solar Powering Michigan 2014
 - Agenda & Presentations
 - Sponsors
- Solar Powering Illinois 2014
 - Agenda & Presentations
 - Sponsors
- Solar Powering Minnesota 2014
 - Agenda & Presentations

- [Request Solar Assistance](#)
- [Interconnection Processes](#)
- [Interconnection and Net Metering Standards](#)
- [Value of Solar Methodology](#)
- [Permitting, Planning & Zoning](#)
- [Solar Project Finance](#)



Grow Solar provides training resources and educational opportunities on ways to reduce the costs

SPARC

SOLAR POWERING AMERICA BY RECOGNIZING COMMUNITIES

SPARC provides customized technical assistance designed to:

- Evaluate existing local policies and processes to identify soft cost barriers, such as, planning/zoning, permitting/inspections, and financing;
- Develop implementation plans based on leading national best practices;
- Understand and replicate models for successful local solar programs;
- Attract solar businesses and jobs to your community;
- Make it easier and more affordable for consumers to choose solar;
- Qualify communities for the new SPARC recognition from Dept of Energy

More Solar, More Opportunity

- Energy Revolution is Well Underway
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- Hallmarks of Success on the Road Ahead

Hallmarks of Success on the Road Ahead

- Encourage multiple solution sets

Encourage multiple solution sets

Scale:

- Utility-scale solar
- Community solar
- On-site solar
 - Commercial
 - Residential

Business models and financing:

- Third party leasing
- Community aggregation
- Energy districts
- Loans
- Liens
- Tariff

Hallmarks of Success on the Road Ahead

- Encourage multiple solution sets
- Invest in flexibility from the start

Start now to integrate more system flexibility

This “duck” shape only develops in system that lacks flexibility...

Figure 1

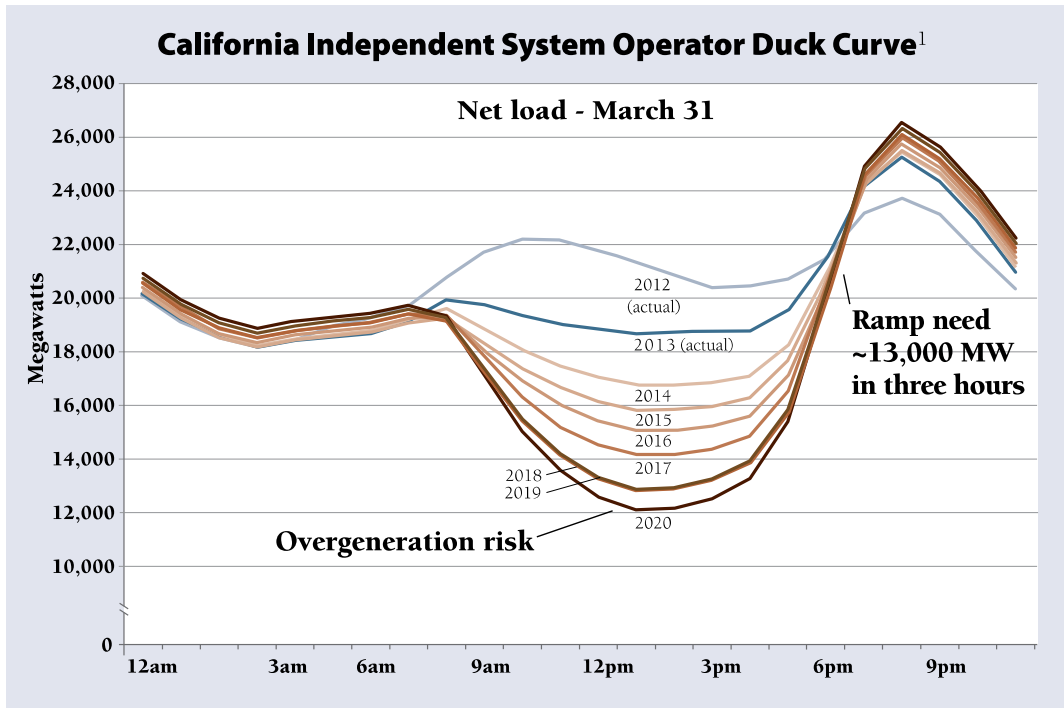
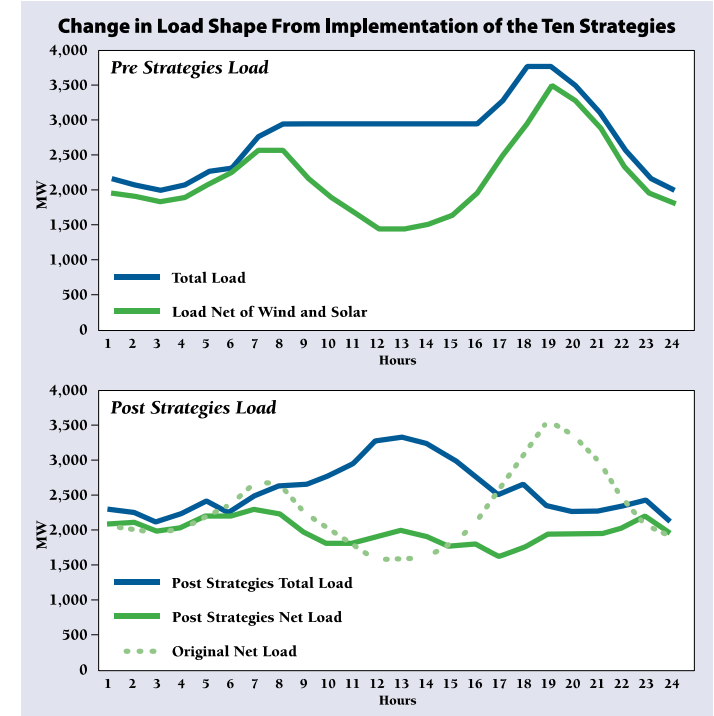


