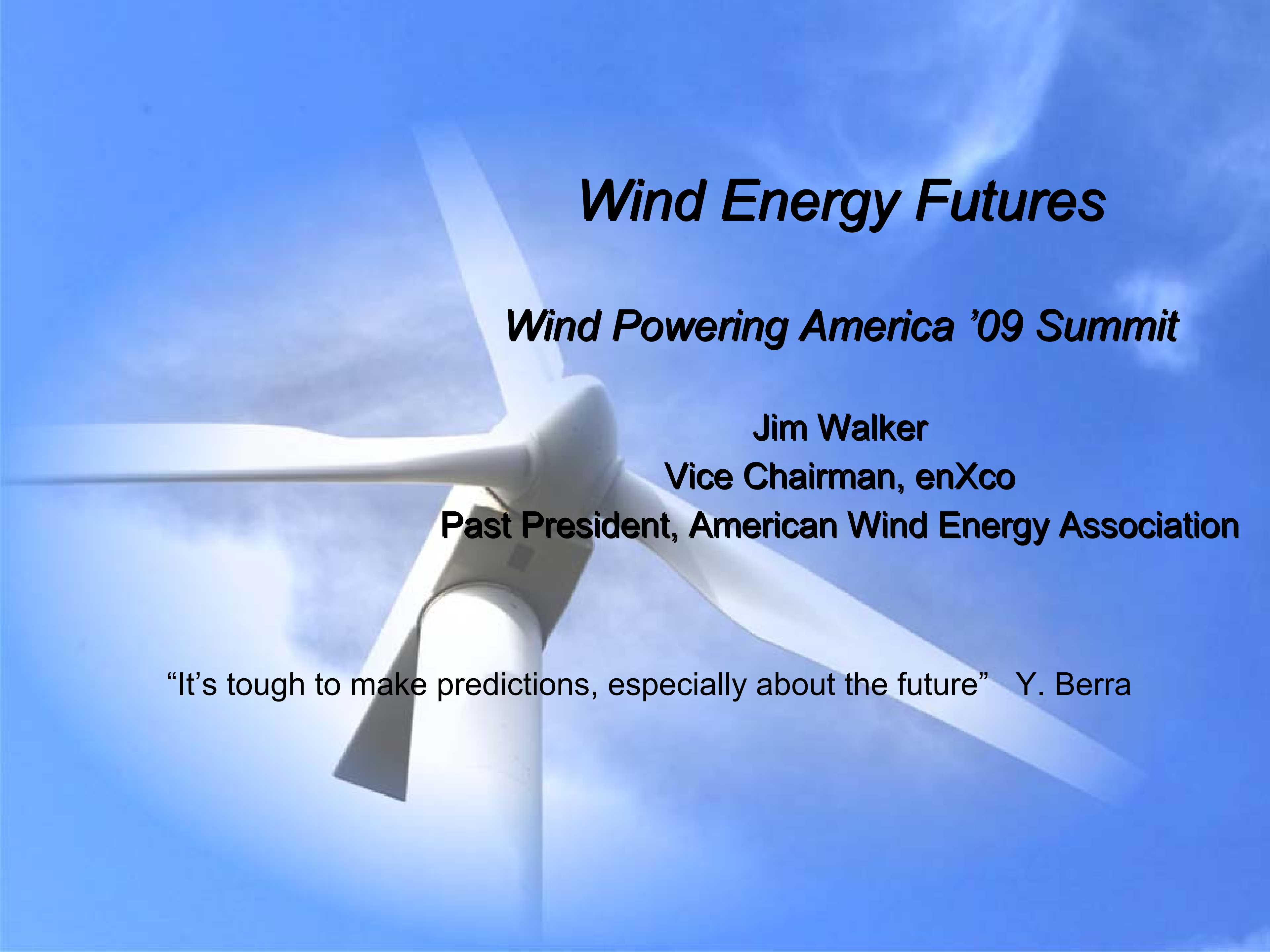


Wind Energy Futures

Wind Powering America '09 Summit

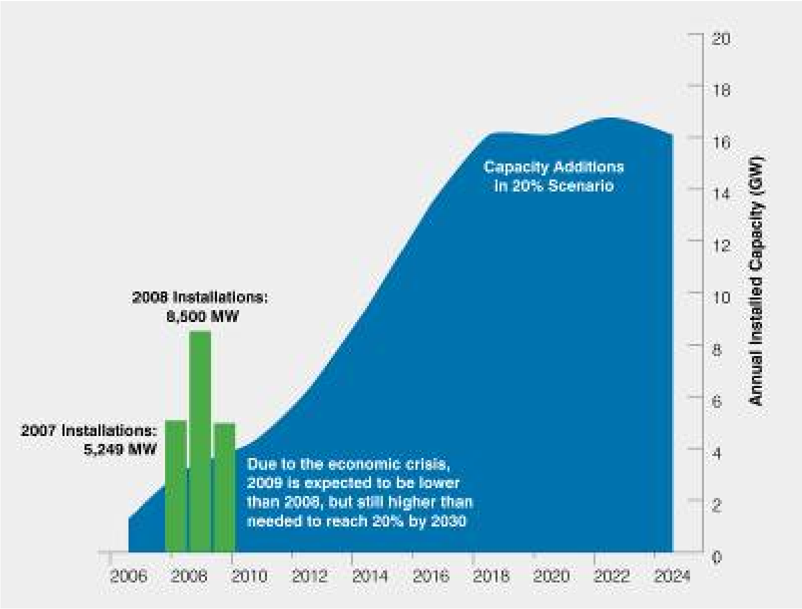
Jim Walker
Vice Chairman, enXco
Past President, American Wind Energy Association

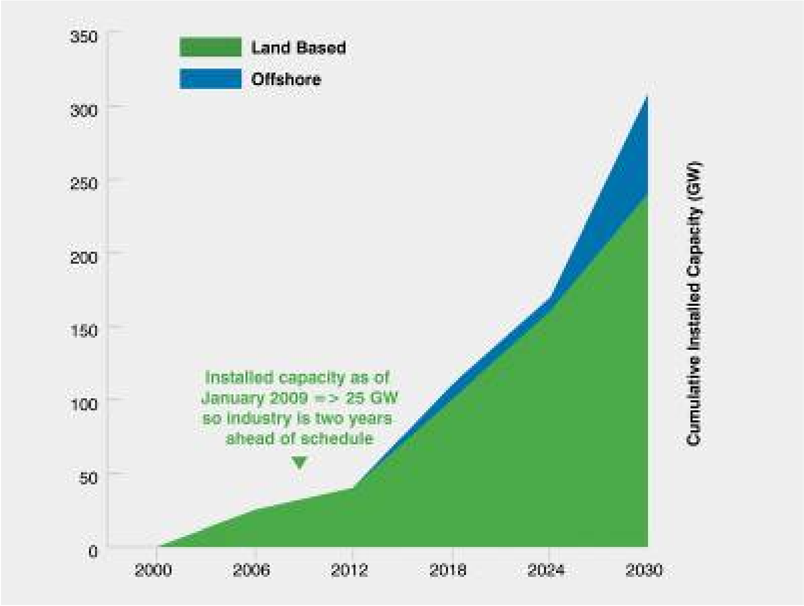
"It's tough to make predictions, especially about the future"   Y. Berra

Recent Developments

- Starting from 2Q08, the US installed over 9,500 MW in the past 12 months.
  - This is 60% of the installation rate needed to achieve the 20% Wind scenario
  - This rate was reached well ahead of schedule for the 20% Wind plan.
- In 2006, there was considerable skepticism about the feasibility of 20% Wind.
  - There was always a presumption of a stable federal policy
- At Windpower2009, the heads of Vestas, GE Wind, Airtricity, Invenergy all said 20% Wind is possible (with the above proviso)
  - The most urgent priority was for a strong Federal Renewable Electricity Standard (RES)

