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Customers and Networks:
Energy Reforms in Great Britain

Richard Green

(from Sept 2011: Imperial College London)

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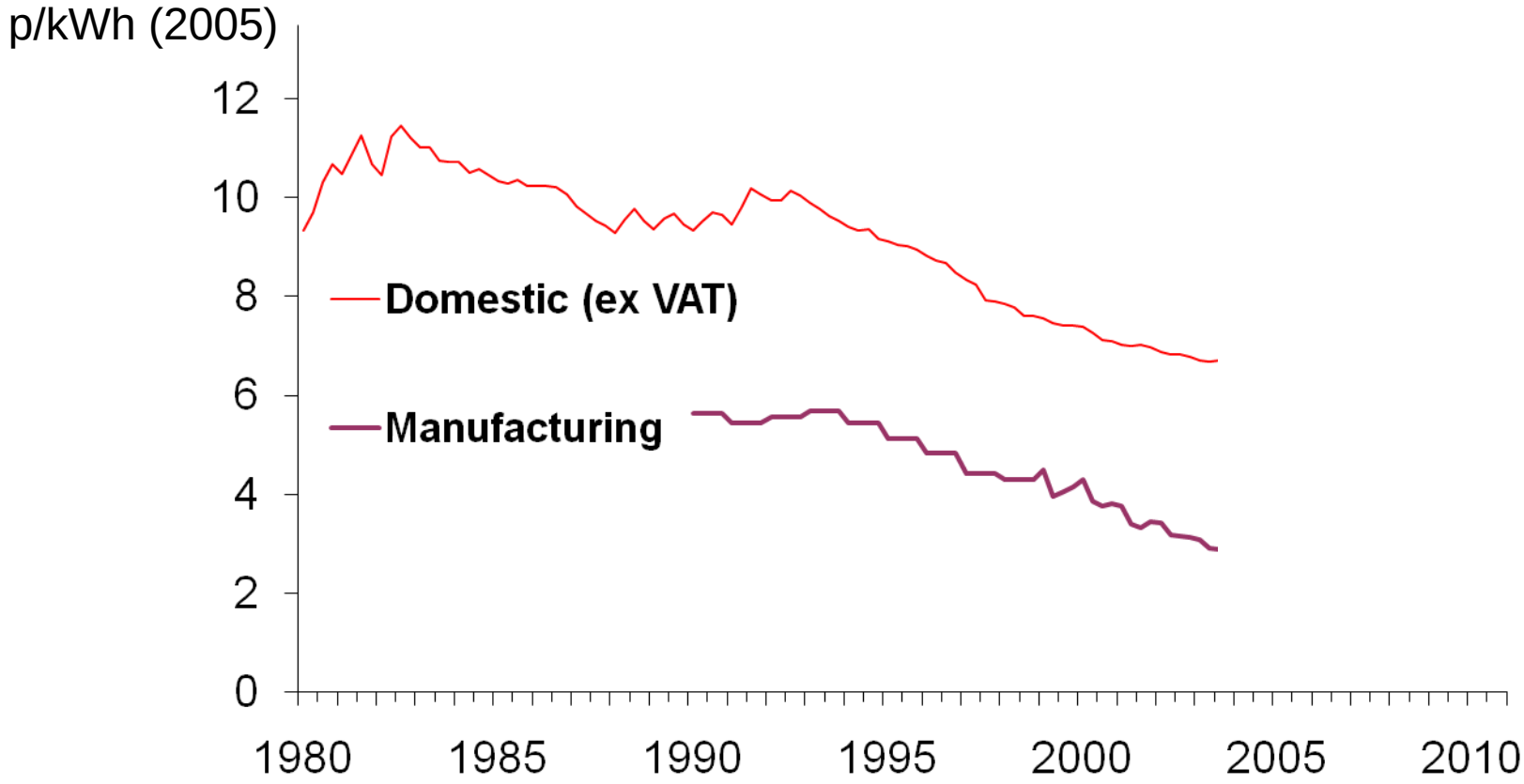
UK Electricity Prices



