US RENEWABLES GROUP

Renewables: Getting From Promise to Performance – What Will It Take?

Edwin F. Feo
USRG Renewable Finance

Overview

- Renewable Energy– Current and Projected
- Challenges to Deployment
- Solutions
- Example - the Future of Wind Energy - 20% by 2030

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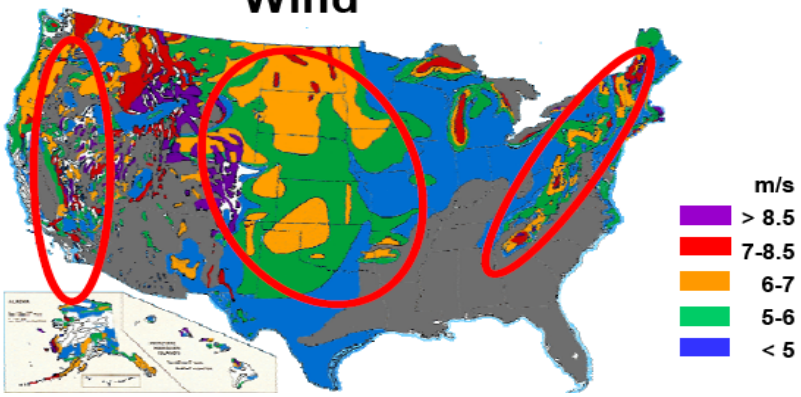
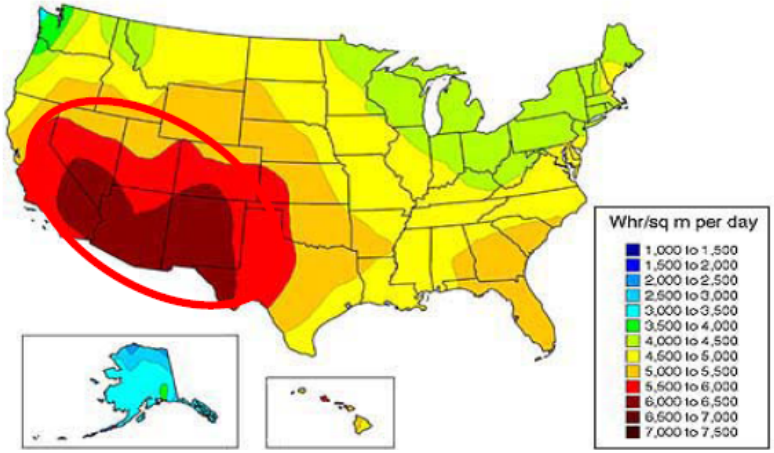
Sources and Uses

Renewable Resources

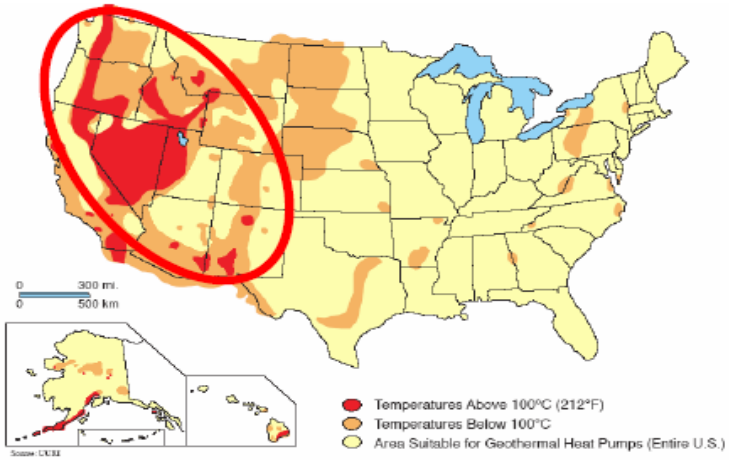
Wind



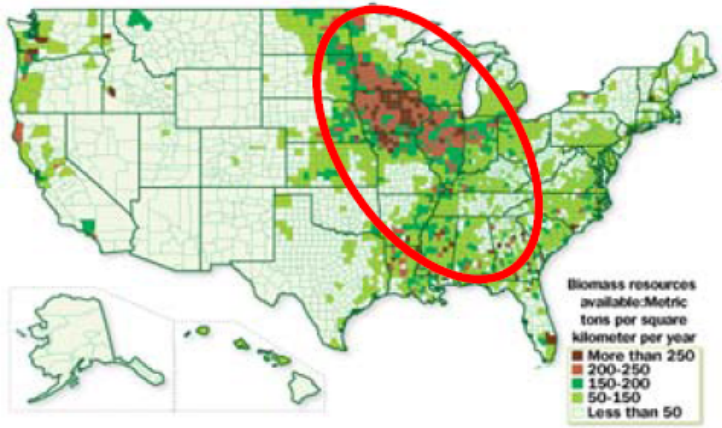
Solar



GeoThermal



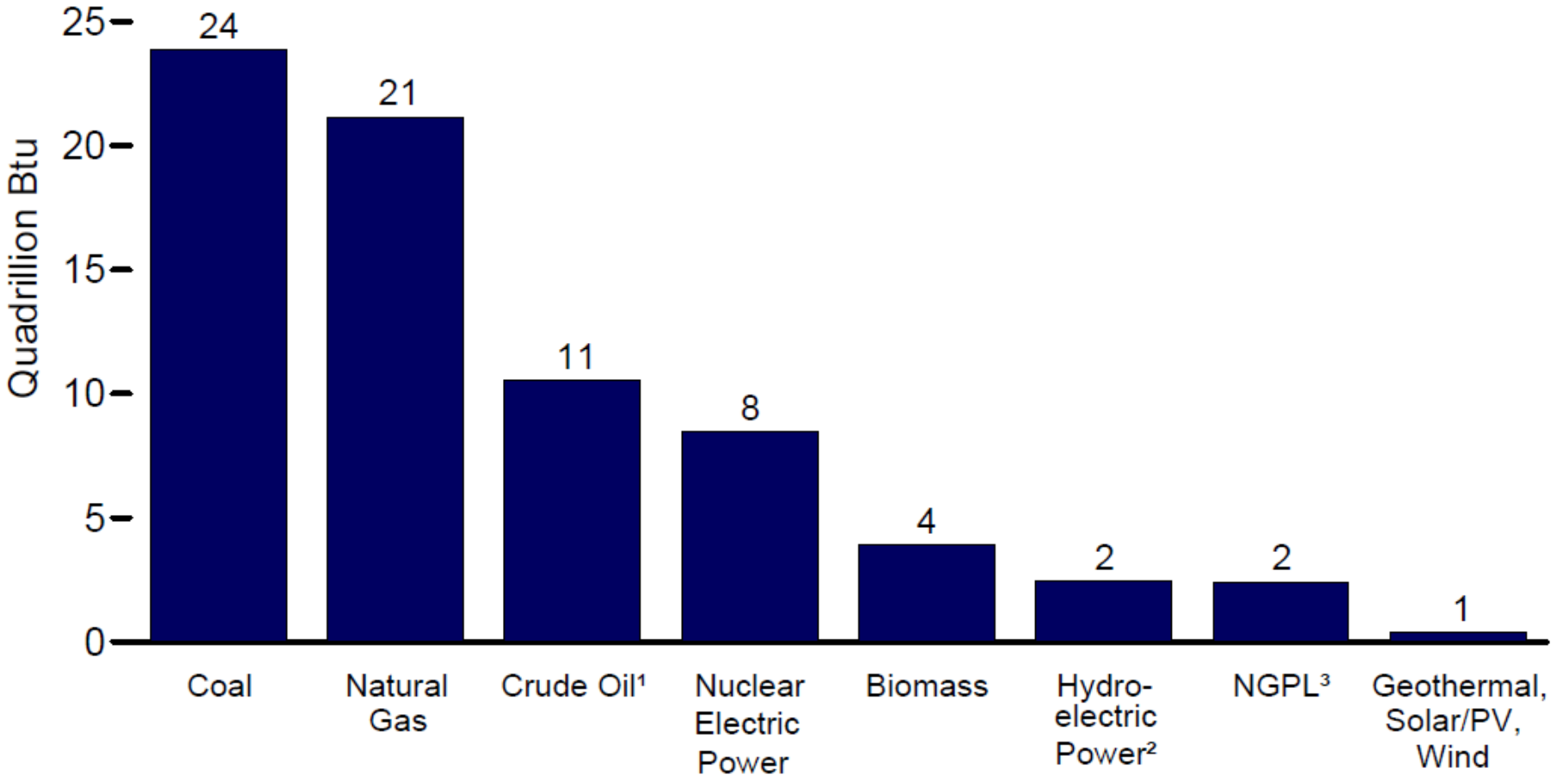
BioMass



20-30% of Energy Needs…

Source: AWEA, US DOE, Acciona, 2010

Primary Energy Production by Source 2008



1
2 Includes lease condensate.
3 Conventional hydroelectric power
Natural gas plant liquids

Source: Energy Information Administration, 2010

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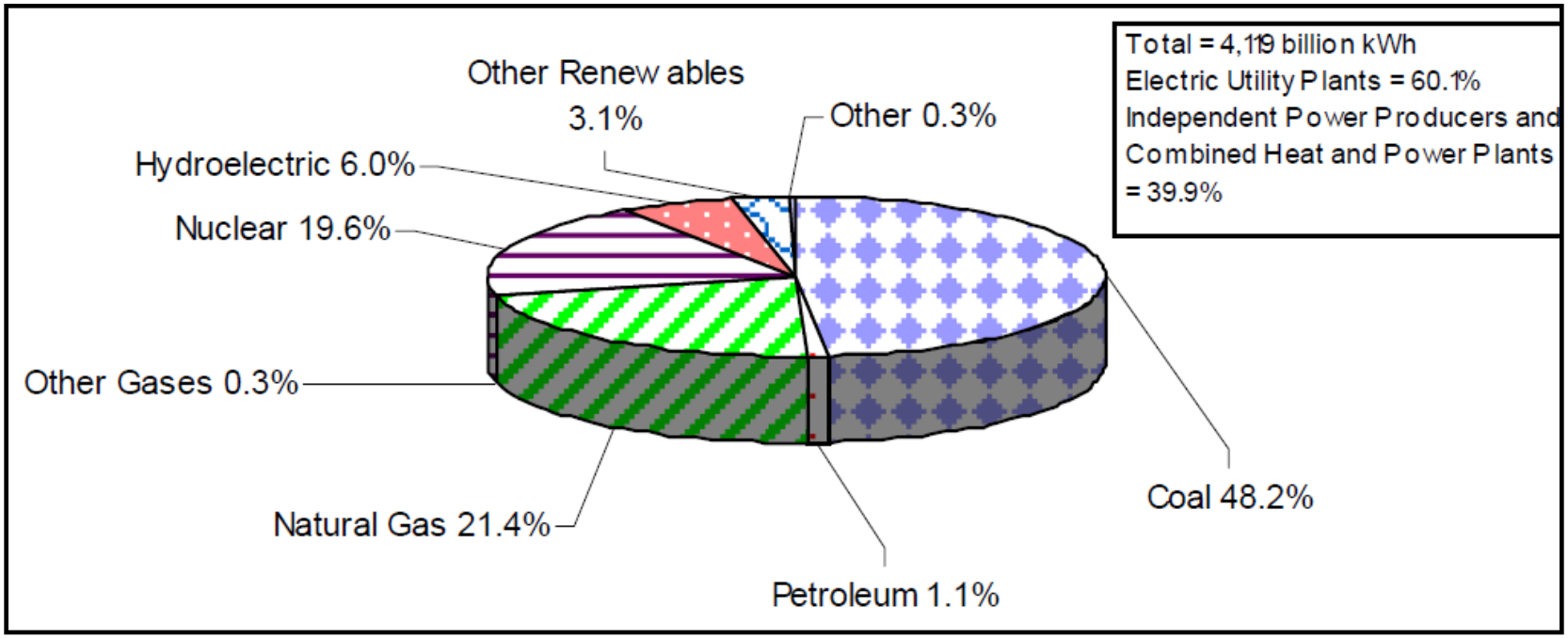
US Electric Power Industry Net Generation 2008