20% by 2030 Report Card

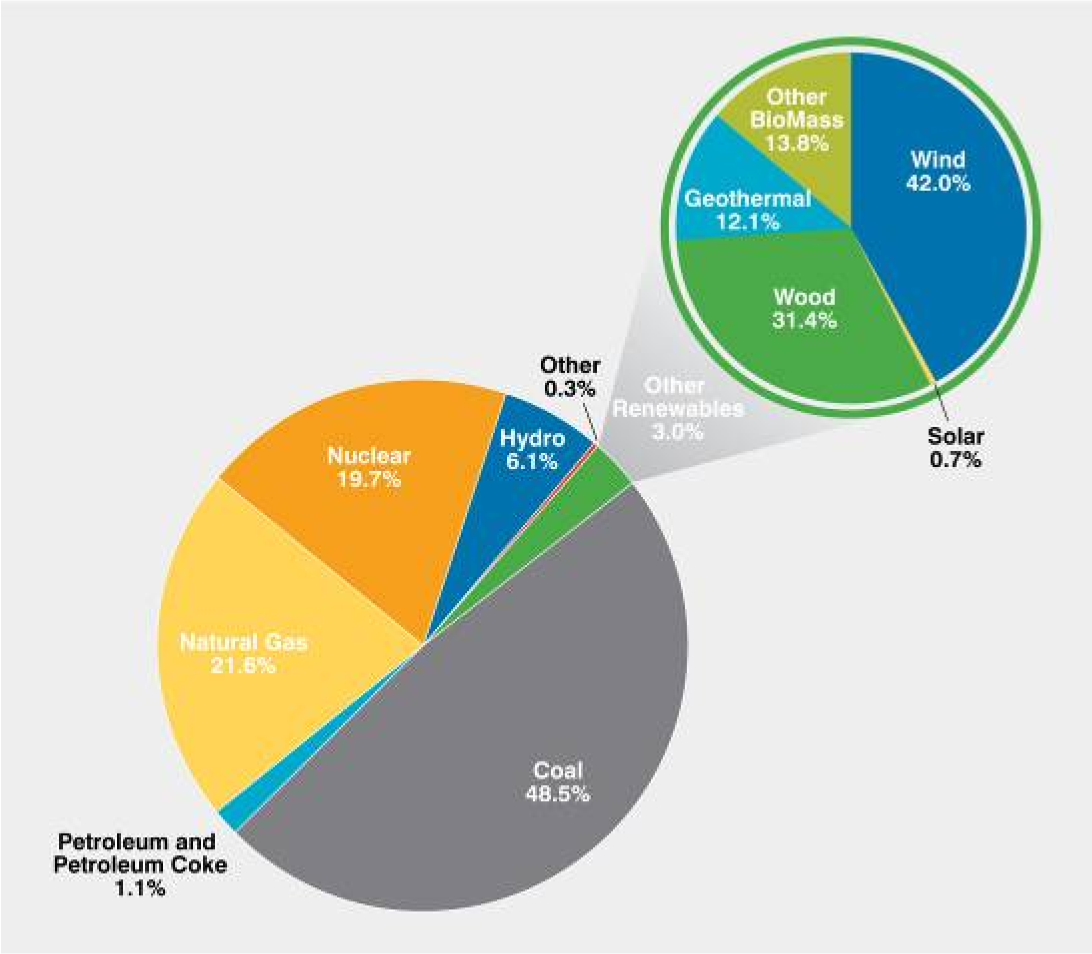




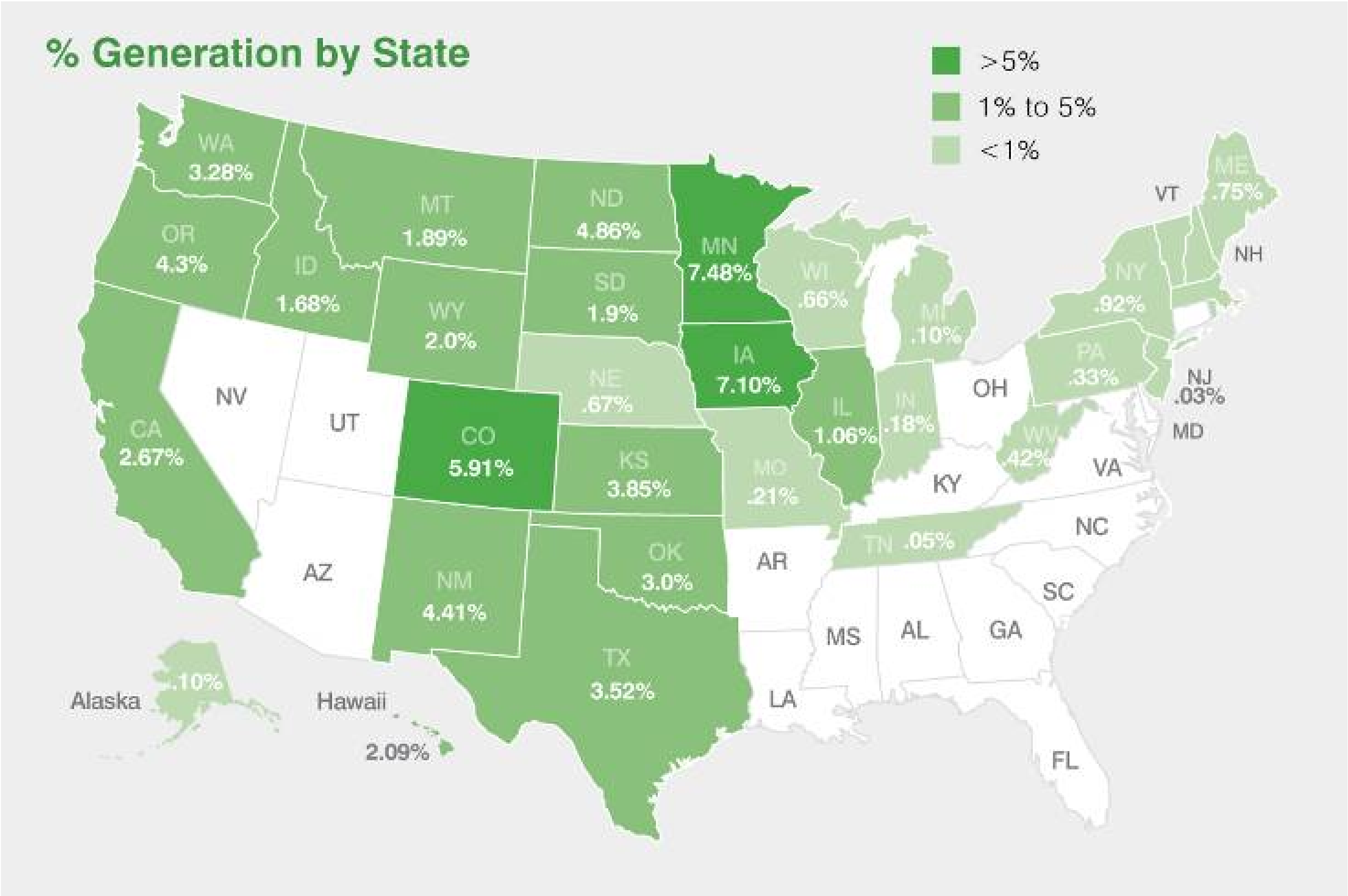
The U.S. installed more than twice the installations necessary in 2008 to get to 20% electricity generation by 2030. The cumulative capacity of 25.3 GW was not projected to be reached until late 2010.

U.S. Electricity Generation Mix

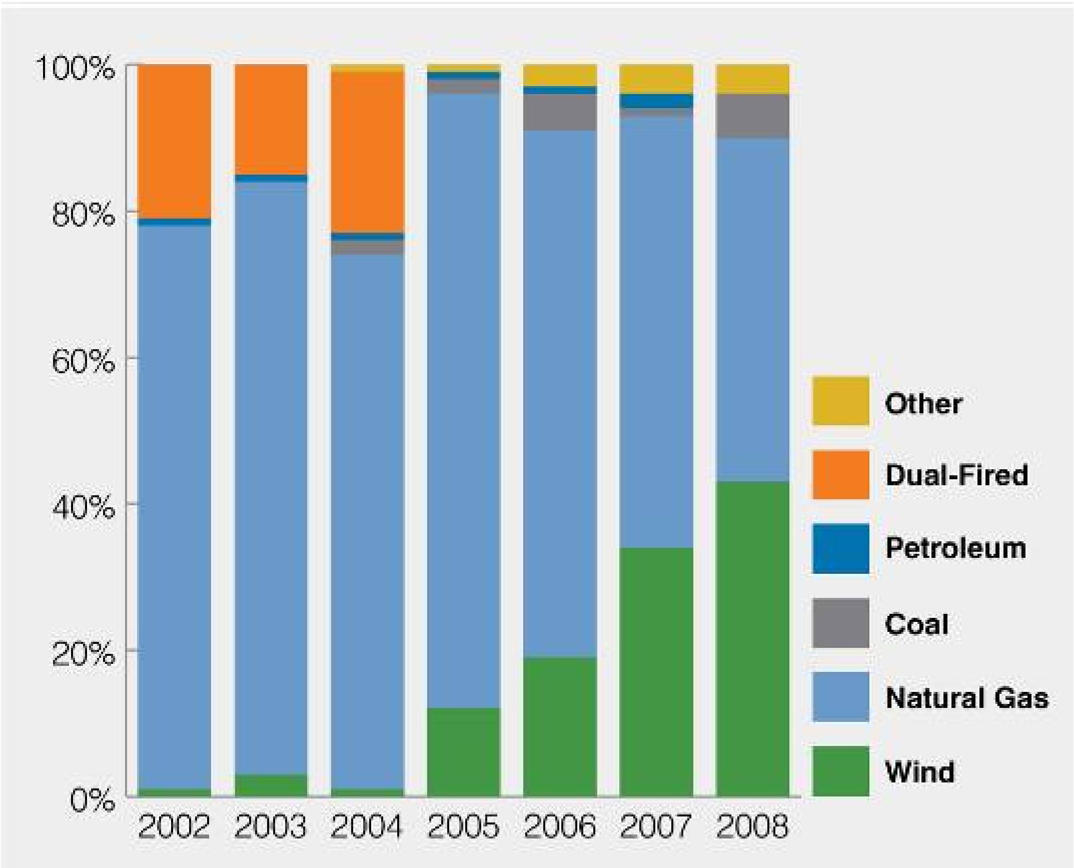
Wind power supplies a small, but quickly growing, percentage of the U.S. electricity mix.



