

Renewable Energy Policy Options: The US Experience

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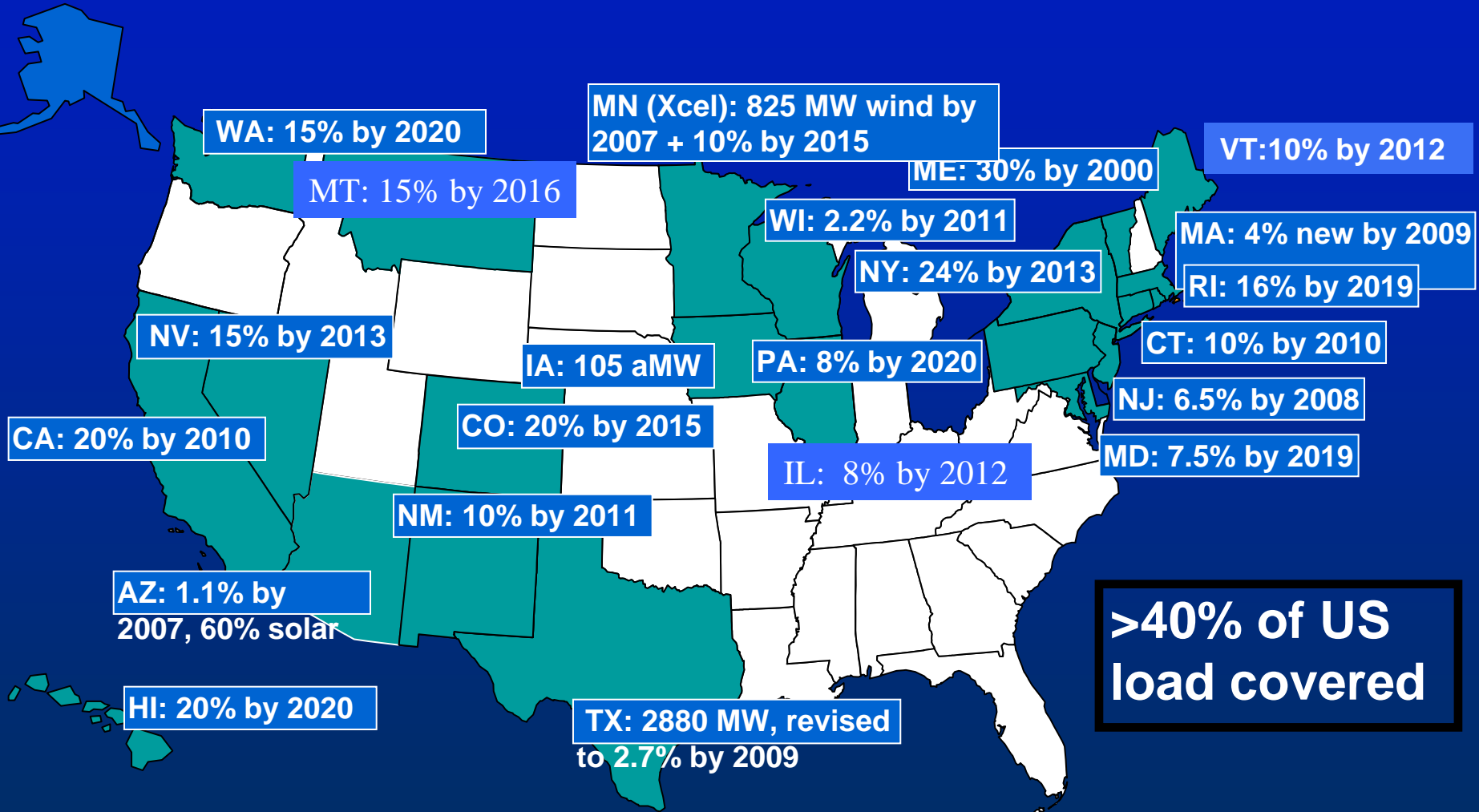
Presentation Goal

- To give a guide to developing renewable energy goals/quotas based on experiences in the United States.
- To discuss lessons and policy design considerations for India.

The Renewable Portfolio Standard: a Definition

- The Renewable Portfolio Standard (RPS) is a policy that requires electricity retailers in a state to provide a specific amount of total power from renewable energy.
 - Typically, the retailers (distribution utilities) meet that goal by buying renewable energy credits.
 - They may also meet the goal by purchasing renewable energy through contracts or by generating renewable energy on their own.
- The RPS is one of the primary renewable energy policy mechanisms used in the U.S. It differs from Europe, which relies more on the feed-in tariff.

