

# The Impact of RES on Wholesale Markets

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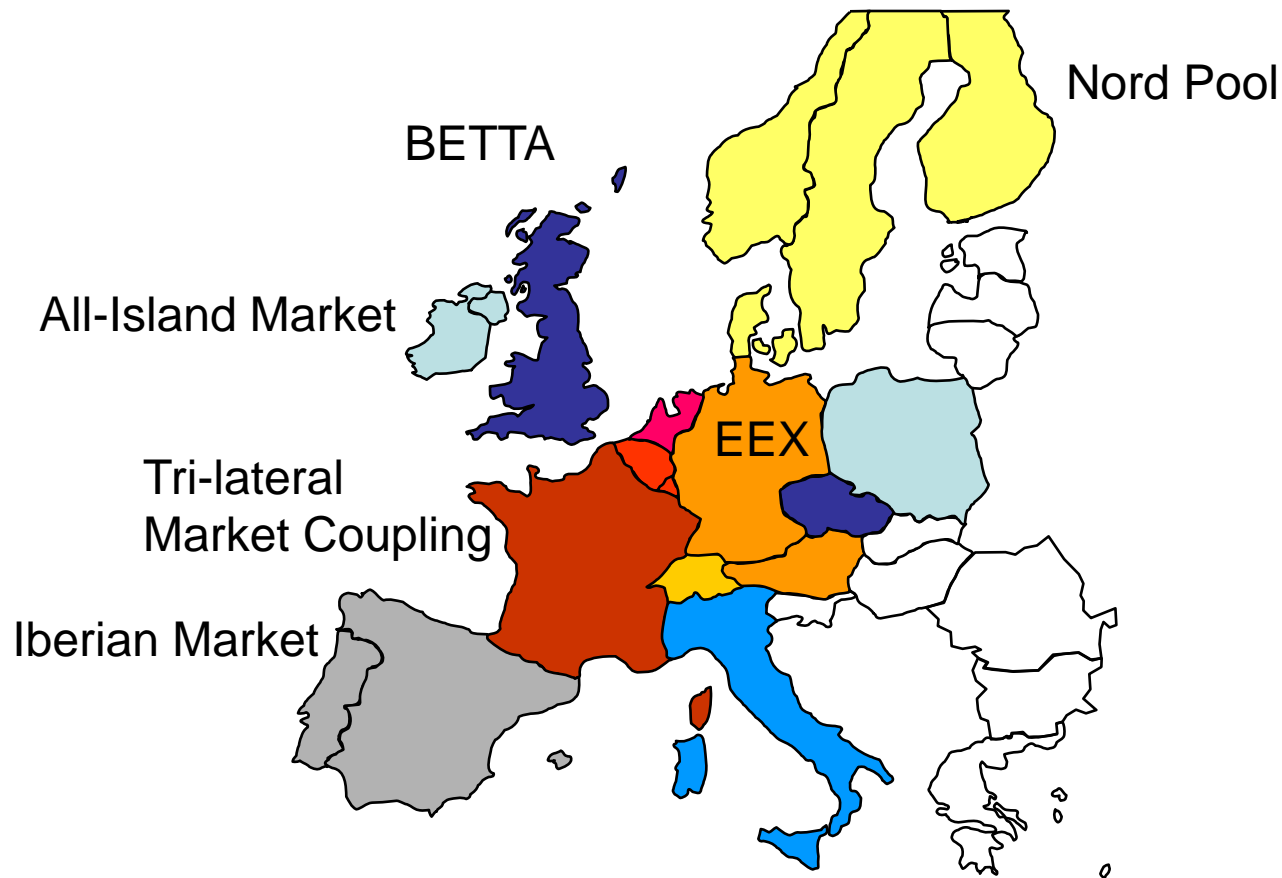
## What is a market *for*?

