

# Voluntary & Compliance Markets

Renewable Energy Markets 2010



- ***Renewable Energy Certificate***

A commodity that represents the environmental attributes of electricity generated from renewable resources like wind, solar, hydro, and biomass. One REC equals one megawatt hour of electricity generation.

- ***Compliance Markets***

Mandated markets created as a result of a Renewable Portfolio Standard (RPS) that requires utilities to supply a certain percentage of electricity from renewable resources. RECs are used to demonstrate compliance.

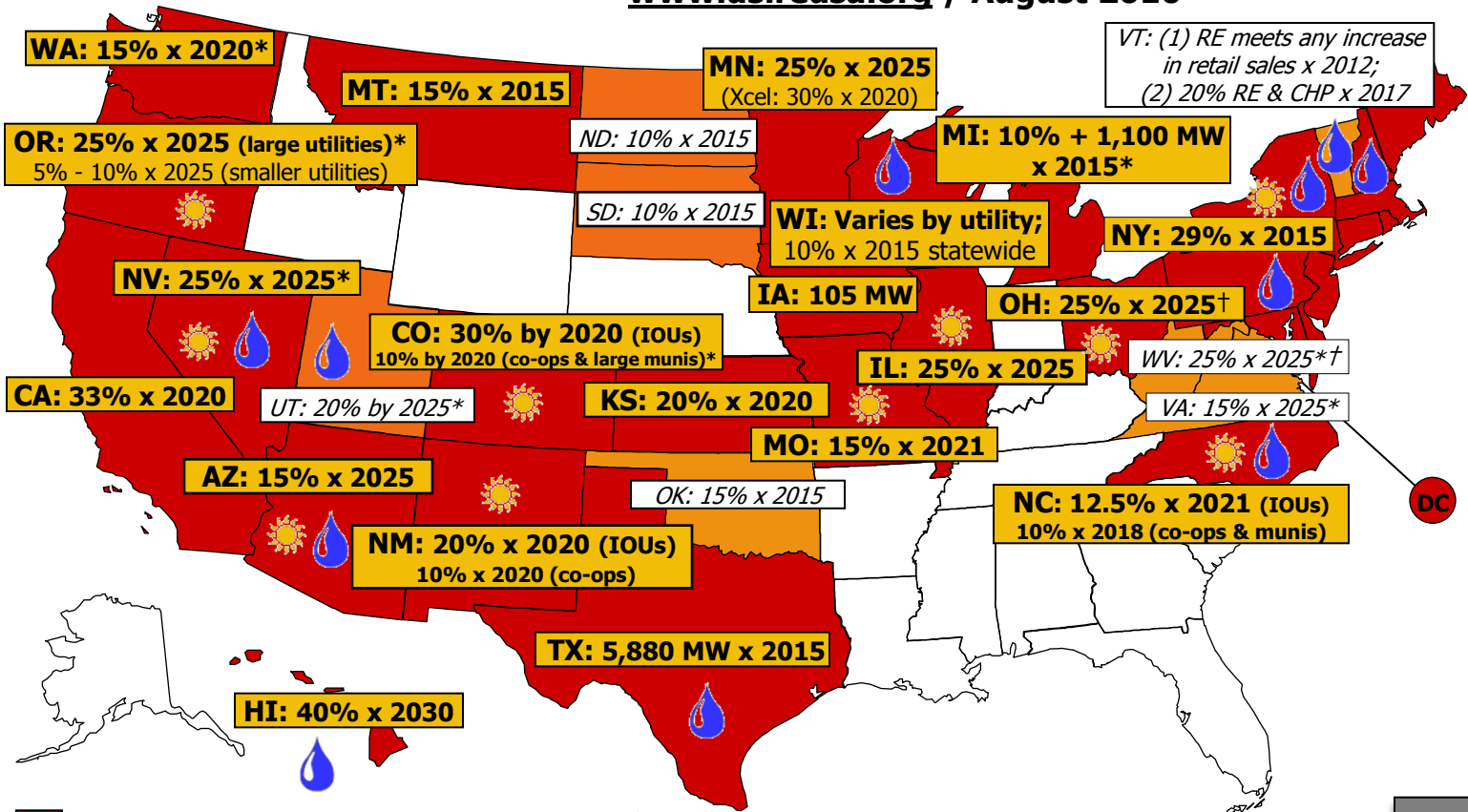
- ***Voluntary Markets***

Individuals and Businesses choosing to support renewable energy.