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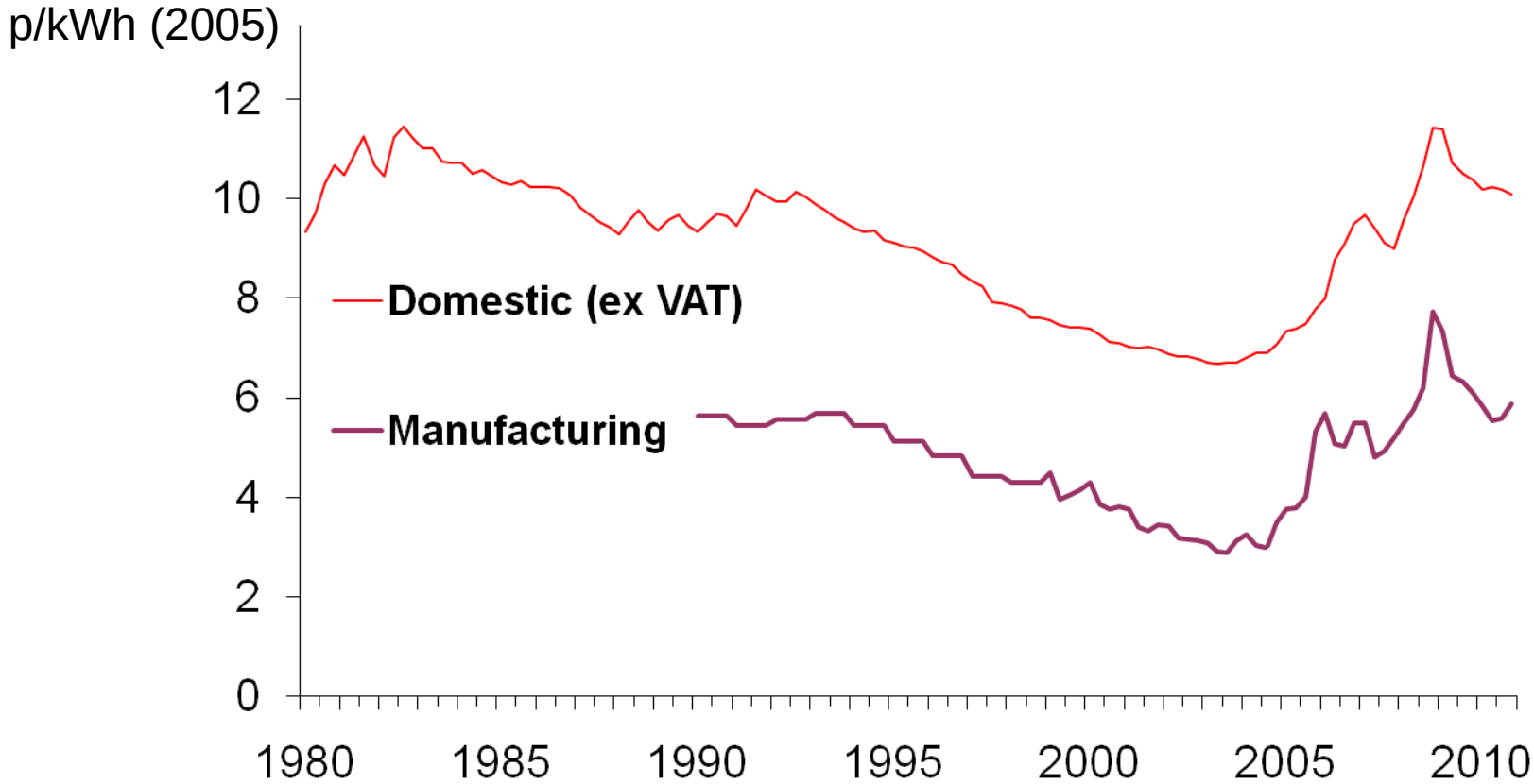