- Choosing how much to produce
- Choosing who gets to produce
- Choosing who gets to consume
  - These are all about *information*
- Moving cash from consumers to producers
  - This is unfortunate (and essential)

## Information, Prices and Markets

- No-one can know everything
- Prices summarise what you don't know
- In most markets, you see a price and respond on the basis of private information
- In many electricity markets, you give out your private information as a price offer

# Europe's electricity markets



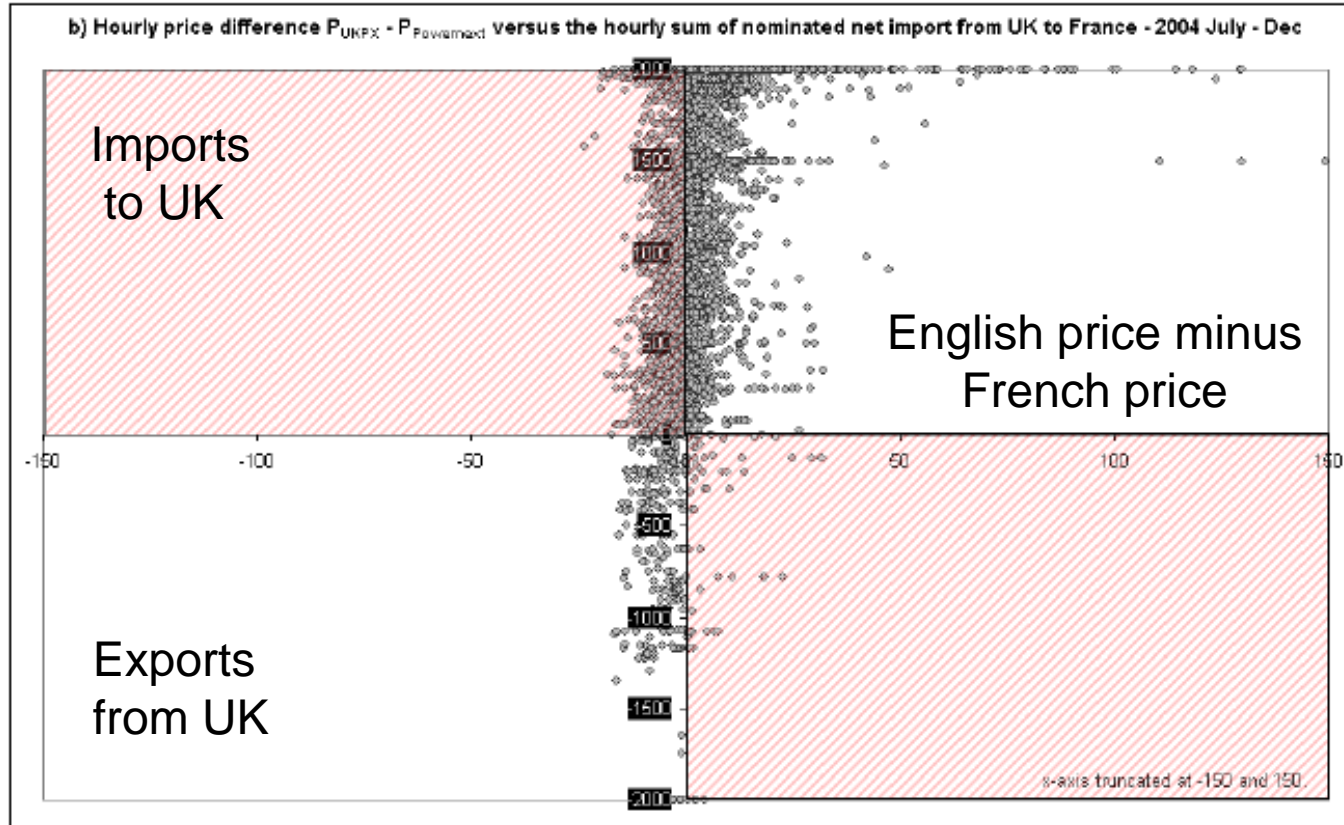
## European Markets

- Power Exchanges run markets for energy, mostly voluntary day-ahead auctions
- Forward markets exist to hedge these
  - Financial hedges or physical trades
- Transmission companies acquire ancillary services, resolve constraints (usually by counter-trading) and balance in real time

## Dealing with geography

- Most markets have a nationwide-price
  - Norway and Italy the main exceptions
- Market coupling allows two nations to share a price if the border is not congested
- With congestion under market coupling, different prices signal the best solution
  - Sends power where it is valued most
  - Older ways of allocating capacity may not

# Errors in Interconnector use



DG Competition, Energy Sector Inquiry, fig 64

## Paying for capacity

- Iberia and the All-Island Market have explicit payments for capacity
- Most system operators buy reserves
- Will energy prices rise when capacity is short?
- Do generators make their money across their portfolio?
- Do integrated electricity firms need to make their money in generation?