## Renewable Portfolio Standards

[www.dsireusa.org](http://www.dsireusa.org) / August 2010



- ME: 30% x 2000**  
New RE: 10% x 2017
- NH: 23.8% x 2025** ☀️
- MA: 22.1% x 2020**  
New RE: 15% x 2020  
(+1% annually thereafter) ☀️
- RI: 16% x 2020**
- CT: 23% x 2020**
- PA: ~18% x 2021†** ☀️
- NJ: 22.5% x 2021** ☀️
- MD: 20% x 2022** ☀️
- DE: 25% x 2026\*** ☀️
- DC: 20% x 2020** 💧 ☀️

- 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 non-renewable alternative resources

**29 states + DC have an RPS**  
(7 states have goals)

# Market Fragmentation

	COD Date	Reporting Pd	Technologies	Geographic Constraints	Spot Price - Offer
Green-E	1/1/1997	Front Half/ Back Half	Wind, Solar, Geo, Biomass, LFG, Hydro	Nationwide	\$0.95
NJ I	NA	June- May	Wind, LFG	PJM	\$2.25
PA II	NA	3 Yrs	MSW, LG Hydro	PJM	\$0.20
NJ Solar	NA	June-May	Solar	PJM	\$665
Texas	9/1/1999	3 Yrs	Wind, Solar, Biomass, Geo, Hydro	ERCOT	\$0.95
Mass I	12/31/1997	3 Yrs	Solar, Wind, Wave, LFG, Biomass	ISO-NE	\$15.00

- Green-E:

*“Green-E Energy only certifies renewable energy products that are fully aggregated to the extent possible under law. Green-E Energy certified MWhs (electricity of REC) must contain all the greenhouse gas (ghg) emission reduction benefits, including carbon dioxide (CO<sub>2</sub>) reduction benefits, associated with the MWh of renewable energy when it was generated.”*

- NJRPS

“REC means a certificate representing the environmental benefits or attributes of one MWh of generation from the generating facility that meets the requirements”

- Tx RPS

“A REC is a tradable instrument that represents all of the renewable attributes associated with one MWh of production from a certified renewable generator”

