



RAP

Energy solutions
for a changing world

Electric Utility Business Models

Roadmap to Implementing Michigan's New Energy Policy
Stakeholder Group Meeting
Lansing, Michigan

Presented by John Shenot

August 3, 2015

The Regulatory Assistance Project

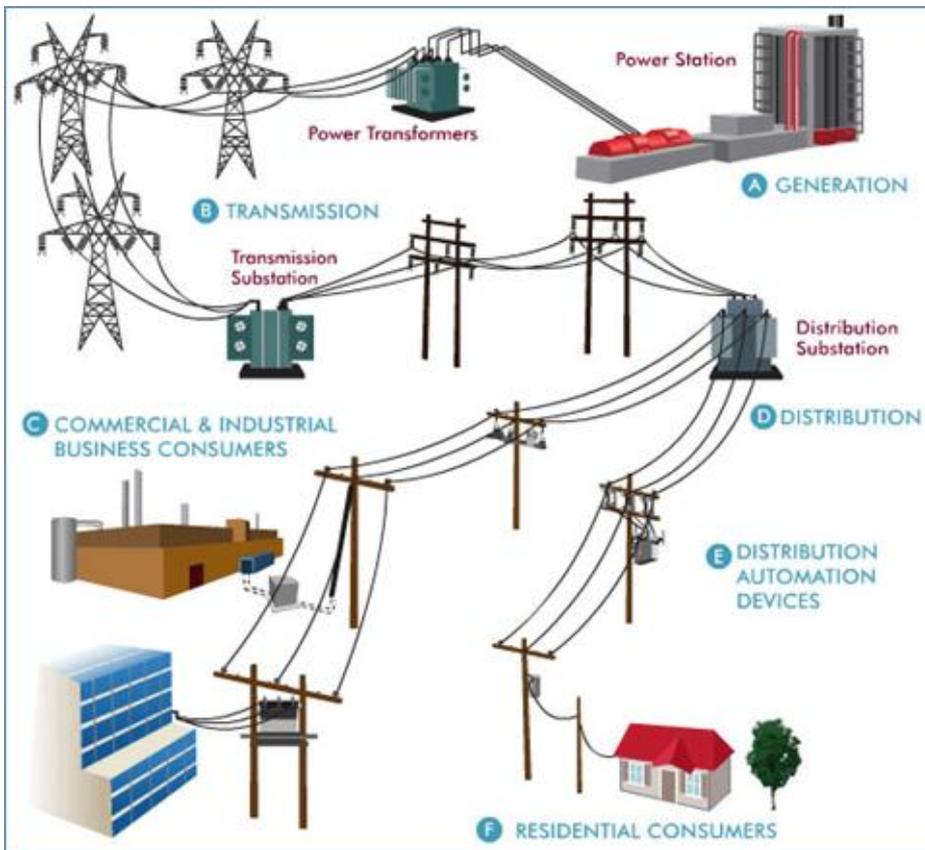
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Outline

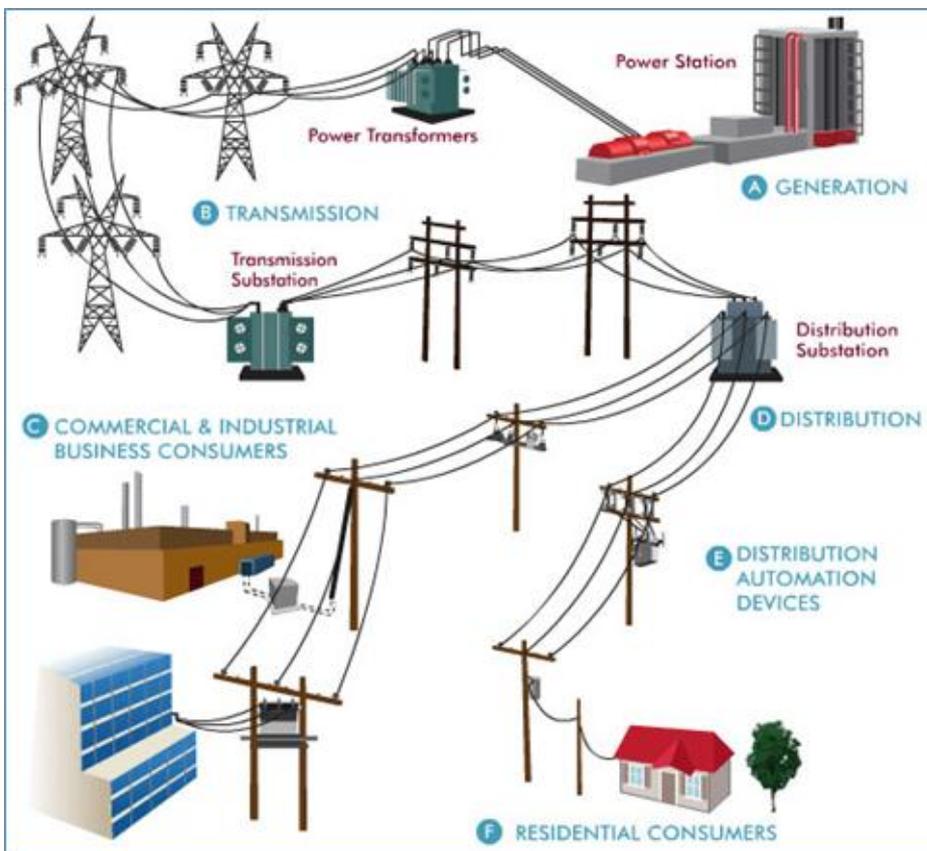
- Current Business Model for Investor-Owned Electric Utilities (IOUs)
- Factors Driving Change to the Status Quo
- Is the Current Business Model for IOUs Sustainable?

The Old Market Structure: Vertically Integrated Utilities



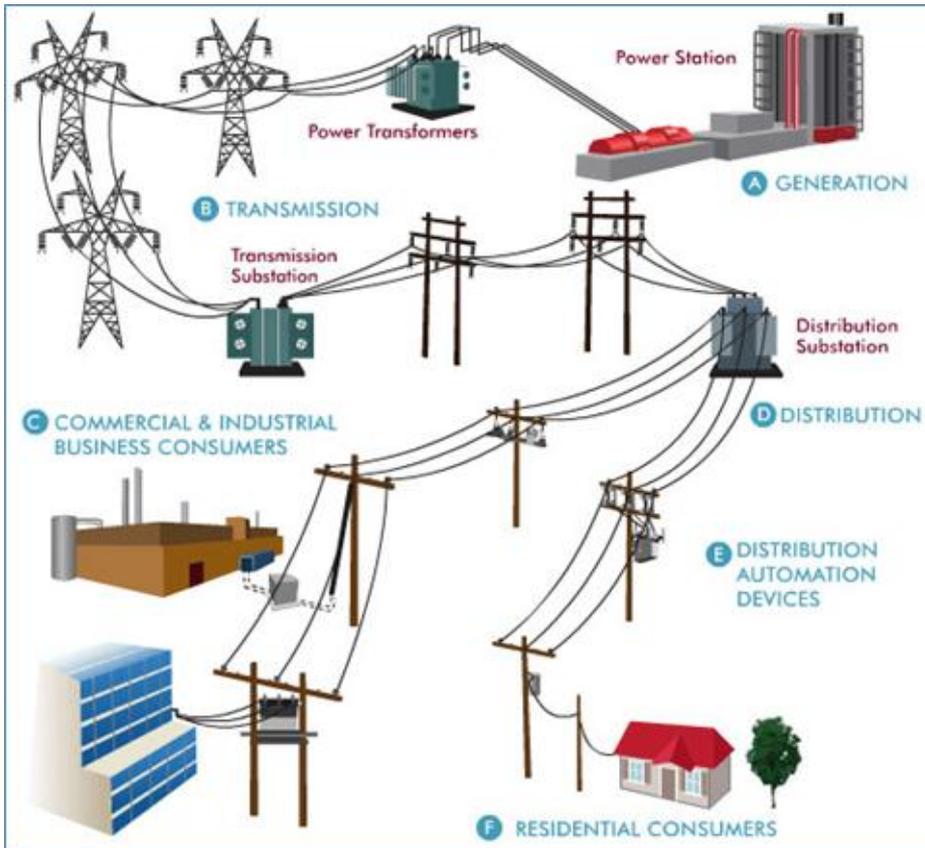
- Utility owned all generation (G), transmission (T), and distribution (D) infrastructure, except for customer-owned generation
- Monopoly franchise
- Obligation to serve
- Economically regulated to protect the public interest

The Current Market Structure: Wholesale Competition and Markets



- Independent companies can own “G” and “T” and sell bulk power to utilities through bilateral contracts or markets
- Utilities still own all “D,” most T, and may own G
- Utility still has monopoly franchise and obligation to serve; still regulated