Source: Energy Information Administration, 2010

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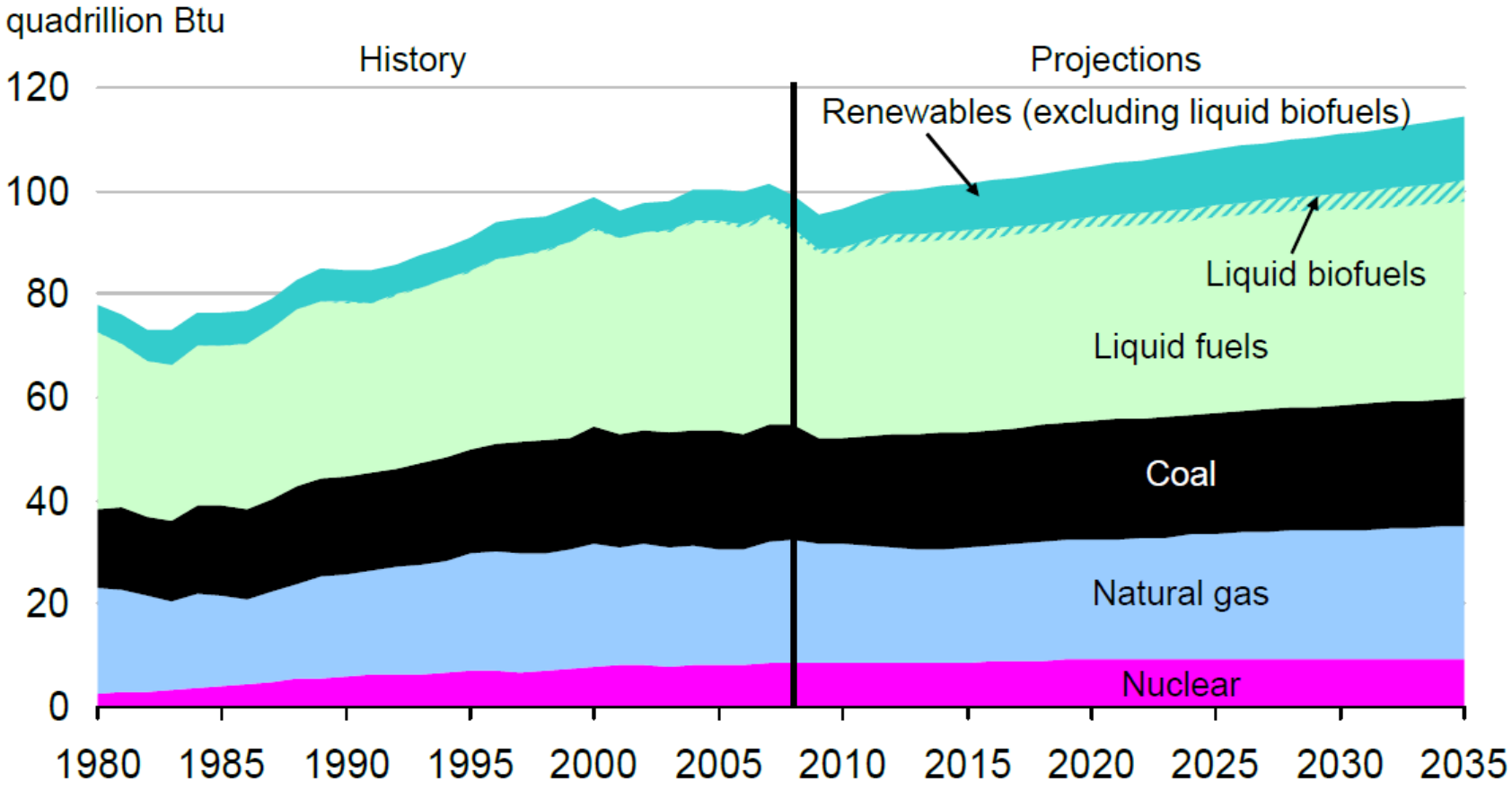
Non-fossil Energy Use: Predictions



Non-fossil energy use grows rapidly, but fossil fuels still provide 78 percent of total energy use in 2035

Source: Johns Hopkins SAIS, Energy Information Administration, 2009

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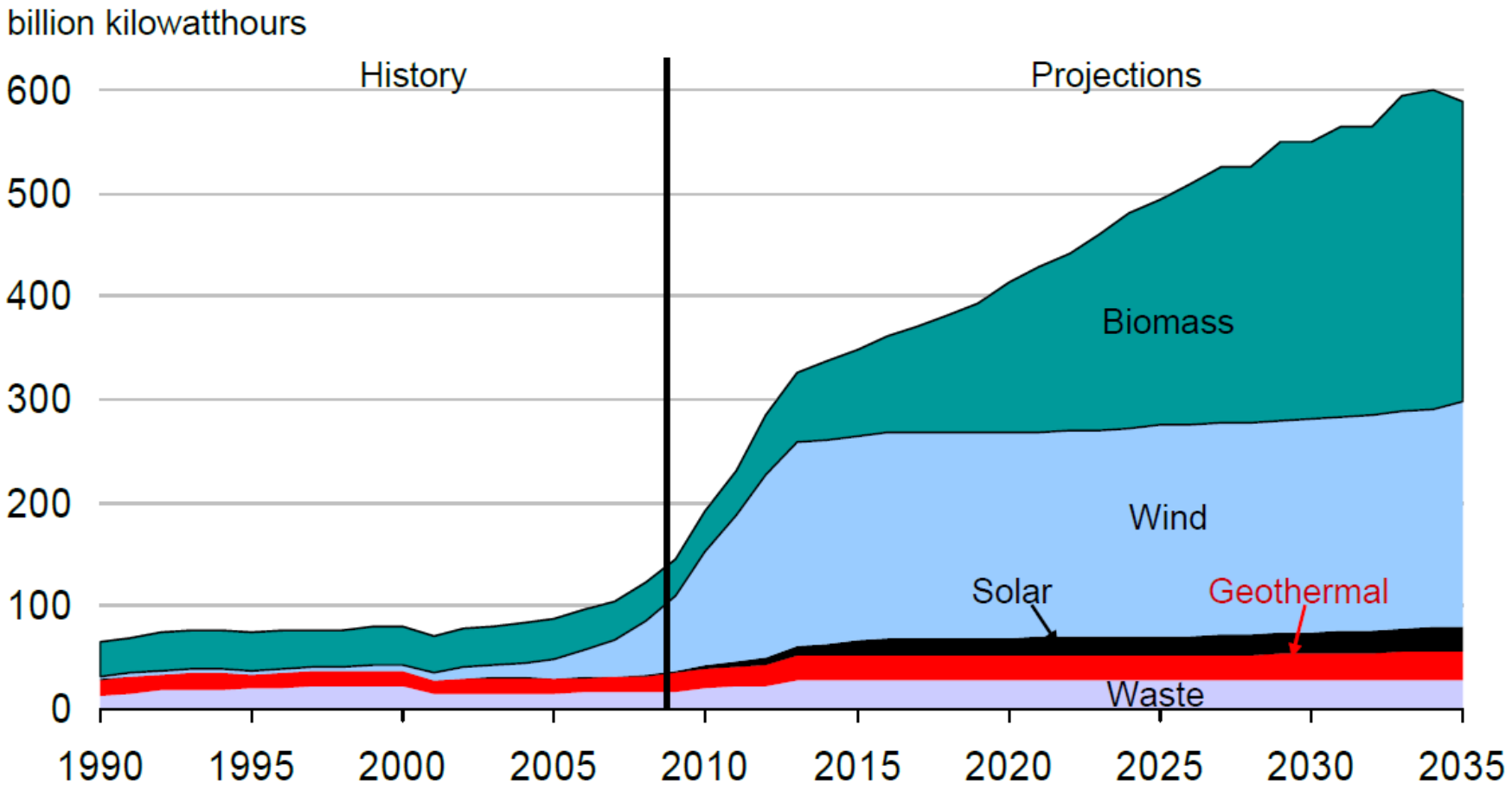
Non-fossil Energy Use: Predictions



Non-hydropower renewable sources meet 41% of total electricity generation growth -from 2008 to 2035