Percent Generation by State

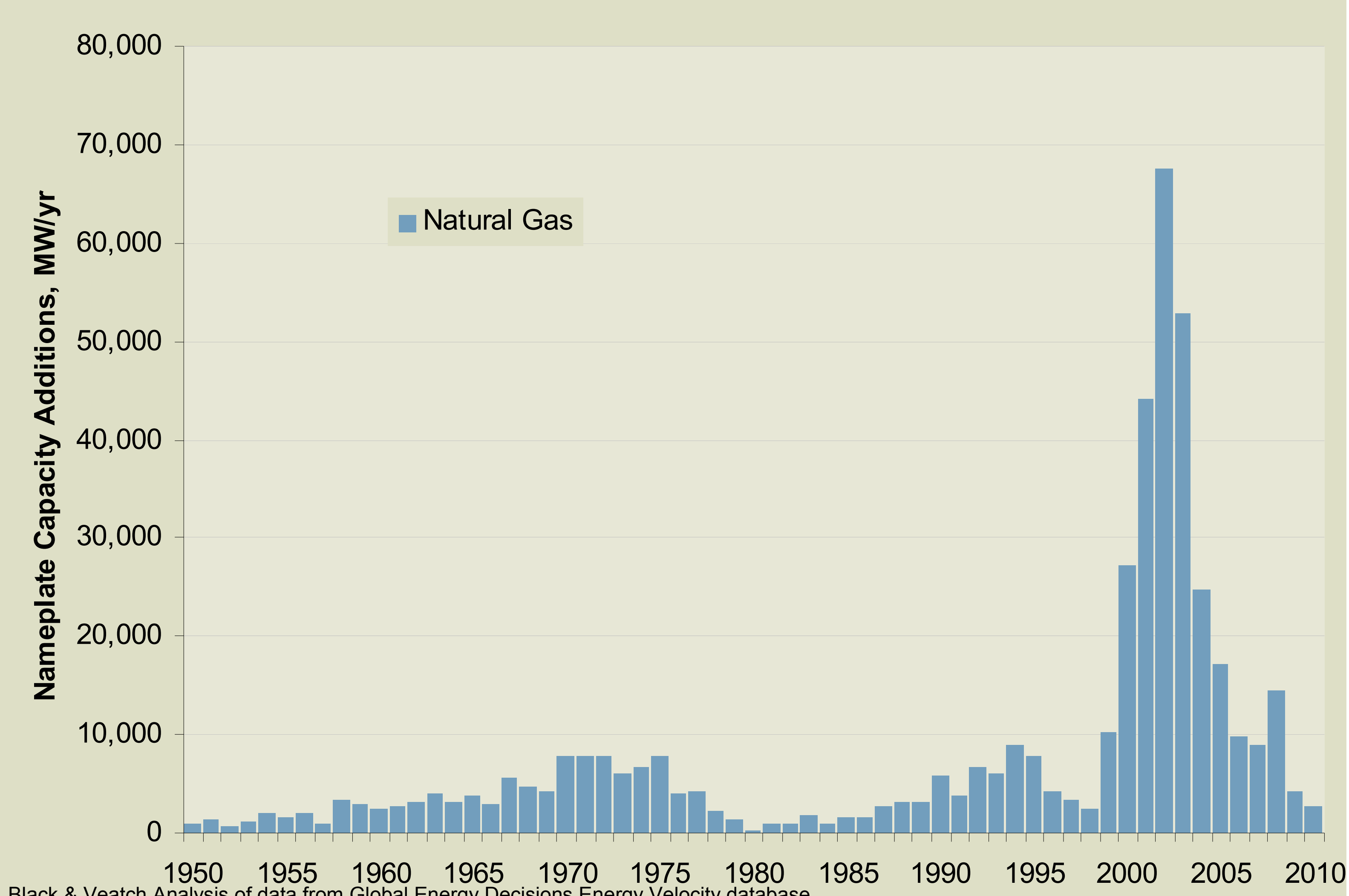


Percentage of Generation Added by Year



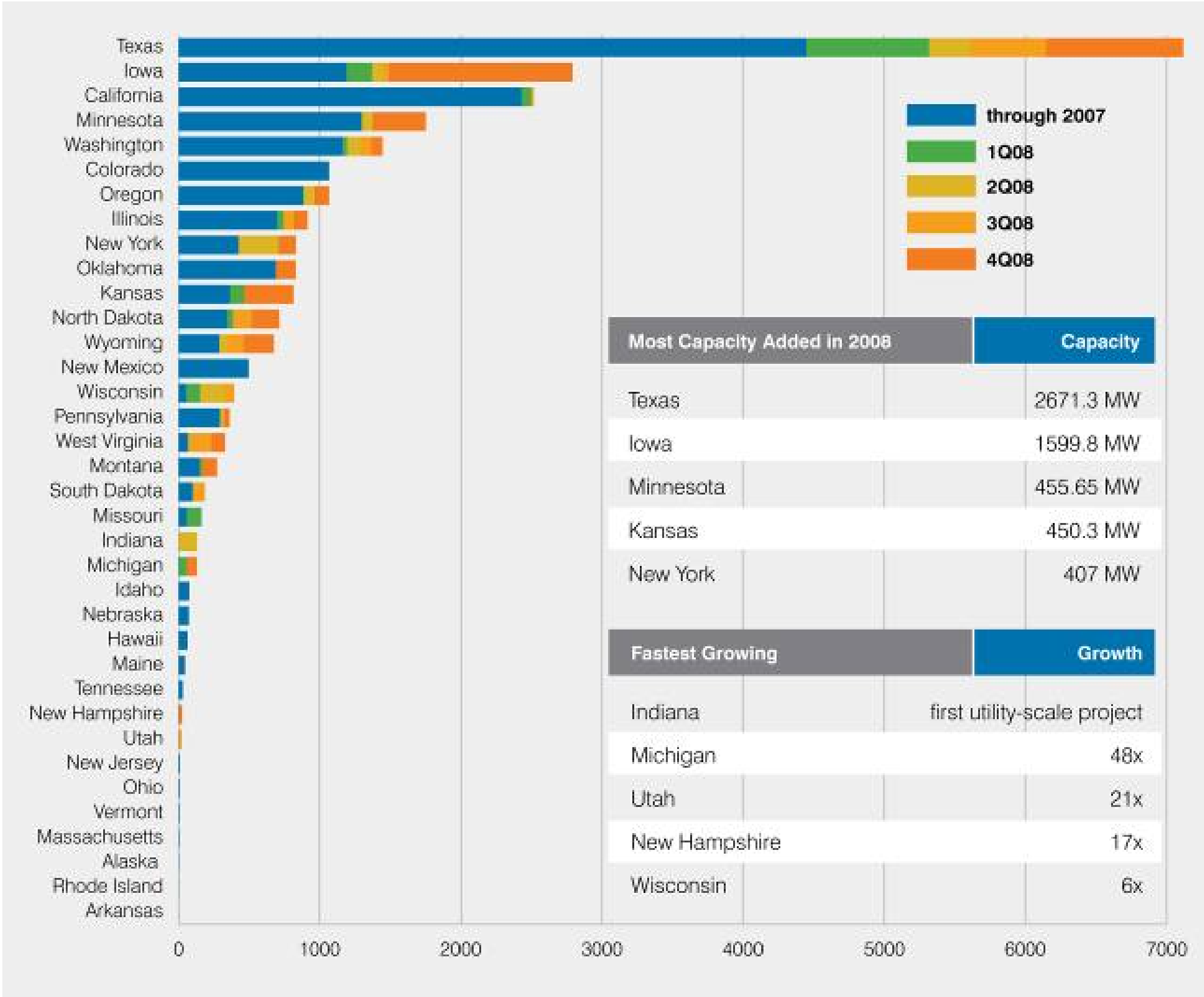
42% of all new generating facilities added in 2008 were wind power plants. Wind was second only to natural gas for the fourth year in a row.

Natural Gas Boom

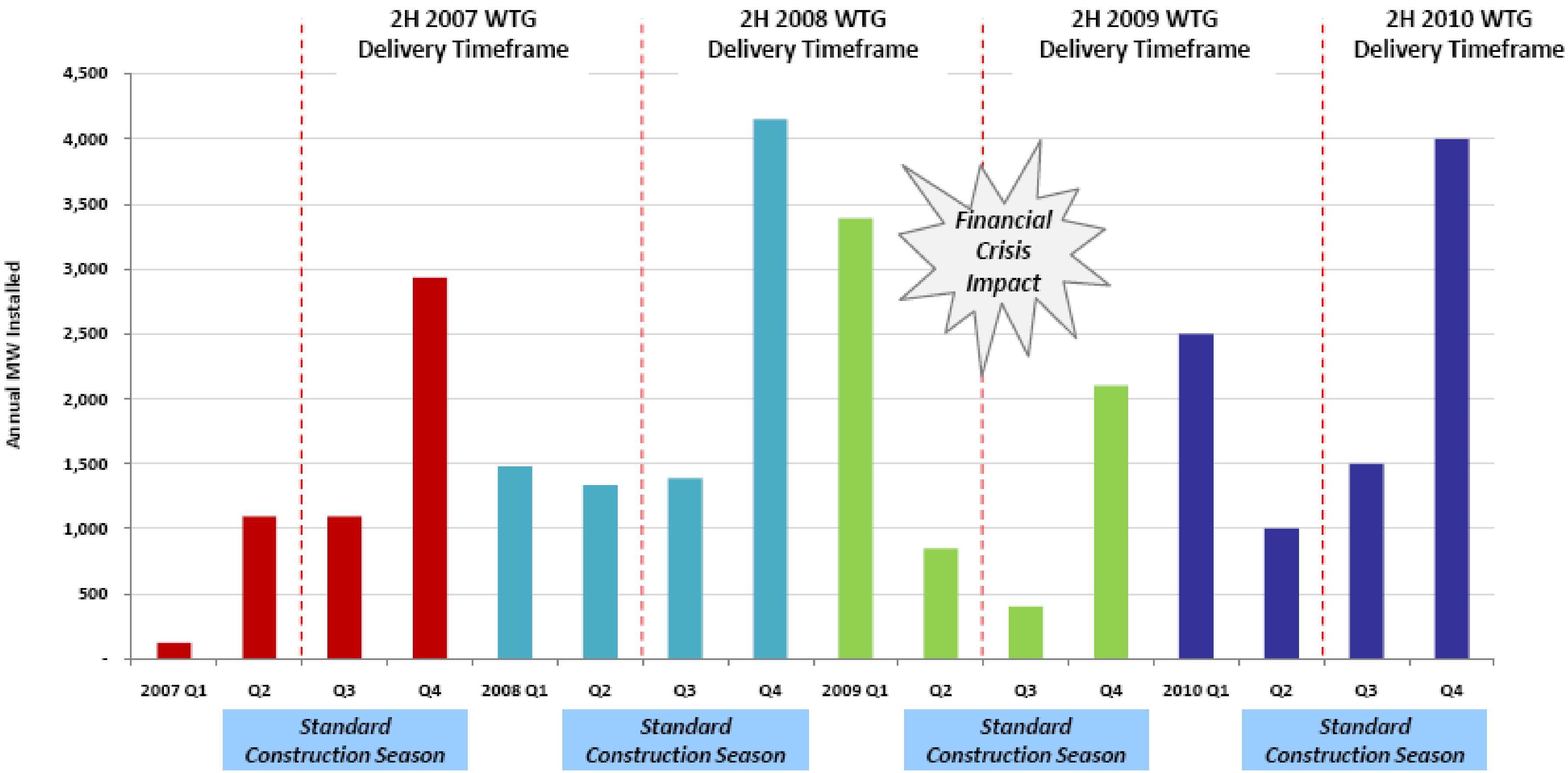


Black & Veatch Analysis of data from Global Energy Decisions Energy Velocity database