Retail Competition



- Michigan allows some consumers (up to 10% of each utility's retail sales) to buy power from non-utility suppliers
- Utility still owns all “D” and has obligation to deliver power from supplier to customers; “D” costs are still regulated; utility generally has a default service obligation

Current Business Model for IOUs

- “Cost of Service/Rate of Return”
Regulation
- Rate Cases
 - Revenue Requirement
 - Allocation of Costs to Customer Classes
 - Rate Design within Customer Classes

The Revenue Requirement

Revenue Requirement = (Rate Base Investment * Rate of Return) +
Operating Expenses + Depreciation + Taxes

Key Concepts

- “Test Year”
- “Rate Base”
- Rate of Return
- Operating Expenses

Customer Classes

- The utility's revenue requirement is allocated to different customer classes:
 - Residential
 - Commercial
 - Industrial
- Retail rates are then designed for each customer class to recover the class' portion of the revenue requirement

Traditional Rate Design

- Retail rate consists of separate lines for:
 - Customer charge (\$/month)
 - Volumetric charge (¢/kWh)
 - May vary with usage, time of year, time of day
 - Demand charge (\$/kW)
 - Usually for commercial/industrial customers only
 - Other charges (e.g., taxes)

Drawbacks of Traditional Regulation

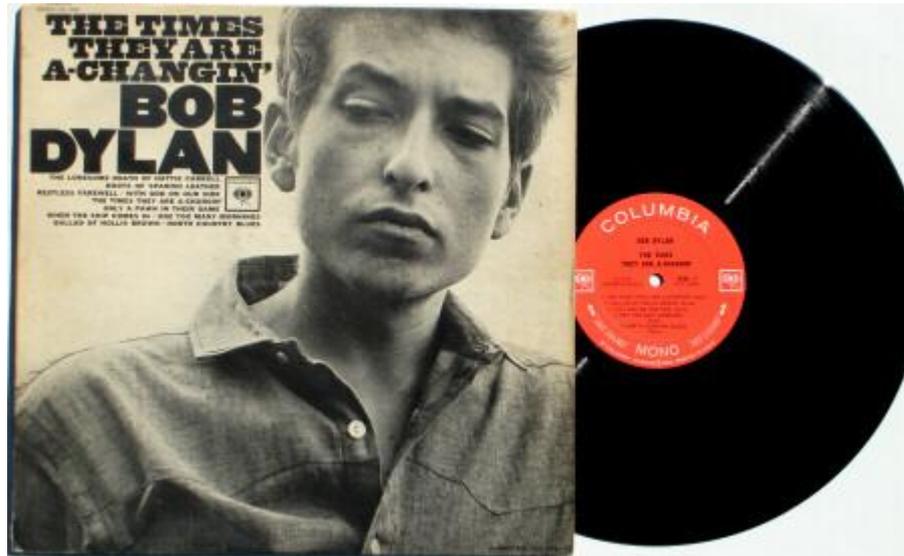
- **Averch-Johnson Effect:** since utilities earn profit on rate base, they have an incentive to overbuild infrastructure
- **Throughput Incentive:** since utilities earn income through selling kWh, they have an incentive to maximize sales
- Third party G&T, customer G, and energy efficiency all reduce profit opportunities

Impact of Sales on Shareholder Returns: An Example

% Change in Sales	Revenue Change		Impact on Earnings		
	Pre-tax	After-tax	Net Earnings	% Change	Actual ROE
5.00%	\$9,047,538	\$5,880,900	\$15,780,900	59.40%	17.53%
4.00%	\$7,238,031	\$4,704,720	\$14,604,720	47.52%	16.23%
3.00%	\$5,428,523	\$3,528,540	\$13,428,540	35.64%	14.92%
2.00%	\$3,619,015	\$2,352,360	\$12,252,360	23.76%	13.61%
1.00%	\$1,809,508	\$1,176,180	\$11,076,180	11.88%	12.31%
0.00%	\$0	\$0	\$9,900,000	0.00%	11.00%
-1.00%	-\$1,809,508	-\$1,176,180	\$8,723,820	-11.88%	9.69%
-2.00%	-\$3,619,015	-\$2,352,360	\$7,547,640	-23.76%	8.39%
-3.00%	-\$5,428,523	-\$3,528,540	\$6,371,460	-35.64%	7.08%
-4.00%	-\$7,238,031	-\$4,704,720	\$5,195,280	-47.52%	5.77%
-5.00%	-\$9,047,538	-\$5,880,900	\$4,019,100	-59.40%	4.47%

ANY
QUESTIONS
?

Factors Driving Change



Your old road is rapidly agin'
Please get out of the new one if you can't lend your hand
For the times they are a-changing'

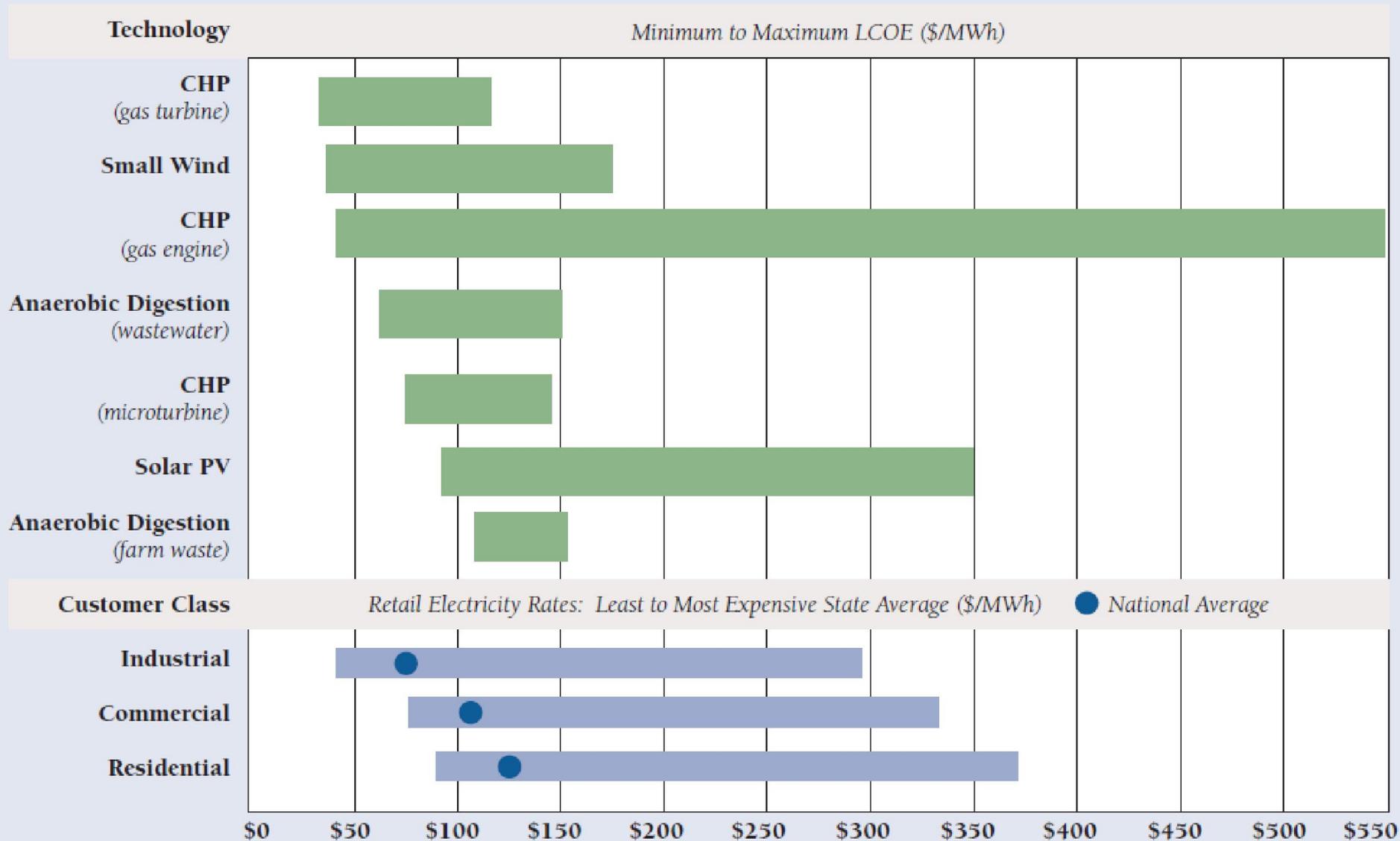
Key Factors

- Technology Innovation
- Changing Fuel & Generation Economics
- New Federal Environmental Regulations
- Aging Infrastructure
- Reduced Load Growth

Technology Innovation

- New and improved technologies lead to lower costs and increased deployment of:
 - Wind Power
 - Solar Power
 - Energy Storage
 - Advanced Metering Infrastructure
- Retail rate “grid parity” may be imminent

Levelized Cost of Energy (LCOE) for Selected Distributed Generation Technologies in the U.S.



