Experience of the United States in the Application of Incentives and Regulations for the Supply of Renewable Energy

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Public Service Commission of Wisconsin
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Outline

- Introduction to Wisconsin
  - Geography and Climate
  - Our Electric Industry
  - Our Regulatory Model
- Barriers to Generating Electricity from Renewable Resources
- Incentives and Regulations Intended to Address Each Barrier

Geography and Climate of Wisconsin

- Land Area: 141,000 km^2
- Population: 5,688,040
- Capital: Madison, population 227,700
- Largest City: Milwaukee, population 584,000

- Average Winter Temperature: -8°C
- Average Summer Temperature: 19°C
- Average Annual Precipitation: 83 cm

Retail Electric Market in Wisconsin

- Local Distribution Companies:
  - 118 monopolies with distinct service territories
    - 12 private utilities (owned by investors)
    - 82 municipal utilities (owned by local government)
    - 24 cooperatives (owned by customers)
- No “retail choice”
- Distribution voltages between 12 kV and 24 kV
- Retail service at 120 V to 240 V

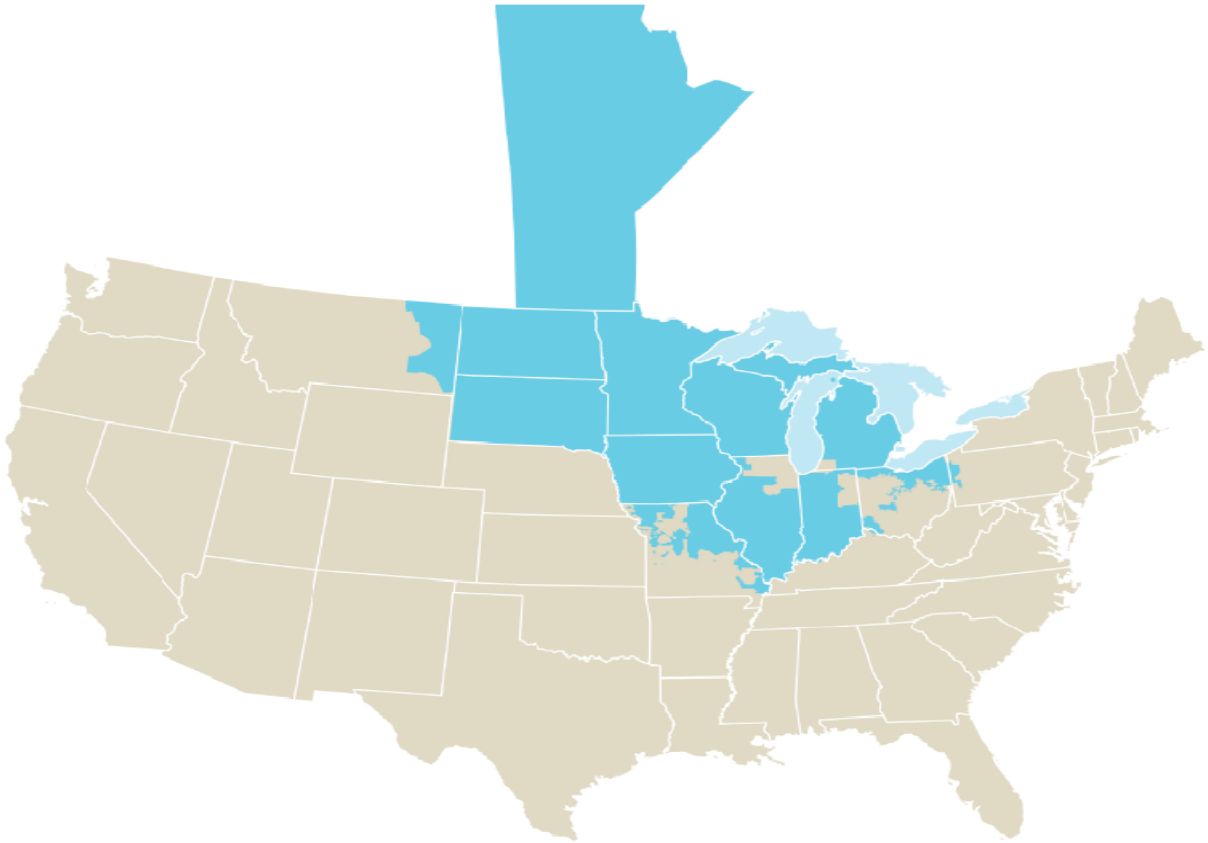
Transmission in Wisconsin

- More than 18,000 km of lines
- Owned and operated by 3 different companies
- Transmission voltages from 69 kV up to 345 kV
  - 500 kV and 765 kV lines are used in some other states