State Renewables Portfolio Standards and Purchase Mandates



>40% of US load covered

The Renewable Portfolio Standard: A 7-Step Program

1. Decide What Resources Qualify

- An RPS can be refined, or it can be very broad.
 - Some states have “tier I or tier II” resources, meaning established and less established resources.
 - This provides a way to target certain types of renewable resources.
 - Some states have “bands” of resources.
 - Eg. A solar requirement within the larger standard.
 - Some states give extra credit to some resources (ie. double credit to solar, or small wind).

Qualifying Resources con't.

- Always: Wind, solar, geothermal, small hydro, “sustainable” biomass, landfill gas.
- Sometimes or questionable: large hydro, fuel cells powered by renewable resources, biomass from other sources such as municipal solid waste.
- Requirements can specify renewables only as a percentage of new load or load growth. Or they can specify a percentage of total capacity.

Small-scale Resources

- An RPS can be structured to allow for small scale resources -- customer-generators.
- Small scale generators can produce Renewable Energy Credits for sale to distribution companies in a trading market.
- An RPS can set aside particular “bands” for small scale resources -- requiring that a certain percentage of the qualifying resources consist of small scale resources.

2. Set the Quota Requirement

- Set a total, ultimate goal.
 - Issues to consider are the renewable resource base, acceptable costs, system characteristics.
- Measure it in capacity or in energy, a % or a #.
- Decide how quickly to phase in the requirements.
 - Phase-in needs to take into account existing knowledge of resources, time to conduct and review bids and sign contracts etc.
 - Too quick a phase-in can raise costs, or mean missing a goal.

3. Set a cost cap.

- A cost cap limits ratepayers' and utilities' exposure to potentially higher costs of renewable energy.
- It can be set in several ways:
 - Explicitly by allowing the distribution utility to have the ability to appeal to the commission if costs exceed traditional generation by x%.
 - Implicitly by a penalty payment.
 - Implicitly by an alternative compliance payment (much like a penalty).

Set a cost cap (con't)

- Penalty and Alternative Compliance
Payment set a cap because they assume the distribution utility will *pay* instead of building more renewables more costly than the penalty.
 - Should be set, but its level reviewed regularly to account for changing marketplace.
 - Should be considered in light of “what do we want: more renewables or compliance, regardless.”
 - Funds from ACP/penalty can be used to fund₁₁ renewable energy projects.

Set a cost cap (con't)

- Keep in mind the interaction of a cost cap with percentage requirements; make sure they don't conflict with one another.
 - A cost cap needs to take into account a realistic assessment of costs. Set too low, the cost cap can make the renewable energy goal unachievable.

4. Establish How to Handle Potentially Higher Costs

- Give distribution utilities a clear right to recover their costs associated with the RPS.
- Provide a specific cost recovery mechanism beyond regular rate recovery, if necessary.
 - This could include establishing a pre-authorized pass through of certain costs, or a mechanisms such as a system benefit fund.

The Estimated Cost of State RPS Policies is Modest

RPS cost studies have typically found that overall rate impacts can be modestly positive or negative: +/- 0.5% electric rate impact, and +/- \$3.5 per year bill impact for average household (NJ is exception)

State	Authors	Incremental Target	Overall Rate Impacts	Avg. Impact on Residential Bill
CA	UCS/SEA/LaCapra	41,000 GWh (2010)	savings: 0.5% in 2010	savings: \$3.5/yr in 2010
CO	Binz	4,500 GWh (2020)	savings: 0.5% expected value	savings: \$2.4/yr expected value
WA	Tellus et al.	14,300 GWh (2023)	no impact	no impact
MN	Wind	6,300 GWh (2010)	savings: 0.7% on average	savings: \$4.6/yr on average
IA	Wind	4,400 GWh (2015)	savings: 0.3% on average	savings: \$3.4/yr on average
WI	UCS/SEA/LaCapra	7,500 GWh (2013)	cost 0.6% on average after 2010	cost \$3.3/yr on average after 2010
PA	Black and Veatch	17,000 GWh (2015)	cost 0.46% on average	cost \$3.5/yr on average
NJ	CEEEP/Rutgers	15,500 GWh (2020)	cost 3.7% in 2020	cost \$33/yr in 2020
NY	DPS/SEA/LaCapra	12,000 GWh (2013)	cost 0.32% in 2009	cost \$3/yr in 2009

* Numbers are approximate

5. Review Regulations to See How They Hold Costs Down.

- Avoid unnecessary geographical restrictions on resources -- for instance, requiring that qualifying resources be from one particular geographic location.
- Consider costs when deciding whether to establish bands for particular resource types.
- Allow and encourage trading of credits as a compliance mechanism.