Wind Power Installations by State



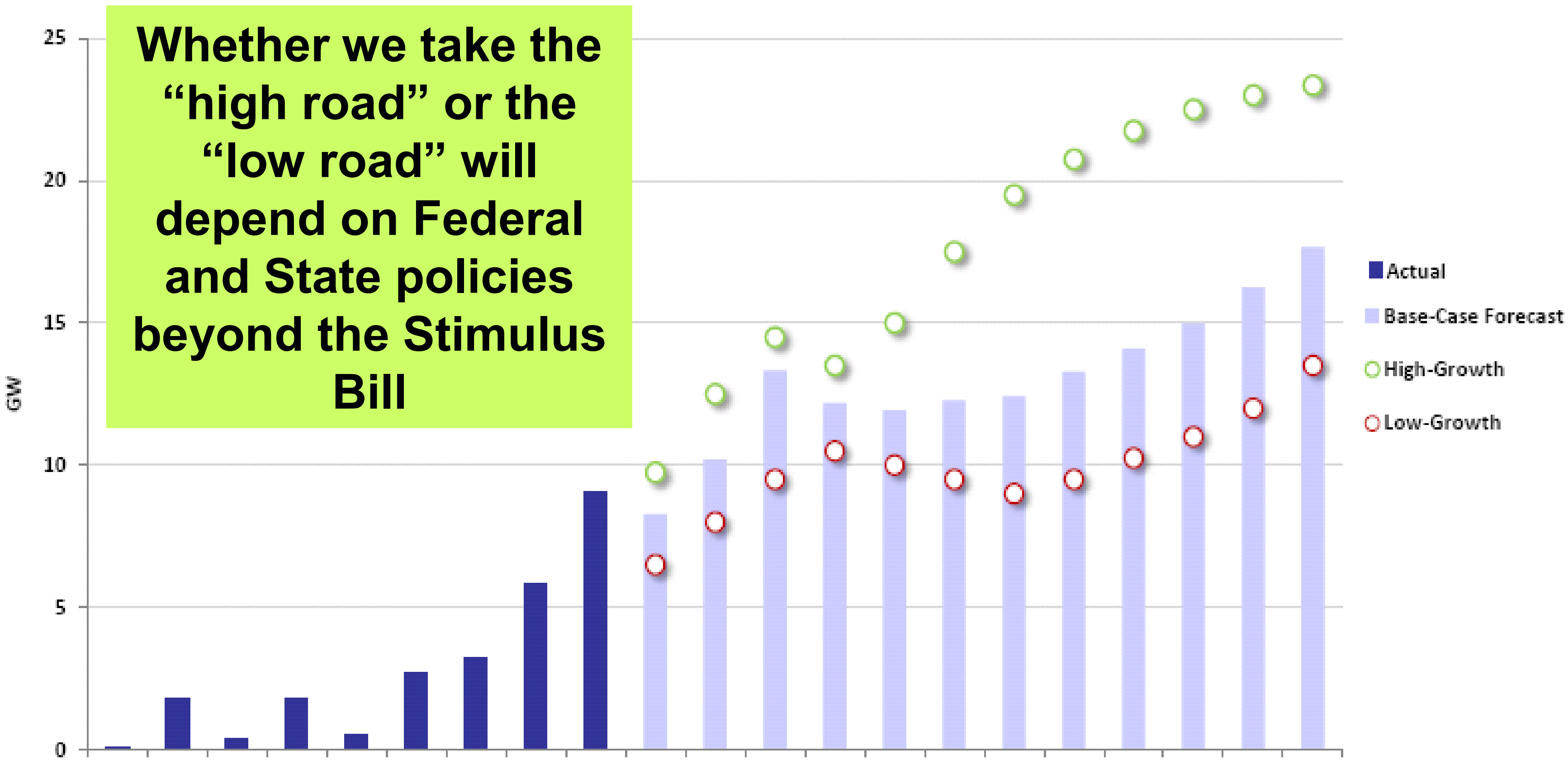
New US Wind Activations by Quarter, Q1 2007 through Q4 2010 (est.)



WTG delivery schedules and standard US construction seasons create a wind project activation "spill-over" each year; the financial crisis will impact 2H 2009 delivery period the most

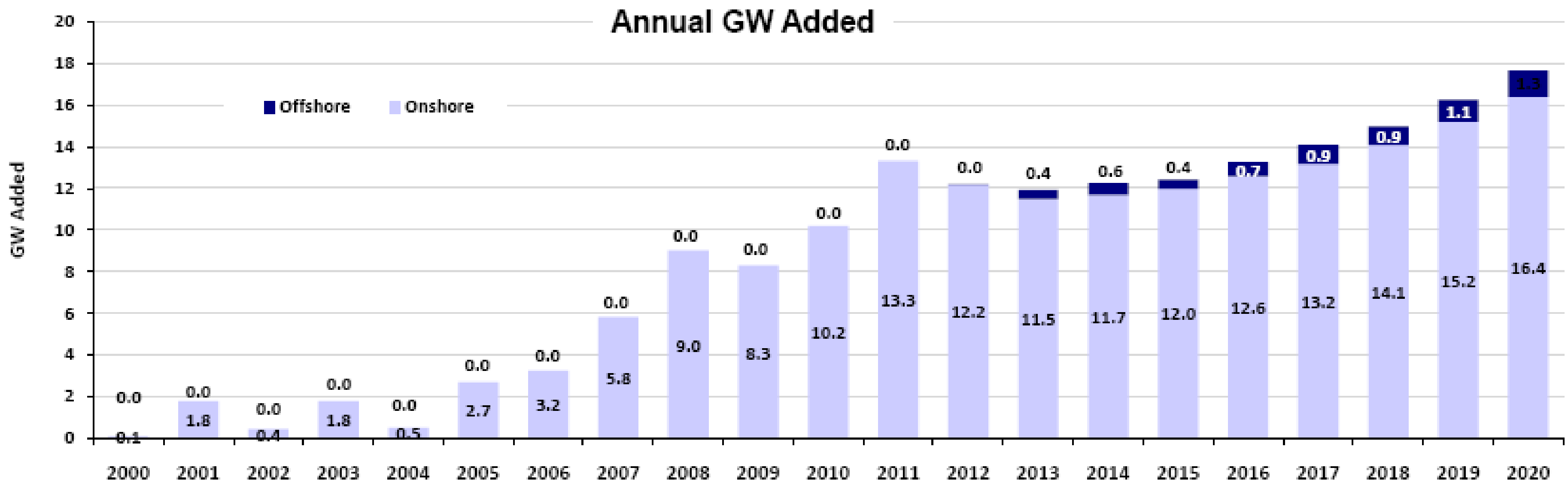
North America Wind Energy Market Forecast: 2009–2020

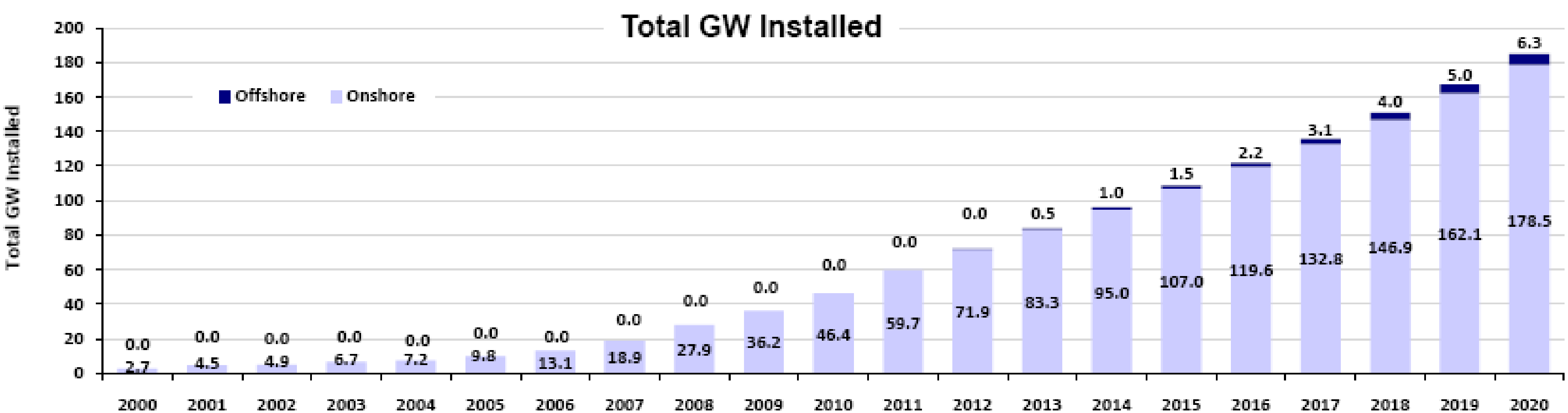
North America GW Added Growth Scenario Comparison



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
High	-	-	-	-	-	-	-	-	-	9.8	12.5	14.5	13.5	15.0	17.5	19.5	20.8	21.8	22.5	23.0	23.4
Base	0.1	1.8	0.4	1.8	0.5	2.7	3.2	5.8	9.0	8.3	10.2	13.3	12.2	11.9	12.3	12.4	13.3	14.1	15.0	16.3	17.7
Low	-	-	-	-	-	-	-	-	-	6.5	8.0	9.5	10.5	10.0	9.5	9.0	9.5	10.3	11.0	12.0	13.5

