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The Economics of Priority Access

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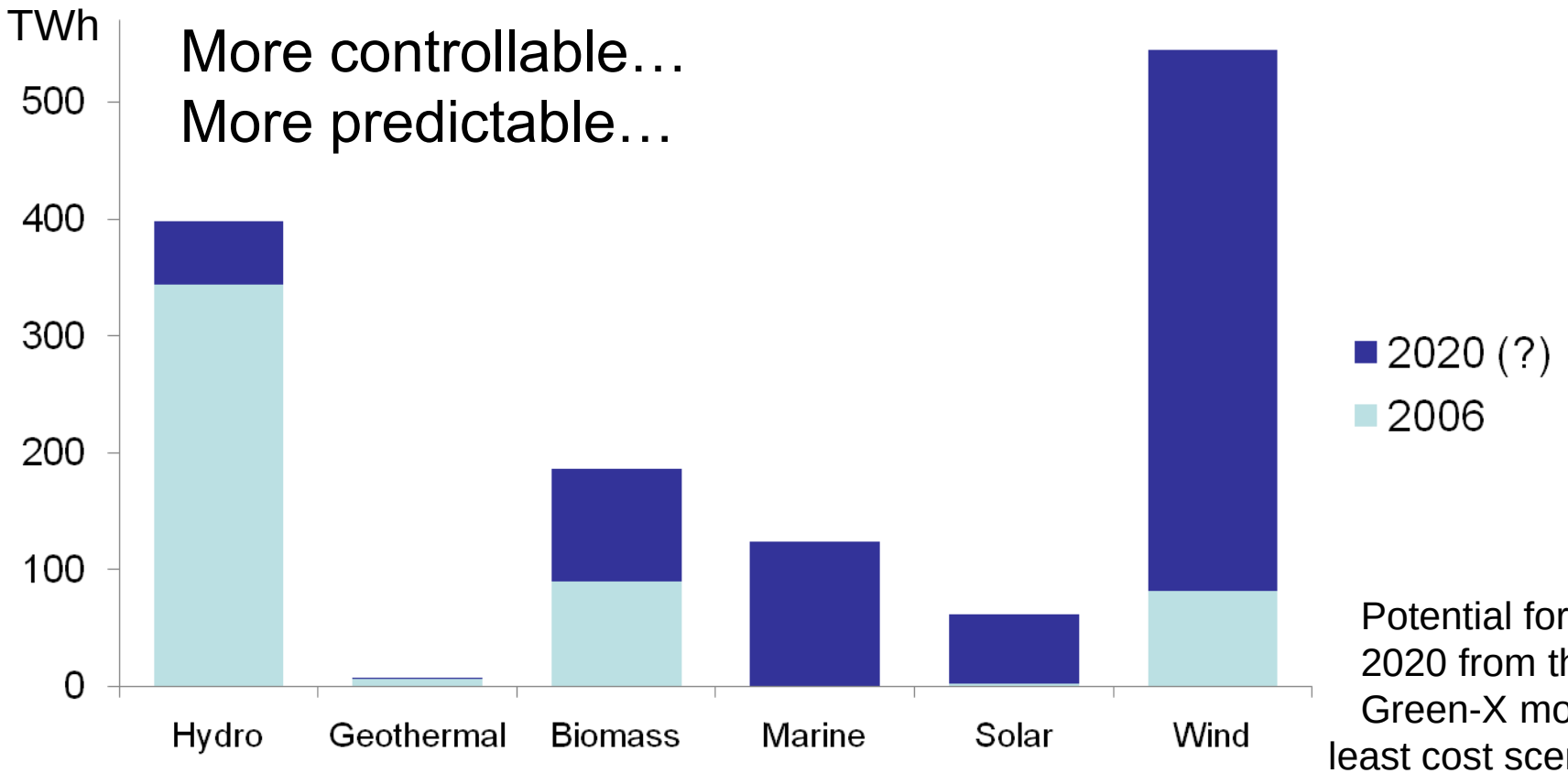
Renewable electricity in the EU



Potential for 2020 from the Green-X model, least cost scenario

Priority access to the grid

- Physical possibility of access
- Financial terms of access
- Access to the transmission system
  - Connection access
- Access to the customer
  - Dispatch access

What should dispatch achieve?

- Demand varies over time
- Demand usually exceeds available generating capacity
- Merit order dispatch selected the cheapest available stations to meet demand
- An efficient market would do the same

Which stations are cheapest?