Sources: Based upon data from Bloomberg New Energy Finance (2013) and EIA (2013)³³

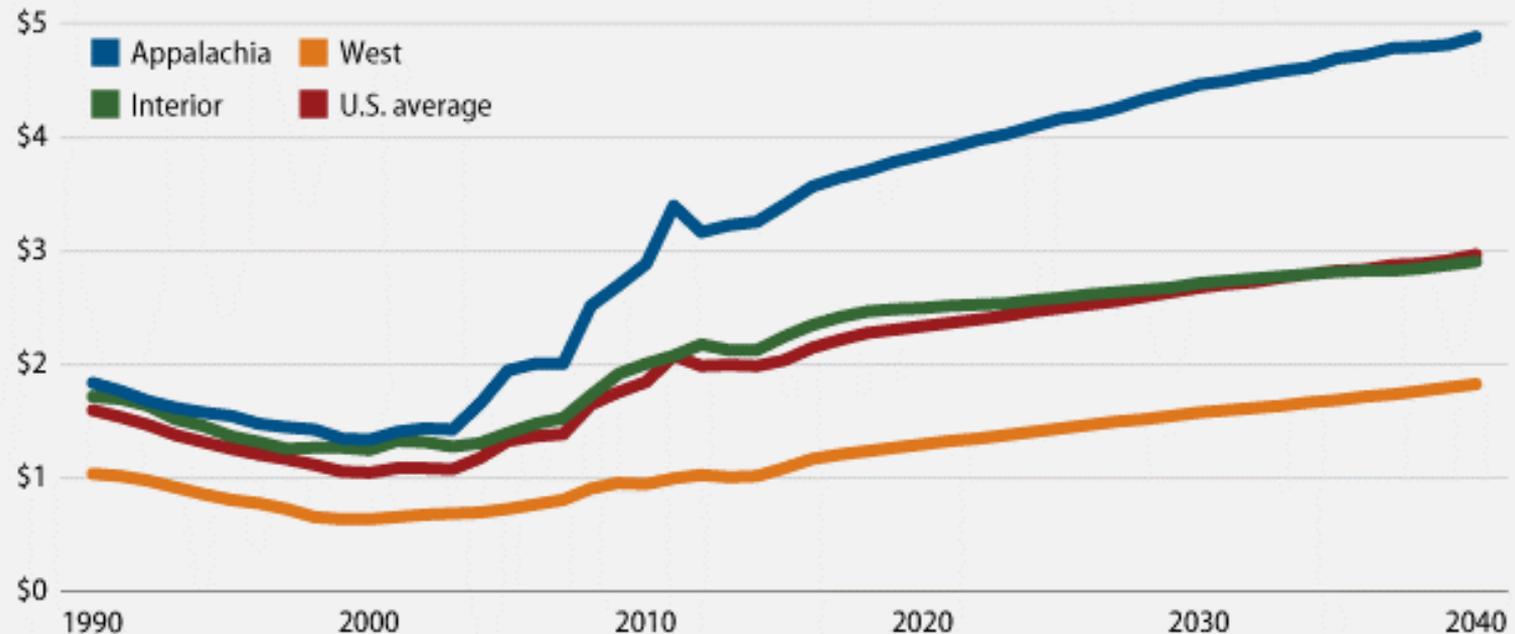
Changing Fuel & Generation Economics

- Coal Price Projections
- Natural Gas Price Projections
- Concerns Regarding Fuel Deliverability
 - Forced Outages in 2014 “Polar Vortex”

Coal Price Projections

FIGURE 3

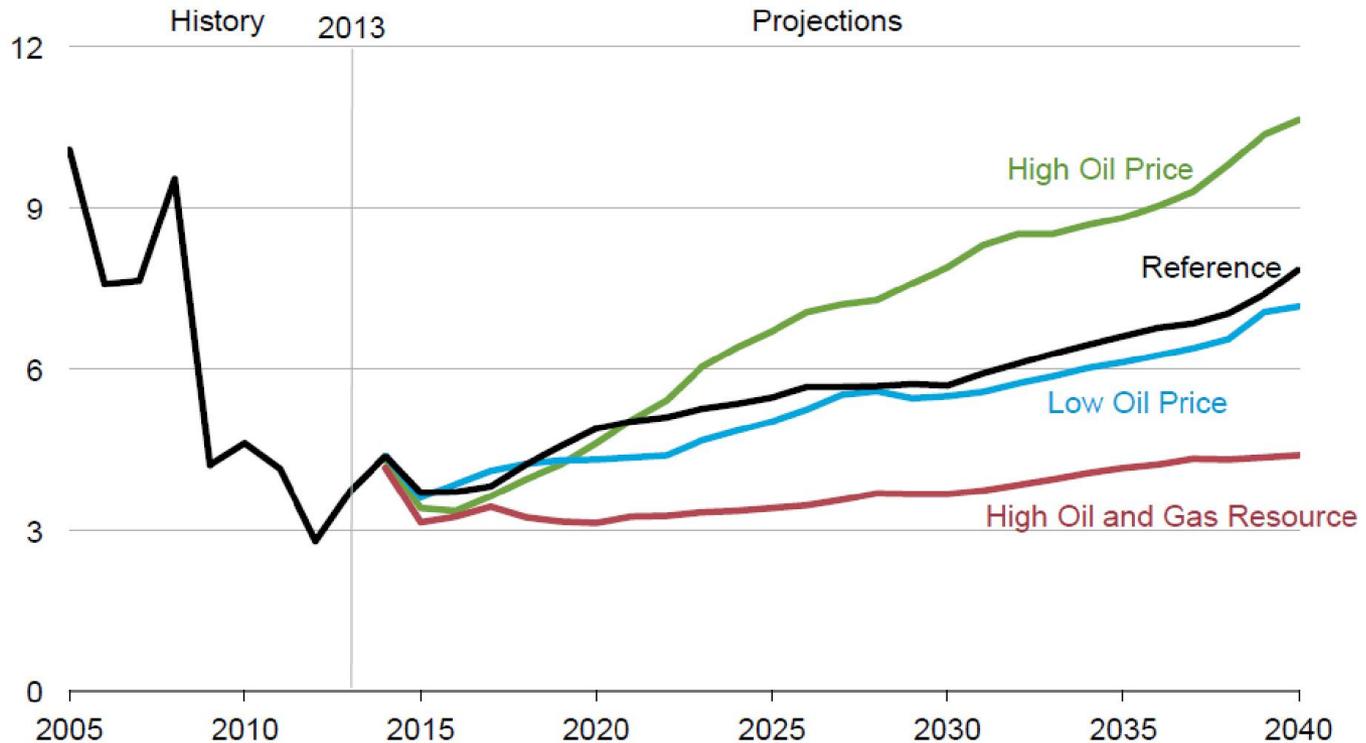
Average annual minemouth coal prices by region: 1990–2012 and projections to 2040, in 2012 dollars per million Btu



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2014* (U.S. Department of Energy, 2014).