North America Total: Base-Case Scenario

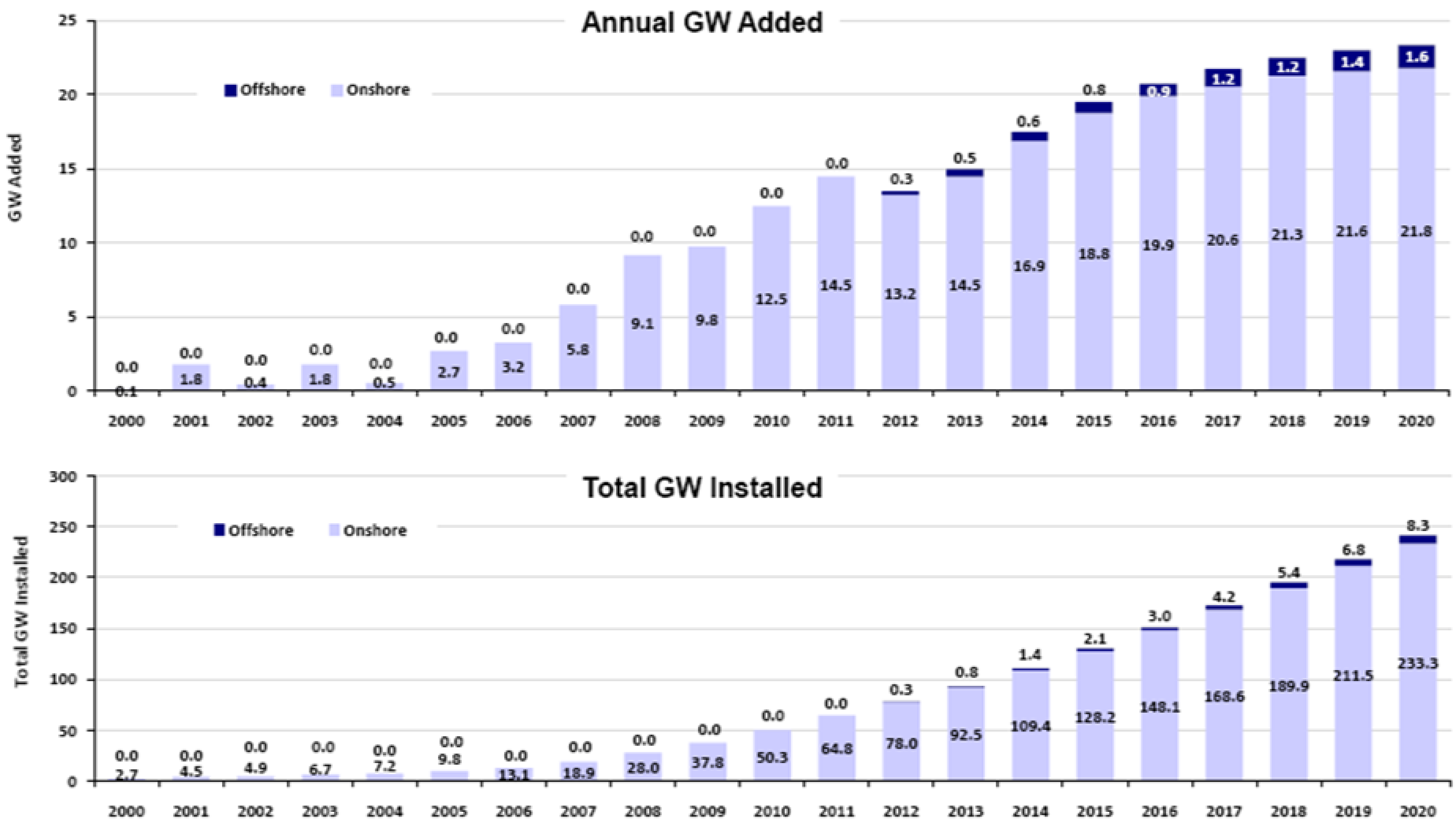




emerging energy research

North America Wind Energy Market Forecast: 2009–2020

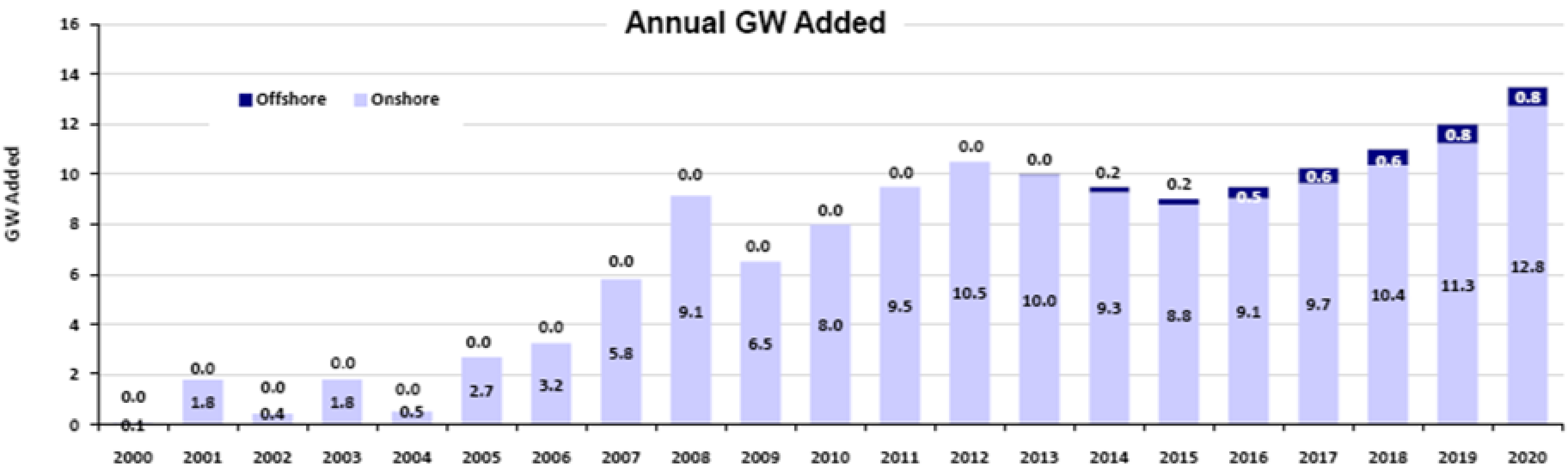
North America Total: High-Growth Scenario