## A low-carbon future

- EU Target of 20% renewable energy

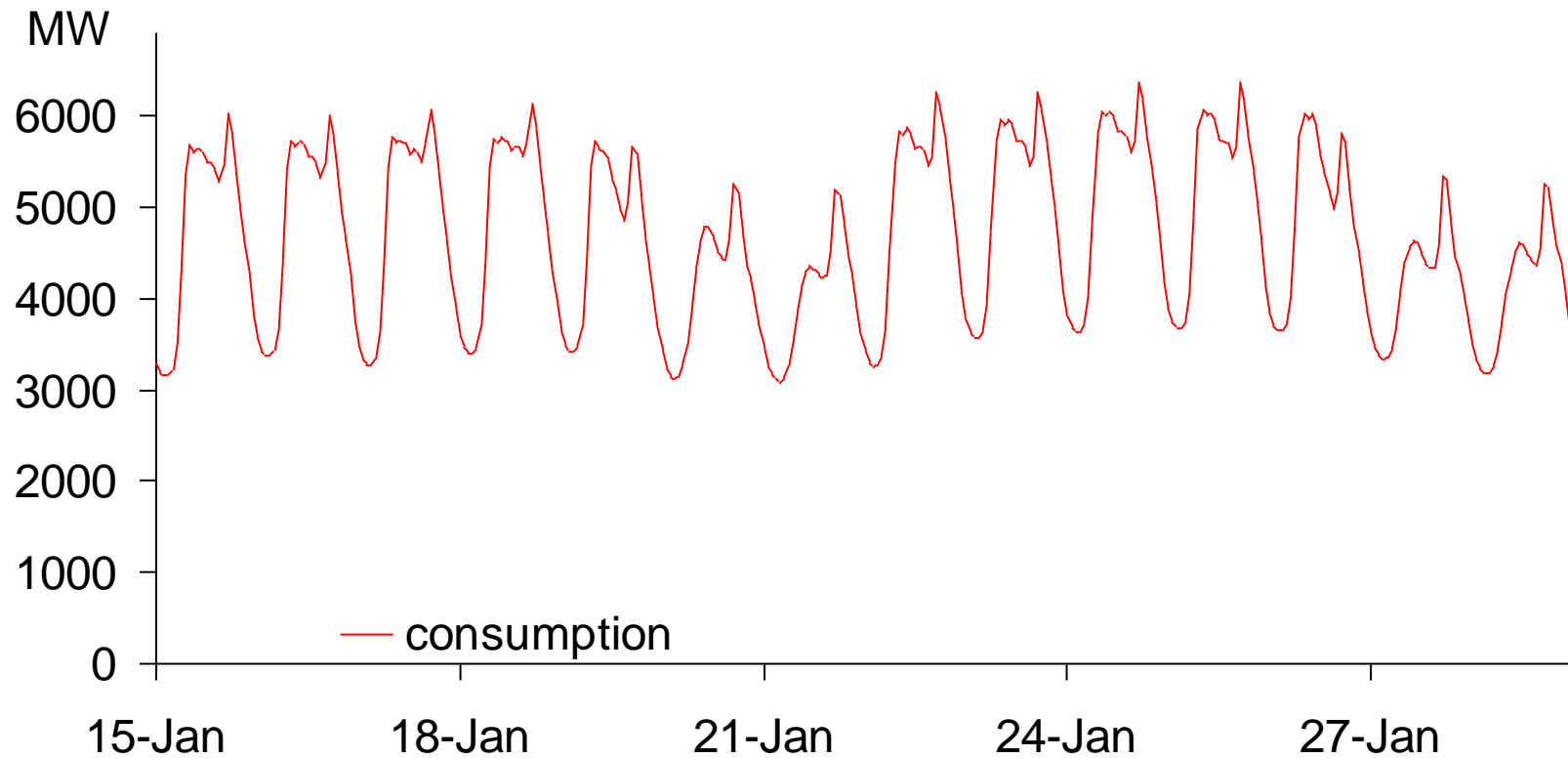
TWh/year	now	2020
Wind Power	60	350
Biomass generation	60	450
Renewable Electricity	440	1250