Natural Gas Price Projections

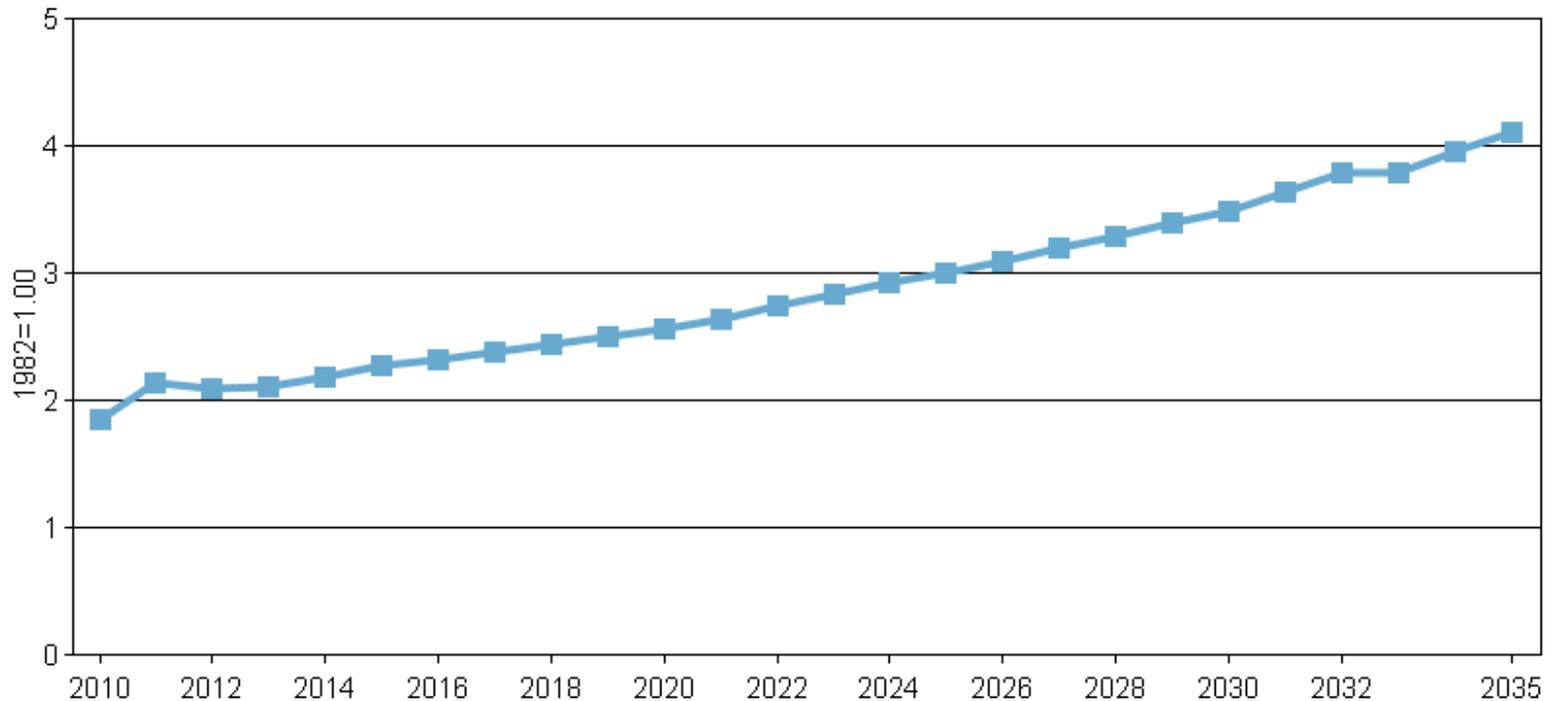
average Henry Hub spot prices for natural gas
2013 dollars per million Btu



Source: EIA, Annual Energy Outlook 2015

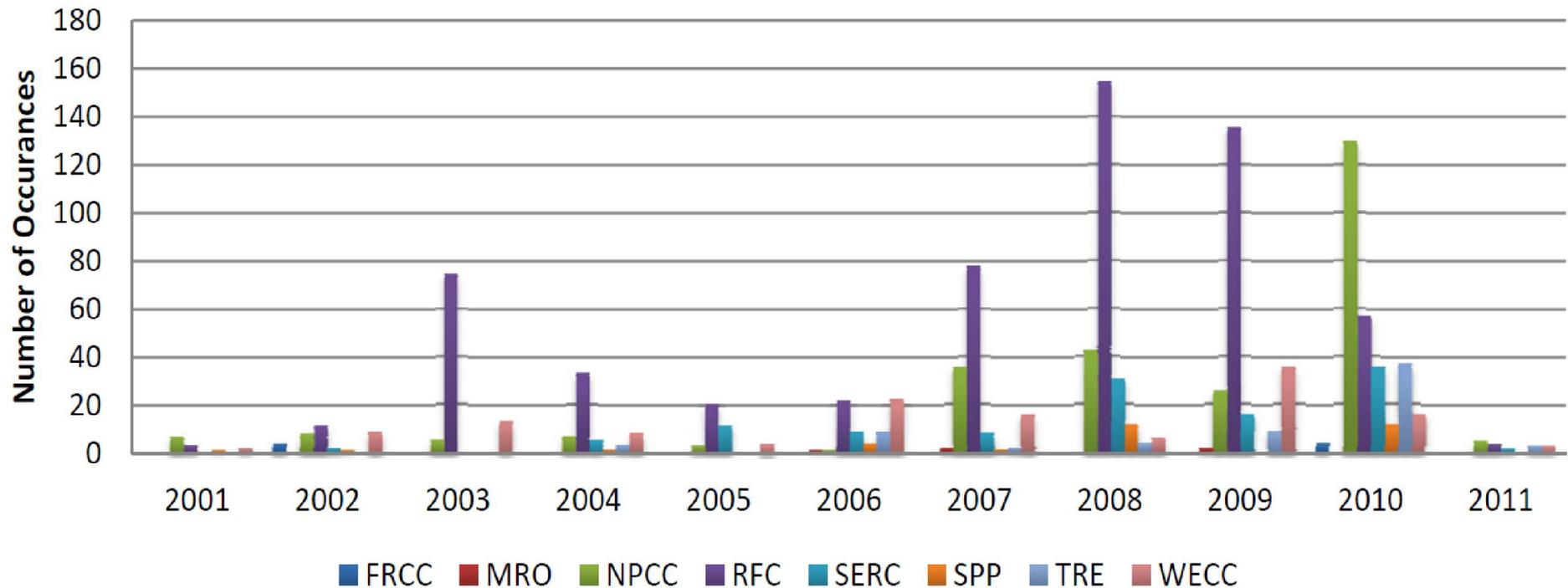
Wholesale Energy Price Projections

Macroeconomic Indicators : Wholesale Price Index: Fuel and Power: AEO2012 Reference case (full report)

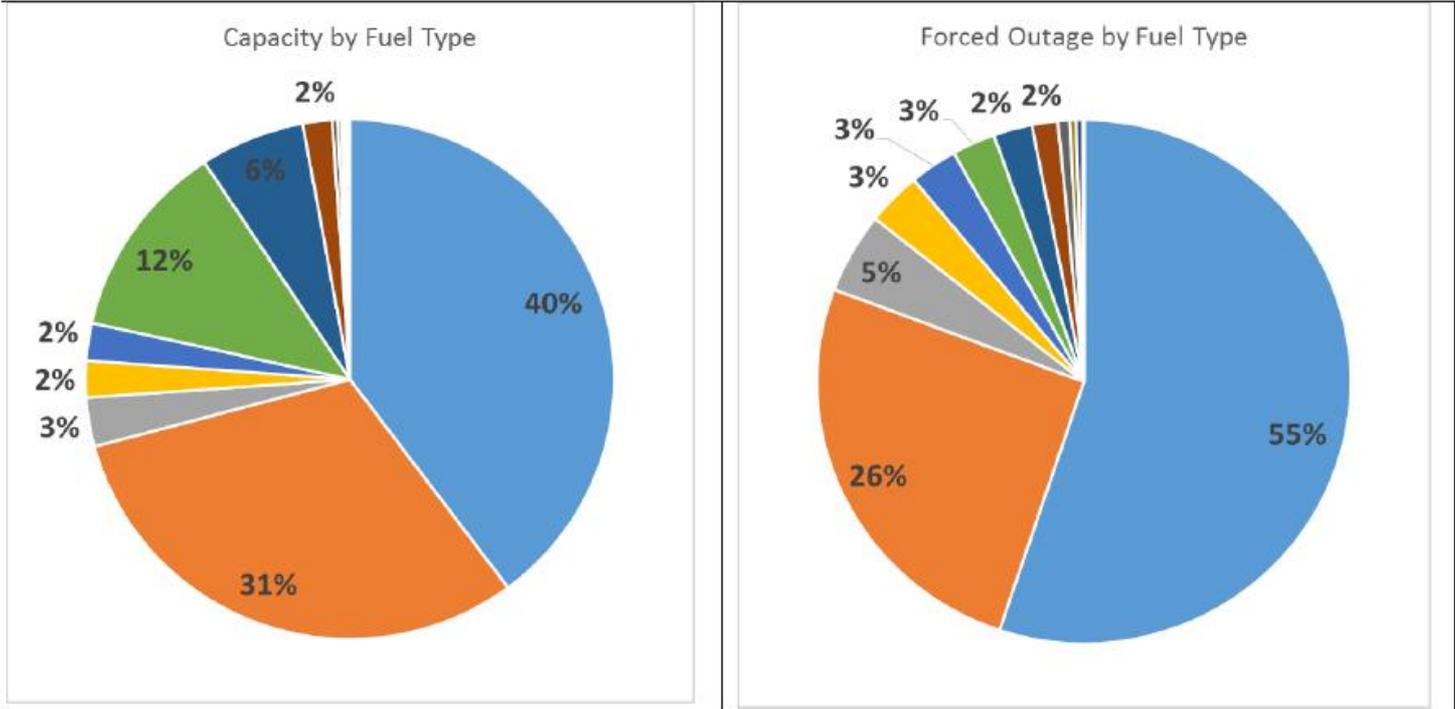


Concerns Regarding Fuel Deliverability

Figure 37: Number of Outages due to Lack of Fuel Supply from 2001 to 2011



Forced Outages in 2014 “Polar Vortex”