Source: Johns Hopkins SAIS, Energy Information Administration, 2009

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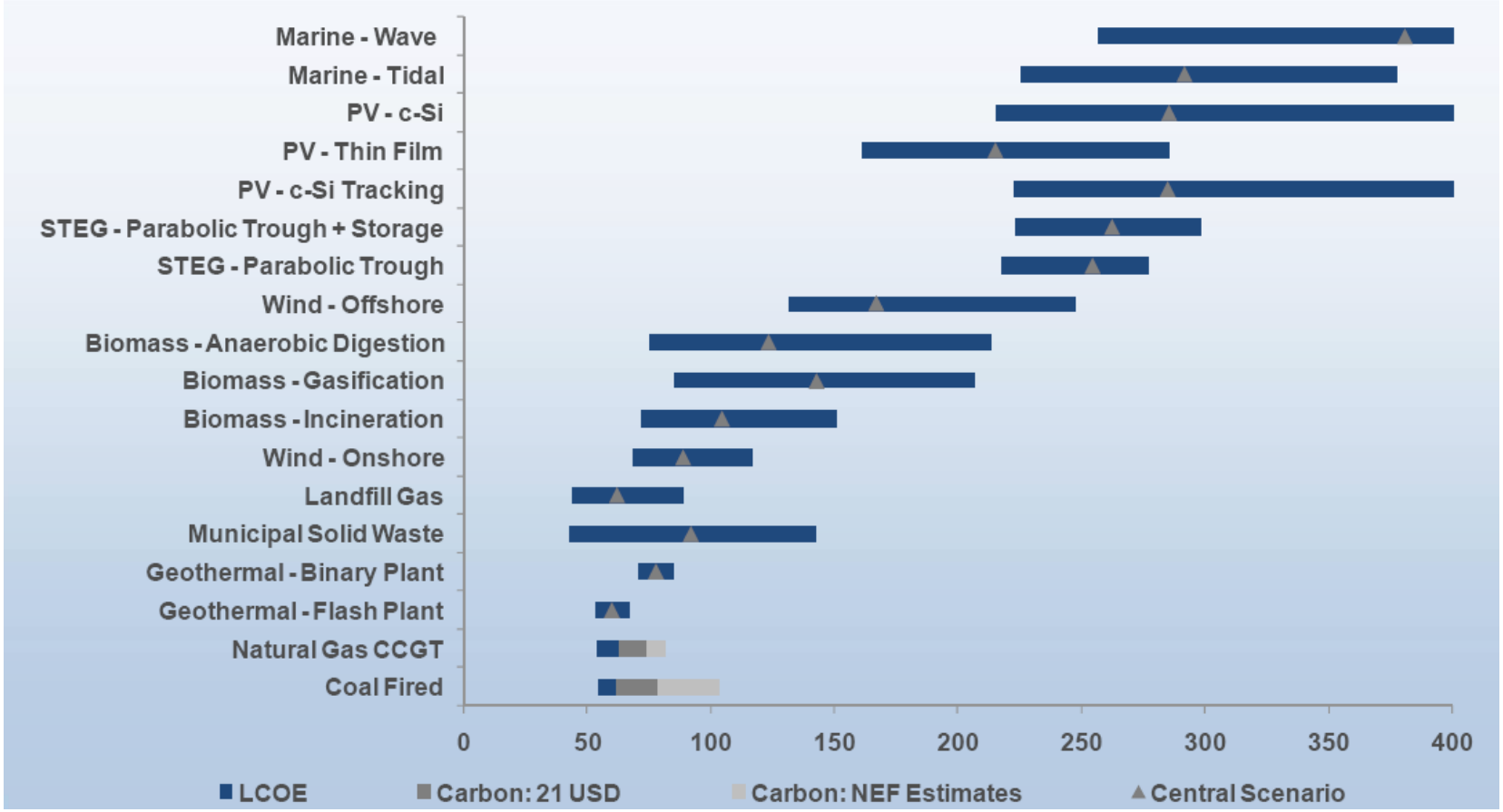
Challenges

Challenges to Use of Renewable Sources

- Relative Cost of Energy
- Technology Development
- Customer Acceptance
- Infrastructure
- Environmental Impact– Siting Challenges

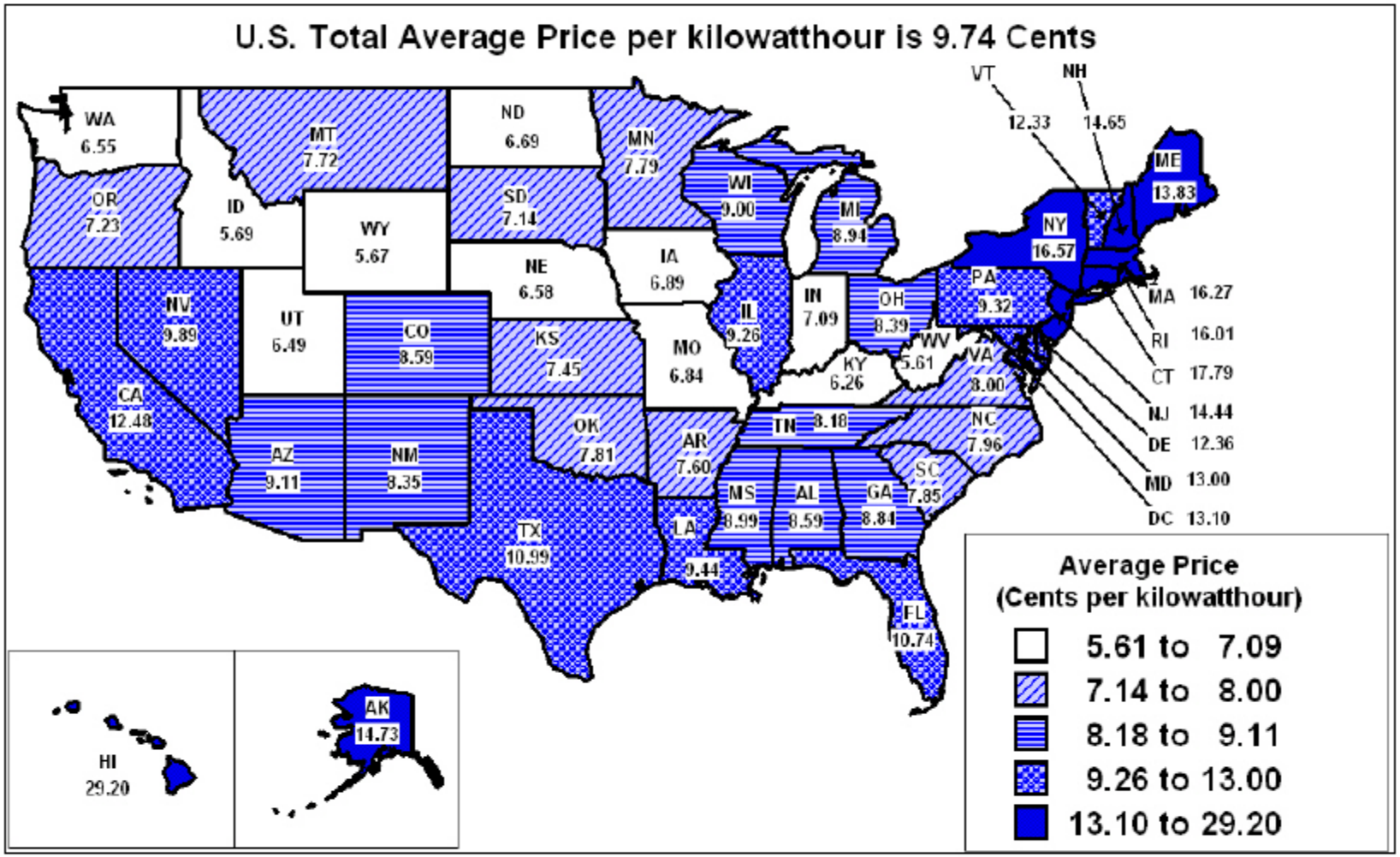
Cost of Energy

Levelized Cost of Energy: $/MWh



Source: New Energy Finance, 2009

Average Retail Price of Electricity by State, 2008



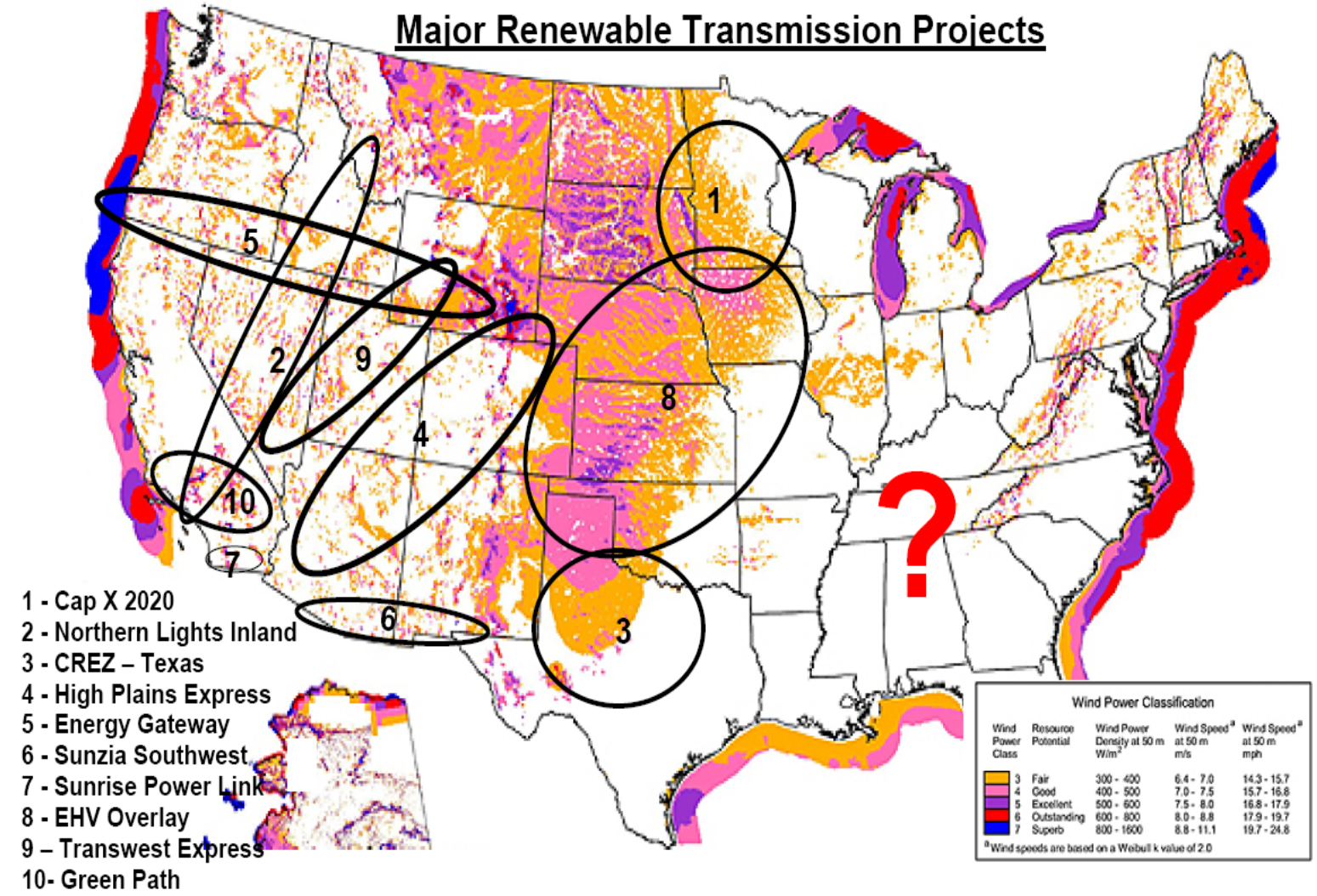
Note: Data are displayed as 5 groups of 10 States and the District of Columbia.