Poyry, 2008 report to BERR on costs of the 20% target

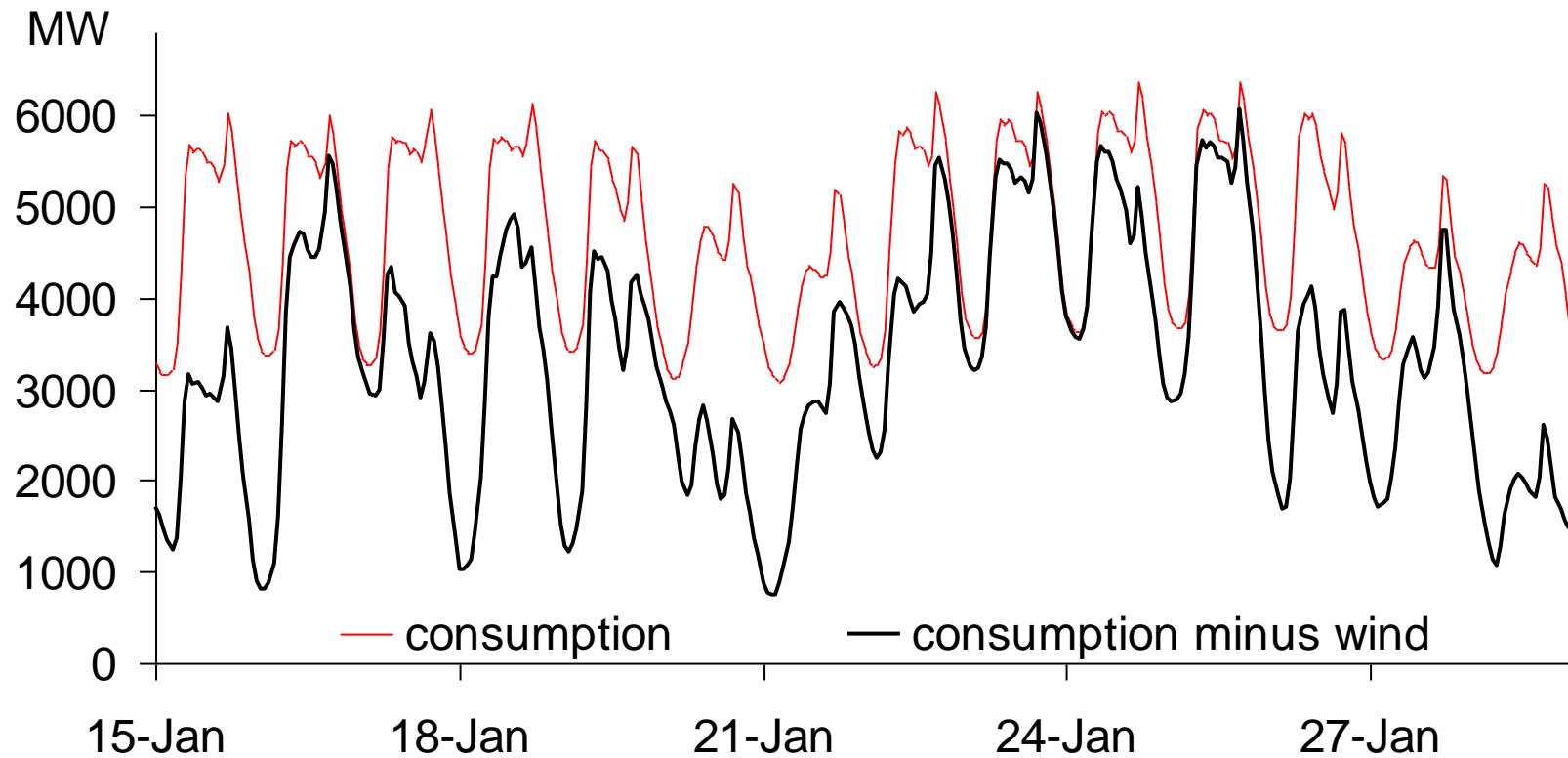
## Implications for the system

- Wind generates when the wind blows
- CHP generates when heat is wanted
- Net load more variable, less predictable
- More short-term reserve needed
- More generation capacity needed
- (Some) more transmission needed