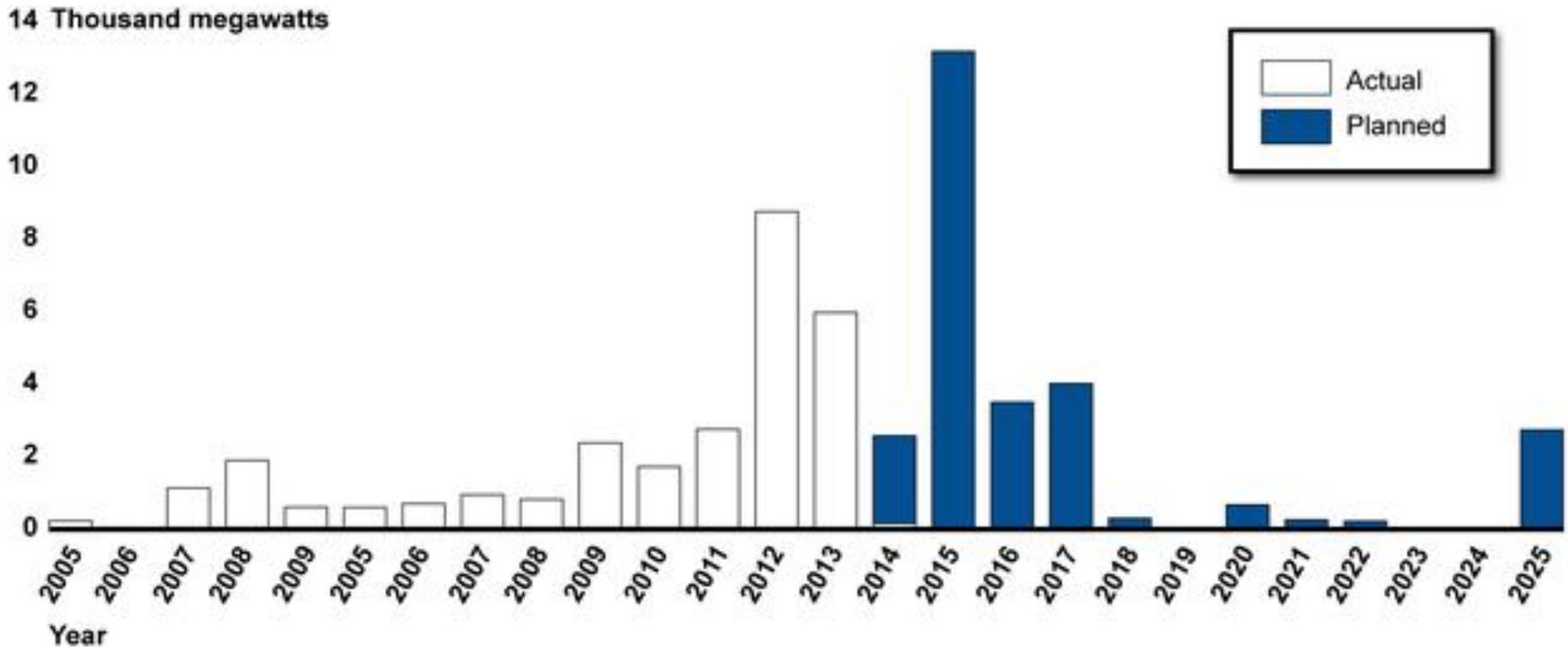


- Gas
- Coal
- Waste Heat
- Distillate Oil
- Oil
- Nuclear
- Water
- Lignite
- Kerosene
- Other - Solid (Tons)
- Other - Gas (Cu. Ft.)
- Wood
- Other - Liquid (BBL)
- Biomass
- JP4 or JP5
- Peat
- Petroleum Coke
- Propane

New Federal Environmental Regulations Affecting Power Sector - Since 2011

- **Air:**
 - Mercury and Air Toxics Standards (MATS)
 - Cross-State Air Pollution Rule (CSAPR)
 - *Clean Power Plan (111d) (proposed)*
 - *Ozone Standard (proposed)*
- **Waste:**
 - Coal Combustion Residuals (CCR)
- **Water:**
 - Cooling Water Intake Structures (316b)
 - *Effluent Limitation Guidelines (proposed)*

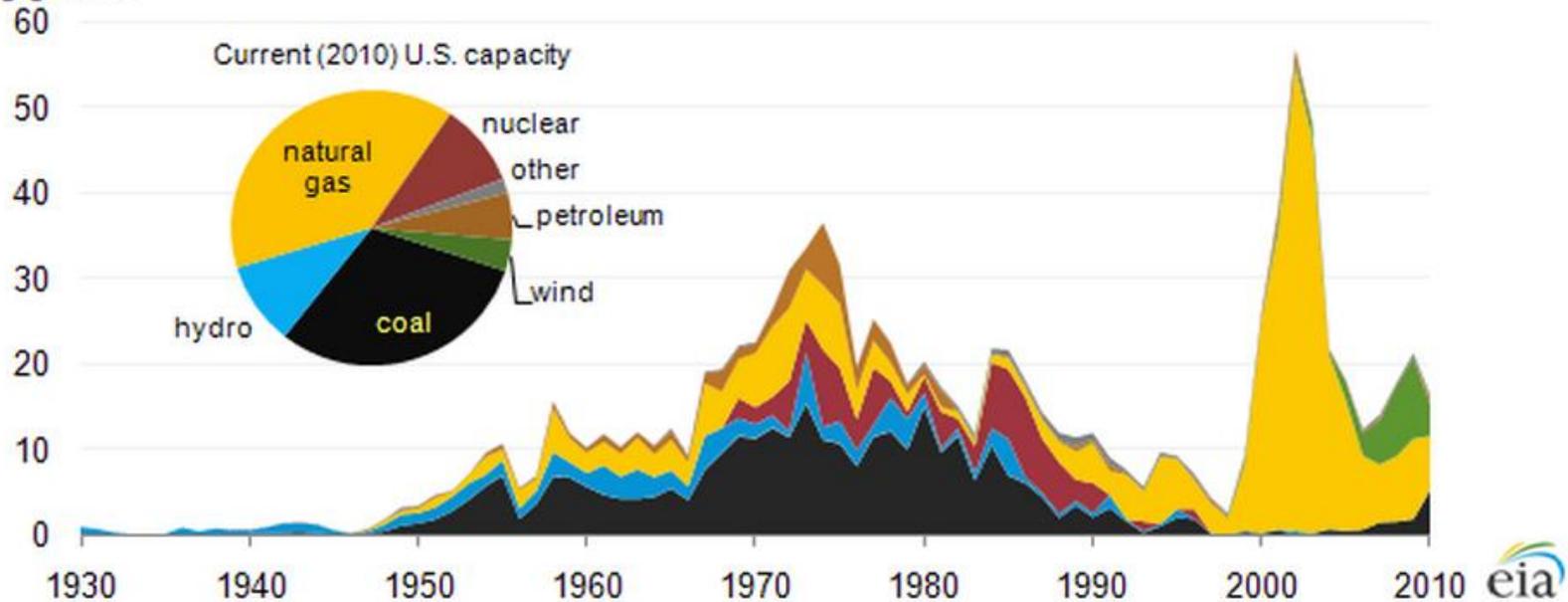
Coal Plant Retirements



Source: GAO analysis of SNL Financial data. | GAO-14-672

Aging Infrastructure

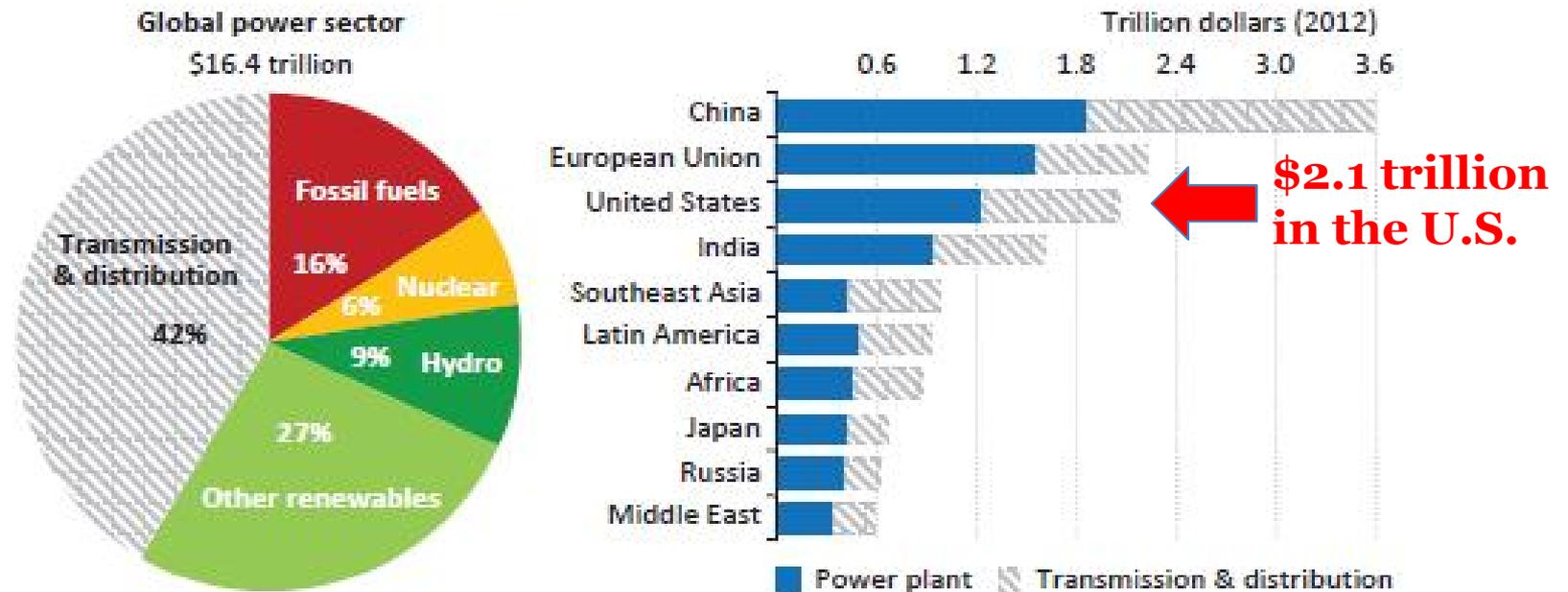
Current (2010) capacity by initial year of operation and fuel type
gigawatts