Source: Energy Information Administration, 2010

Transmission – Major Backlogs

- California had over 13,000 MW of wind energy waiting to connect to the grid
- 70,000 MW of wind energy waiting to interconnect in the upper Midwest
- 40,000 MW of wind energy in the lower Midwest
- 40,000 MW of wind energy in the Great Lakes/Mid-Atlantic
- 50,000 MW of wind energy in Texas

Transmission and Wind Resources



Source: Acciona, 2010

Solutions

Policy Solutions

- Federal Incentives– Taxes, Grants, Loans
- Other Financial Incentives
- Federal Renewable Fuel Mandate
- Renewable Portfolio Standards
- Infrastructure and Permitting

Federal Tax Incentives

- IRC Section 45 Production Tax Credit
- IRC Section 48 Production Tax Credit
- RE Manufacturer's Tax Credit
- Accelerated and Bonus Depreciation
- Ethanol Production, Use and Sale
- Alternative Fuel Mixture Credit
- Cellulosic Biofuel Producer Tax Credit

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Other Federal Incentives

- DoE Loan Guaranty Program
  - 1703– federal loans for innovative technology
  - 1705– support financing for commercial technology
- ARPA-E grants
- Treasury Grant Program
  - In lieu of tax credits

Renewable Fuel Standard

- Energy Security Act of 2007 increased Renewable Fuels Standard to 36 billion gallons by 2022
- Set mandatory blend levels for renewable fuels and establishes GHG reduction criteria
- RF producers required to register with the EPA
- Regulations apply to refiners, blenders and importers

Year	Cellulosic Biofuel	Biomass-Based Diesel	Other Advanced Biofuel[1]	Total Advanced Biofuel	Other Biofuel[2]	Total Renewable Fuel
2006					*4.0*	**4.0**
2007					*4.7*	**4.7**
2008					*9.0*	**9.0**
2009		0.5	*0.1*	0.6	*10.5*	**11.1**
2010	0.10	0.65	*0.2*	0.95	*12.0*	**12.95**
2011	0.25	0.8	*0.3*	1.35	*12.6*	**13.95**
2012	0.50	1.0	*0.5*	2.0	*13.2*	**15.2**
2013	1.00	1.0	*1.75*	2.75	*13.8*	**16.55**
2014	1.75	1.0	*2.0*	3.75	*14.4*	**18.15**
2015	3.00	1.0	*2.5*	5.5	*15.0*	**20.5**
2016	4.25	1.0	*3.0*	7.25	*15.0*	**22.25**
2017	5.50	1.0	*3.5*	9.0	*15.0*	**24.0**
2018	7.00	1.0	*4.0*	11.0	*15.0*	**26.0**
2019	8.50	1.0	*4.5*	13.0	*15.0*	**28.0**
2020	10.50	1.0	*4.5*	15.0	*15.0*	**30.0**
2021	13.50	1.0	*4.5*	18.0	*15.0*	**33.0**
2022	16.00	1.0	*5.0*	21.0	*15.0*	**36.0**

Source: Energy Independence and Security Act of 2007 (HR 6)

Note: Values in *italics* calculated from RFS values as found in the 2007 Act.

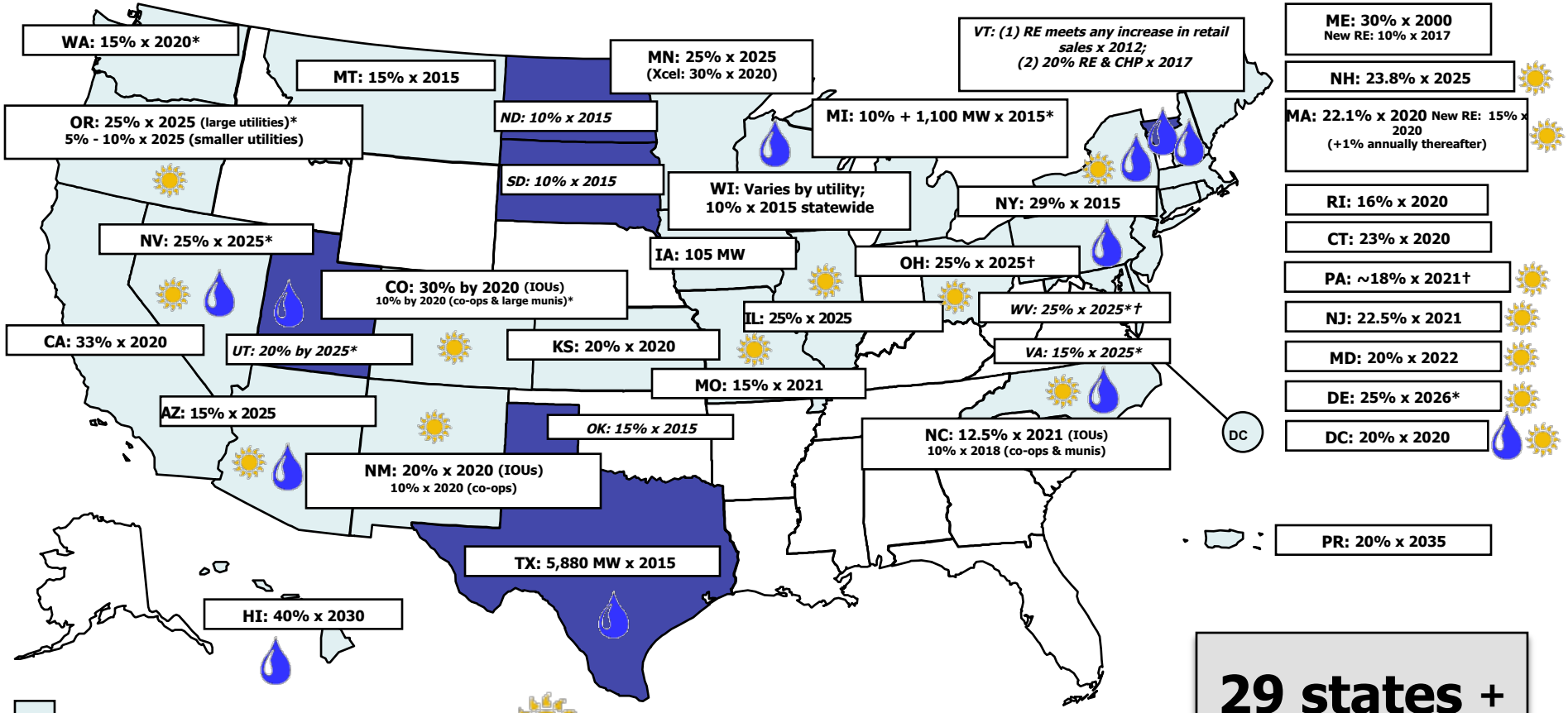
[1] Other Advanced Biofuel = Advanced Biofuel – Cellulosic Biofuel – Biomass-Based Diesel

[2] Other Biofuel = Total Renewable Fuel – Total Advanced Biofuel

Source: www.EPA.gov - EPA presentation on Energy Independence and Security Act of 2007: Key Provisions Affecting Combined Heat and Power.

Renewable Portfolio Standards

www.dsireusa.org / October 2010



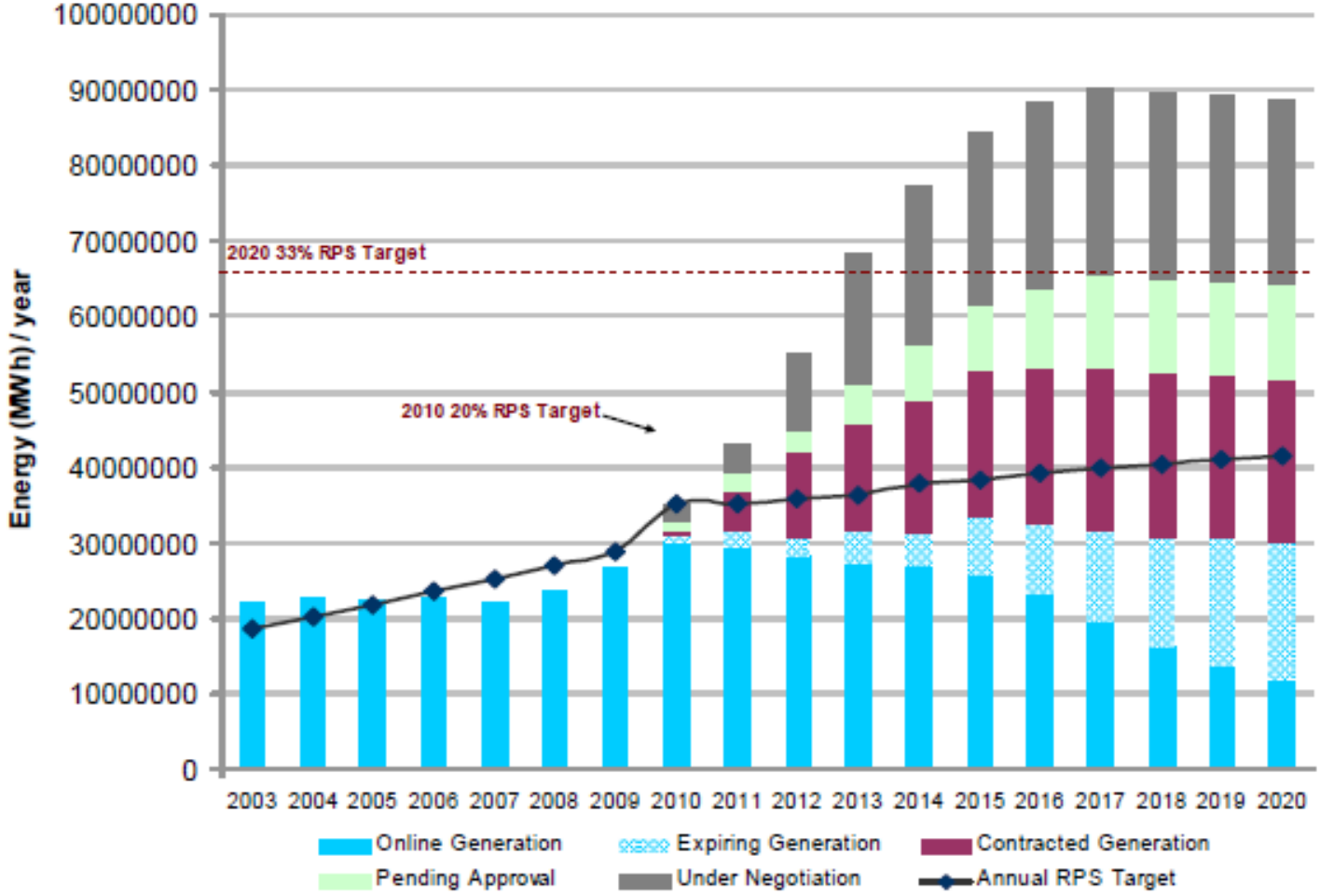
29 states + DC and PR have an RPS
(7 states have goals)