Generation in Wisconsin

- Generation assets owned by:
  - Local Distribution Companies (utilities and cooperatives)
  - Independent Power Producers (also known as “merchant” power plants)
- Part of a competitive regional wholesale market spanning 13 states and 1 Canadian province
- Dispatch throughout the regional market controlled by Midwest Independent Transmission System Operator

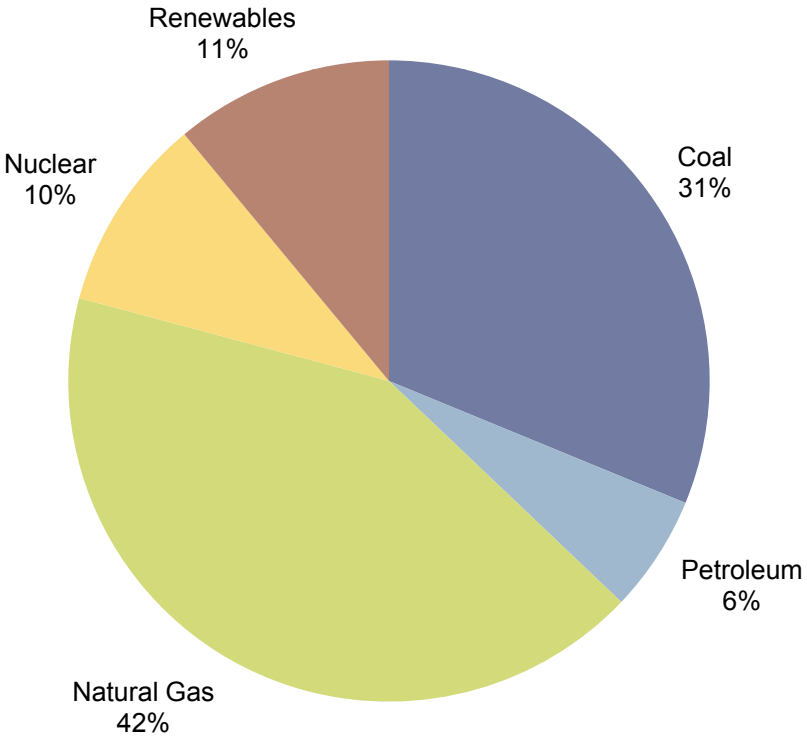
The Midwest Regional Market



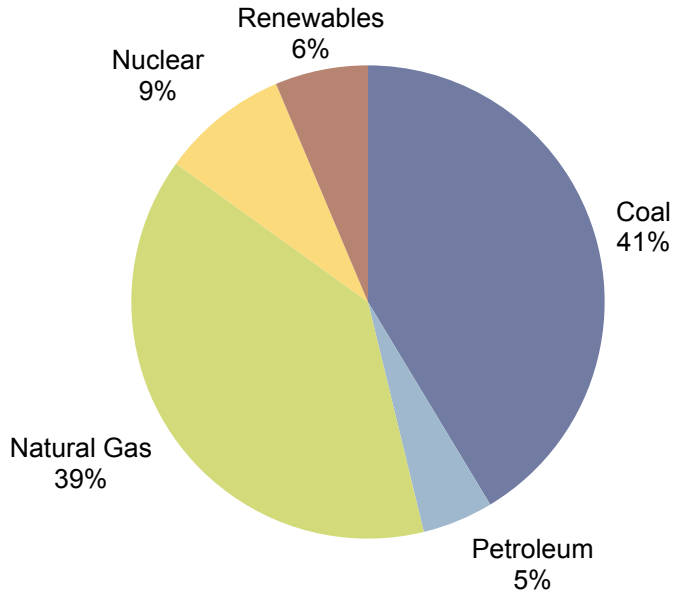
Midwest ISO Regional Reliability Area

2008 Installed Capacity

United States
1,104,500 MW

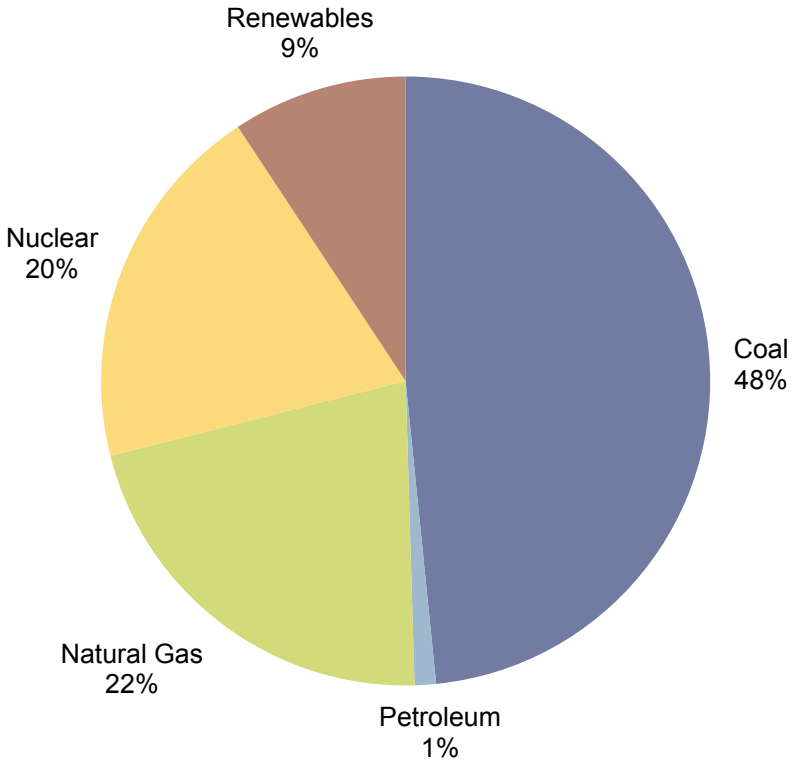


Wisconsin
18,500 MW

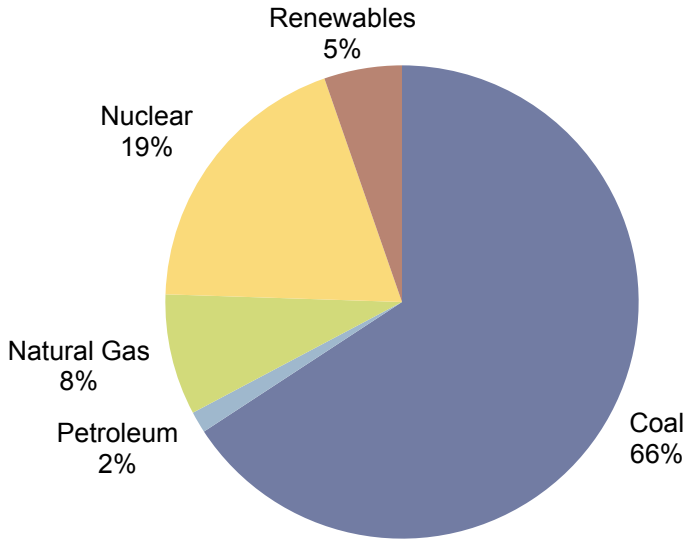


2008 Generation by Fuel Type

United States
4,119,400,000 MWh



Wisconsin
63,500,000 MWh

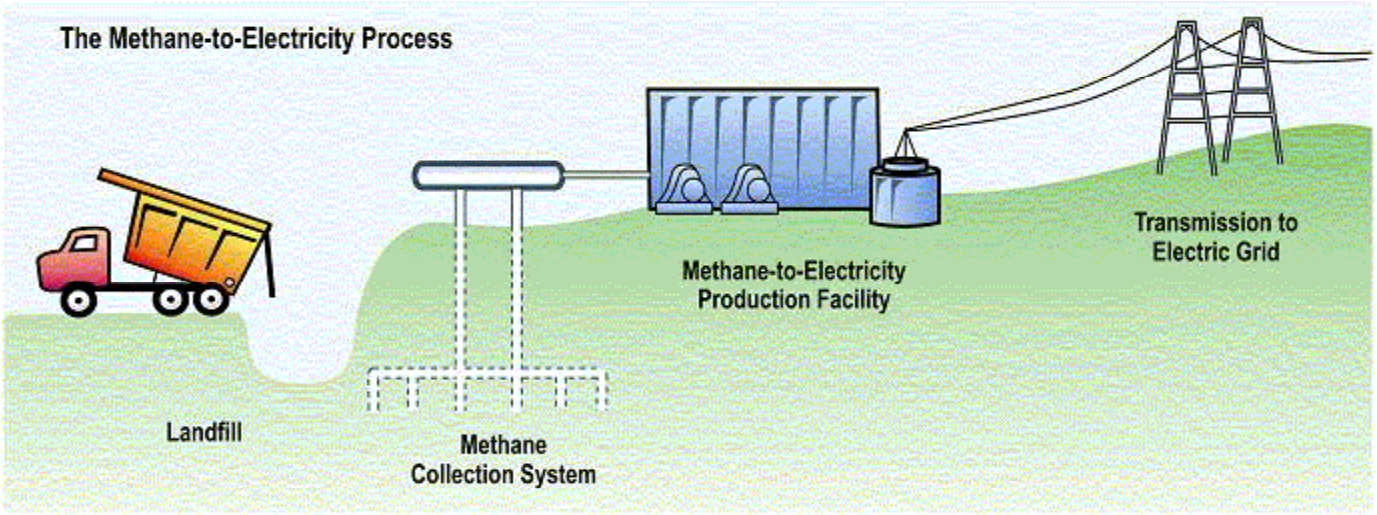


Hydroelectric

Biomass (Wood)

Wind

Biogas from Landfills



Biogas from Livestock Manure

Solar

Public Service Commission of Wisconsin (PSCW)

- Wisconsin was 1st state to regulate public utilities (1907)
- Three Commissioners appointed by the Governor to serve 6-year terms
- Staff of ~150
- We regulate more than 1,100 public utilities that provide electricity, natural gas, water and telecommunication services

PSCW Role in Regulation of Electricity Industry

- The PSCW has broad regulatory authority over:
  - Investor Owned Utilities (IOUs)
  - Municipal Electric Utilities
- The PSCW has varying limited regulatory authority over:
