Clean Energy Portfolio Standards and Deployment Subsidies

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20th USAEE NCAC Washington Energy Policy Conference

April 13, 2016

RESOURCES FOR THE FUTURE

Examples: The Main US Policies in Question

"RPS" -- Renewable Energy Portfolio Standard. Requirement that a percentage of the electric energy sold come from renewable sources.
Similar: Clean energy portfolio standards

"PTC" -- Production Tax Credit. An amount per kWh. In US, applies to wind farms completed through 2019.
Similar: Any per-kWh subsidy for a "clean" technology

"ITC" -- Investment Tax Credit. In US, reimburses a portion of up-front cost of solar generators completed by 2022.
Similar: Any subsidy for installing a "clean" technology

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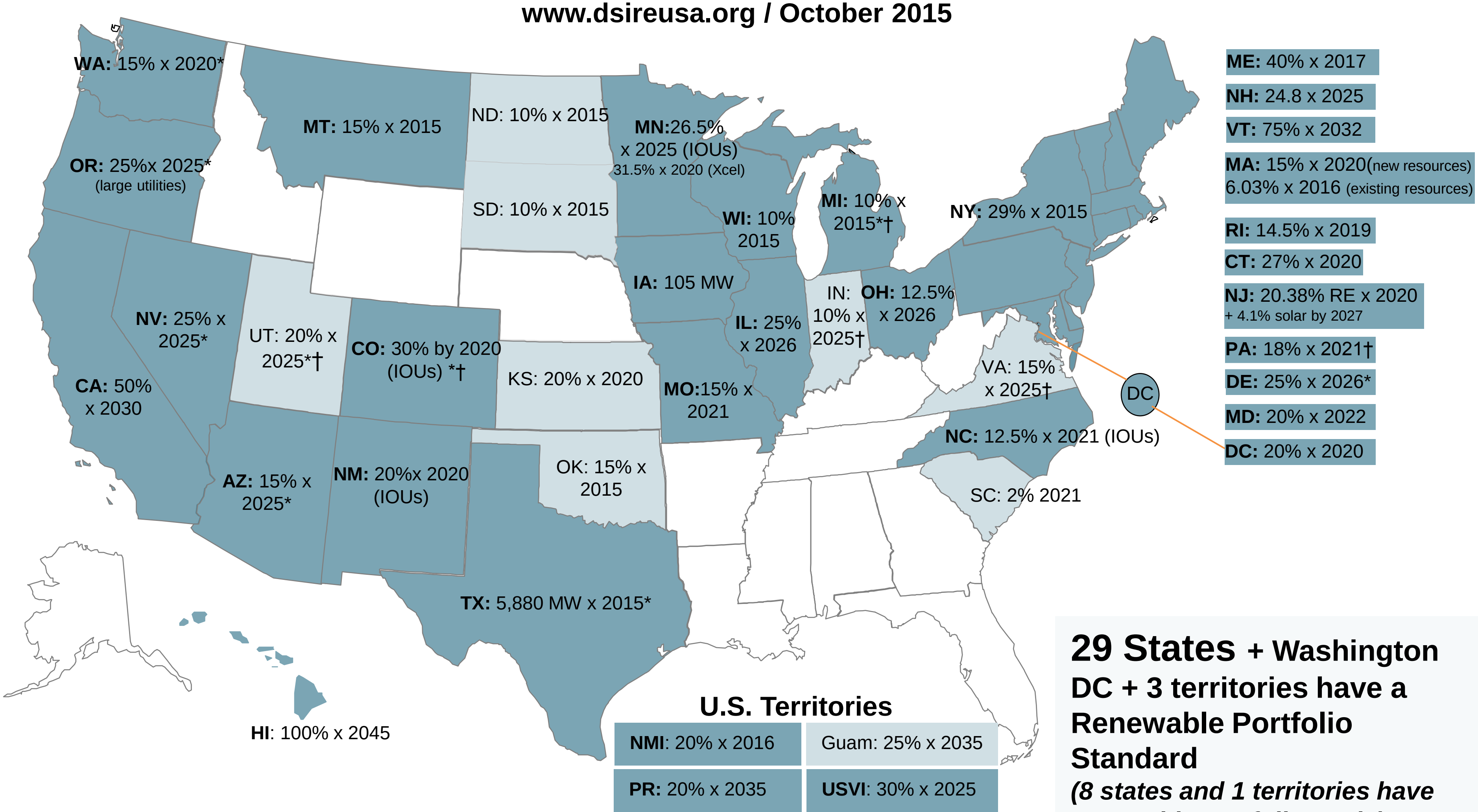
Renewable Portfolio Standard Policies

www.dsireusa.org / October 2015



29 States + Washington DC + 3 territories have a Renewable Portfolio Standard

(8 states and 1 territories have renewable portfolio goals)