California RPS: 20% (Headed to 33%)

- IOUs to achieve 20% or financial penalty
- Major municipals have instituted programs
- Proposed 33% by 2020
- Currently 15% average
- RFO process
- Results in long-term power purchase agreements
  - Terms up to 25 years
  - Fixed price (with TOU variation)
  - MPR

Utility Compliance with RPS

IOUs Actual and Forecasted RPS Generation



Source: California Public Utilities Commission, 2nd Quarter 2010

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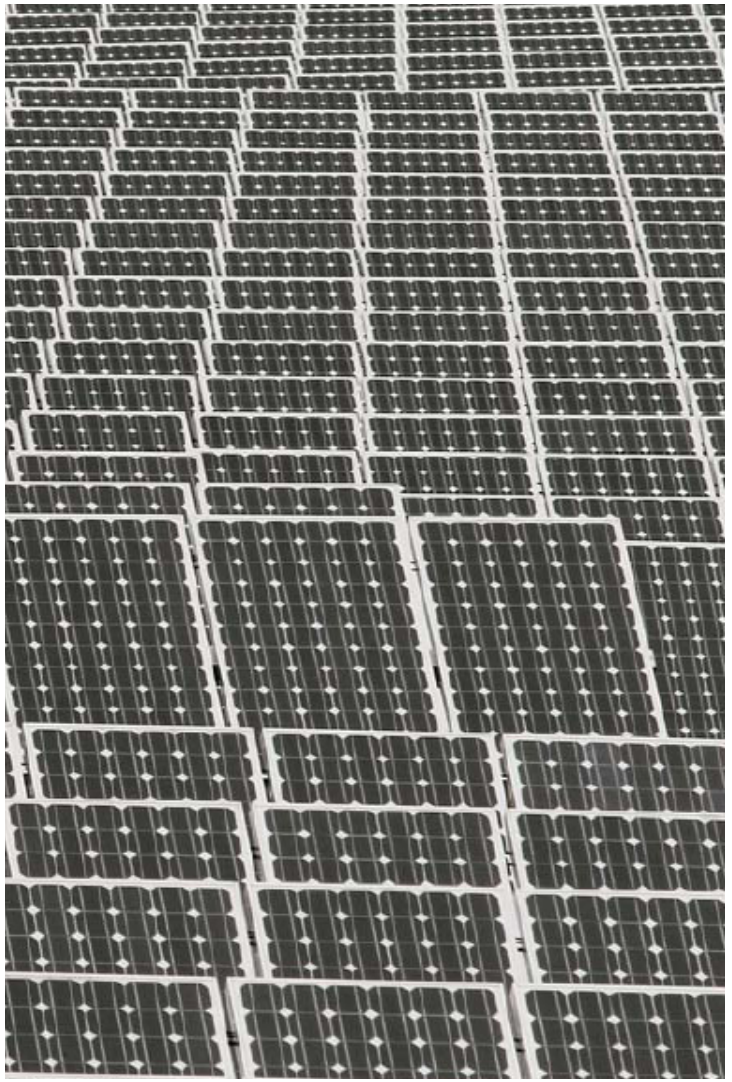
Other State Incentives

- Property tax exemptions
- California Solar Initiative (2006)
- Global Warming Solutions Act (AB32) (2006)
- Feed in Tariff (2010)



Infrastructure and Siting

- Federal Transmission Policy– National Security Corridors
- BLM Programmatic Approach
- Offshore Leases– Authority of DOI and FERC
- State Programs
  - CREZ, RETI
  - Expedited CEC Siting

What Else?

- Federal RES?
- Cap and Trade or Carbon Tax?
- Federal FIT?
- Federal Transmission Siting?

US Energy Bills/Climate Change Initiatives

Bill	Number	Sponsor(s)	Status
American Clean Energy and Security Act	H.R. 2454	Waxman-Markey	Jul 7, 2009: Read the second time. Placed on Senate Legislative Calendar under General Orders.
Clean Energy Jobs and American Power Act	S. 1733	Kerry-Boxer	Feb 2, 2010: Placed on Senate Legislative Calendar under General Orders. Calendar No. 267.
American Clean Energy Leadership	S. 1462	Bingaman	Jul 16, 2009: Placed on Senate Legislative Calendar under General Orders. Would require 15% renewable electric standard for large utilities.
Clean Energy Partnerships Act	S. 2729	Stabenow	Nov 5, 2009: Sponsor introductory remarks on measure. (S11202-11203)
Clean Energy Act	S. 2776	Alexander-Webb	Nov 16, 2009: Read twice and referred to the Committee on Energy and Natural Resources.
Carbon Limits and Energy for American's Renewal Act	S. 2877	Cantwell- Collins	Dec 11, 2009: Read twice and referred to the Committee on Finance.

Example
DoE Study on the Future of Wind Energy – 20% by 2030

Scope and Findings

- Department of Energy study in 2008 re requirements to achieve 20% Wind Energy Generation by 2030
- Focus on federal policies necessary to meet a wind penetration target

Primary Findings

- 20% wind electricity would require about 300 GW (300,000 MW) of wind generation
- Affordable, accessible wind resources available across the nation
- Cost to integrate wind modest
- Emissions reductions and water savings
- Transmission a challenge

Policies Considered

- Current State RPS
- Continuation of Tax Credits
- Areas of Change:
  - Federal RES
  - Carbon Pricing

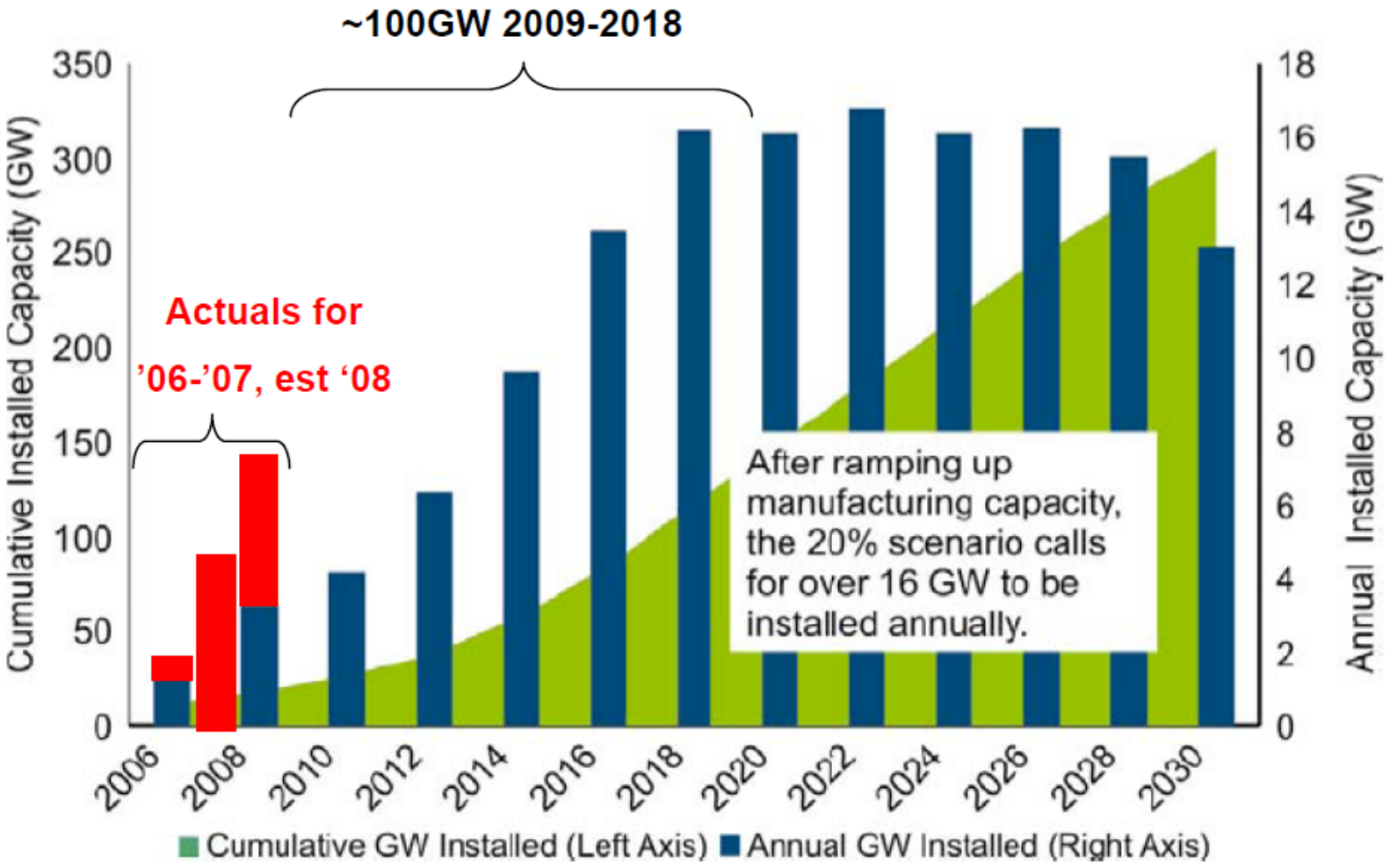
National RES Model

Case	Target	Load Impacted	Efficiency Allowed?
Low	15% by 2020	72%	No
Medium	20% by 2020	72%	Yes—up to 5%
High	25% by 2025	85%	No