6. Establish a Credit Trading and Tracking System

- Retailers (distribution companies) can meet their requirements by possessing credits that demonstrate a certain amount of renewable energy has been produced, and that they have paid a market value for that production.
 - Distribution companies acquire these credits by producing renewable energy or by purchasing the credits.

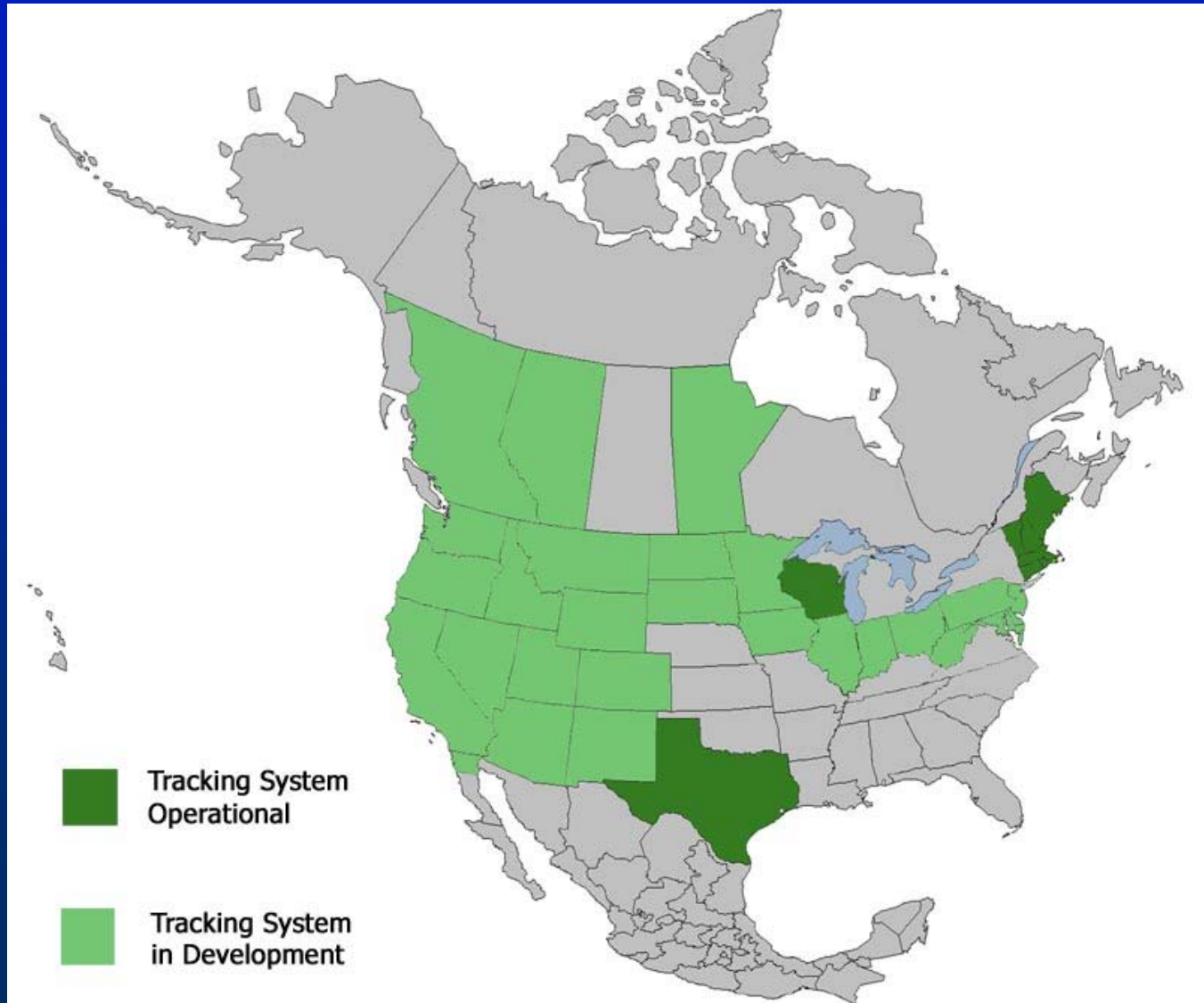
How RECs Are Used To Show Compliance

- RECs must be “issued”
 - 1 REC = 1MWh of Renewable Energy generation
 - Usually issued by PUC or tracking system
 - Credibility is key, so the regulatory body must agree/rule that the tracking system is valid.
- RECs are “retired” when used to determine compliance
 - RECs transferred to own retirement account
 - RECs transferred to state