Source: U.S. Energy Information Administration, Energy in Brief article, *How old are U.S. power plants?*, August 8, 2011.

Huge Level of Investment Needed

Figure 3.7 ▶ Cumulative global power sector investment by type and selected region in the New Policies Scenario, 2014-2035

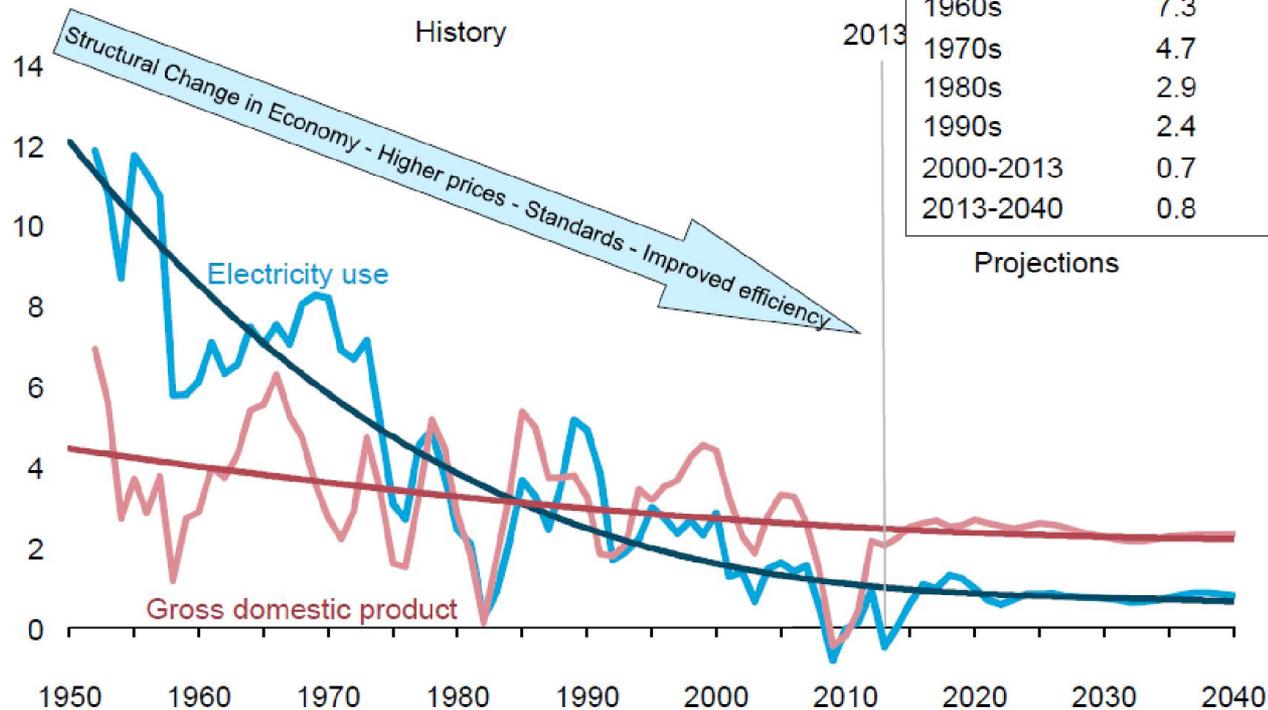


Source: International Energy Agency, *World Energy Investment Outlook*, 2014

Reduced Load Growth

Growth in electricity use slows, but electricity use still increases by 24% from 2013 to 2040

U.S. electricity use and GDP
percent growth (rolling average of 3-year periods)



Source: EIA, Annual Energy Outlook 2015 Reference case

Annual Growth Rate Projections (2015-2024)

	Net CAGR (w/EE)
MISO Michigan Energy	0.77%
MISO System-wide Energy	0.87%
MISO System-wide Summer Peak	0.86%
PJM AEP Energy	0.7%
PJM AEP Summer Peak	0.8%
PJM System-wide Energy	1.0%
PJM System-wide Summer Peak	1.0%

ANY
QUESTIONS
?

Thank You for Your Time and Attention

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts focused on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies to:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raonline.org

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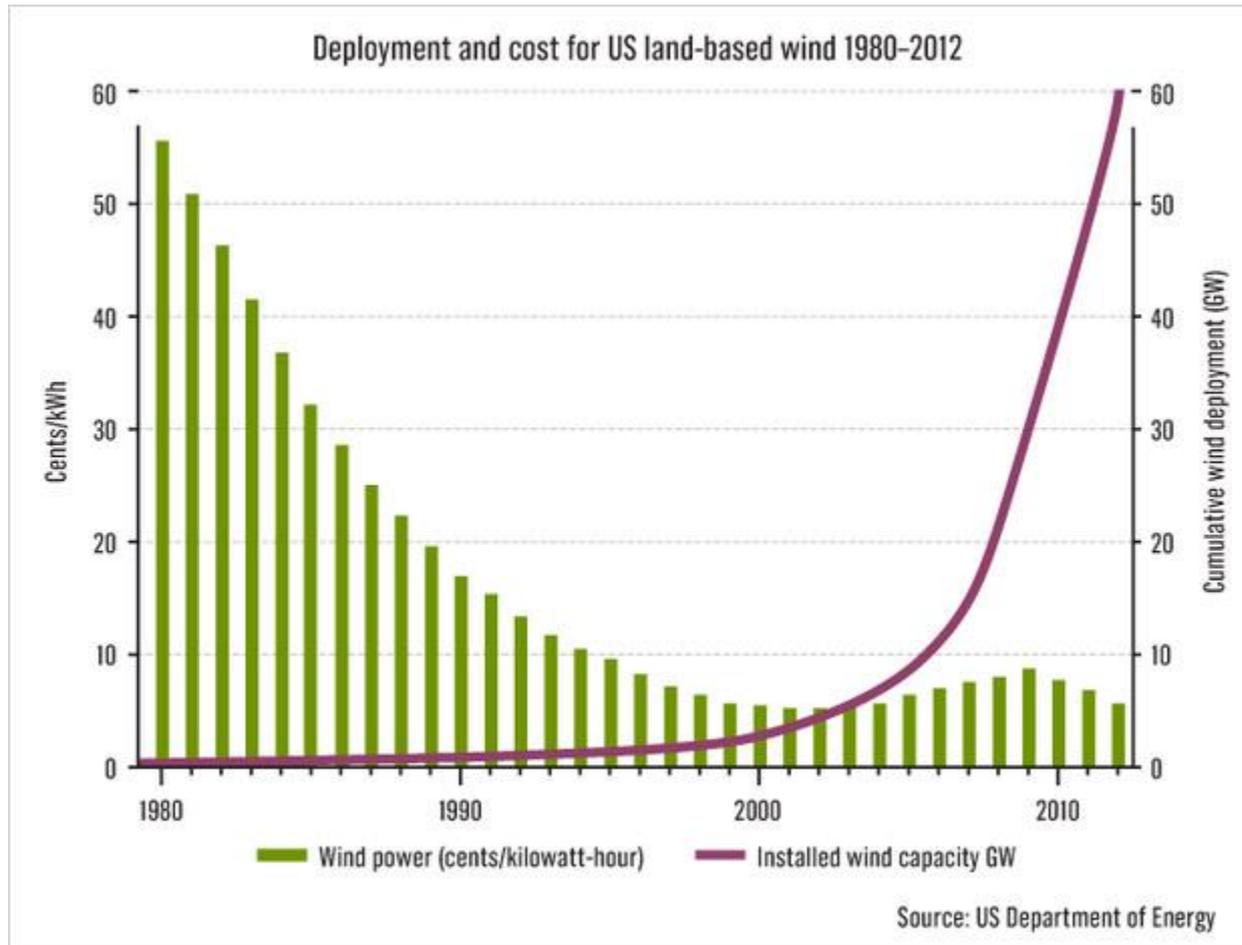