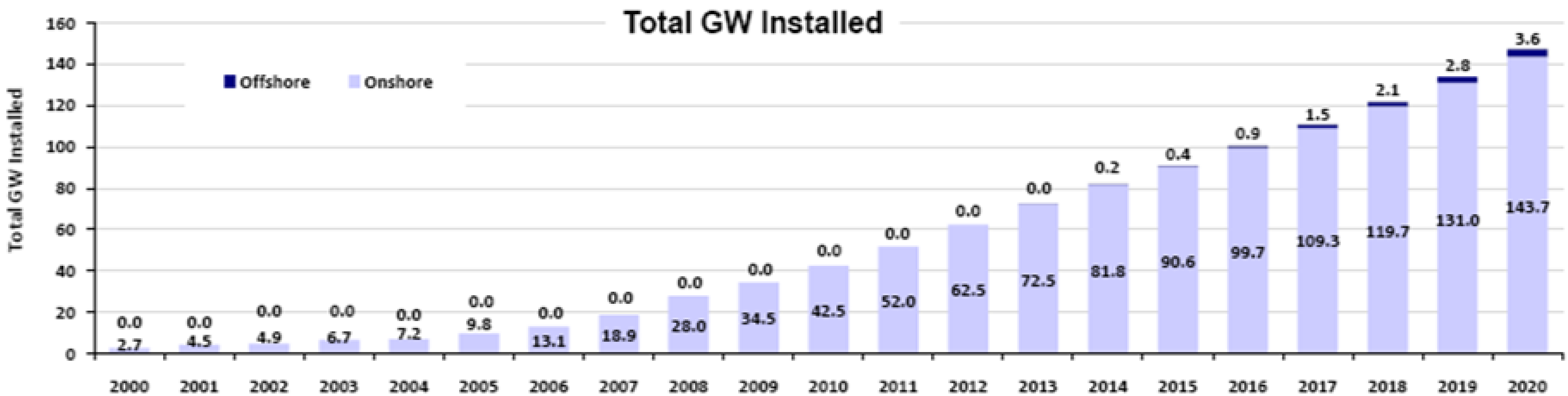


emerging energy research

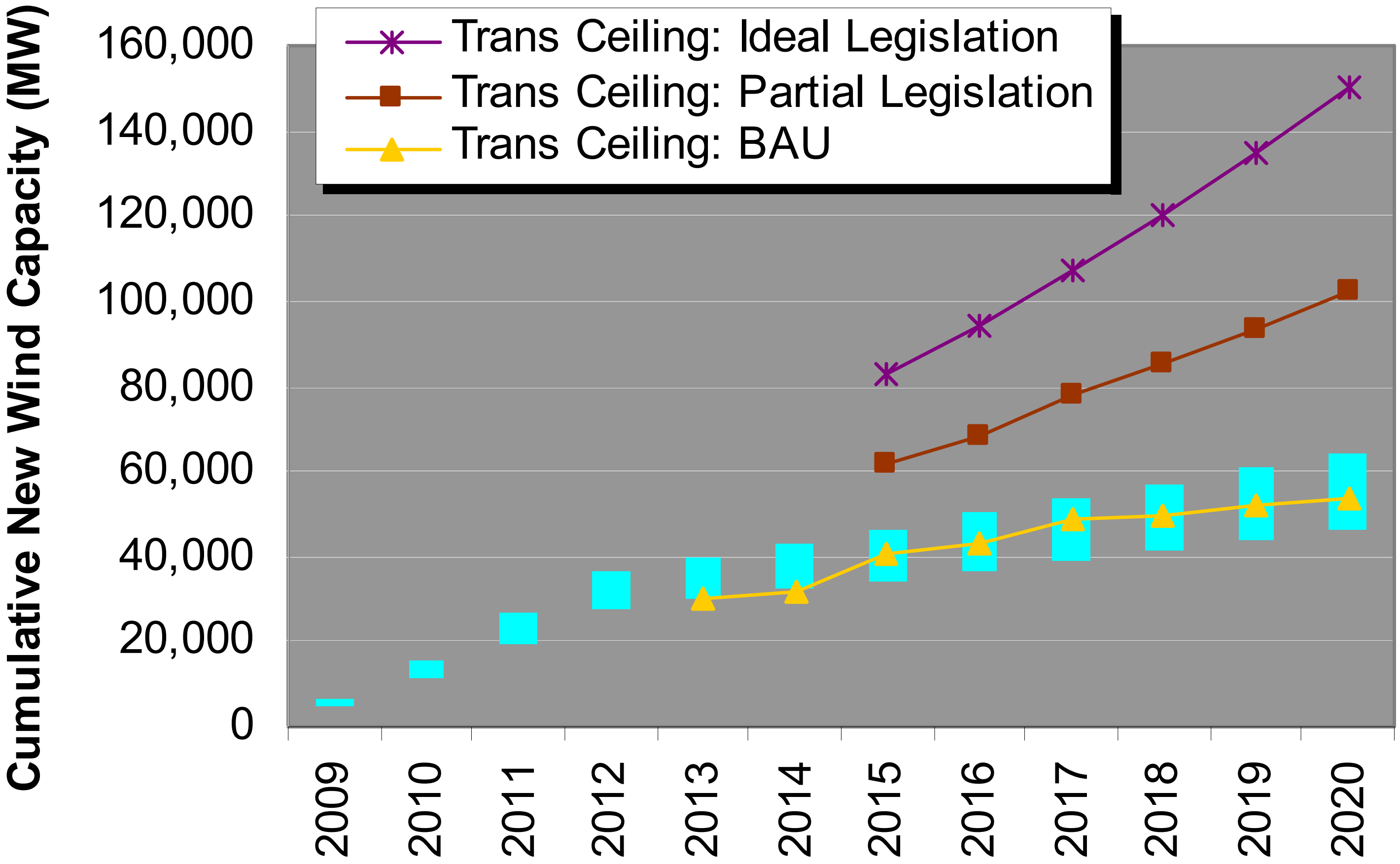
North America Wind Energy Market Forecast: 2009–2020