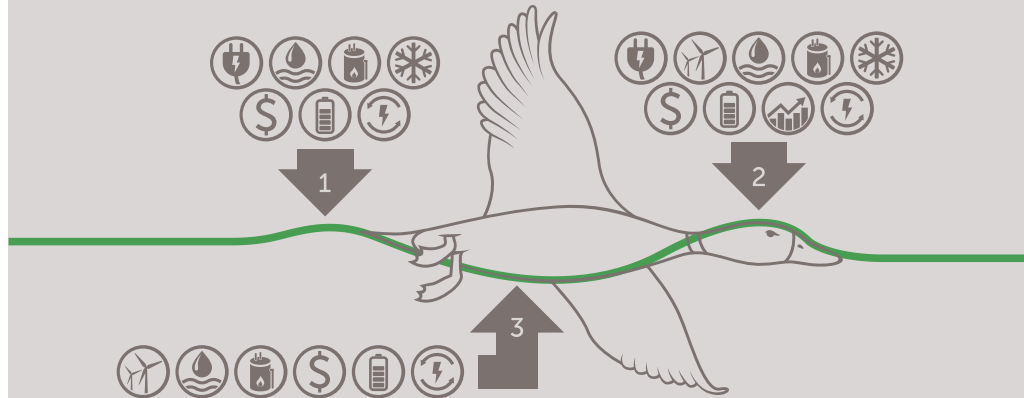
Figure 5



... and strategies for gaining flexibility are available today.

Teaching the “Duck” to Fly:

10 strategies to control generation, manage demand, & flatten the Duck Curve



“No regrets” options that are cost effective today can be integrated relatively easily



Targeted Efficiency

Focus energy efficiency measures to provide savings in key hours of system stress. ↓↓



Peak-Oriented Renewables

Add renewables with favorable hourly production. Modify the dispatch protocol for existing hydro with multi-hour “pondage.” ↓↑



Manage Water Pumping

Run pumps during periods of low load or high solar output, curtailing during ramping hours. ↓↑



Control Electric Water Heaters

Increase usage during night & mid-day hours, & decrease during peak demand periods. ↓↑



Ice Storage for Commercial AC

Convert commercial AC to ice or chilled-water storage operated during non-ramping hours. ↓↑



Rate Design

Focus pricing on crucial hours. Replace flat rates & demand charge rate forms with time-of-use rates. Avoid high fixed charges. ↓↓



Targeted Electric Storage

Deploy storage to reduce need for transmission & distribution, & to enable intermittent renewables. ↓↑



Demand Response

Deploy demand response programs that shave load during critical hours on severe stress days. ↓



Inter-Regional Power Exchange

Import power from & export power to other regions with different peaking periods. ↓↑