Carbon Policies Model

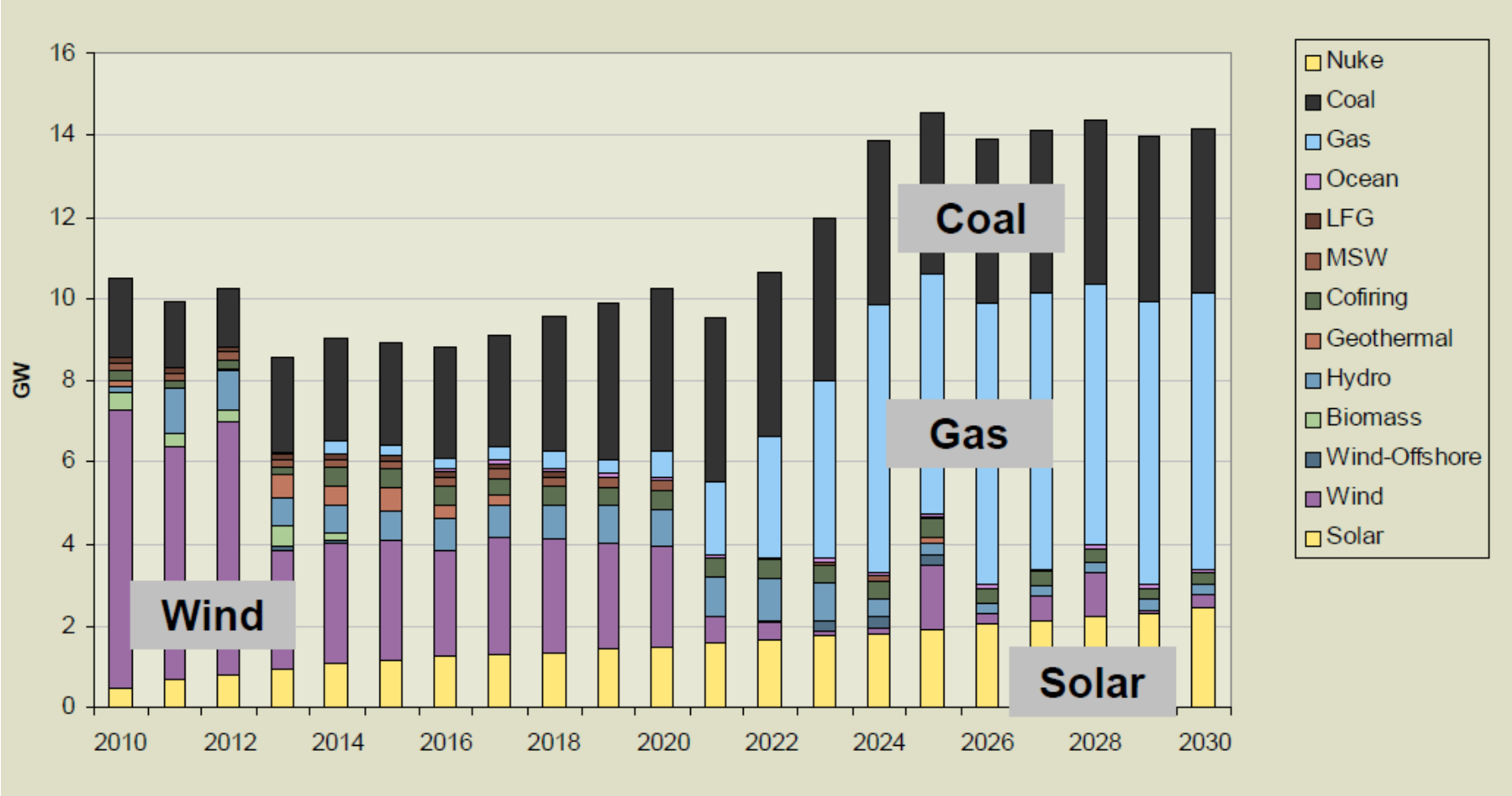
Case	Target (1990 Base)	Carbon Price		Policy Basis
		2015	2030	
Low	Equal by 2030	12	30	Bingaman Specter
Medium	50% lower by 2050	20	50	Lieberman Warner Boxer
High	80% lower by 2050	30	75	Sanders Boxer

Growth Path for Wind



Source: DOE, AWEA. enXco 2009

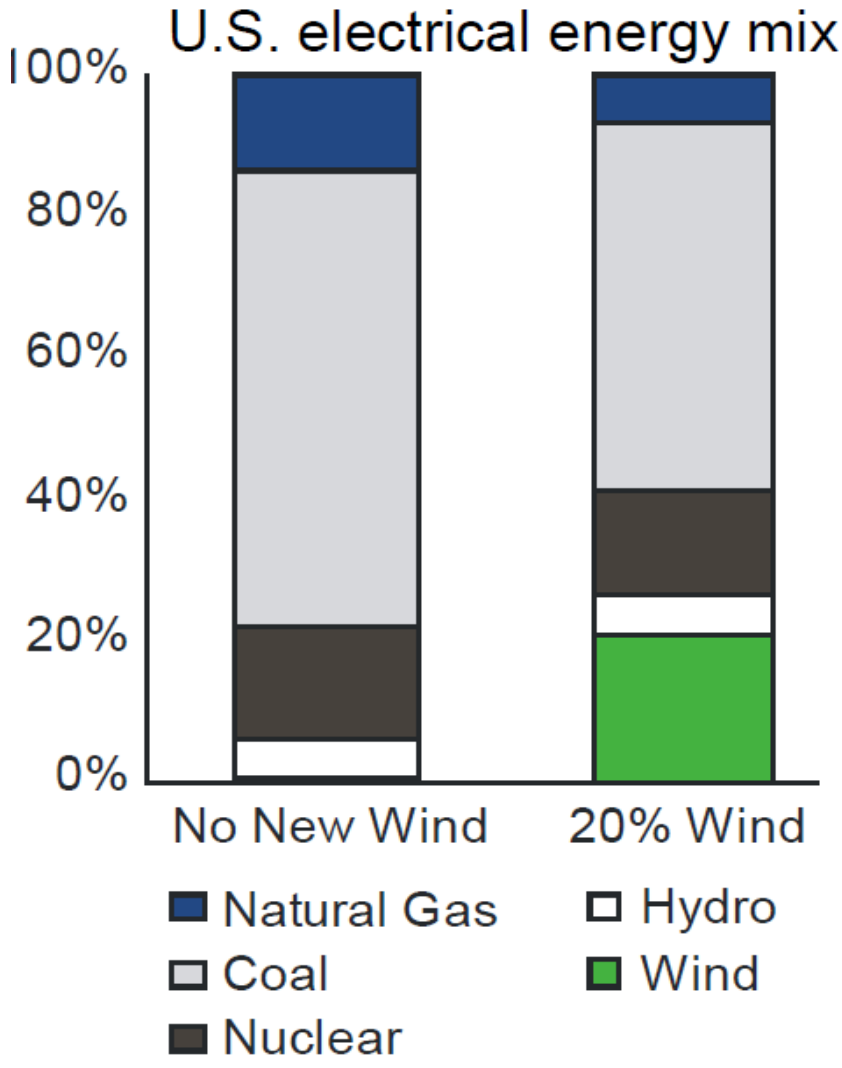
Base Case - Capacity



Source: Black & Veatch, 2010

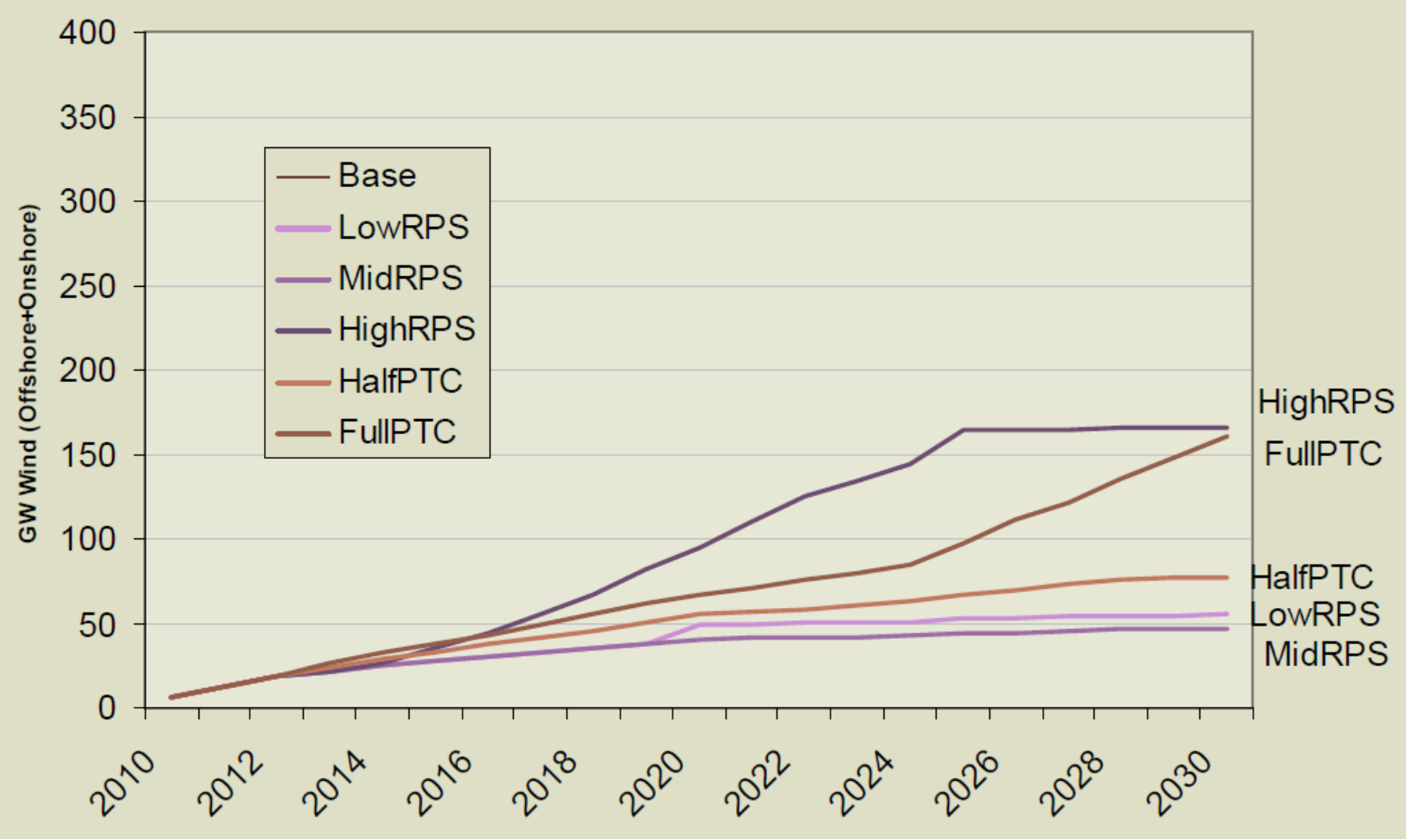
20% Wind Scenario Impact on Generation Mix in 2030