Where RECs are Used as RPS Implementation Tool

- 13 states have a certificate-based RPS compliance mechanism
 - ME, MA, CT, RI, NV, AZ, WI, NJ, PA, MD, TX, CO, DC
- 5 states likely to use certificates once regional tracking system is operational
 - CA, MN, NM, MT, IL
- 3 states undecided or have other methods to show compliance
 - NY, HI, IA

Certificate Tracking Systems



Source: Center for
Resource Solutions

How to Prevent Double Counting: Definitions

- Double Sale
 - Selling part or whole REC to two or more parties
- Double Use
 - Single MWh used for more than one purpose
- Double Claiming
 - Two or more parties claiming ownership or benefits of single MWh, e.g. on disclosure label

Double Sale

- RPS Context:
 - REC is sold to more than one company and both companies are using the REC for their RPS obligation, or
 - REC is used for RPS, but part of the REC was also sold to emission trader

Preventing Double Sale

- State should use tracking system for RPS compliance
- Tracking system should acknowledge problem of disaggregation
 - Track only whole RECs-i.e. disallow disaggregation, or
 - If disaggregation is allowed, then disposition of attributes should be tracked
- Clear rules related to disaggregation of REC in regulation, i.e. whether disaggregated RECs can be used to meet obligation
- Utility should have clear contracts about disposition of RECs in PPAs

Deliverability Requirements

- 3 varieties of deliverability requirements in RPS
 - In-state generation
 - In-state deliverability
 - Regional deliverability

7. Set Up a Procurement Mechanism

- Resources can be acquired through either a bid-out procurement or through a fixed tariff system.
 - The competitive bid procurement system is common in the U.S. It works well if it is:
 - Transparent: all bidders know, at the same time, under the same circumstances, all information pertaining to the bid.
 - Monitored: a 3rd party monitor/evaluator helps.
 - Simple: Bids that are primarily price-only bids (with all other features being uniform) are easiest to compare. Deadlines, terms must be clear.
 - Fair: all qualified bidders treated alike.

Procurement Mechanism (con't)

- Pay attention to details such as the size of bids.
 - Small bid increments (eg. 20-50 MW) may encourage certain kinds of resources such as biomass.
 - Such small bid increments can also increase costs of the bids. Wind may be better suited to higher levels of 50, 100, 400 MWs, as costs go down with higher increments.

RPS and Feed-in Tariff Contrasted

- Feed-in Tariff
 - Provides long term price, term certainty, which is good for financing.
 - May not offer the best incentive for cost reduction, efficiency improvements.
- RPS
 - U.S. has experienced difficulty in securing long term REC contracts -- hurts financing.
 - Offers good incentives for cost reduction, efficiency.

Lessons for the RPS

- In its “pure” form the RPS tends to encourage primarily the least costly resources -- wind, landfill gas for example.
 - To make and RPS effective for small scale or more expensive resources, special “bands” need to be established.
- The design of the credit tracking and trading system is critically important to the success of the RPS.

Lessons for the RPS

- The market for credits is important. A credible, long-term market for credits is difficult to establish.
- The credits cannot become part of the financable stream of revenues without the long term market. That long term market has not yet been established in the US.
- Define issues such as ownership of credits, retirement of credits, double counting.

Lessons for the RPS

- Define resources carefully and clearly -- especially with biomass and hydro.
- Unless set up with specific “bands” or “tiers” the RPS will tend to yield the lowest cost renewables. In the US, that has typically meant almost all wind, with some biomass, some landfill gas and some geothermal energy.

Lessons for the RPS

- An RPS will work best at helping the more established technologies; another policy such as grants, investment tax credits or even a feed-in tariff may be best for newer technologies.
- Make sure to address how and if off-grid/small scale resources will qualify for the RPS.
- Consider interactions of any cost caps with RPS requirements -- make sure both are realistic when they interact with one another.

Lessons for the RPS

- The RPS is only one policy in the broader context of other electricity regulatory policy.
 - Power plant and power line siting authority and rules.
 - Transmission rules esp. regarding cost recovery and allocation of costs.

Thank you!