North America Total: Low-Growth Scenario

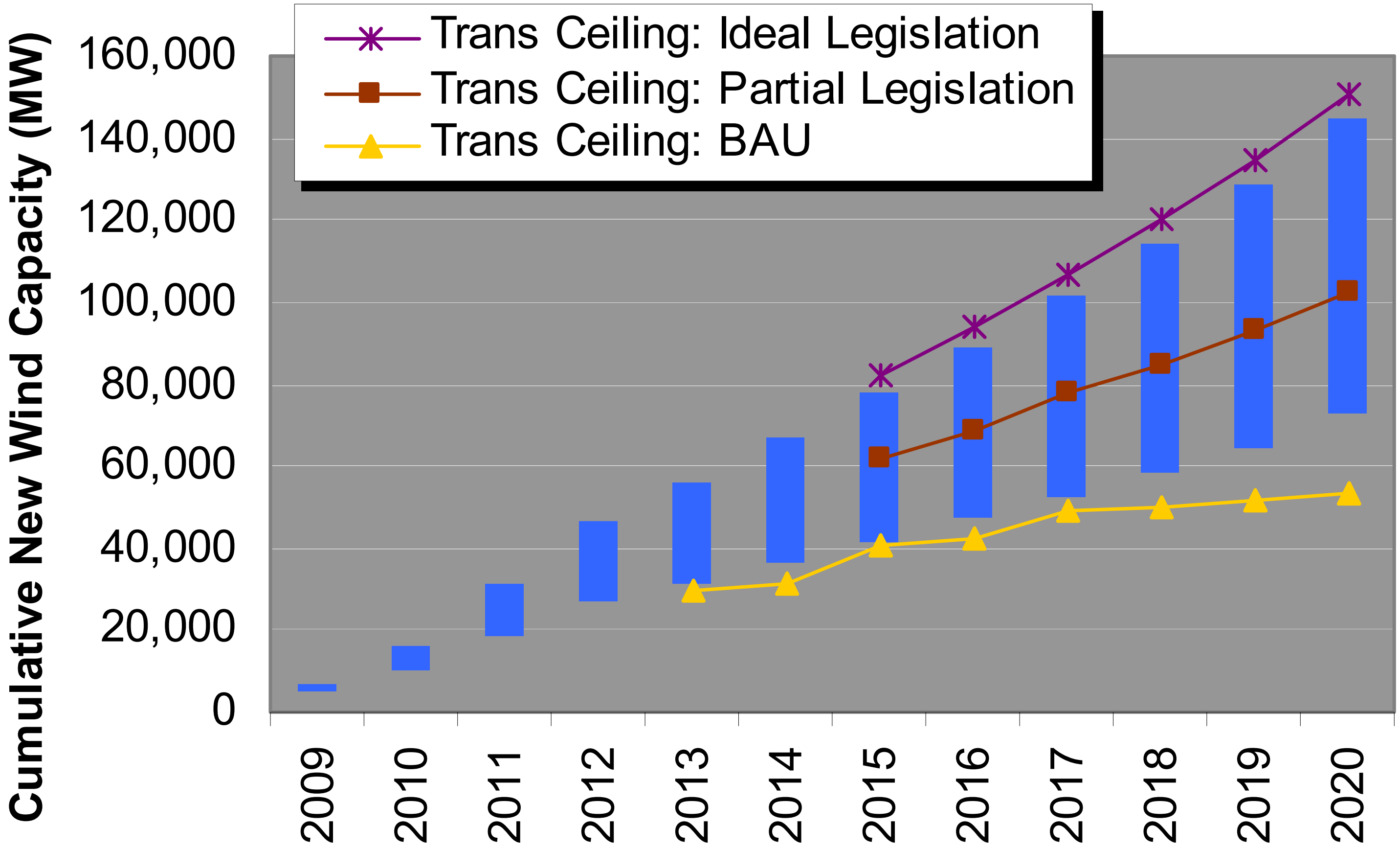




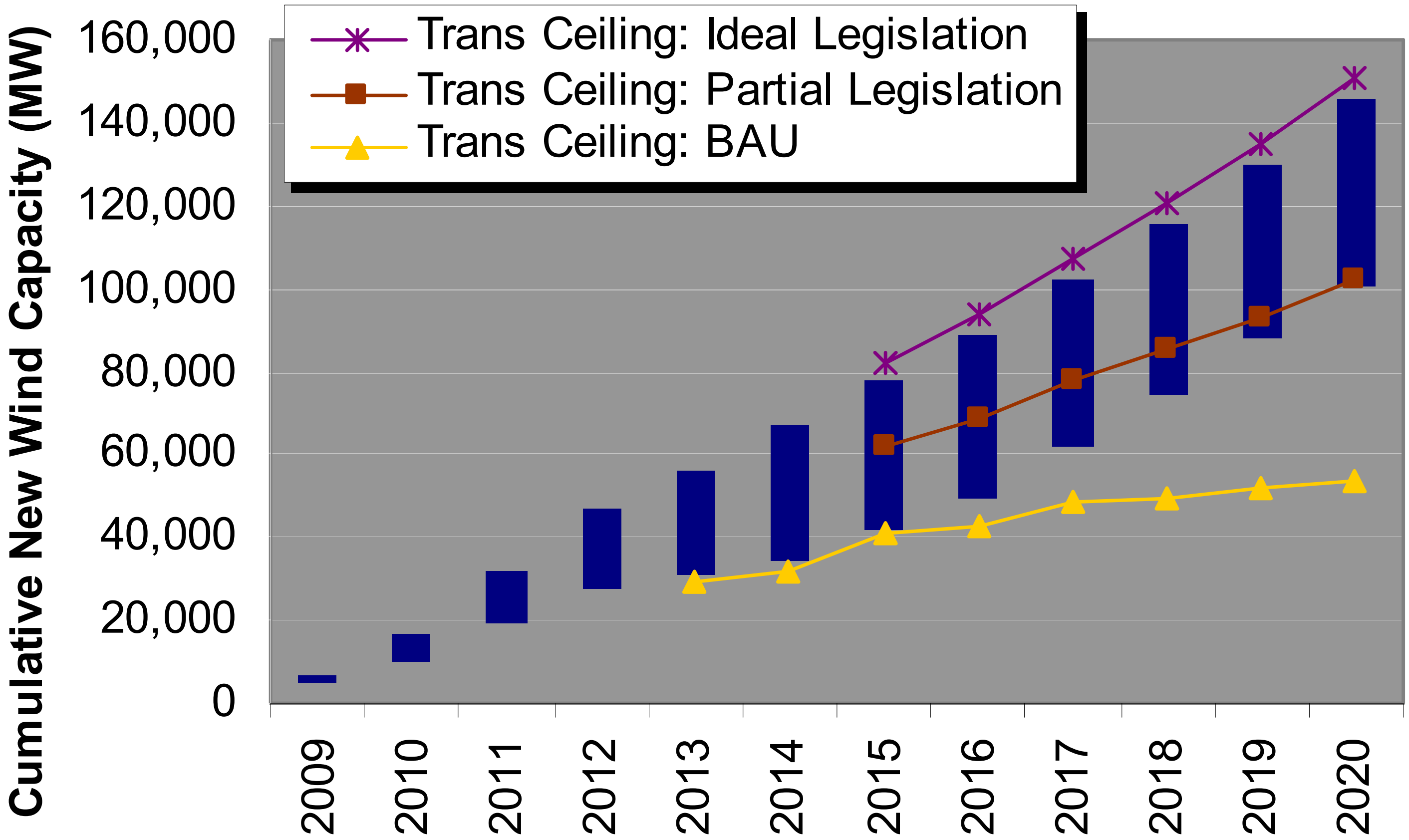
Scenario 1: Base Case, No Policy



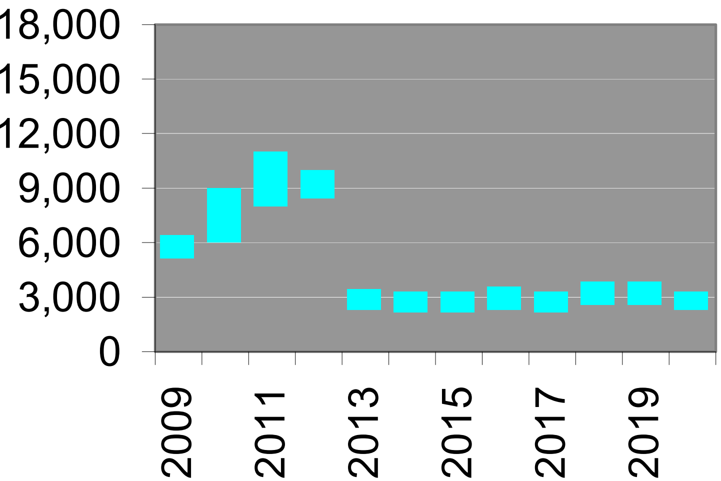
Scenario 2:
Base Case + RES



Scenario 3:
Base Case + RES + Climate Legislation

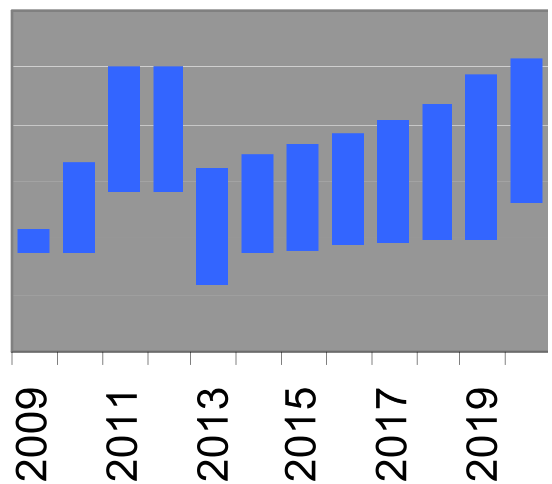


Base Case



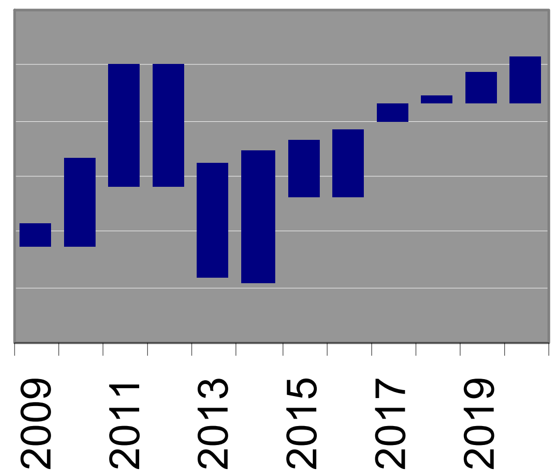
- Post PTC in 2012, assuming no other policy, state RPS programs with teeth are the only driver left

Base Case + RES



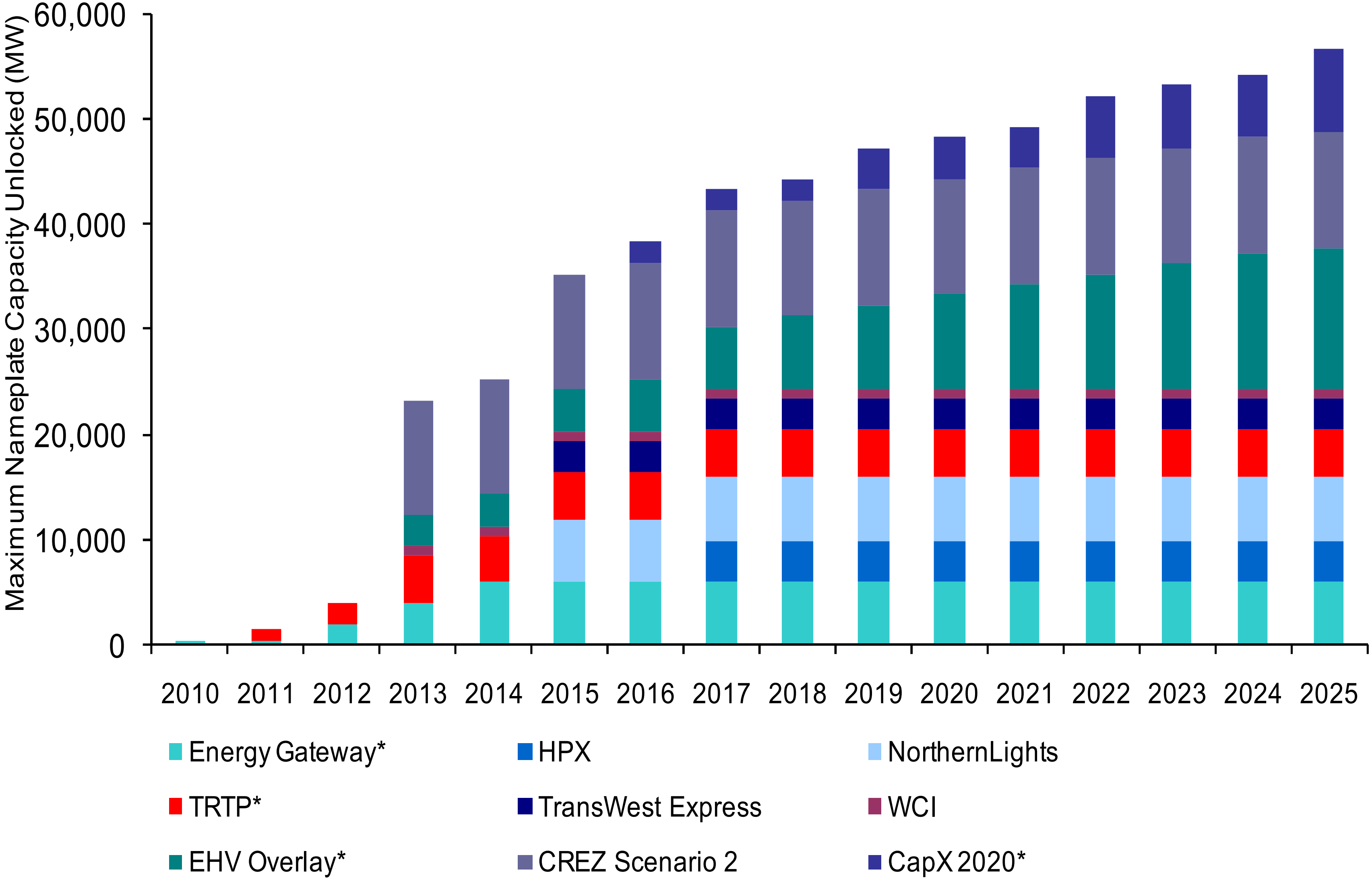
- With RES, there will be an overbuild pre-2012 to get PTC and meet RES needs for later years. The RES requirement is low in 2013-2015 range leaving a slight market gap and will see a drop off

Base Case + RES + Climate

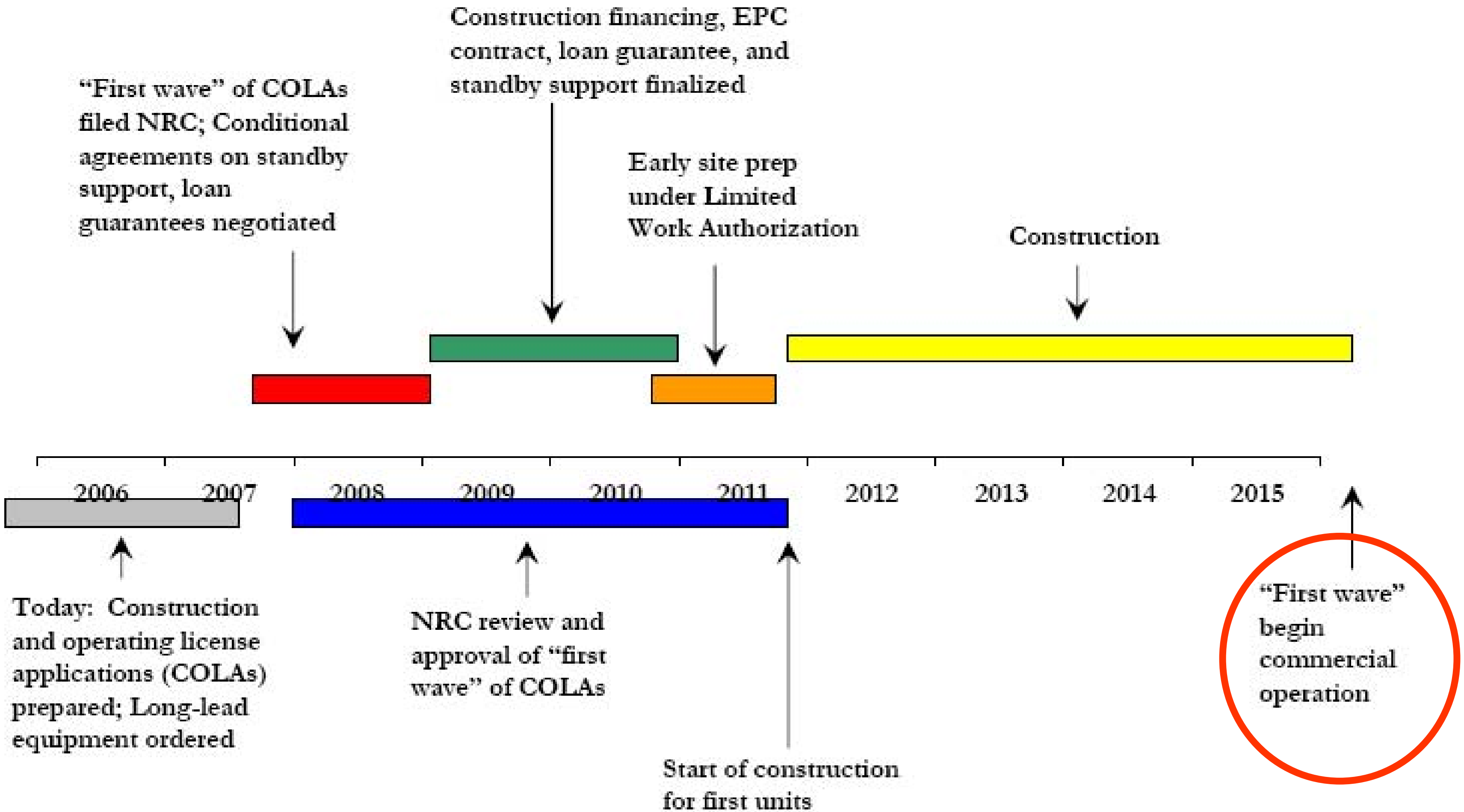


- Top range stays essentially the same, but bottom range comes up. Even though top is same, probability of higher annual installation increases in this scenario given the range is tighter and higher.