	Marginal cost of small variation (saving from reducing output)
Wind	Practically zero
Nuclear	Very low
Hydro	Opportunity cost of water
Thermal	Low – high

- Implications

- run wind stations in preference to almost everything else
- run hydro to use up its water in high-value periods
- run biomass in line with its fuel costs (adjust for CHP)

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Which stations are cheapest?

	Marginal cost of small variation (saving from reducing output)	Marginal cost of large variation (saving, net of cost of restarting later)
Wind	Practically zero	Practically zero
Nuclear	Very low	Negative and large!
Hydro	Opportunity cost of water	Opportunity cost of water
Thermal	Low – high	Can be negative

- Implications

- keep nuclear running in preference to almost everything else
- avoid turning off large thermal stations for short periods
- turn off hydro, then wind

Support schemes and costs

- Most Member States have output-linked support for renewables
- Marginal financial cost of reducing output is thus the fuel saving, less support forgone
  - Value of tradable green certificate or
  - Value of feed-in tariff
- ETS should internalise others' cost of CO_2

Dispatch access

- Physical access to dispatch?
  - guaranteed to be able to deliver
- Financial access to dispatch?
  - compensated for non-delivery
- Market access to dispatch?
  - sell (or not) on the same terms as others
  - n.b. feed-in tariffs take renewable generators out of the main wholesale market

Physical access to dispatch

- May not always be possible

Financial access to dispatch

- Just as good for the generator (?)

Market access

- Bid-based markets can reflect relative costs of different generators
  - Caveats on market power, externalities, etc
- Renewables likely to be dispatched on basis of relative costs (efficient)
- Output-based support effectively allows generator to buy more access

Transmission-limited dispatch

- Transmission lines (etc) fail if overloaded
  - Automatically disconnect to prevent this
- Generators and lines can fail suddenly
- Operators run the system in “N-1” mode
- Planners build the system in “N-2” mode
- Specialist knowledge is needed to apply these limits in practice!

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Renewables and transmission

- Many renewable resources are remote from customers and grid links are weak
- Transmission limits will mean not all stations in the area can run

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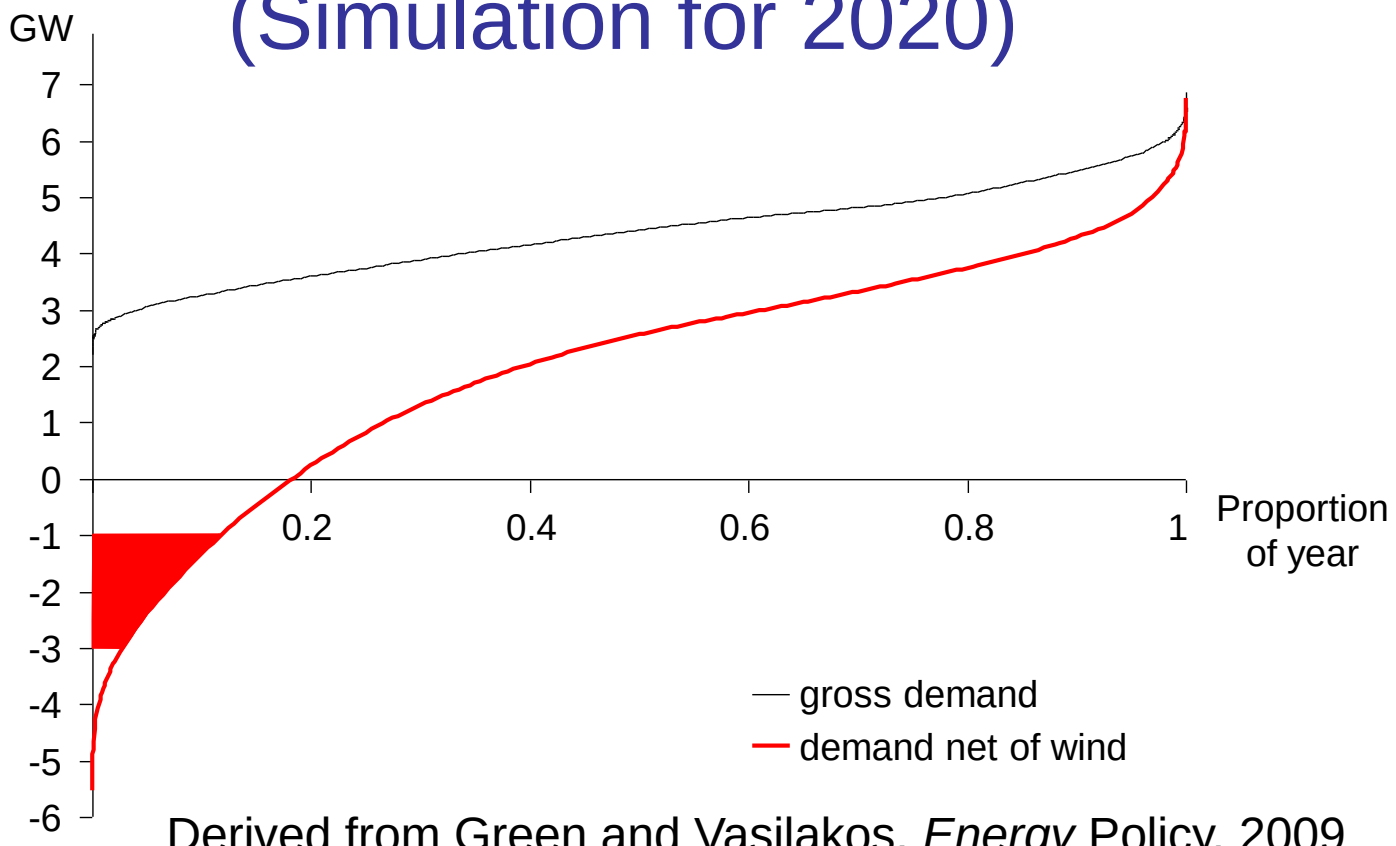
Load-duration curves for Scotland (Simulation for 2020)



