UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Are the British Electricity Trading and Transmission Arrangements Future-Proof?

Richard Green

University of Birmingham
(from September 2011, Imperial College London)

Thinking Networks

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

A timeline

- 1990: Electricity Pool of England & Wales
- 2001: New Electricity Trading Arrangements
- 2005: British Electricity Trading and Transmission Arrangements
- 2010: Electricity Market Reform
- 2020: UK target is 15% renewable energy

  = 30-40% renewable electricity

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Three tasks

- Give generators the incentive to build new plants (and keep old ones open) if (and only if) the capacity is needed
- Connect generators to the system in a timely manner – if the latter can cope
- Promote efficient operation by the stations connected to the grid, while respecting physical constraints and reserve needs

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

BETTA's market design

- Bilateral trading (mostly OTC and exchange-based; very limited auctioning) until GATE CLOSURE (1 hour to real time)
- National Grid trades in balancing mechanism to keep system stable
- Imbalances paid for surplus / shortage of generation or load (separately)
- No geographic prices

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

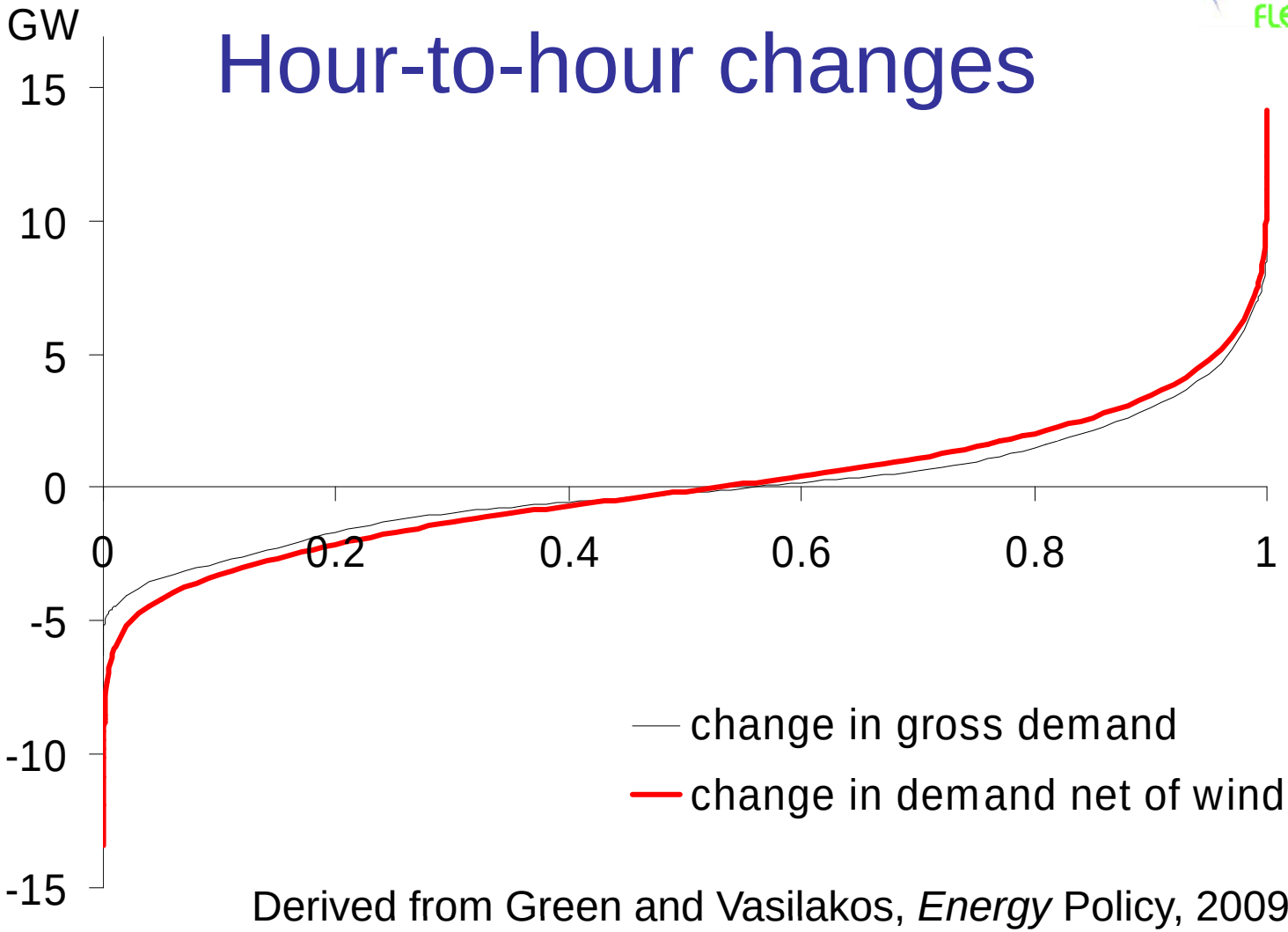
The challenge

- 15% of renewable energy by 2020
- 30-40% of renewable electricity
- 30 GW of wind?
  - Peak demand c 60 GW
- Even after “portfolio effects”, outputs will still fluctuate significantly

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Hour-to-hour changes



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

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

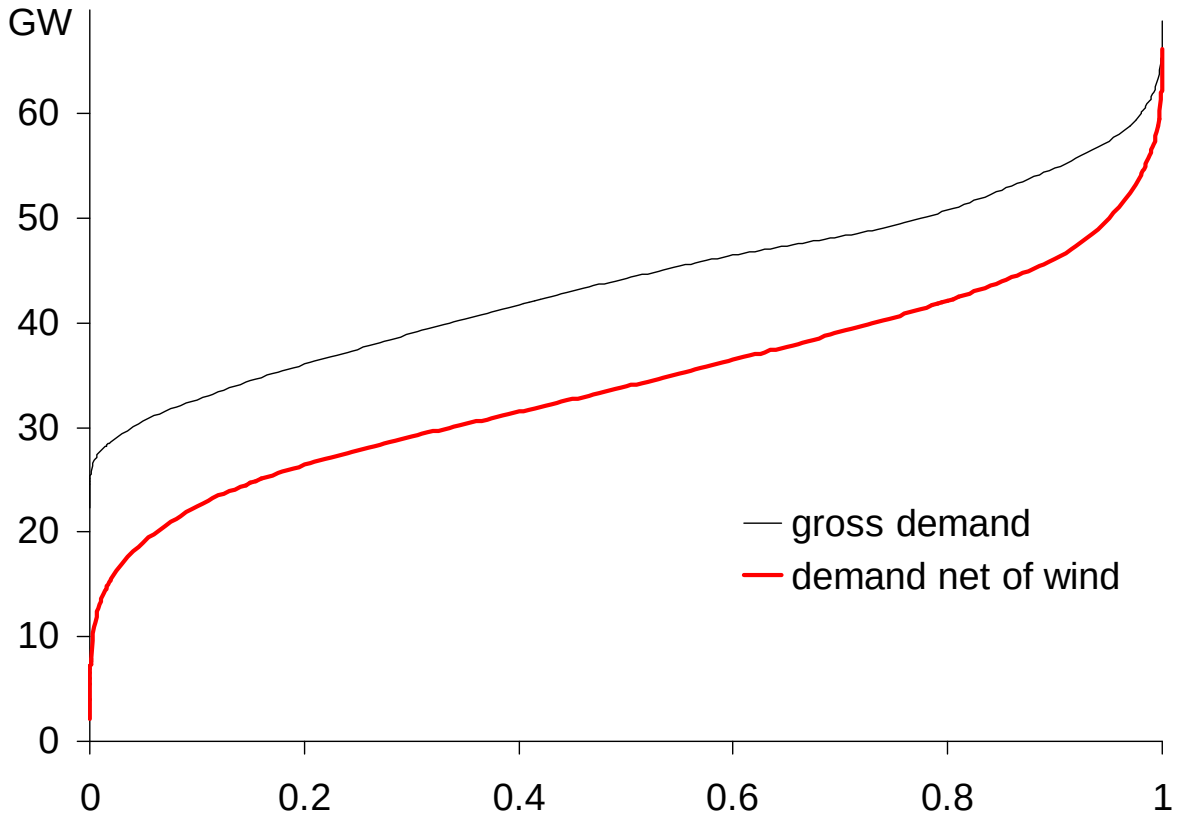
Implication

- A liquid market in which companies can react to changes will be helpful
- BETTA's short-term markets are illiquid
  - Vertical integration
  - Bilateral trading opaque