  - American Transmission Company (ATC)
  - Cooperatives
  - Independent Power Producers

PSCW Role in Regulation of Electricity Industry

- Ensure that in the absence of competition, adequate and reasonably priced service is provided to utility customers:
  - Pre-construction approval of large generation and transmission projects
  - Approval of retail rates
  - Oversight of utility finance, structure, mergers
  - Oversight of energy efficiency and conservation programs

Barriers to Generating Electricity from Renewable Resources

- Siting and Transmission Interconnection
- Market Access
- Costs

Barrier: Siting and Transmission Interconnection

- Problems:
  - Local governments may prohibit or severely restrict the construction of new renewable energy installations, especially those involving large numbers of wind turbines
  - The owners of the transmission system may require new renewable energy installations to meet strict standards or pay for improvements to the transmission grid before being interconnected
- Policies that address this barrier:
  - Siting Laws
  - Interconnection Laws and Tariffs

Siting Laws

- Wisconsin has an “Energy Policy Law” that includes the following:
  - “It is the goal of the state that, to the extent that it is cost−effective and technically feasible, all new installed capacity for electric generation in the state be based on renewable energy resources.”
- Wisconsin also has a law requiring PSCW to establish uniform standards and approval procedures that will apply to all new wind power installations throughout the state
- Other states may have similar laws

Interconnection Laws and Tariffs

- Wisconsin has technical standards that specify all of the requirements that a new generator must meet to be interconnected to the grid
- State and federal regulators, and industry groups, are currently trying to establish fair tariffs to determine who pays for needed transmission upgrades when a new generation facility is connected to the grid
- Renewable generators may be exempt from contributing to Ancillary Services/ Governor Response/Voltage Support

Barrier: Market Access

- Problem: Developers of renewable energy projects need prior assurances that they will be able to use or sell all of the electricity that they can generate
- Policies that address this barrier:
  - Net Metering
  - Federal Purchase Requirements for Qualifying Facilities
  - Quotas (Renewable Portfolio Standards)

Net Metering

- Electric meter runs backward if a customer generates more electricity than he uses
- Result: price paid to the customer for generation is essentially equal to the customer's retail rate
- Federal law requires states to have a net metering policy, but does not dictate what the policy must be
- Example: PSCW requires Wisconsin utilities to offer net metering to any customer up to 20 kW capacity
- Helpful for very small generators, such as solar panel owners or owners of a single wind turbine