Lessons

- Green power purchase programs have thus far resulted in a good deal of wind development, some solar very small increments (c. 16 MW) of geothermal installations.
- Have resulted in purchases of wind and some biomass.

Extra Slides

Lessons

- System benefit funds often work best to encourage the newer technologies. An RPS often is best with the more established technologies.
 - Capital cost buydowns and production incentives can be a big help from SBFs as well, if the fund is big enough.
 - Questions about how effective SBFs might be for large scale wind -- it still doesn't guarantee a power purchase agreement.

Lessons

- Tax incentives may help but in many cases are not the most critical policy.
- The RPS policy can be one of the most critical policies. The design details of an RPS matter a lot. (eligibility of the resource, in-state production requirements, required lead time, size of bids).
- Transmission policy is critical.

What Policies Really Matter?

- The Renewable Portfolio Standard
- Some – but not all -- tax incentives, especially packages of incentives.
- Non renewables-specific policies: siting, transmission, air quality policy.

Tax Incentives

Federal Tax Incentives

- A (very important but unpredictable) 1.8 cent/kWh production tax credit.
 - Benefits primarily accrue to wind, although it recently became available to other technologies, and may begin to benefit those as well.
 - The on-again, off-again nature of this tax credit has limited its effectiveness.
- New tax credits for solar power installations (went into effect with the signing of the federal energy bill).

Tax Incentives

- Hawaii: 100% credit on equity investment in other renewables.
- Nevada: local sales tax exemption, 2% states sales tax rate for and other renewables.
- ND: 100% property tax exemption for renewables. ND also has a 3% income tax credit.
- Utah: Sales tax exemption of 100% for renewables.
- WA sales tax exemption for wind equipment.

State Production Tax Credits

- **Examples:**

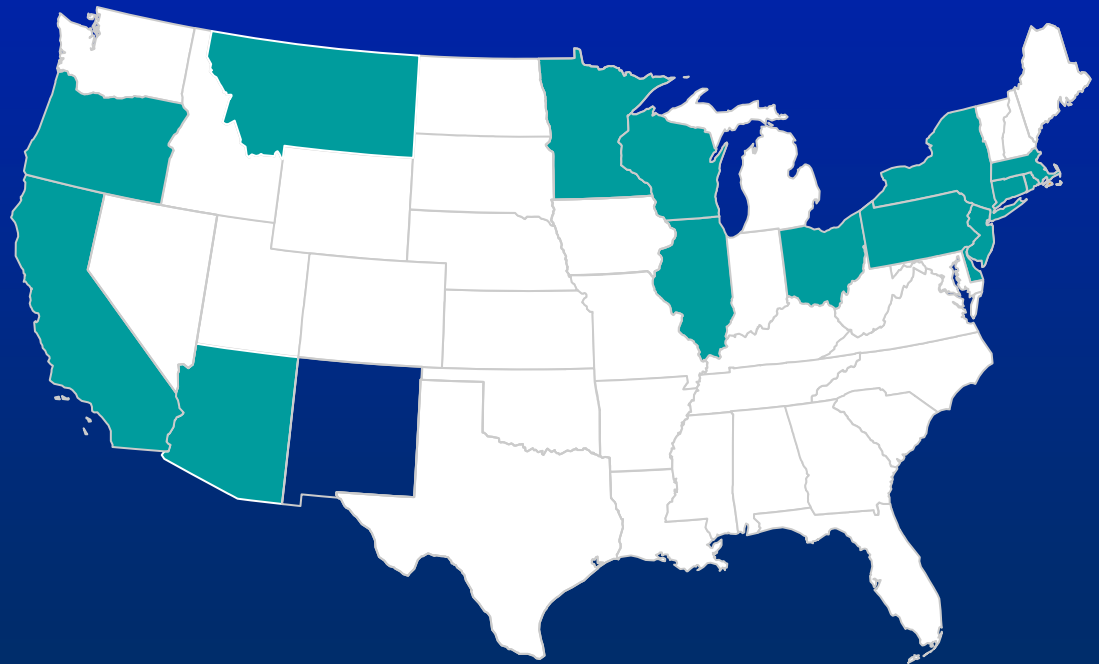
- **New Mexico:** 10 years, 1 cent/kWh
- **Oklahoma:** Through 2011, 0.25-0.75 cents/kWh

- **Issues:**

- **Transferability:** Allow non-taxable entities to transfer credit to taxable entities (e.g., Oklahoma)