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Load-duration curves for GB

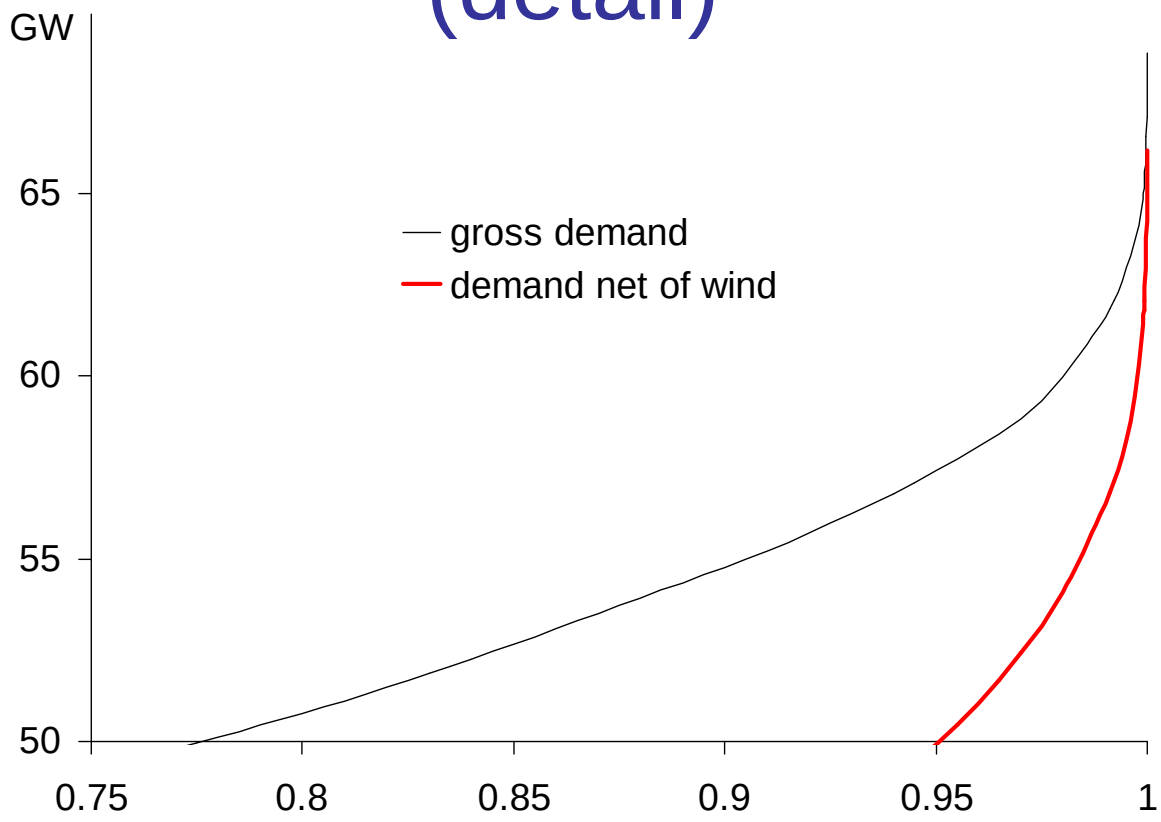


ibid.

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Load-duration curves for GB (detail)



ibid.