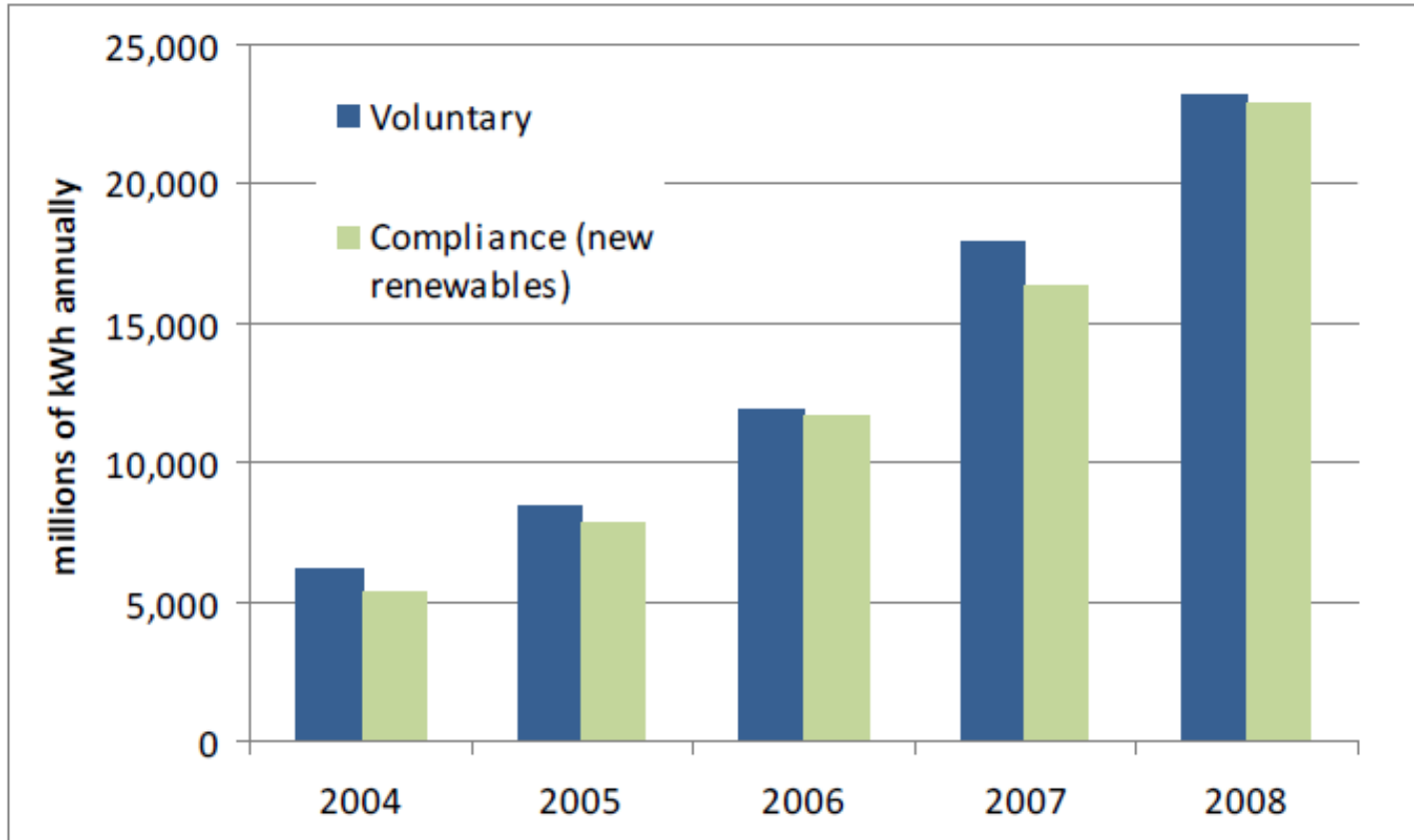


# Contracting Differences

- Compliance Markets more Commoditized
- Contracting Hurdles in Voluntary Market
- VRE Set-Asides in RGGI States



# Market Snapshot: 2004-2008

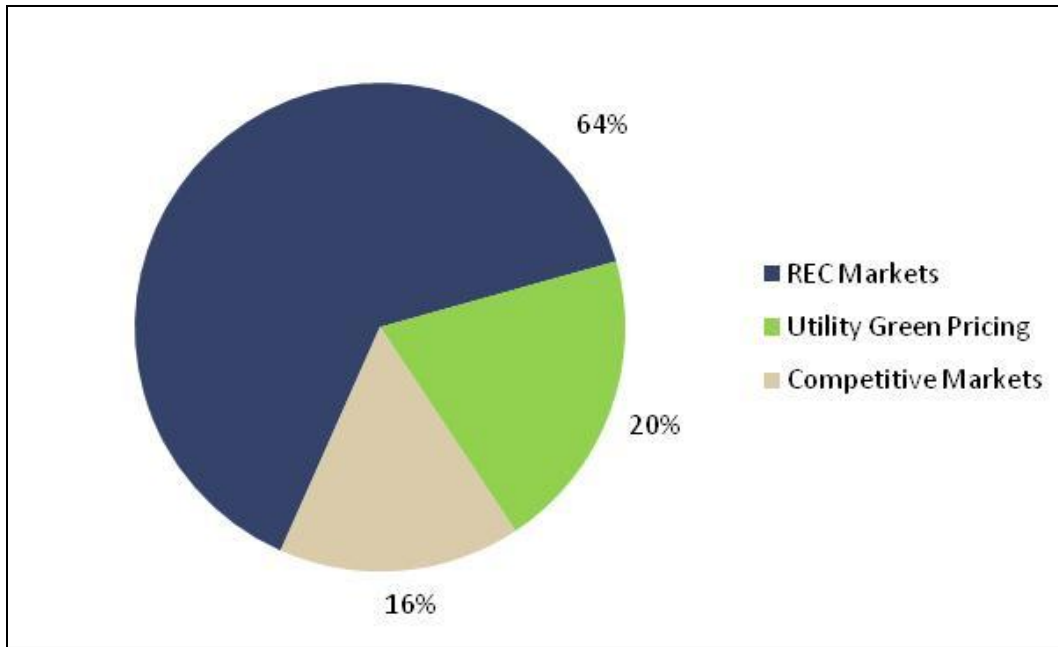


Source: NREL 2009 Report, Green Power Marketing in the United States: A Status Report (2008 Data)