Retire Inflexible Generating Plants

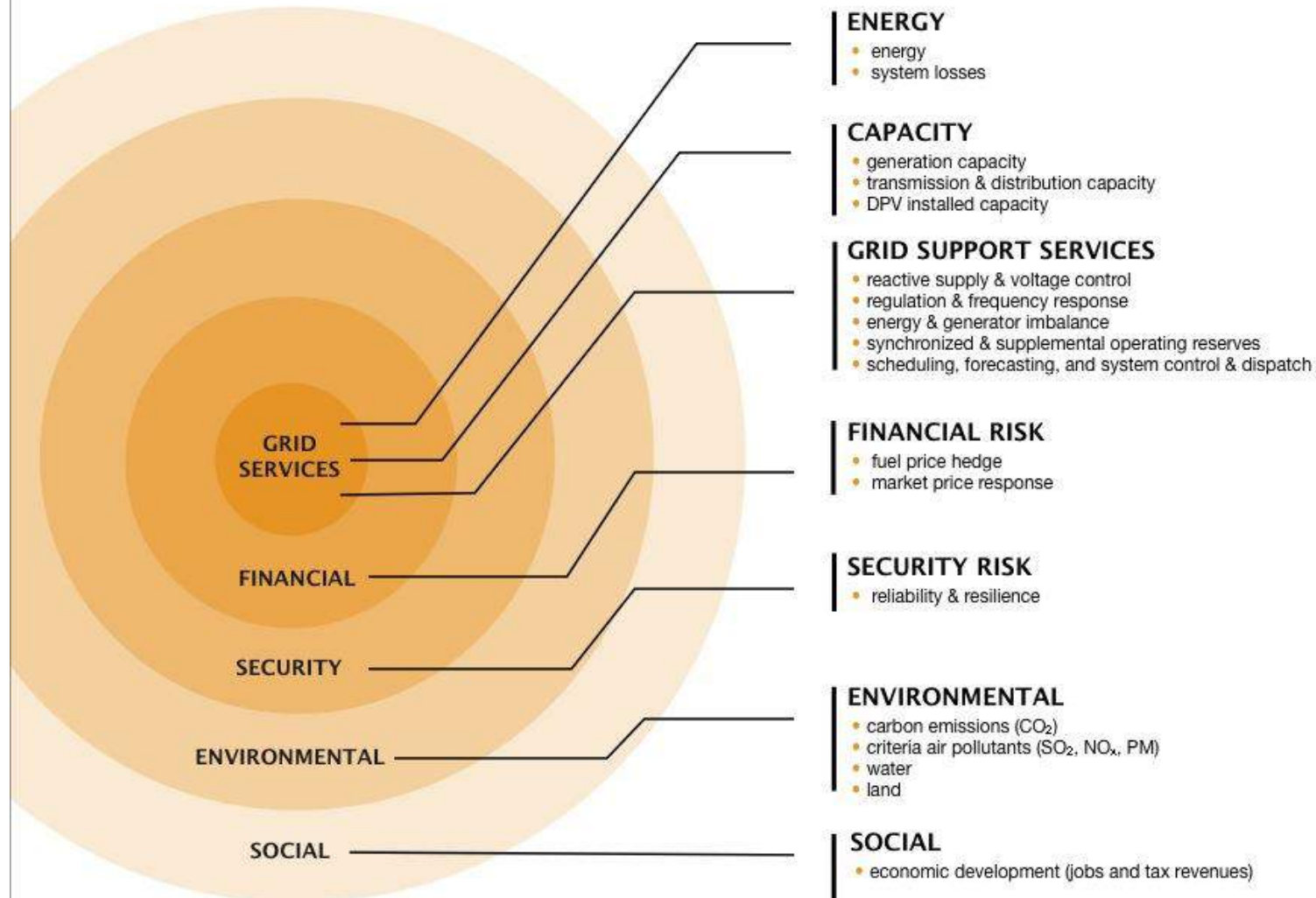
Replace older fossil & nuclear plants with a mix of renewables, flexible resources, & storage.

Hallmarks of Success on the Road Ahead

- Encourage multiple solution sets
- Invest in flexibility from the start
- Support fair valuation

BENEFIT & COST CATEGORIES

For the purposes of this report, **value is defined as net value, i.e. benefits minus costs**. Depending upon the size of the benefit and the size of the cost, value can be positive or negative. A variety of categories of benefits or costs of DPV have been considered or acknowledged in evaluating the value of DPV. Broadly, these categories are:



Hallmarks of Success on the Road Ahead

- Encourage multiple solution sets
- Invest in flexibility from the start
- Support fair valuation
- **Prioritize inclusion**



Shared Renewable Energy for Low- to Moderate-Income Consumers: POLICY GUIDELINES AND MODEL PROVISIONS



Shaping our future with clean energy

Online resource center for opening opportunity

LOW-INCOME SOLAR POLICY GUIDE

- ABOUT
- GUIDING PRINCIPLES
- POLICY TOOLS**
- SUCCESSFUL MODELS

Compensation Mechanisms

- Net Metering/Virtual Net Metering
- Community Shared Solar

Direct Incentives

- Federal and State Tax Credits
- Rebates
- Solar/Renewable Energy Credits

Financing

- On-Bill Recovery
- Property Assessed Clean Energy
- Community Purchase Programs
- Community Development Institutions
- Green Banks
- Grants and Technical Assistance
- Place-Based Investments


Other

- Federal Partnerships/Best Practices Sharing
- Consumer Protection

There are many different ways to structure solar adoption programs, and the foundation of effective low-income solar programs, as well as tools specific to each income sector. These tools can be combined in multiple ways to create effective programs that address the unique access issues and policy environments of different states and communities. The models described in the Successful Models section.