Renewable portfolio standard

Renewable portfolio goal

* Extra credit for solar or customer-sited renewables

† Includes non-renewable alternative resources

Motivation

Clean energy portfolio standards and deployment subsidies may be politically viable, and already exist in many parts of the world.

I hope to provide some input useful in answering the following questions:

1. Under what circumstances should they be adopted or continued?
2. How should they be designed/adjusted?
3. What other policies should ideally accompany them?

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Outline

1. First-best policy portfolio, including deployment subsidies for less mature clean technologies
2. Some effects of deployment subsidies and RPSes when other policies are not optimal
3. How to improve an RPS

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Theoretically Optimal Policy Portfolio for Energy Externalities

One policy to address each externality:

1. Emission damage – *Charge sources for it*
2. Spillover of learning from R&D – *% subsidy equal to share of profit changes that accrue to others*
3. Spillover of learning from deployment – *Subsidy equal to marginal cost reduction from spillover – Perhaps currently solar PV ~5¢/kWh, wind ~1¢/kWh*
4. Energy efficiency benefits not valued by customer – *Subsidy equal to those benefits*

Source: Fischer, Newell, and Preonas, RFF Discussion Paper 13-20

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How Do PTC, ITC, and RPS Fit into This Set of Optimal Policies?

PTC and ITC are subsidies for deployment.

RPS creates a subsidy for deployment (though also raises price of non-qualifying energy).

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How Does an RPS or Deployment Subsidy by Itself Compare with Alternatives?

Fischer, Newell, and Preonas (2013) estimate the cost of achieving a 40% CO2 reduction by using just one policy, relative to the cost of using the optimal set of policies:

CO_2 emission price	~1.25x
RPS	~2.5x
PTC & ITC	~5x

"Cost" refers to effect on total social surplus before counting emission reduction benefits.

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CO_2 emission price	**~1.25x**
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However, they use a partial equilibrium analysis. Goulder, Hafstead, and Williams (2014) show that taking into account interactions with other taxes, an RPS may not be as inferior to an emission price.

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With CO_2 Cap But No Binding NO_X or SO_2 Cap, RPS/PTC/ITC Is Likely to Increase NO_X and SO_2 Emissions

1. Other than non-emitting generation, the other main CO_2 reduction strategy is replacement of old emitters (e.g. coal) with new natural gas combined cycle generators, which have ~0.5x the CO_2 rate of coal-burners but close to 0x the NO_X and SO_2 emission rates

2. RPS, PTC, or ITC
   → more non-emitting generation
   → the emitting generators can have higher average CO_2 emission rates
   → more coal-fired generation
   → Same CO_2 emissions, higher NO_X and SO_2 emissions

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Political Economy of an RPS, PTC, or ITC Without the Rest of the Optimal Policy Set

May be the only politically feasible option for reducing emissions

May build a constituency for other parts of the optimal policy set[1]

[1]Meckling et al, *Science* 349 (2015) pp. 1170-1171

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Improving an RPS

Get the price for each technology to approximate the estimated optimum

- Optimal subsidy varies by technology, so different trading ratios, tiers, or price collars for different technologies could improve an RPS
- To better disincentivize emissions, could expand RPS to include cap and trade for high-emitting generation

Socially optimal RPS credit price path may be downward, which should be taken into account in setting the path of the yearly % requirement.

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Thank you.

Some Relevant Papers

Fischer and Newell, *Journal of Environmental Economics and Management* 55 (2008), 142–162.

Fischer, Newell, and Preonas, RFF Discussion Paper 13-20.

Fischer and Preonas, *International Review of Environmental and Resource Economics*, 2010, 4: 51–92.

Goulder, Hafstead, and Williams, RFF Discussion Paper 14-02.

Meckling et al, *Science* 349 (2015), 1170-1171.

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