Derived from Green and Vasilakos, *Energy* Policy, 2009

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Renewables and transmission

- Many renewable resources are remote from customers and grid links are weak
- Transmission limits will mean not all stations in the area can run
- Who loses access, and how?
  - Bundled transmission operators can favour affiliated generators

Are wholesale prices spatial?

- Uniform prices normally imply financially firm access rights
  - Compensation paid if access denied
- Prices that vary with location imply access is not financially firm unless paid for
  - Local price falls when constraints bind
  - Financial Transmission Right is a separate contract that offers compensation for this

Conclusion on dispatch access

- Market access should be efficient, but hardly gives priority
- Financial access combines efficiency and feasibility, but may be costly

Connection access

- Physical connection to the grid
  - Is this available, and when?
  - Does it depend on distant reinforcements?
- Financial terms of connection
  - Including use of system charges
  - Do distant generators pay more?
  - Do generators behind constraints pay more?
  - What split between capacity and output?

What are we trying to achieve?

- A target level of renewable output at minimum cost (?)
  - subject to supporting new technologies (?)
- Resource cost to society?
  - Renewable generators should face the transmission and other costs they impose
- Financial cost to consumers / taxpayers?

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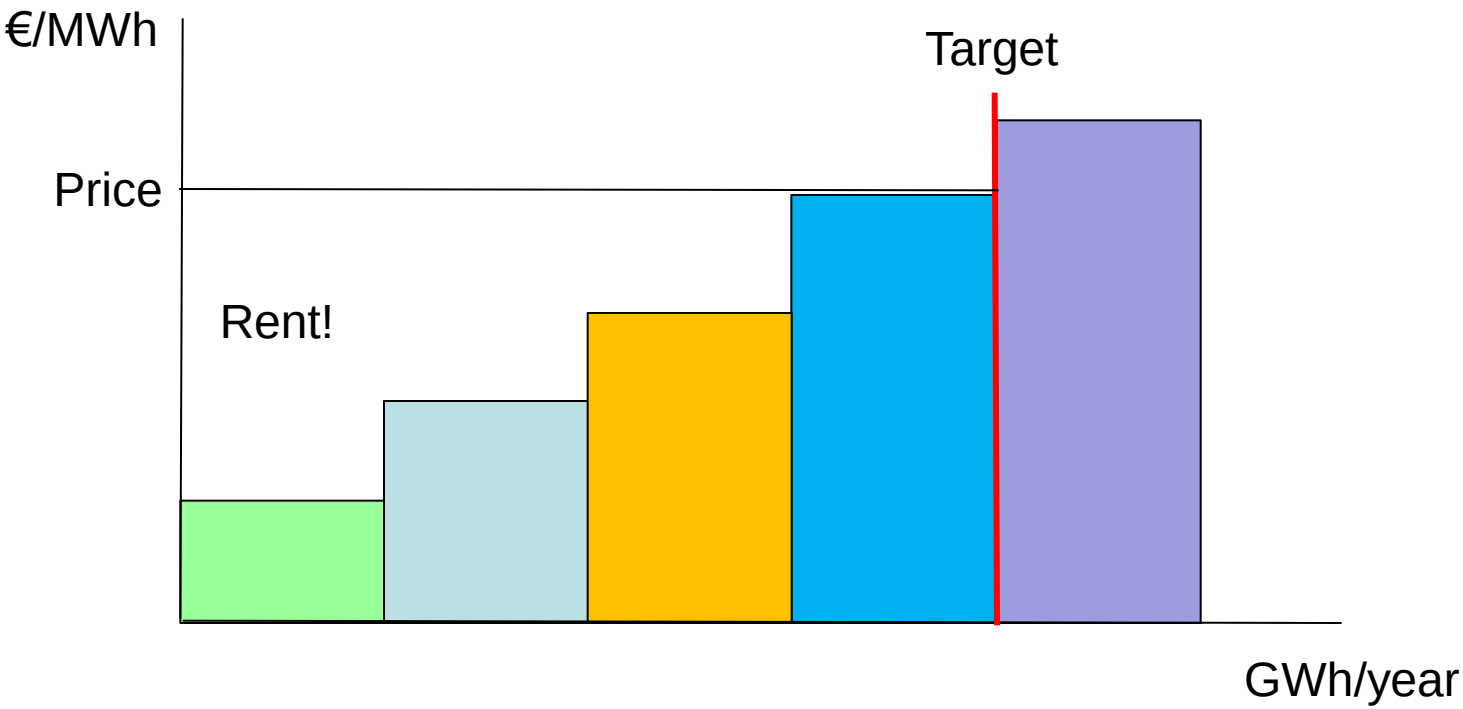
Where are the marginal renewables?



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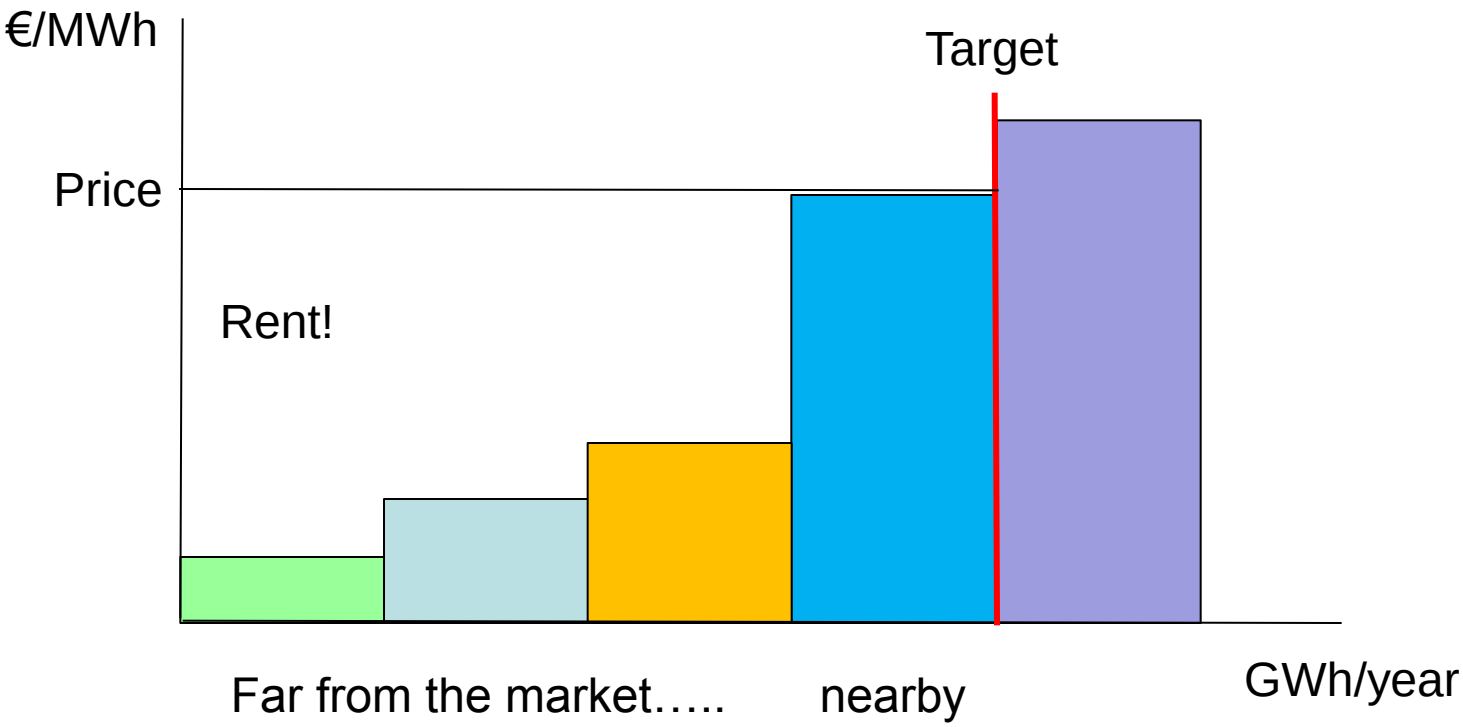