# Unbundled REC market dominates voluntary renewable market with 15.6 M MWh

**Total sales of voluntary renewable energy (2008) = 24 million MWh**

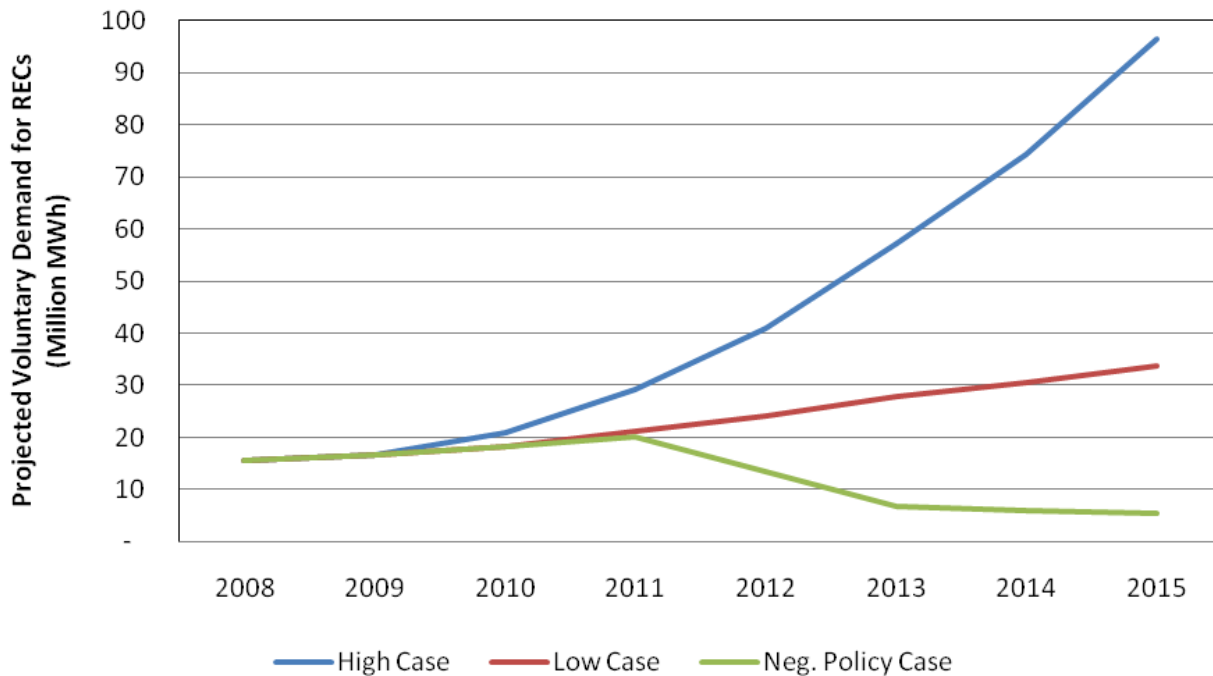


- Unbundled REC market is almost entirely C&I driven
- In 2008, of the 15.6 M MWh of unbundled RECs sold:
  - 15.4 M MWh sold to non-residential customers (99%)
  - 0.2 M MWh sold to residential customers (1%)
- Voluntary renewable market exceeds size of mandatory market, which resulted in 23 M MWh in 2008

Source: NREL, 2010 report ("Voluntary Green Power Market Forecast Through 2015") based on 2008 data.



# Continued growth of unbundled REC market will depend on GHG policy



## High Case:

- Demand grows consistent with historical trends
- 40% growth in 2011-2013, ramping down to 30%

## Low Case:

- Assume slower growth due to market maturity
- 15% growth in 2011-2013, declining to 10%

## Negative Policy Case:

- Future policies reduce motivation for purchasing green power (non GHG claims allowed for voluntary market)
- Major reductions starting in 2012
- Steady 10% decrease per year after 2014

Source: NREL, 2010 report ("Voluntary Green Power Market Forecast Through 2015") based on 2008 data.