Federal Purchase Requirements

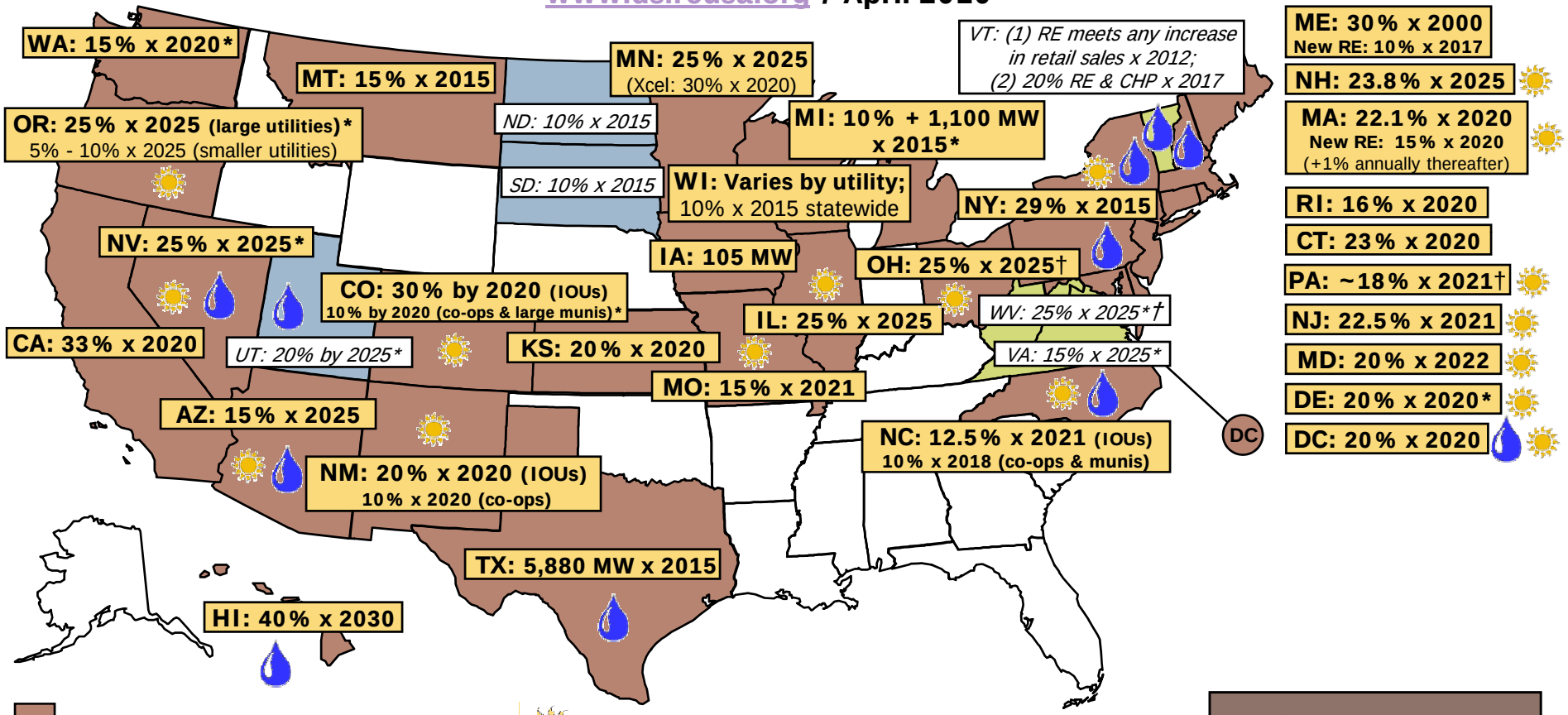
- Federal law requires utilities to purchase any electricity generated by qualifying facilities
- This requirement applies to renewable facilities of up to 80 MW capacity
- Standard purchase prices are established by state regulators (such as PSCW) for each electric utility
- The standard price established by the regulators may not exceed the utility's "avoided costs"
- Owners of qualifying facilities also have the option of negotiating with the utility for a different price than the standard price

Quotas
(Renewable Portfolio Standards)

- 29 states have laws requiring utilities to meet a quota for supplying electricity from renewable resources
- No federal standards at this time
- Most often, but not always, expressed as a percentage of total utility retail sales (e.g., Wisconsin law requires 6% of total retail sales in 2010 to be renewable, and 10% in 2015)
- **Generally regarded as the most successful <u>regulatory</u> policy for promoting renewable energy in the United States**