- Reduces electric utility natural gas consumption by 50%
- Reduces total natural gas consumption by 11%
- Natural gas consumer benefits: $86-214 billion*
- Reduces electric utility coal consumption by 18%
- Avoids construction of 80 GW of new coal power plants



Source: DOE, AWEA. enXco 2009

Results of RPS, RES



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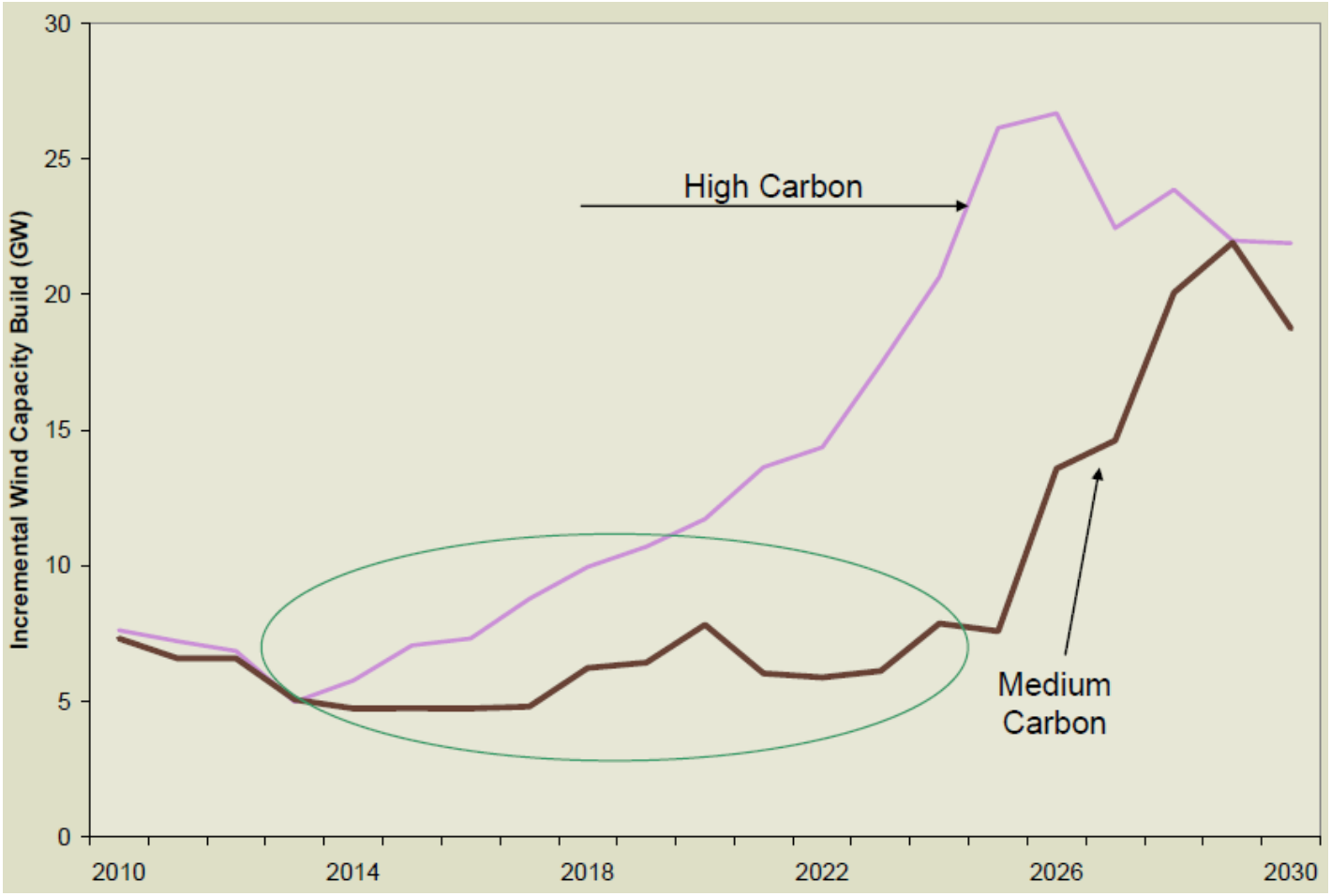
Carbon Price Initially a Weak Driver



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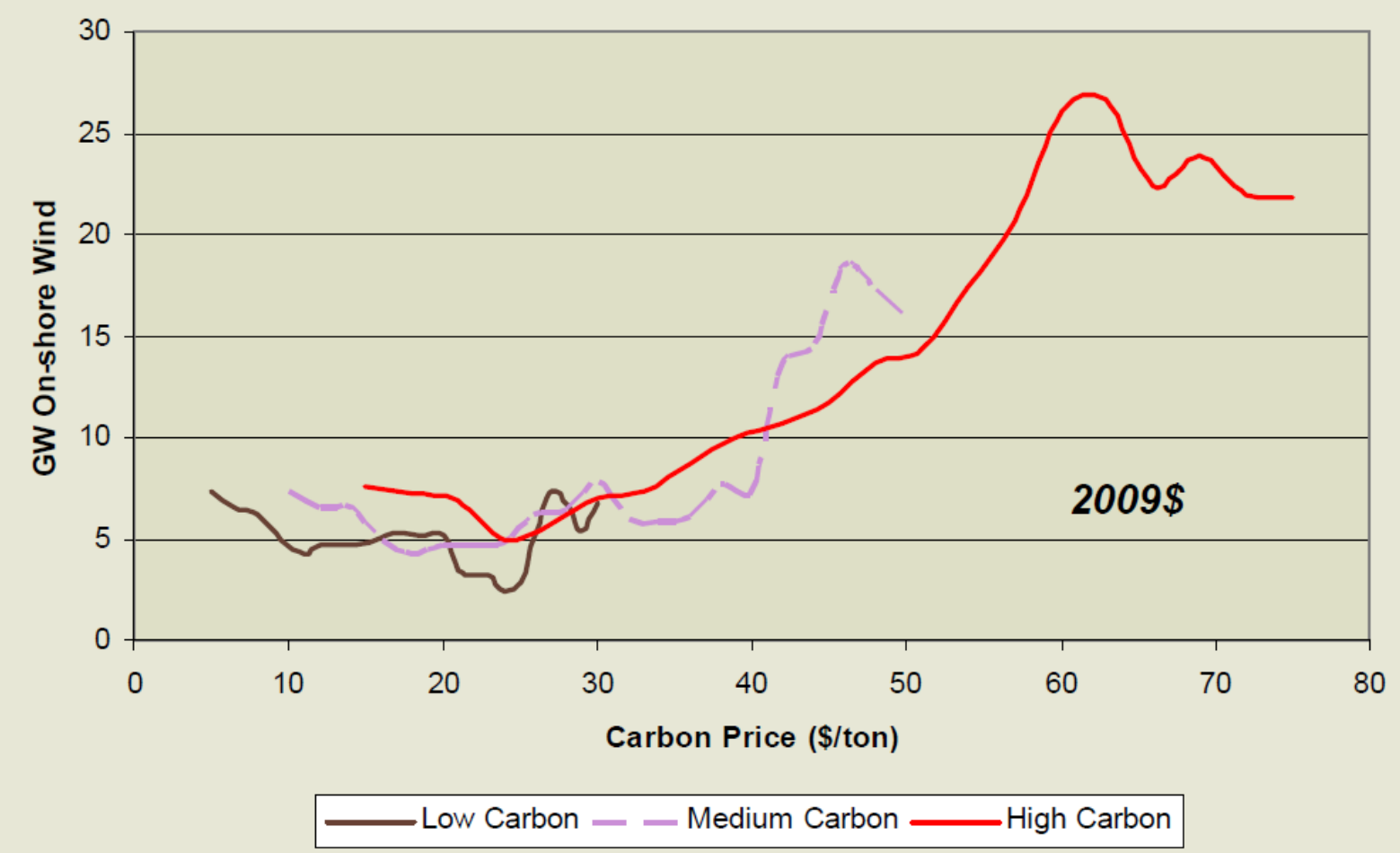
Carbon Price Effect