IMPACT HIGHLIGHTS

Desert Sunshine




"My gosh, it's like having my own ATM machine," said Pearl Verre as she looked at the solar panels.

Solar Empowerment



In the town of Gardner, Massachusetts, a community solar array on the site of a long-abandoned movie theater is providing clean energy to the community.

Community Powered Solar



In the heart of a largely African American community in North Minneapolis, Shiloh Community Solar is providing clean energy to the community.

National resource center for community solar

NATIONAL COMMUNITY SOLAR PARTNERSHIP



Hallmarks of Success on the Road Ahead

- Encourage multiple solution sets
- Invest in flexibility from the start
- Support fair valuation
- Prioritize inclusion
- Count the jobs: Good for a generation!

IOWA

Total Solar Jobs, 2015

349

Cumulative Installed
Capacity thru Q3 2015 (MW)

25.0

IOWA

Sector	IA Solar Jobs	% IA Solar Jobs	% U.S. Solar Jobs
Installation	147	42.0%	57.4%
Manufacturing	75	21.6%	14.5%
Sales & Distribution	48	13.8%	11.7%
Project Development	44	12.6%	10.8%
Other	35	10.0%	5.7%

Solar Jobs Census 2015

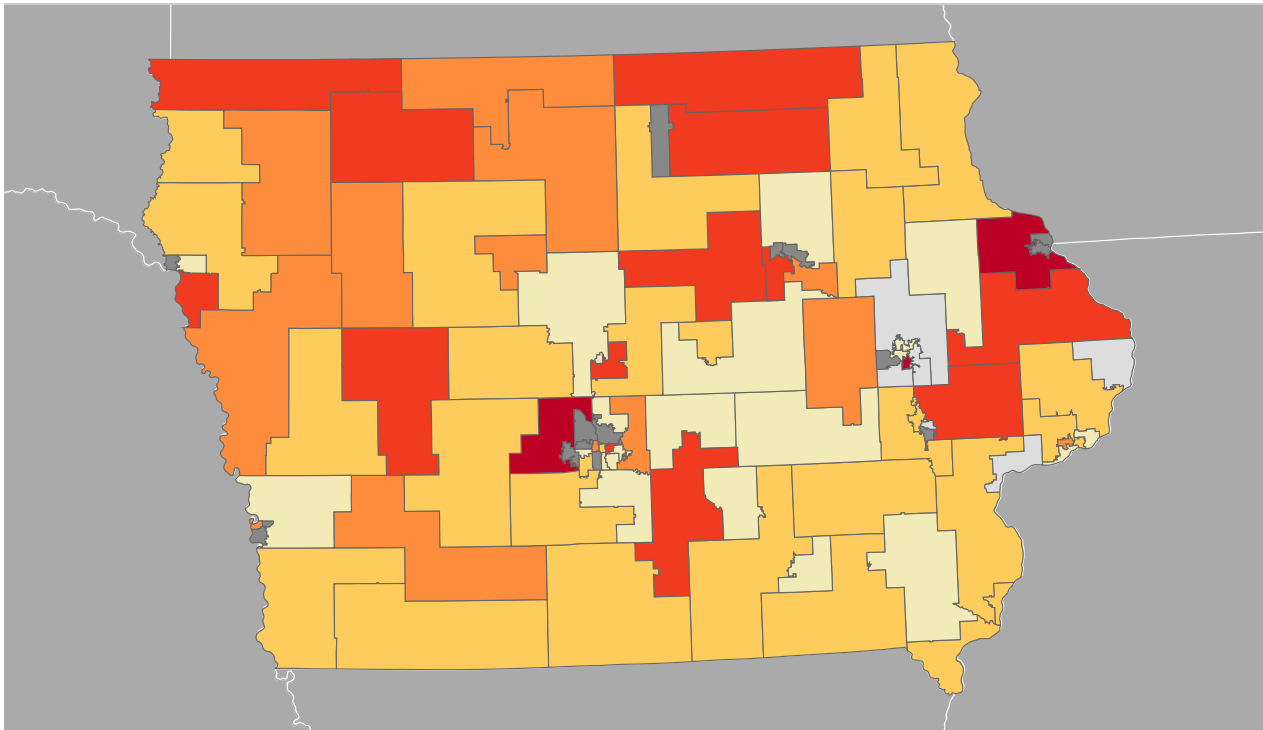
[National Map](#) > [West North Central](#) > Iowa

COUNTIES

U.S. CONGRESSIONAL DISTRICTS

STATE HOUSE DISTRICTS DISTRICTS

STATE SENATE DISTRICTS



Solar Jobs

0



15

N/A



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