State System Benefit Funds

- 15 states, funded through system-benefits charges or other means
- More than \$4 billion through 2012
- CA: >\$200 M/yr
- OR: ~\$10 M/yr
- MT: ~\$2 M/yr



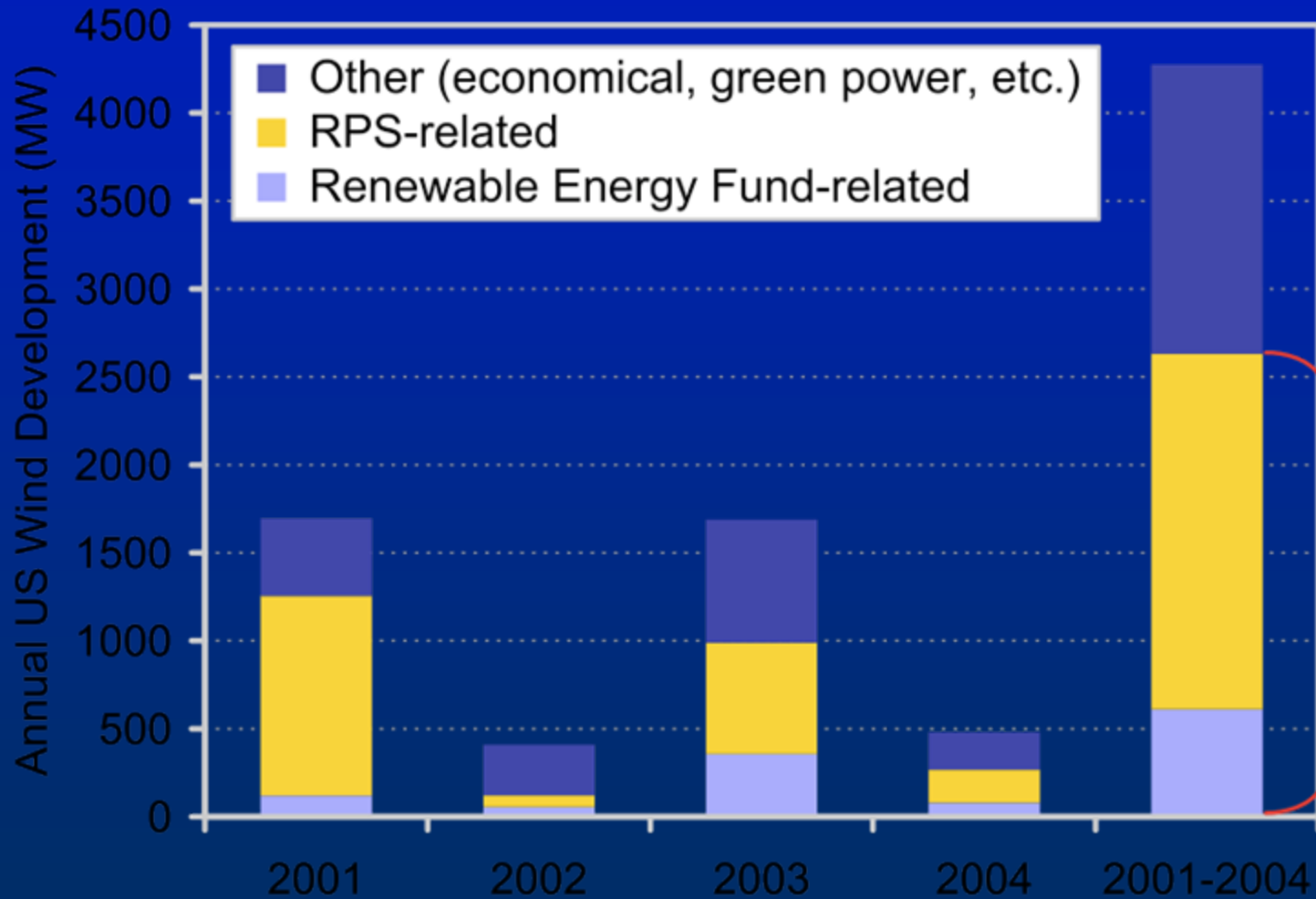
System Benefit Funds

- These funds are not linked to restructuring/deregulation.
- They are a fee, and technically not a tax.
- Some states see them as a way to encourage newer, somewhat more expensive technologies. (An RPS works best for the lower cost resources).

System Benefit Funds

- They provide a flexible financing mechanism for renewable energy.
- States use them for: resource assessments, grant programs, technology demonstrations, education on renewable energy, buy-downs of renewable energy, “venture capital” type funding of renewables etc.