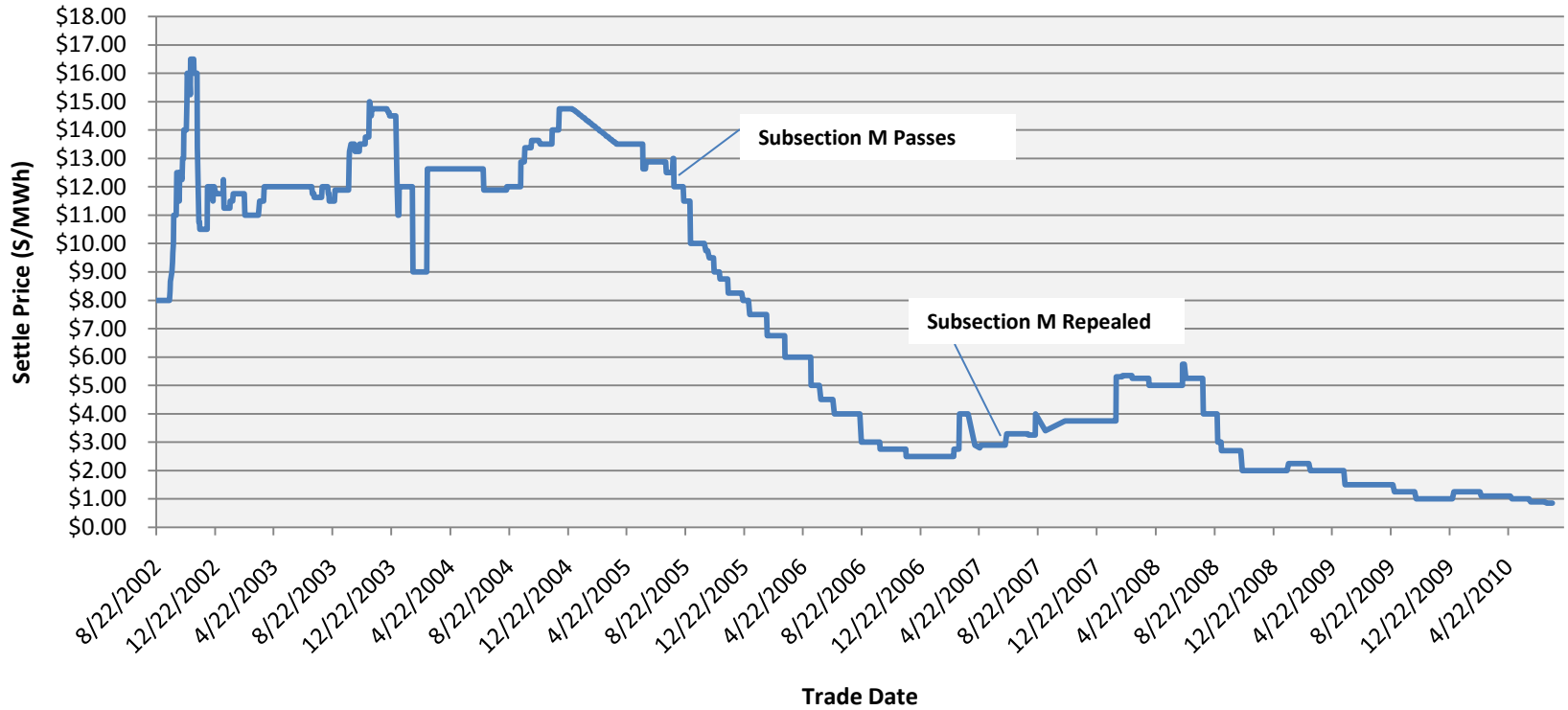


# Voluntary Market Leading Texas

	Voluntary	Compliance	Total	Capacity (MW)
2007	1,672,306	3,388,063	5,065,291	4,919
2008	6,934,286	6,934,286	13,661,763	8,599
2009	8,942,836	6,800,249	15,748,427	10,367

Source: [www.texasrenewables.com/reports.ap](http://www.texasrenewables.com/reports.ap)

### Historical TX REC Spot Prices 8/2002 - 8/2010



Pricing Courtesy Evolution Markets



# Future Uncertainties in Voluntary Market

- Voluntary Market Growth
- Increased Appetite for On-Site Solar/ Distributed Generation
- Federal RES
- Regional Carbon Markets & VRE Set-Asides





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