Renewable Portfolio Standards

www.dsireusa.org / April 2010



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

(6 states have goals)

Effect of Renewable Portfolio Standards in Wisconsin

- Retail Sales from Renewables:
  - 2001-2003 (average) = 2,400,000 MWh
  - 2009 = 4,100,000 MWh

Barrier: Costs

- Problem: Without government intervention, the costs of generating electricity from renewable resources are often prohibitive
- Policies that address this barrier:
  - Federal Tax Incentives
  - Federal Production Payments
  - Price Setting (Feed-In Tariffs)
  - Other Financial Incentives
  - Environmental Regulations

Costs

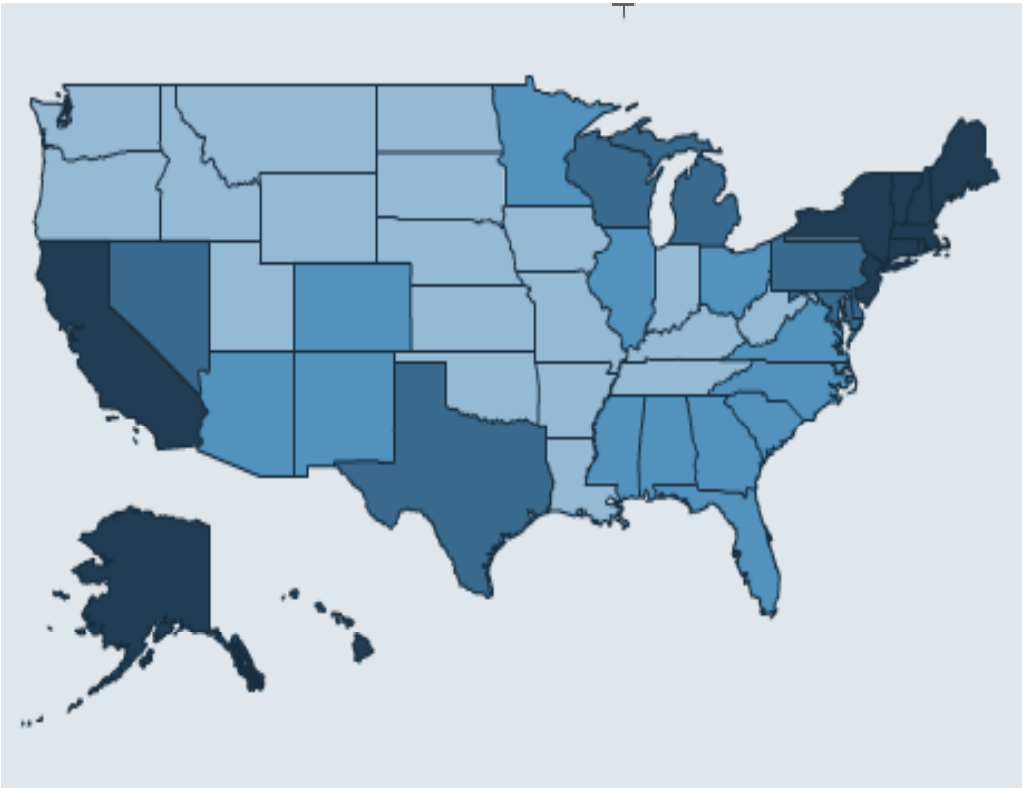
- Estimated Levelized Cost of Energy:
  - Existing Wisconsin Nuclear = 3.0 cents/kWh
  - Existing Wisconsin Coal = 3.4 cents/kWh
  - New Nuclear = 9.8 to 12.6 cents/kWh
  - New Coal = 7.4 to 13.5 cents/kWh
  - New Natural Gas = 7.3 to 10.0 cents/kWh
  - **New Wind = 8.9 to 15.0 cents/kWh**
  - **New Biomass = 7.5 to 12.3 cents/kWh**
  - **New Solar Photovoltaic = 24.4 to 40.5 cents/kWh**
- New renewable generation can sometimes compete with new conventional generation, but not existing coal or nuclear units

Prices

- Average wholesale prices in Midwest market:
  - Prior to recession, 5 to 6 cents/kWh
  - Since recession, < 4 cents/kWh
- Peak wholesale prices can be much higher
- Average retail prices (2010):