# Denmark, January 2007



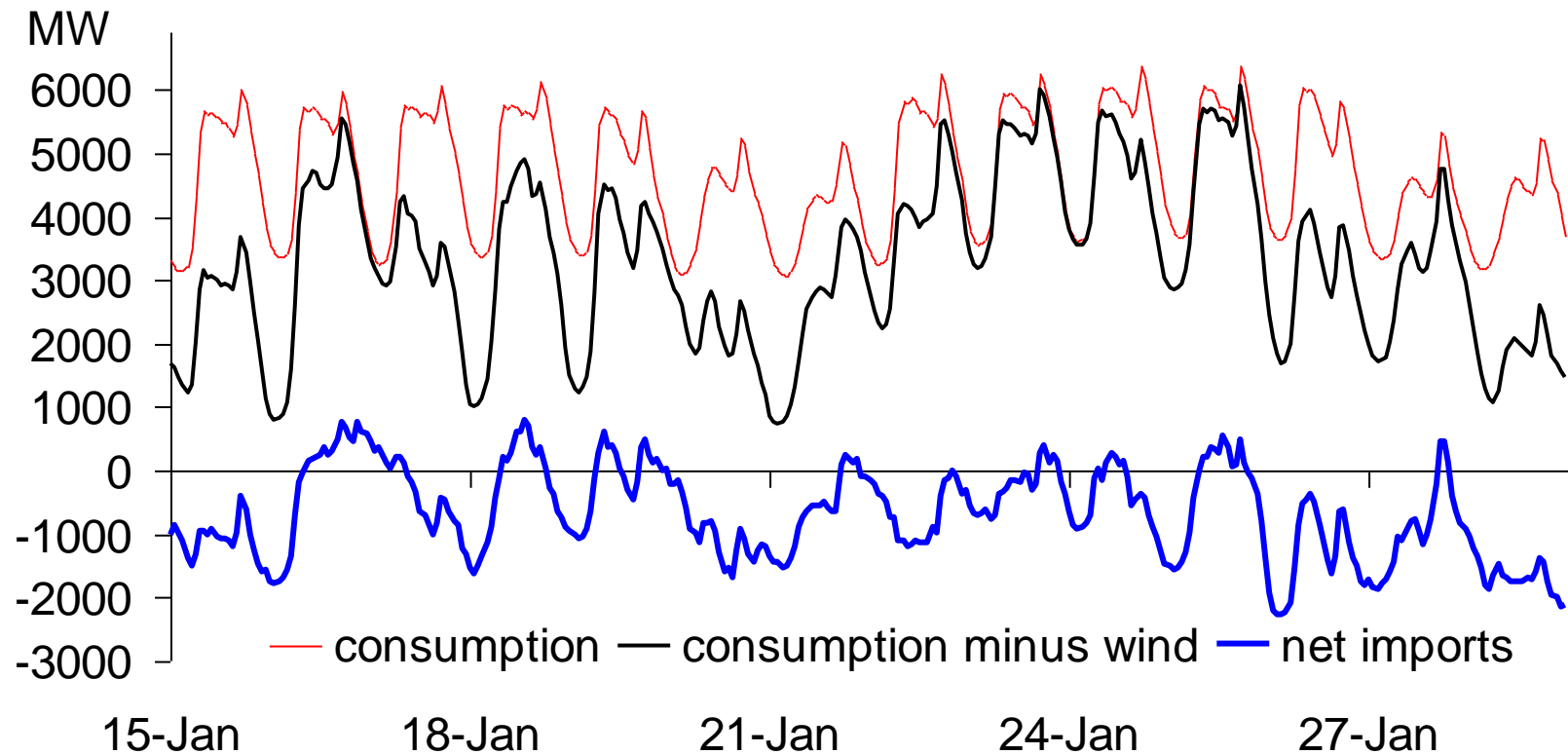
# Denmark, January 2007



## Market volatility

- More variation in the load of thermal plant
  - Greater variation in prices
- More times when this load changes rapidly
  - Greater variation in prices
- More chances to trade power