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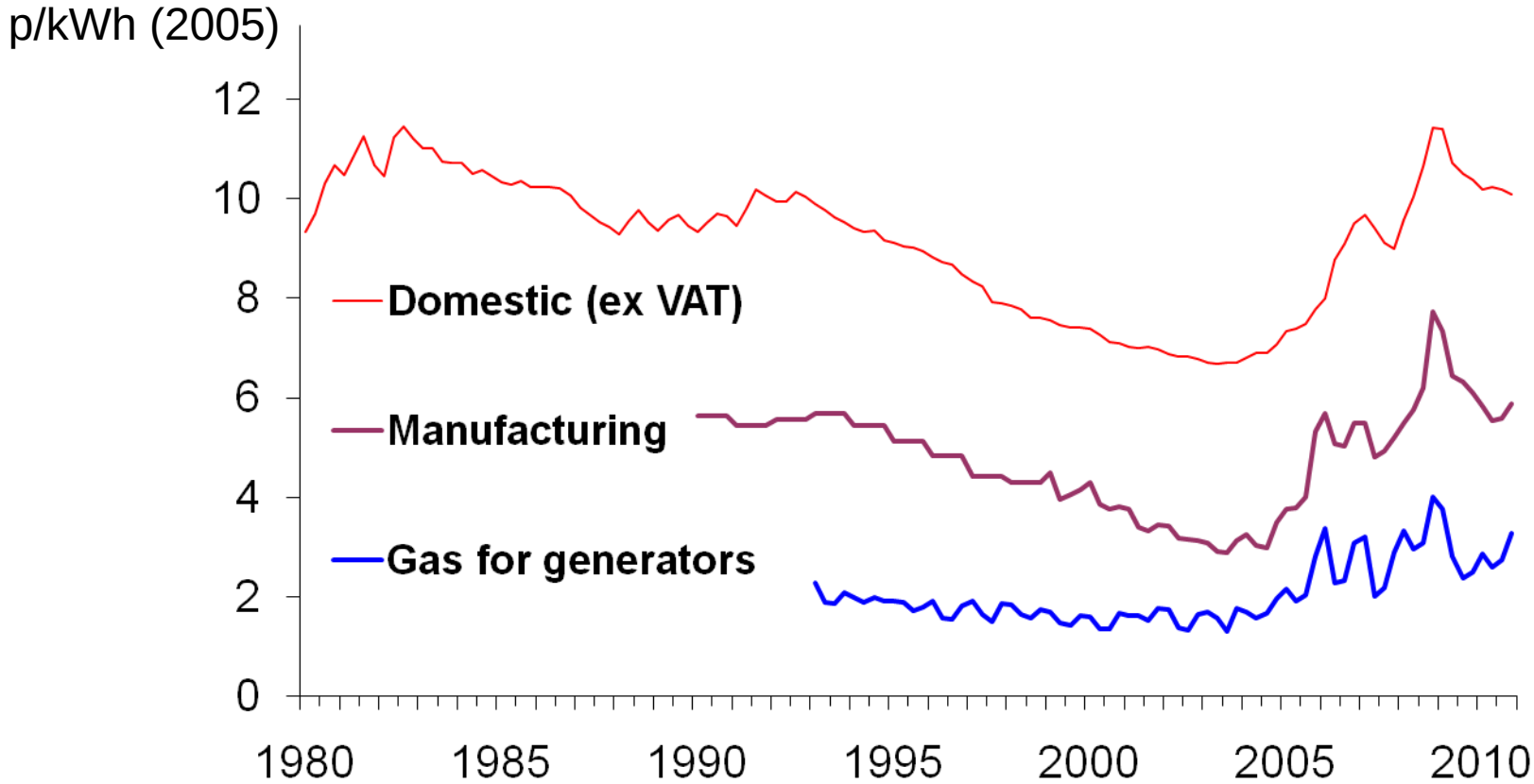

Source: DECC

Where are we coming from?

Not the USA!