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

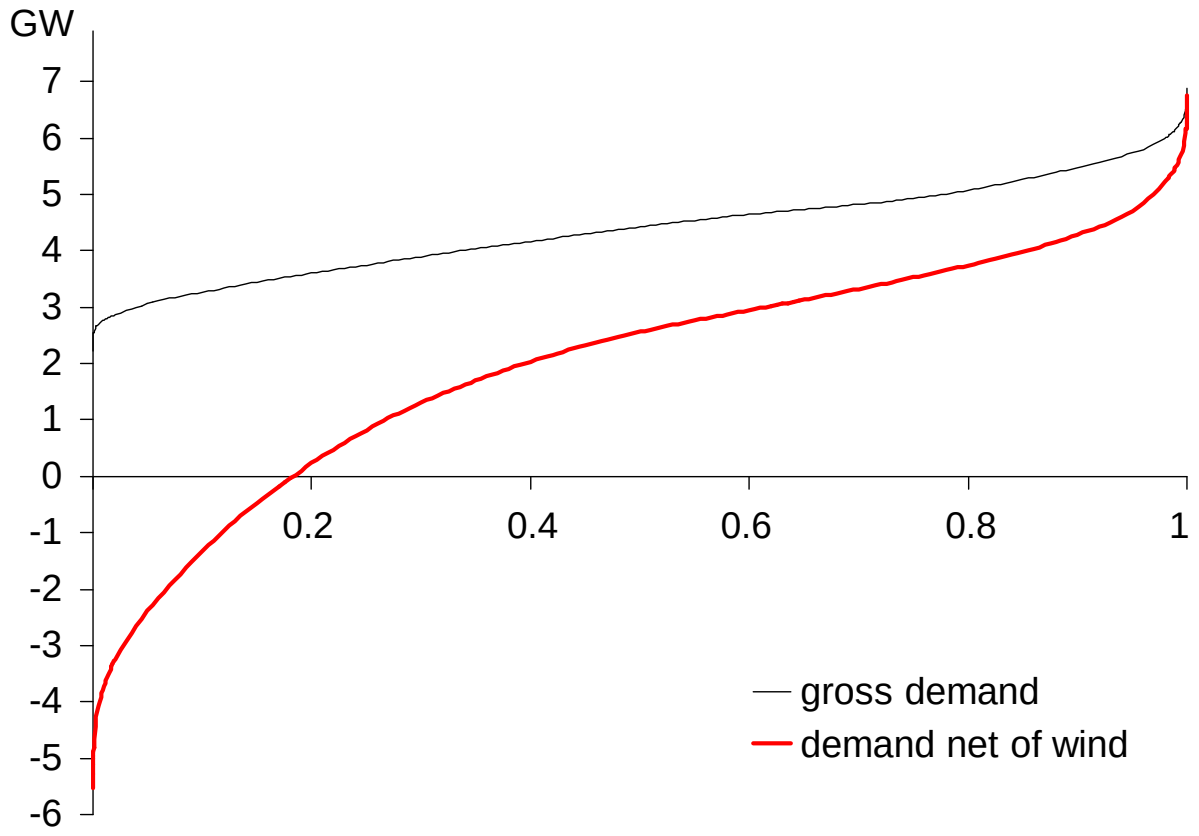
Implication

- A large amount of plant will not run very often
- Recovering fixed costs in an energy-only market will be risky
- BETTA relies on arbitrage to feed through revenues from the Balancing Mechanism
- NG's reserve tenders are a back-up

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Load-duration curves for Scotland



ibid.

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Implication

- Transmission constraints bind more often
- Balancing Mechanism is slightly inefficient at resolving constraints and losses
- BETTA provides little incentive to avoid frequently-constrained sites
  - If you can get a connection!

UNIVERSITY OF BIRMINGHAM

Who should pay for congestion?

- New generators in an area?
  - Reduces profitability of entrants *for a given market price and level of renewable support*
- All the generators in a constrained area?
  - Better for entrants (see above); reduces incentive to avoid poor areas
- All generators

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Possible improvements

- Establish and promote day-ahead and real-time auctions
- Set locational prices based on marginal costs – use these to manage congestion
- Use financial transmission contracts to lock in incumbents' rents while giving operating incentives
- Capacity market to raise transparency

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Electricity Market Reform

- Capacity market under consultation
  - Government favoured a “last resort” model
- Contracts for low-carbon generators
- Carbon price support
  - Supplementary tax + ETS price = pre-set path
- Emissions Performance Standard
  - Long-term right to run part-abated coal plant

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Project TransmiT

- Ofgem review of transmission charging etc.
- Facilitate timely move to low carbon electricity with value for money
- Connection policy – should users commit? Should the TSO compensate for delay?
- Charging – should this be on energy or capacity? Should there be more geographical differentiation?

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet

Academic Reports

- Cambridge, US, Strathclyde/Birmingham
- Two interim reports favoured nodal pricing
- One noted advantages of cost reflectivity and lack of stakeholder support
  - Energy-based charges are good for stations with low load factors
  - EMR allows for compensating changes in support to low-carbon generators

UNIVERSITY OF BIRMINGHAM

SUPERGEN FLEXNet