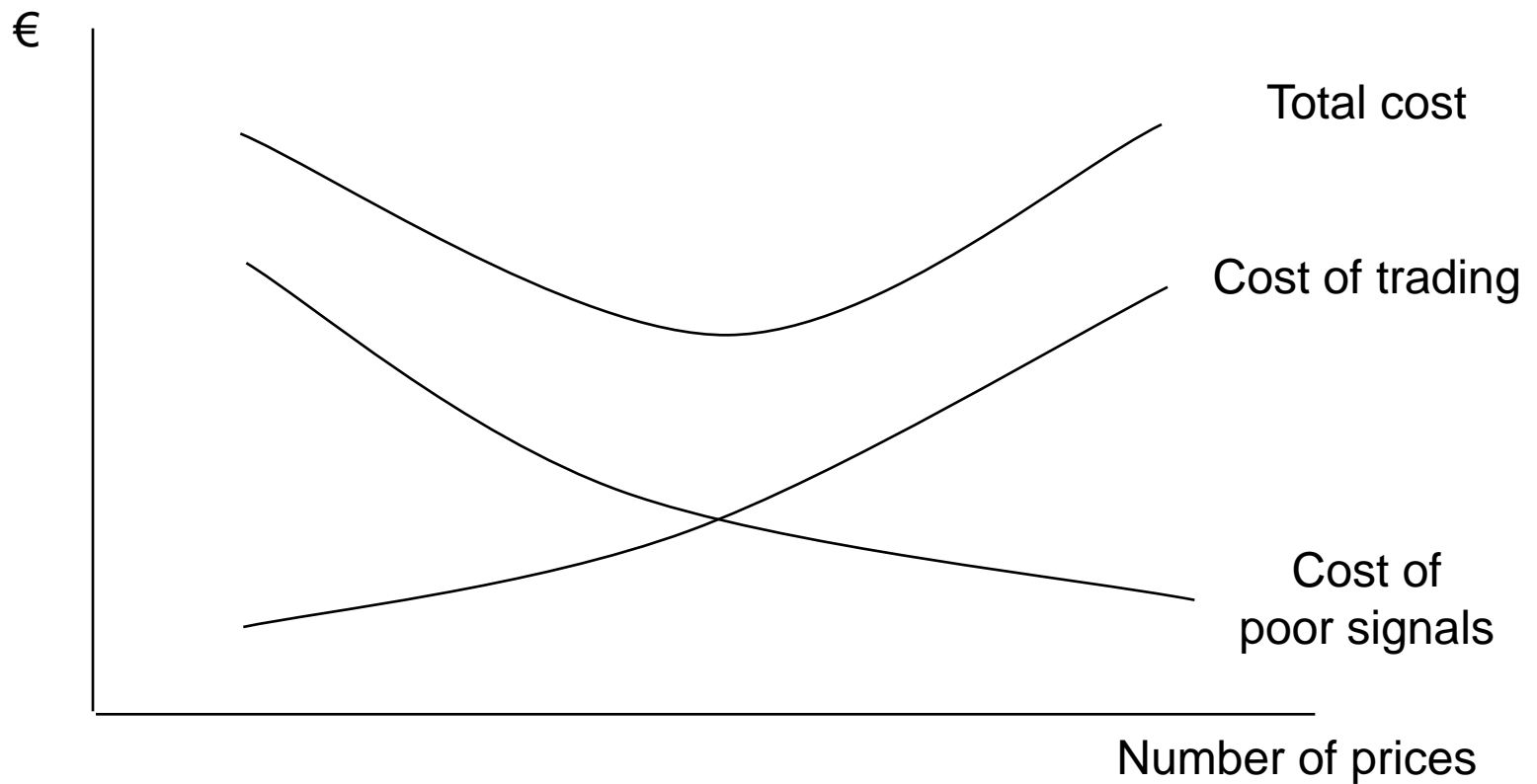
# Denmark, January 2007



## Bigger or smaller markets?

- There may be times when we can move power from surplus to deficit areas
  - Create a bigger market to make this easier
- There may be times when a smaller area is transmission-constrained with a surplus or deficit
  - Signal this clearly with a local price
- We need bigger markets with local prices

# How many prices?



## Implications for market design: Geography

- Marginal cost of power becomes more volatile over space and time
- This raises the cost of poor signals
- Implies we need more “products”
  - In other words, smaller price zones

## Thin, volatile, markets?

- Some zones may have few generators
  - These *already* have market power
  - A transparent system may reduce it
- Prices may differ between zones
  - Hedging these differences is relatively easy
    - Market participants face equal and opposite risks

## Implications for market design: Capacity

- More stations run only for short periods
  - Will they cover their costs from energy and reserve market revenues?
  - Are the risks symmetric?
- Should we have an explicit market for capacity to make sure?

# Capacity markets

- Need to run several years in advance
  - Means entrants can bid to build plant
- Need to be price-sensitive
  - Safety value against excessive prices
- Need to take location into account
  - Not all plants are equal, given transmission constraints

Could this actually work in practice?

## US (Standard) Market Design

- New England, New York, PJM (running); California, Texas Nodal (imminent)
- ISO-run voluntary markets for energy and ancillary services, jointly optimised
- Set nodal prices day-ahead and real time
- Capacity markets provide “missing money”
- Hedge with Financial Transmission Rights (FTRs) and forward markets

## Conclusion

- Renewables will be hard to accommodate
- Electricity markets can respond
- We need
  - More accurate price signals
  - New ways to pay for capacity
  - To avoid creating losers unnecessarily