State Policy Drives A Lot of Recent Wind Development



60% of all US wind power capacity built from 2001-2004 was RPS- or SBC-related

Source: Ryan Wiser, LBNL

Policies Focused on Emissions Reduction

- Output based emissions standards and multi-pollutant strategies.
- Siting policy.
 - The Oregon approach to siting new plants that requires that new facilities meet a certain emissions standard.

Air Regulations and Laws

- NH and MA specifically regulate CO₂, SO₂, NO_x and Hg (mercury) through one law.
 - Massachusetts: output based standards for SO_x and NO_x. Caps CO₂ and Hg.
 - New Hampshire: caps emissions of SO₂, Hg, NO_x and CO₂. Reduces SO₂ emissions by 75%, NO_x by 70% and CO₂ to 1990 levels by 2010. Energy efficiency measures are given credit.

Green Pricing and Green Markets

- Voluntary approaches can build some green power markets. The effect is limited, but measurable.
- Typical green pricing programs capture around 1% of total customers. Some capture more, including the Oregon approach.
 - In New York, 1 utility has mimicked Oregon.

Capacity to Serve Green Power Mkts

Table 1 – New Renewables Capacity Supplying Green Power Markets

Source	MW in Place	%	MW Planned	%
Wind	1544.6	93.8	306.7	78.0
Biomass	77.4	4.7	60.3	15.3
Solar	5.6	0.3	1.3	0.3
Geothermal	10.5	0.6	25.0	6.4
Small Hydro	9.3	0.6	0.0	0.0
Total	1647.3	100.0	393.4	100.0

Capacity for Green Pricing Programs

Table 2 – New Renewables Capacity Supplying Green Pricing Programs

Source	MW in Place	%	MW Planned	%
Wind	425.4	81.7	133.4	78.6
Biomass	75.7	14.5	10.0	5.9
Solar	4.9	0.9	1.3	0.8
Geothermal	5.5	1.1	25.0	14.7
Small Hydro	9.3	1.8	0.0	0.0
Total	520.8	100.0	169.7	100.0

Capacity to Serve Competitive Green Markets

Table 3 – New Renewables Capacity Supplying Competitive Markets

Source	MW in Place	%	MW Planned	%
Wind	1119.2	99.3	173.3	77.5
Biomass	1.7	0.1	50.3	22.5
Solar	0.7	0.1	0.0	0.0
Geothermal	5.0	0.4	0.0	0.0
Small Hydro	0.0	0.0	0.0	0.0
Total	1126.5	100.0	223.7	100.0

Government Purchases

- CT, NJ, NY, TN, IL, MD, PA and RI state governments have all committed to purchases of green power for state facilities.
 - Typical ranges are from 5% to 20% of total state or agency usage.
 - State government typically pays a small premium for the green power purchase.

A Couple of Case Studies: Nevada

- Sierra Pacific bid resulted in 130 MW of wind, 97 of geothermal and 50 of solar thermal (277 MW) total.
 - With typical capacity ratings, geothermal will supply 60% of the energy from this mix.
 - Utilities had concerns about how much wind they could integrate into the system.
 - Capped wind at 150 MW.
 - Gave geothermal some advantage in the bidding process.

A Couple of Case Studies: California

- CA's RPS is new. Only one early bid done.
 - Resulted in 300 MW of geothermal power.
- California's RPS legislation requires the CPUC to consider "least cost/best fit" for the system. Utilities/CPUC must also consider the delivery profile (peak, baseload, as available etc.) of the resources.
 - These considerations may benefit baseload resources over wind.

Double Use

- RPS Context:
 - REC used to meet RPS obligation and also used to supply voluntary green power customers
 - REC used for two different state RPS'

Preventing Double Use*

- Tracking system alone will not prevent double use
 - Regulators need to require that a specific retirement account be established for their state RPS, or
 - Require companies to transfer RECs to regulator who will retire them
 - Best Practice: REC used for RPS or green power program, not both
 - Need clear rules in regulation related to double use of REC

* *Some forms of double use may be acceptable*

Double Claiming

- RPS Context:
 - Utility purchases unbundled RE (without RECs) but still claims RE purchase for RPS obligation

Preventing Double Claiming

- Employ tracking system- only REC owner may make claims about REC
- Need clear rules regarding use of RECs in RPS to ensure that RE purchases include RECs