The Regulatory Assistance Project

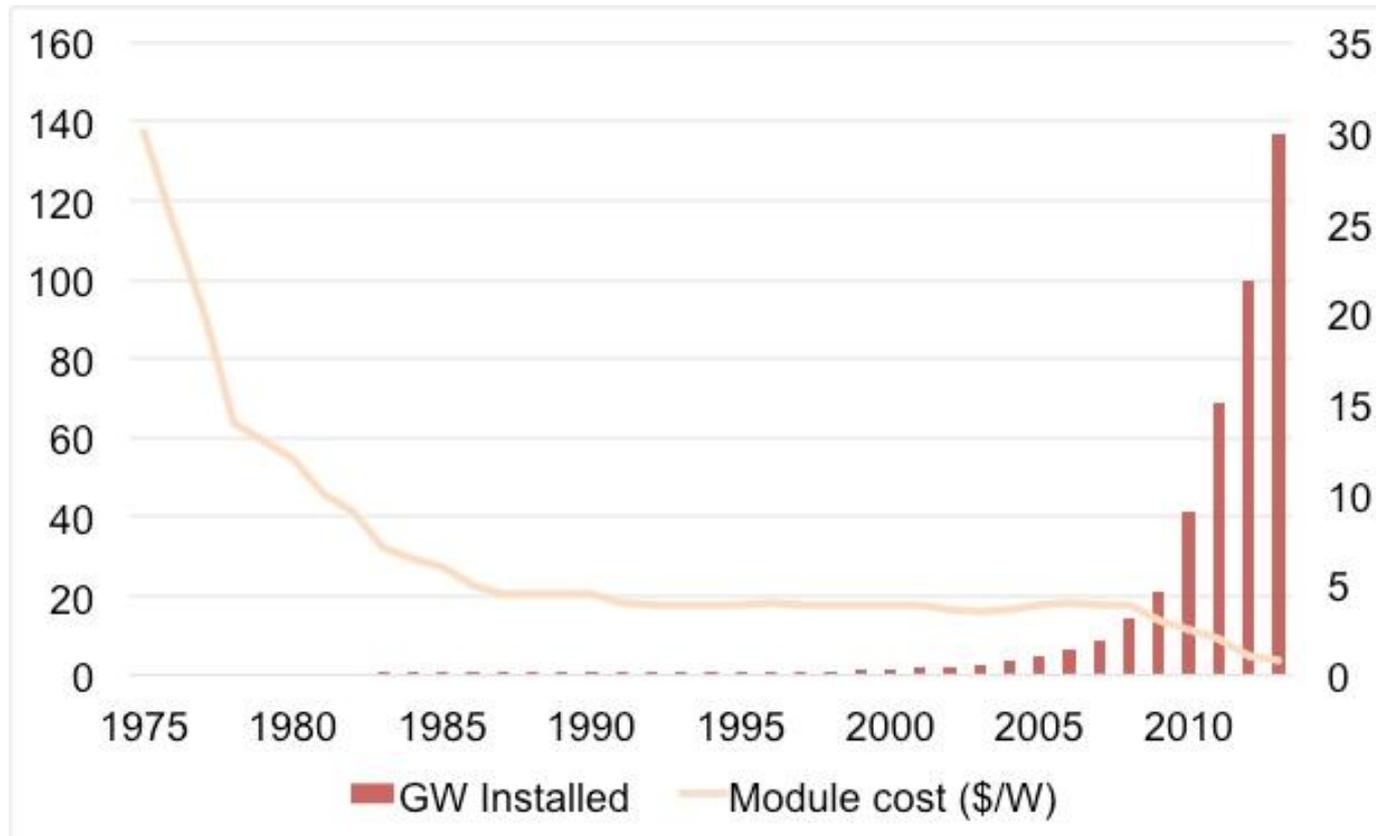
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Wind Power Innovation

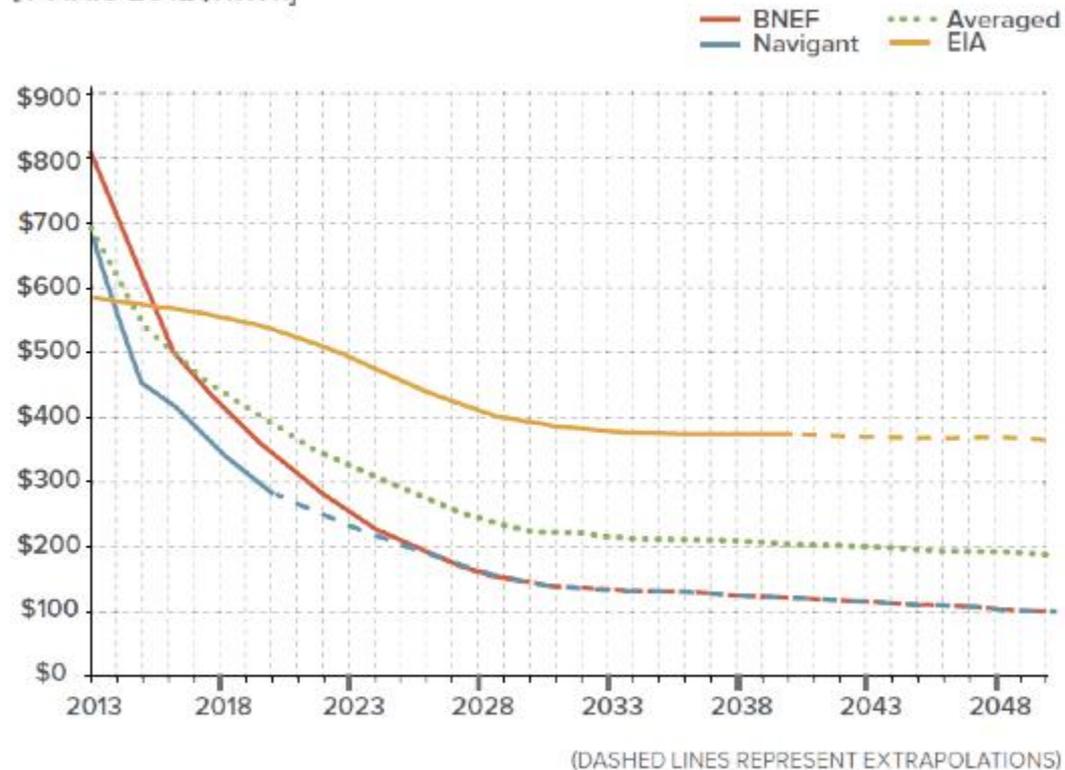


Solar Innovation



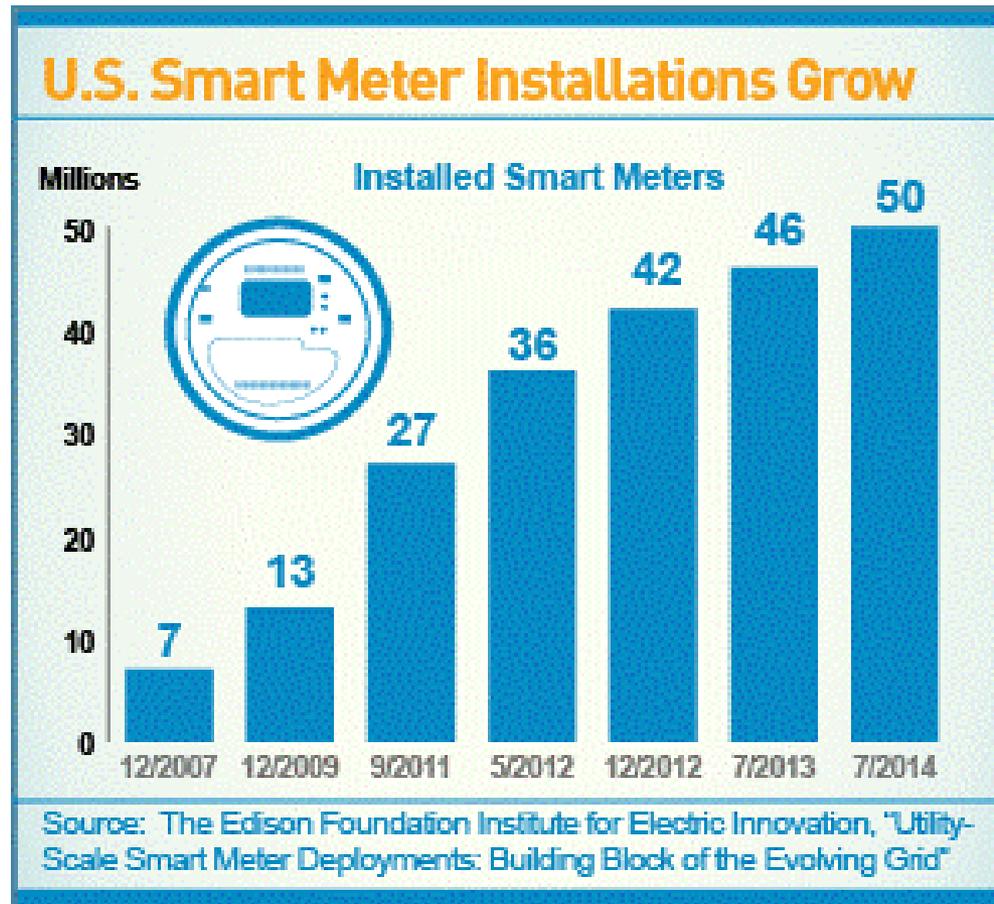
Energy Storage Innovation

BATTERY PRICE PROJECTIONS
[Y-AXIS 2012\$/kWh]