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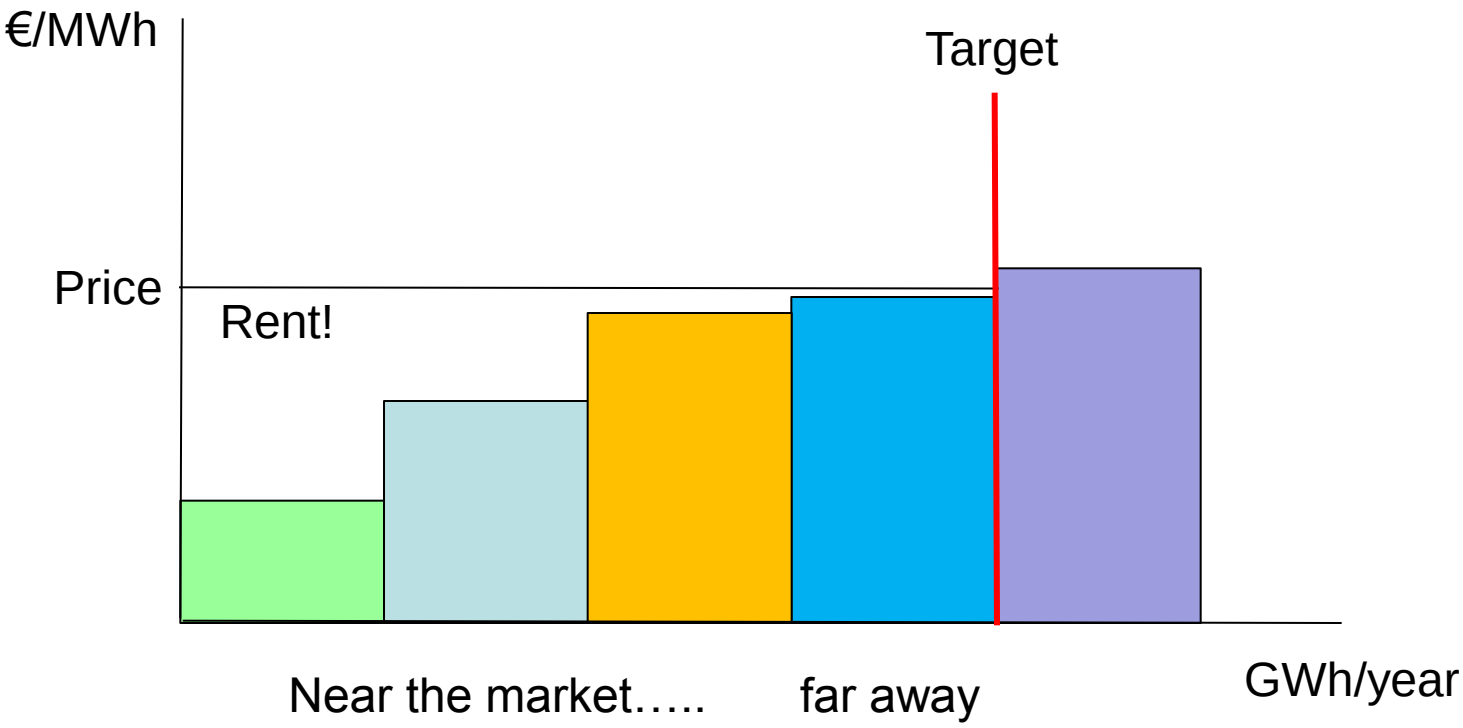

Implications

- Priority access may reduce the financial cost of supporting renewable generators
- Overly cheap access may raise the resource cost of meeting the 2020 target
- Blocking access would make it impossible to meet the 2020 renewables target

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