How RECs Can Help Demonstrate Deliverability

- In-state/regional generation RPS requirement
 - Need to prove generator is located in state/region
 - Tracking system makes it easier for regulators to determine compliance
 - RECs that are issued by a tracking system will contain field with generation location

How RECs Can Help Demonstrate Deliverability

- In-state/regional deliverability:
 - Where generator is NOT located in state or region
 - If tracking system tracks load (NEGIS and PJM GATS) then can verify deliverability
 - If tracking system does not track load, then you need another method such as NERC tags combined with RECs to show deliverability

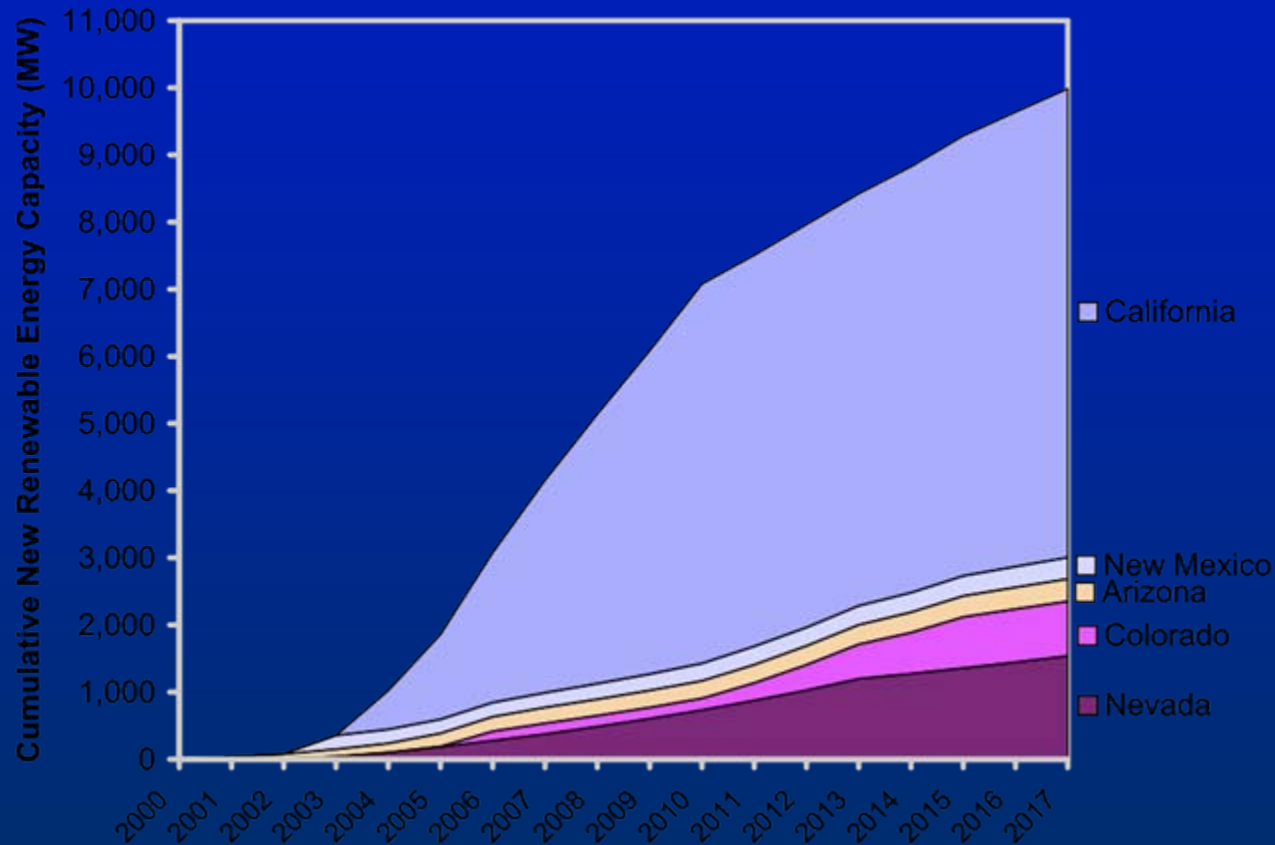
The Potential Impacts of Western RPS Policies Are Sizable

•Pitfalls are common:

- Broad RE Definitions
- RPS Not Imposed Equally
- Unclear Standard
- Limited Tradability of RECs
- Retailers Unwilling to Sign Long Term Contracts

•But impacts of RPS can be significant

- In West, CA likely to be major demand driver



Source: Union of Concerned Scientists and California Energy Commission