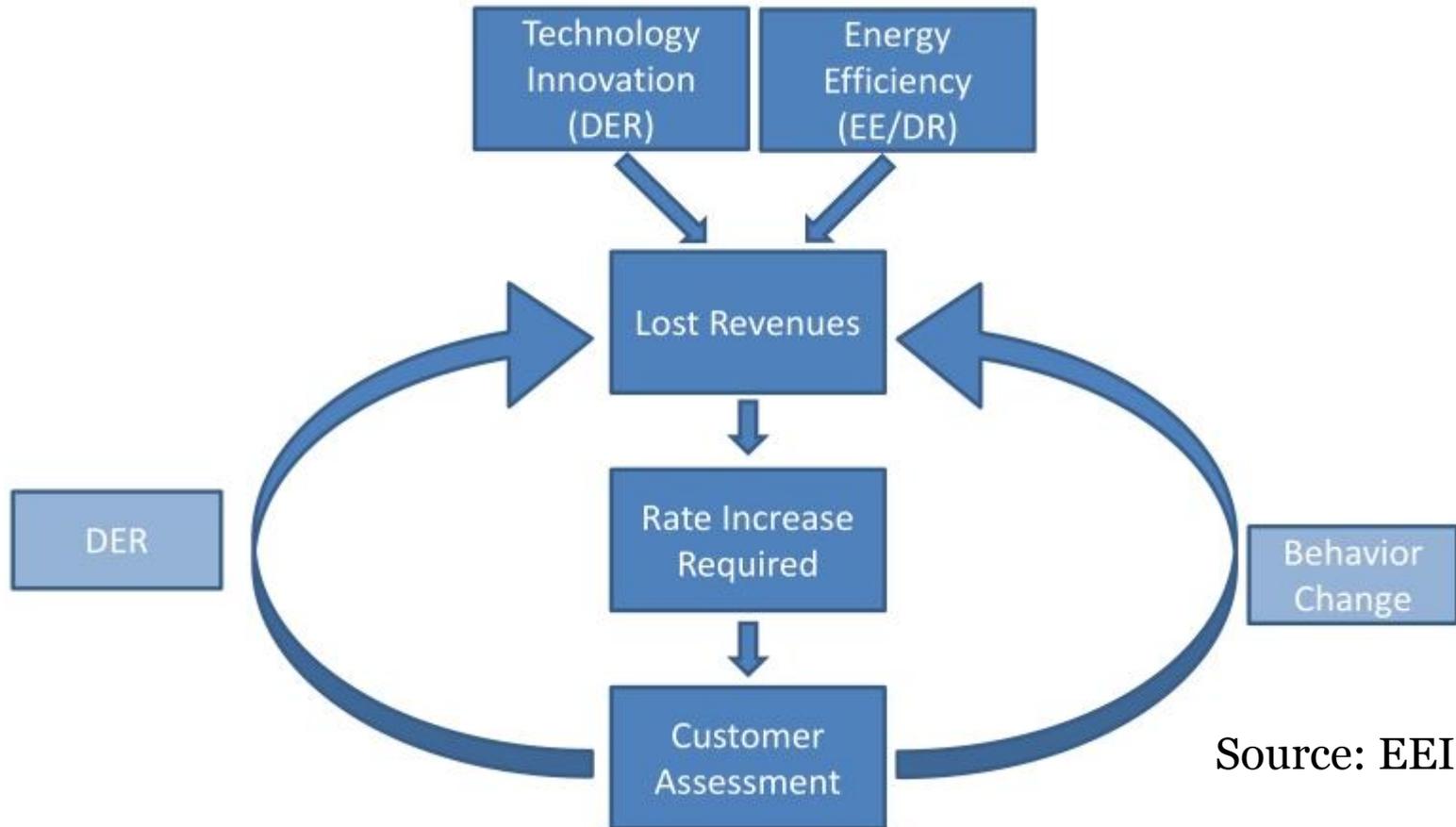


Source: Rocky Mountain Institute

Meter Innovation

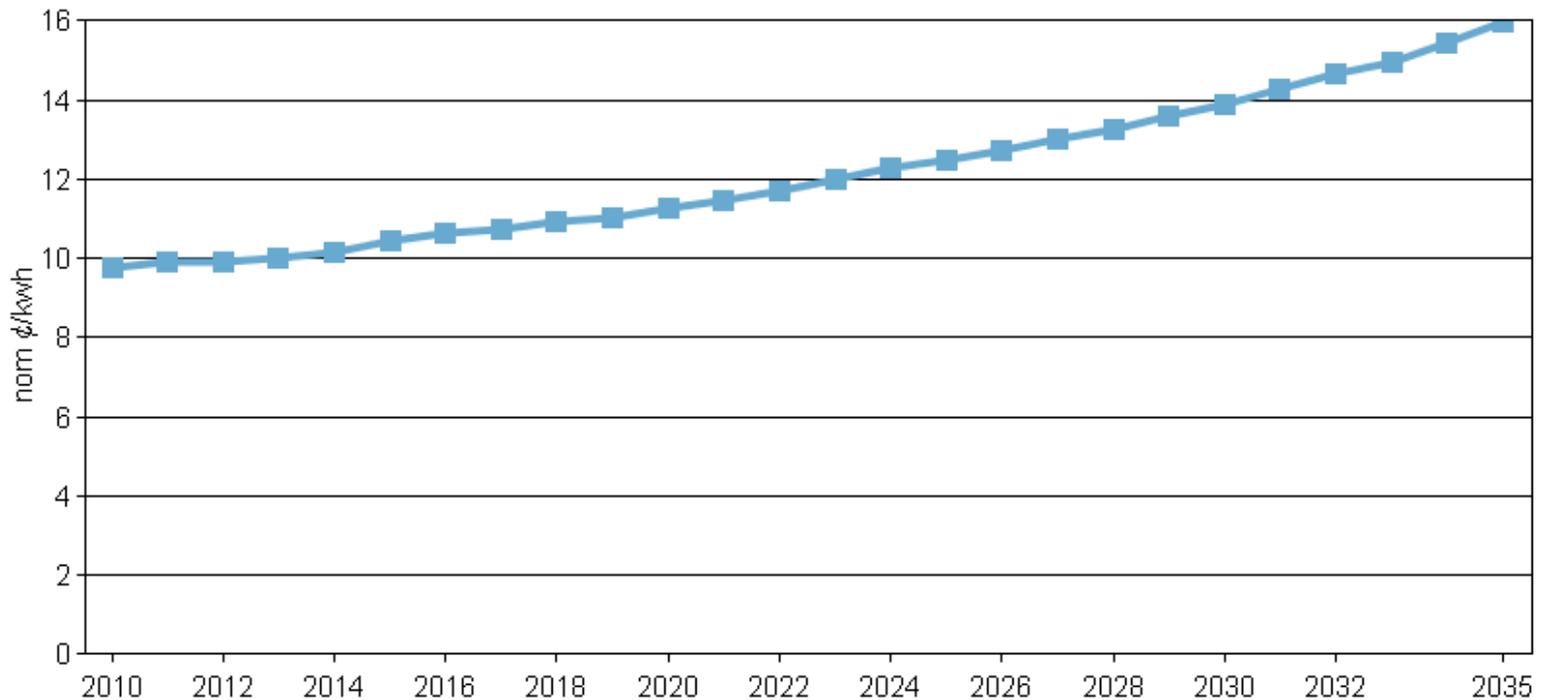


Vicious Cycle from Disruptive Forces



Average Retail Rates in U.S. (cents/kWh)

Electricity : End-Use Prices: All Sectors Average: AEO2012 Reference case (full report)



Independent Statistics & Analysis

U.S. Energy Information
Administration

Solar Costs Approaching Parity with Retail Rates

Population at Grid Parity and Residential Rooftop Solar Potential (MW)