New Wind Capacity enabled by Transmission plans that are moving forward



Timing of New Nuclear Plant Deployment across the Country



Carbon Capture & Storage Timeline – COD Circa 2020

Definition of phases – reference case

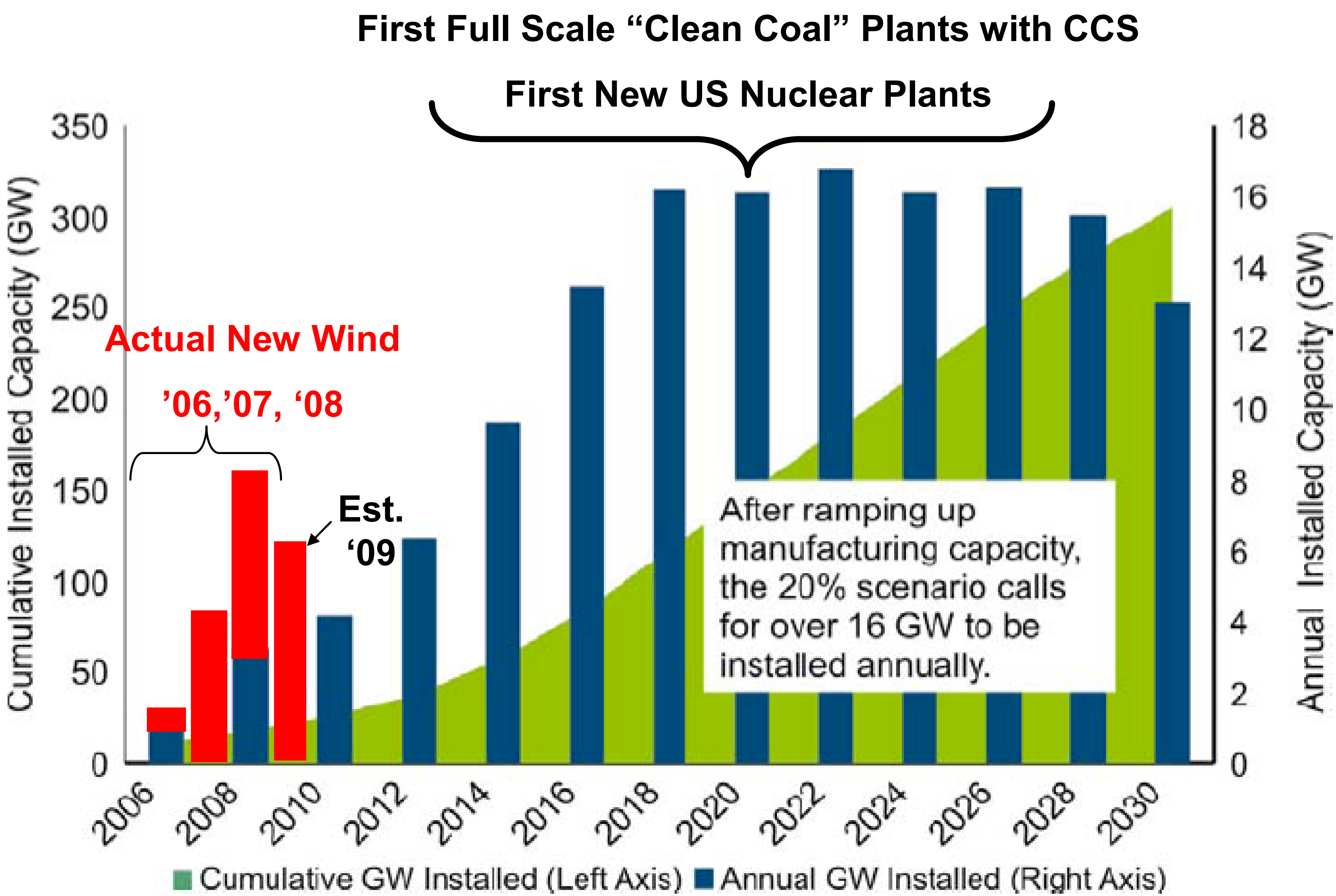
	Demonstration phase	Early commercial phase	Mature commercial phase
Definition	• Sub-commercial scale projects to validate CCS as an integrated technology at scale and start learning curve	• First full scale projects to start ramp up of abatement potential	• Widespread European roll out of full scale projects; significant abatement is realized
Key assumptions			
• Size	• 300 MW	• 900 MW	• 900 MW
• Efficiency penalty	• ~10%	• ~10%	• ~9%*
• Utilization**	• 80%	• 86%	• 86%
• Economic life	• 25 years	• 40 years	• 40 years
• WACC	• 8%	• 8%	• 8%
• Transport distance	• Onshore: 100km • Offshore: 200km	• Onshore: 200km • Offshore: 300km	• Onshore: 300km • Offshore: 400km (with booster)
• Onshore/offshore split	• 80%/20%	• 50%/50%	• 20%/80%
• Earliest start date	• 2015	• 2020	• 2030

* Assuming no technological breakthrough
** A non-CCS plant is assumed to have utilization of 86%
Source: Team analysis

7

"Carbon Capture and Storage: Assessing the Economics" McKinsey & Co. 22 Sept 2008

Wind Is a Vital Bridge to the Future



MAY 2008 – DOE ISSUES 20% WIND REPORT!

MAY 2009 – DOE ISSUES 4% WIND REPORT?

Table 1. Summary Results

	2007	2020			2025			2030		
Generation (billion kilowatthours)	**Reference**	**Reference**	**RESFEC**	**RESNEC**	**Reference**	**RESFEC**	**RESNEC**	**Reference**	**RESFEC**	**RESNEC**
Coal	2021	2198	2160	2090	2202	2076	2005	2311	2129	2054
Petroleum	66	49	49	49	49	50	49	50	50	50
Natural Gas	892	714	709	672	908	839	774	976	921	826
Nuclear	806	876	876	869	882	881	872	890	876	859
Conventional Hydropower	248	299	298	297	299	298	297	300	298	298
Geothermal	15	22	23	26	22	25	28	24	25	31
Municpal Waste	16	24	26	28	24	27	28	24	28	28
Wood and Other Biomass	39	139	178	263	197	359	460	218	438	577
Solar	1	20	20	20	21	22	23	23	30	31
Wind	32	203	204	227	207	207	248	208	208	249
Other	22	28	28	28	29	29	28	29	29	28
Total Generation	4159	4573	4571	4571	4840	4813	4813	5055	5032	5031
Prices (cents per kilowatthour)										
Credit Price	0.0	0.0	0.6	1.7	0.0	5.0	5.0	0.0	2.5	3.5
Electricity Price	9.1	9.3	9.3	9.3	9.5	9.7	9.8	10.1	10.1	10.1
RPS Compliance										
Total Electricity Sales (billion kilowatthours)	3747	4127	4124	4125	4348	4327	4320	4527	4500	4495
Covered Baseline[1]	NA	NA	3355	3357	NA	3358	3352	NA	3731	3727
Credits Required (percent of total sales)	0.0	0.0	11.4	14.2	0.0	16.5	20.6	0.0	16.5	20.7
Credits Achieved (percent of total sales)	0.0	0.0	11.2	14.0	0.0	14.9	18.3	0.0	16.3	20.4
Eligible Generation Achieved (percent of total electricity sales)	0.0	0.0	10.9	13.7	0.0	14.8	18.2	0.0	16.2	20.4
Electricity Sector Carbon Dioxide (million metric tons)	2,433	2,466	2,426	2,341	2,533	2,382	2,287	2,639	2,444	2,333

[1]Defined as total electricity sales minus sales from exempt small retailers, minus hydroelectric generation and minus non-landfill gas municipal solid waste generation.
Source: Energy Information Administration, National Energy Modeling System runs, STIMULUS.D041409A, WAXRPS.D041609A, AND WAXRPSNE.D041609C.

Conclusions

- Last 12 month pace of installations shows "peaking" capacity of wind, but is not sustainable under current policies
  - Is like an anaerobic sprint but we are running a marathon.
- Very near term determined by Recovery Act implementation
- Medium and longer term depends most urgently on RES
  - What happens to financial incentives after 2012 needs to be looked at now.
  - Transmission driven by RES requirements
  - Radar issues affecting over 9,000 MW
- Until RES is passed, state programs remain main market driver.
  - Will low gas prices lead to RPS relaxation?

Why WPA Is Needed Now

- RES is key – RES is winnable
  - "We are only in the 2nd inning" (Jaime Steve, ex AWEA)
  - Be motivated, not deterred by low target numbers from Committees
  - Keep making the substantive case for wind
- RES will drive transmission reform and planning
- State RPS are still the key factor creating a market for wind – we need to stop the backslides
- Jobs, training and education are highest priority
  - WPA a proven program in this arena
  - CEQ (Van Jones) is actively looking for "Success Stories" as well as "Need for Improvement" feedback
  - AWEA will be assembling "camera ready" site visit opportunities