Renewable Energy in Texas

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A Century of Wind Power in Texas

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Topics

- Renewable Energy Policy in Texas
- Policy Choices in Renewable Energy Development
- Renewable Energy and Transmission
- Political Considerations

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Renewable Energy in a Market Environment

- 1999 legislation introduced retail competition in much of Texas
- Legislation resulted in unbundling, sale of assets, and significant market entry
  - Separation of production, delivery and retail sales operations

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Texas Renewable Energy Program

- Renewable Portfolio Standard--1999
  - Goal of 2000 MW of renewables by 2009
  - REC trading program
  - Transmission policies facilitated interconnection and transmission service
- Renewable energy amendments--2005
  - Higher goal for renewables—5000 MW by 2015
  - Target for non-wind renewable resources
  - Identification of renewable zones and transmission to serve the zones

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Results of Renewable Policies

- Producers decide what and where to build
- Producers favor large wind projects—low cost in Texas
- Insufficient incentive for high-cost technologies
- RECs support voluntary renewable energy products
- Transmission built to interconnect resources and relieve constraints but not for future projects

Year	Goal (MW)	Actual (MW)	Non-Wind (MW)
2003	400	990	45
2005	850	1190	45
2007	1400	3100	77
Today	1400	4600	108

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Where is the value?

- Sources of value for developer
  - Energy market
    - Regional electricity prices have tracked natural gas prices
  - RECs
    - REC prices have fallen as supply of RECs has increased, relative to demand
    - 2006, 6.5 million RECs generated, 3.4 million required for compliance, 780 thousand retired for renewable energy verification
  - Tax credits
    - Fixed value, indexed to inflation
    - Developer must have a need for credits
    - Periodic lapses of credits, based on national legislation

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Policy Choices for Renewable Energy

- What is the goal?
  - Energy independence, clean air, climate change, rural development, universal electric service
- What resources qualify for support?
- What are the support mechanisms?
  - Income tax, import duties, portfolio standard, direct support payments, standard offer (feed-in tariff), government procurement, green pricing

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Renewable Resource Qualities

- What qualities provide advantages or disadvantages?
  - Cost
  - Air emissions
  - Net CO_2 emissions
  - Availability of energy source
  - Location of energy source
  - Intermittence
  - Dispatchability
  - Maturity of technology

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Characteristics of Support Mechanisms

- Amount
- Variability
- Certainty
  - To provider
  - To government or utility
- Duration
- Value to various types of market participants
- Ease of administration

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Other Policy Issues

- In a competitive environment
  - How can generation and transmission development be coordinated?
- In a regulated environment
  - How can regulated company be induced to invest in non-traditional resource?

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Integration of Renewables

- What is the cost of integrating the resource?
  - Intermittent, non-dispatchable resources can increase costs of matching supply and demand
  - Level of costs depend on level of renewable resource and other resources on system
  - Costs can be borne by control area operator or renewable energy generator
  - Additional risks for thermal generation

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Texas Transmission Policies

- Regional postage-stamp rate
  - Distance not a factor in rate
  - Multiple utilities do not charge multiple rates
- Standard interconnection agreement
- Transmission upgrades in regional rates
- Neutral planning organization
- Cost-recovery mechanism for investment
- Congestion managed through energy prices, transmission revenue rights

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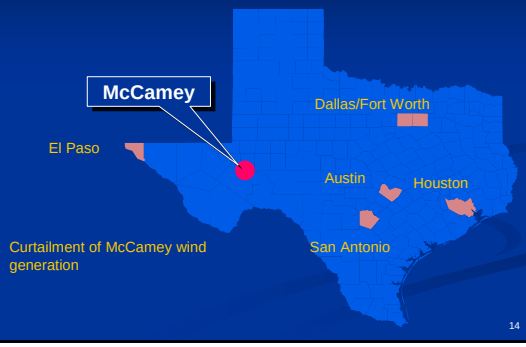
Texas Wind Rush



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Competitive Renewable Energy Zones

- 2005 Legislation
  - Designate zones for renewable energy development
  - Coordinate transmission and generation development
  - Develop transmission plan
  - Pre-approval of need for transmission facilities
  - Consider level of financial commitment in designating zone and granting CCN

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Politics of Wind in Texas

- Successful implementation of early steps of 2000 MW goal
- Communities and businesses that benefited wanted more
- Communities that had wind resource wanted to benefit from it
- Legislators in wind-rich areas took greater interest in renewable energy issues

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Sources of Information

- PUC
  - Statute—PURA 2005 §39.904
    - www.puc.state.tx.us/rules/statutes/index.cfm
  - Rules—Substantive Rule 25.173, 25.174
    - www.puc.state.tx.us/rules/subrules/electric/index.cfm
- REC administrator—ERCOT
  - Capacity, energy, annual reports
    - www.texasrenewables.com

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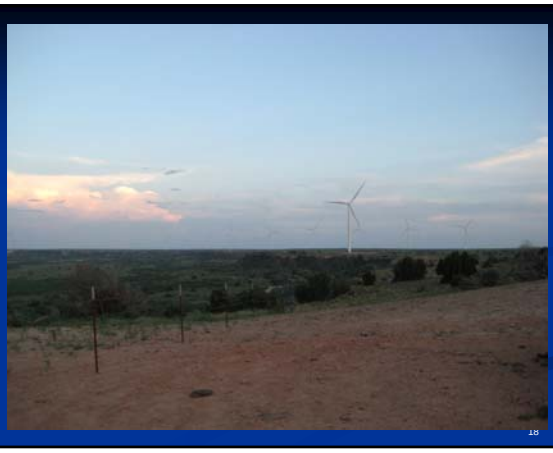

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Renewable Energy is a Global Phenomenon