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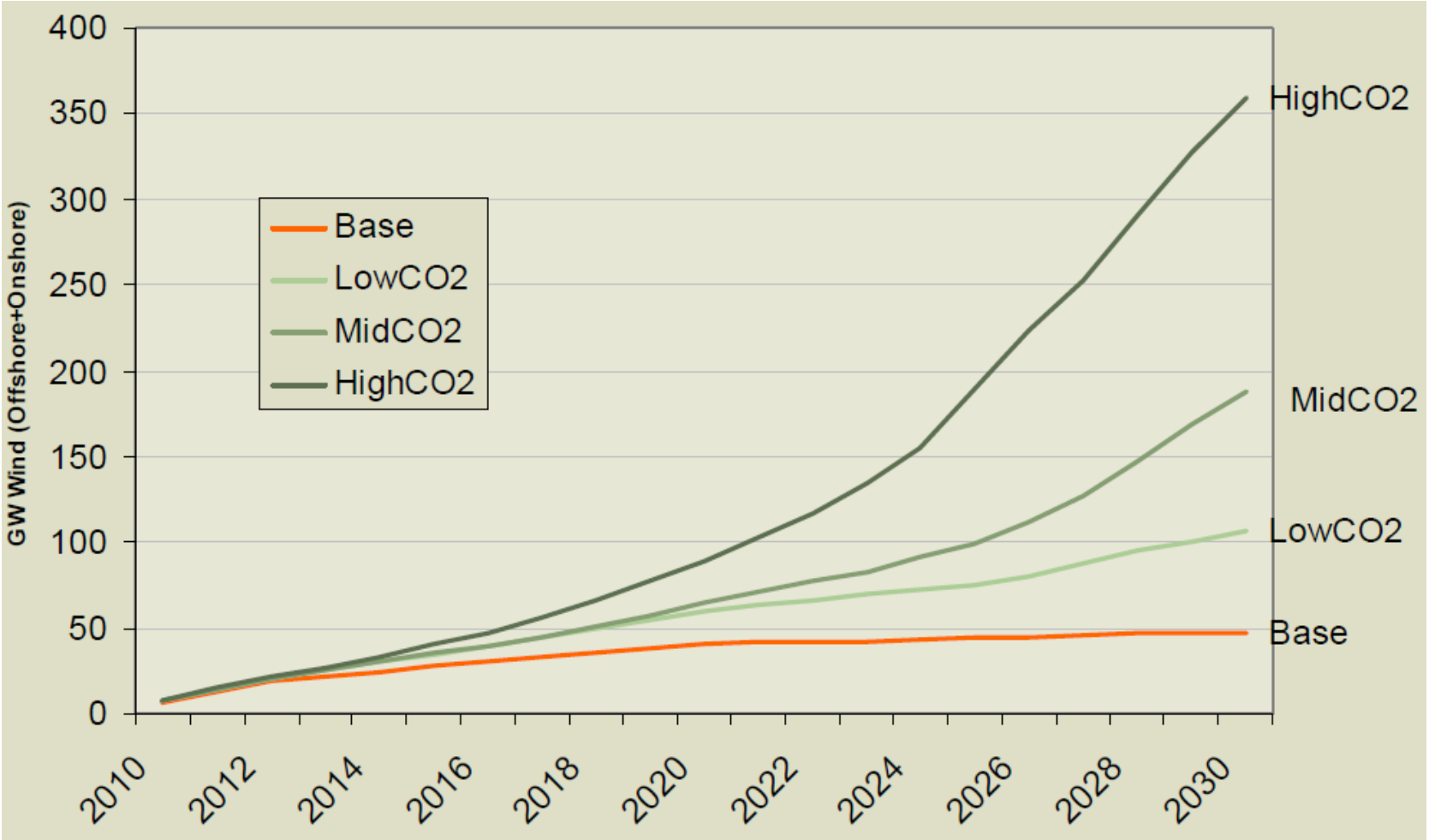
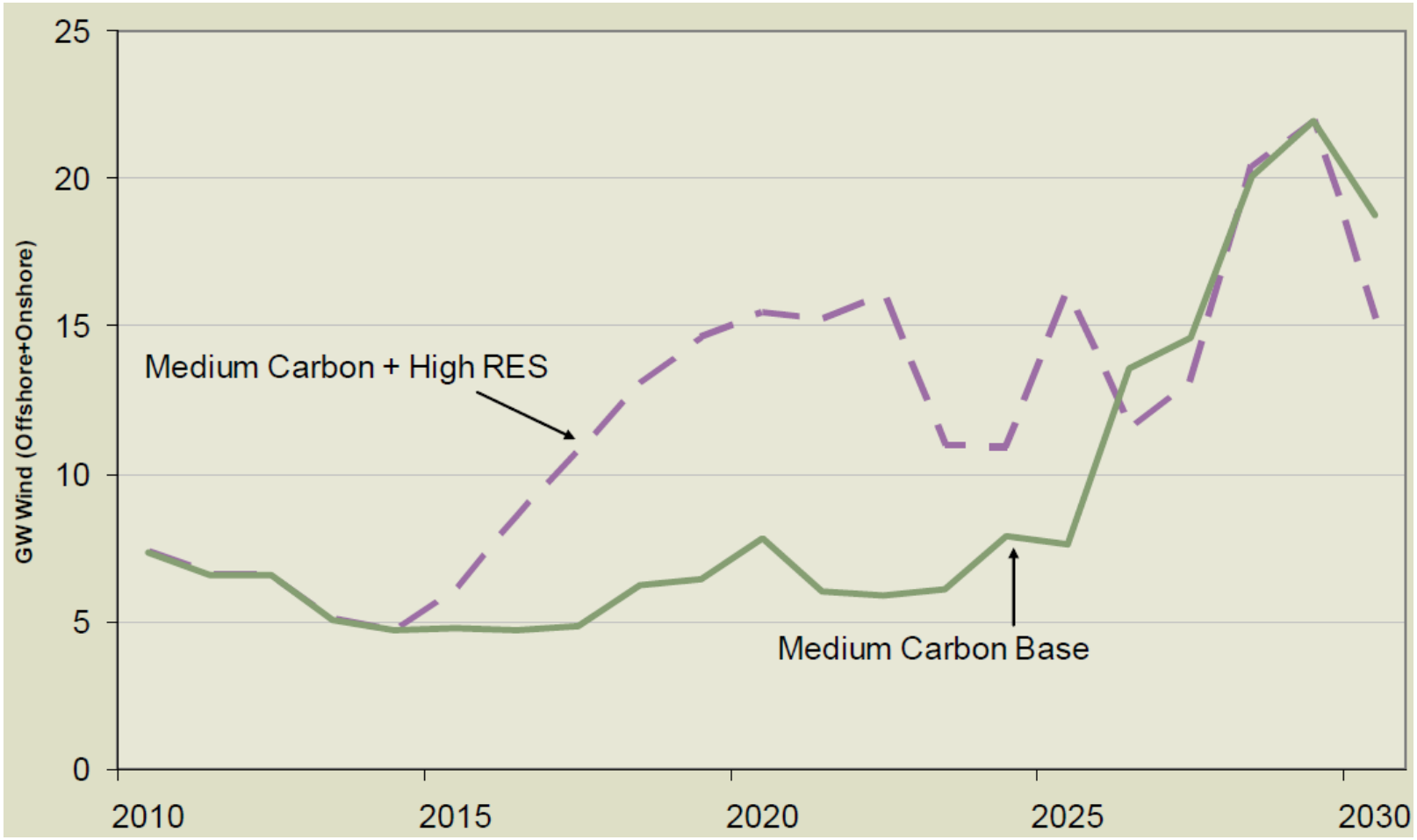
CO2 Results



Source: Black & Veatch, 2010

Medium Carbon + High RES = Steady Growth



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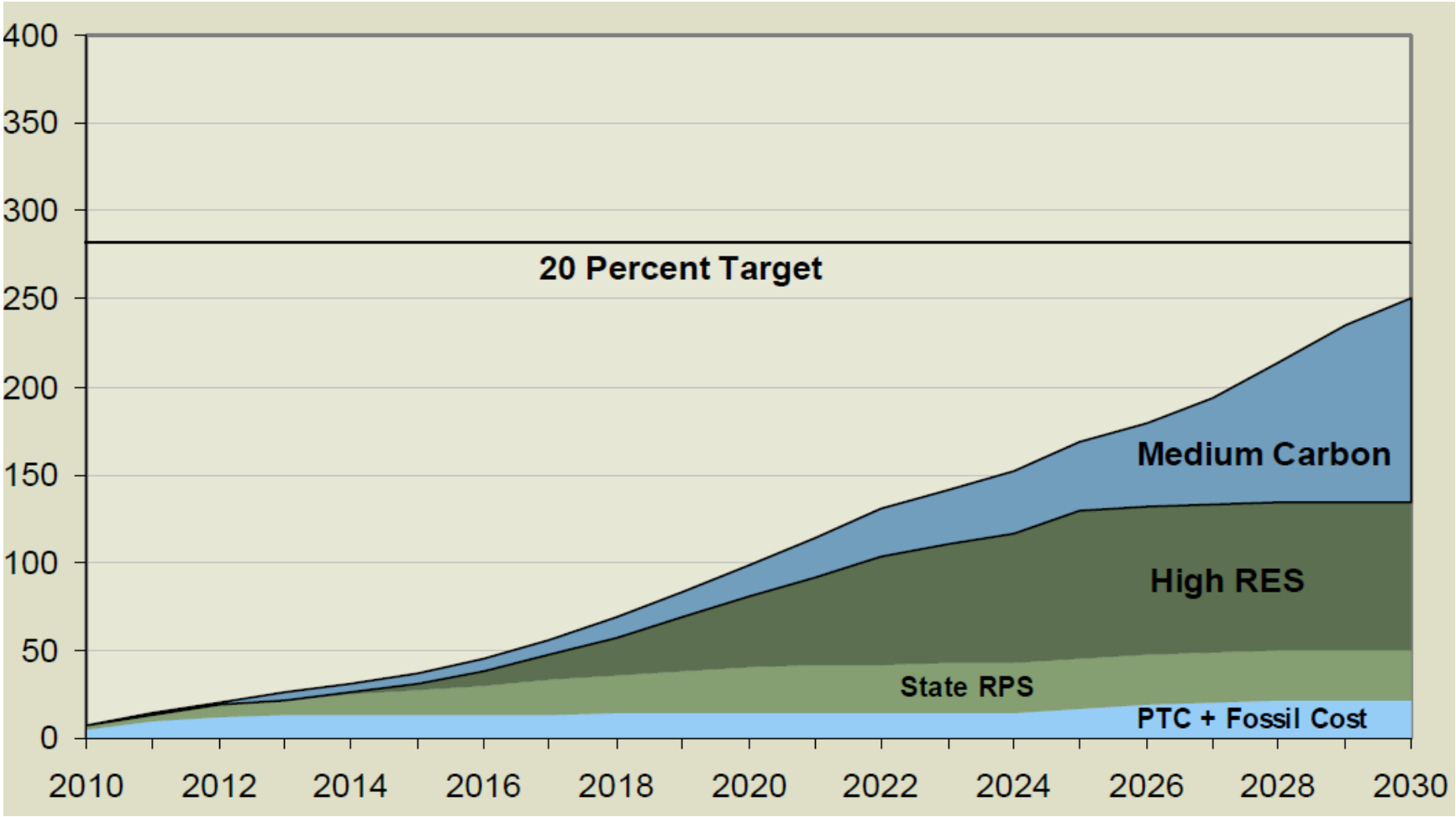
Policy Contributions Toward Goals



Source: Black & Veatch, 2010

Questions?

About the Presenter

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Ed Feo is a founder and managing partner of USRG Renewable Finance. USRGRF provides long term financing to renewable energy projects. Previously, Ed was a partner in the international law firm of Milbank, Tweed, Hadley & McCloy LLP and headed the Firm's Power & Energy practice.

Mr. Feo was named in 2010 by the *National Law Journal* as one of "The Most Influential Lawyers of the Decade" for his work on energy and environmental transactions. He has been named in the *California Lawyer* magazine as an "Attorney of the Year" in the Energy category and by *The American Lawyer* as a "Deal Maker of the Year." He was named as one of the Top 100 Lawyers in California by *The Daily Journal* in 2006, 2007, 2008 and 2009, and was named one of the "Five Most Influential People in Renewable Energy" in 2008 by *Institutional Investor*.

Mr. Feo is a well known speaker at renewable energy conferences, including at the American Wind Energy Association annual conference, the European Wind Energy Association annual conference, the National Renewable Energy Laboratory Growth Forum, Solar Power International, the American Council on Renewable Energy annual conference, the Geothermal Resources Council, the World Renewable Energy Conference, the Renewable Energy Finance Forum, and numerous other industry events. He is also a frequent writer on renewable energy topics, including as a columnist for *North American Clean Energy* and as a contributor to *Reuter's/PFI Clean Energy Finance*. He is on the board of editors of *The Journal of Structured Finance*.

Mr. Feo graduated with a B.A. and J.D. from UCLA, and was elected to *Phi Beta Kappa*, the Board of Editors of the *UCLA Law Review* and Order of the Coif.