	Wisconsin	United States
Residential	11.75 cents/kWh	10.54 cents/kWh
Commercial	9.48 cents/kWh	9.58 cents/kWh
Industrial	6.43 cents/kWh	6.54 cents/kWh

Residential Electricity Prices
January 2010



Legend

- > 14.20 cents/kWh
- 10.40 - 14.20 cents/kWh
- 8.81 - 10.39 cents/kWh
- < 8.81 cents/kWh

Conclusions about Costs and Prices

- Without government intervention, new renewables are usually not economical to build in areas where sufficient generating capacity already exists because they usually can't compete with existing fossil fuel generation
- Without government intervention, new renewable generation will struggle to compete with conventional resources even in areas where new generating capacity is required

Renewable Electricity Production Tax Credit

- Applies to many (but not all) types of renewable energy
- Provides a credit that reduces the federal tax obligation of the owner of a renewable generation facility
- Amount of credit is adjusted based on inflation, and is currently:
  - 2.2 cents per kWh for wind, geothermal, or biomass
  - 1.1 cents per kWh for other renewable resources
- Applies to the first 5 or 10 years of operation, depending on the type of renewable resource
- **Generally regarded as the most successful incentive policy for promoting renewable energy in the United States**

Renewable Energy Production Incentive

- Federal program similar to the tax credit programs, but applies to entities that do not have federal tax obligations (such as municipal electric utilities and electric cooperatives)
- Payment instead of tax credit: up to 2.2 cents per kWh in 2010
- Unlike tax credit programs, funding is capped and dependent on annual appropriations
- Demand usually exceeds funding, so payments are reduced below maximum amount

Business Energy Investment Tax Credit

- Applies to many (but not all) types of renewable energy
- Provides a credit that reduces the federal tax obligation of the owner of a renewable generation facility
- Amount of credit is based on the cost of the project:
  - 30% of the cost of solar and small wind projects
  - 10% of the cost of other qualifying renewable energy projects
- In some cases the maximum amount of the credit is capped
- Project owner may only use the production tax credit or the investment tax credit – not both

Residential Renewable Energy Tax Credit

- Similar to business energy investment tax credit
- Applies only to solar, wind, geothermal, and fuel cells
- Amount of credit is 30% of the cost of the project
- In some cases the maximum amount of the credit is capped

Treasury Grants

- Due to the recession of 2008 and 2009, many businesses lost money and had no federal tax obligation
- For those businesses, renewable energy tax credits had no value
- As part of the *American Recovery and Reinvestment Act of 2009*, the law was changed to allow qualifying businesses to request a “Treasury grant” instead of tax credits
- These grants pay an amount equal to the amount of the investment tax credits

Price Setting (Feed-In Tariffs)

- Utility purchases electricity generated by a customer at a premium, i.e. a price greater than the utility's "avoided cost"
- Usually offered as a fixed price for a fixed period of time
- Price varies based on the renewable resource
- Laws requiring utilities to do this are considered by many to be the single most effective policy for encouraging renewable energy
- Much more experience with such policies in Europe and Canada than in the United States
- Ongoing legal debate over whether state regulators in the United States can order utilities to do this
- Several Wisconsin utilities voluntarily offer feed-in tariffs:
  - 22.5 to 30 cents per kWh for solar electricity
  - 6.1 to 9.3 cents per kWh for biogas electricity

Other Financial Incentives

- Clean Renewable Energy Bonds
- Qualified Energy Conservation Bonds
- Federal Loan Guarantees
- Some states offer incentive programs similar to the federal programs (tax incentives, production payments, special bonds, etc.)
- New Ideas:
  - Property Tax Financing
  - Utility Bill Financing

Wisconsin's Focus on Energy Program

- Utilities add a surcharge to customer bills
- Money from this surcharge is used to fund energy efficiency and renewable energy programs
- Renewable energy programs include:
  - Initial site assessments (potential for renewable energy)
  - Detailed feasibility studies
  - Grants and rebates for installation of renewable energy systems

focus on energy
The power is within you.

Environmental Regulations

- Regulation of air pollutants (such as sulfur dioxide) tends to increase costs for fossil fuel generation, without increasing costs of renewables
- Regulation of greenhouse gases, if enacted in the United States, could also substantially increase costs for fossil fuel generation
- Both of these factors are likely to further narrow the cost gap between renewable electricity and electricity from fossil fuels

Questions?

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