- 1983: BT regulation should avoid the failings of US-style regulation
  - Cost-plus characteristics
  - Averch Johnson Effect
- Fix prices, not profits

RPI – X for electricity networks

- 5-year price control periods
  - Occasional “reopeners” for major projects
- Distribution revenues linked to forecast customer numbers and units distributed
- Transmission revenues linked to forecast peak demand

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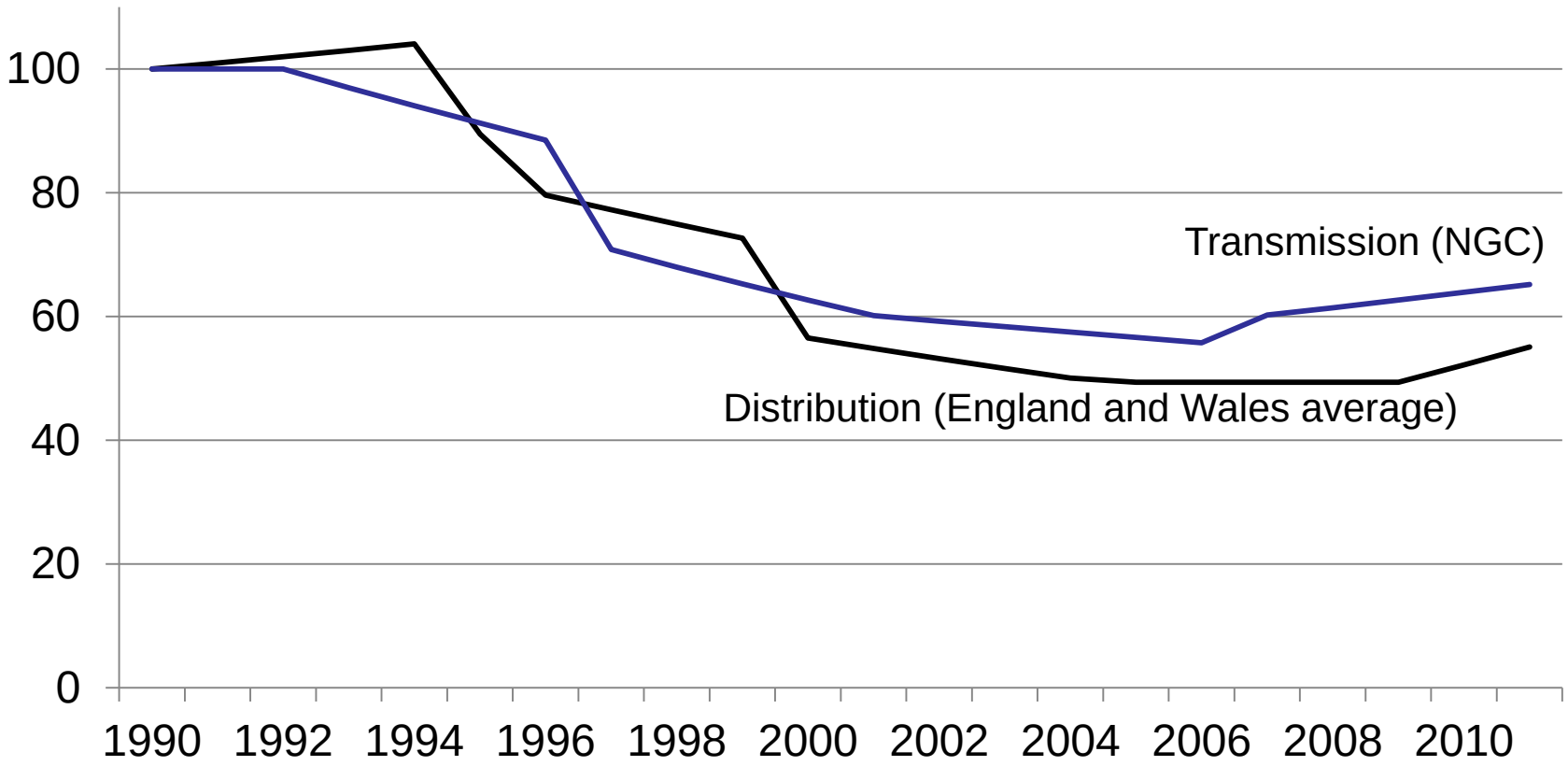
Regulated prices, 1990=100



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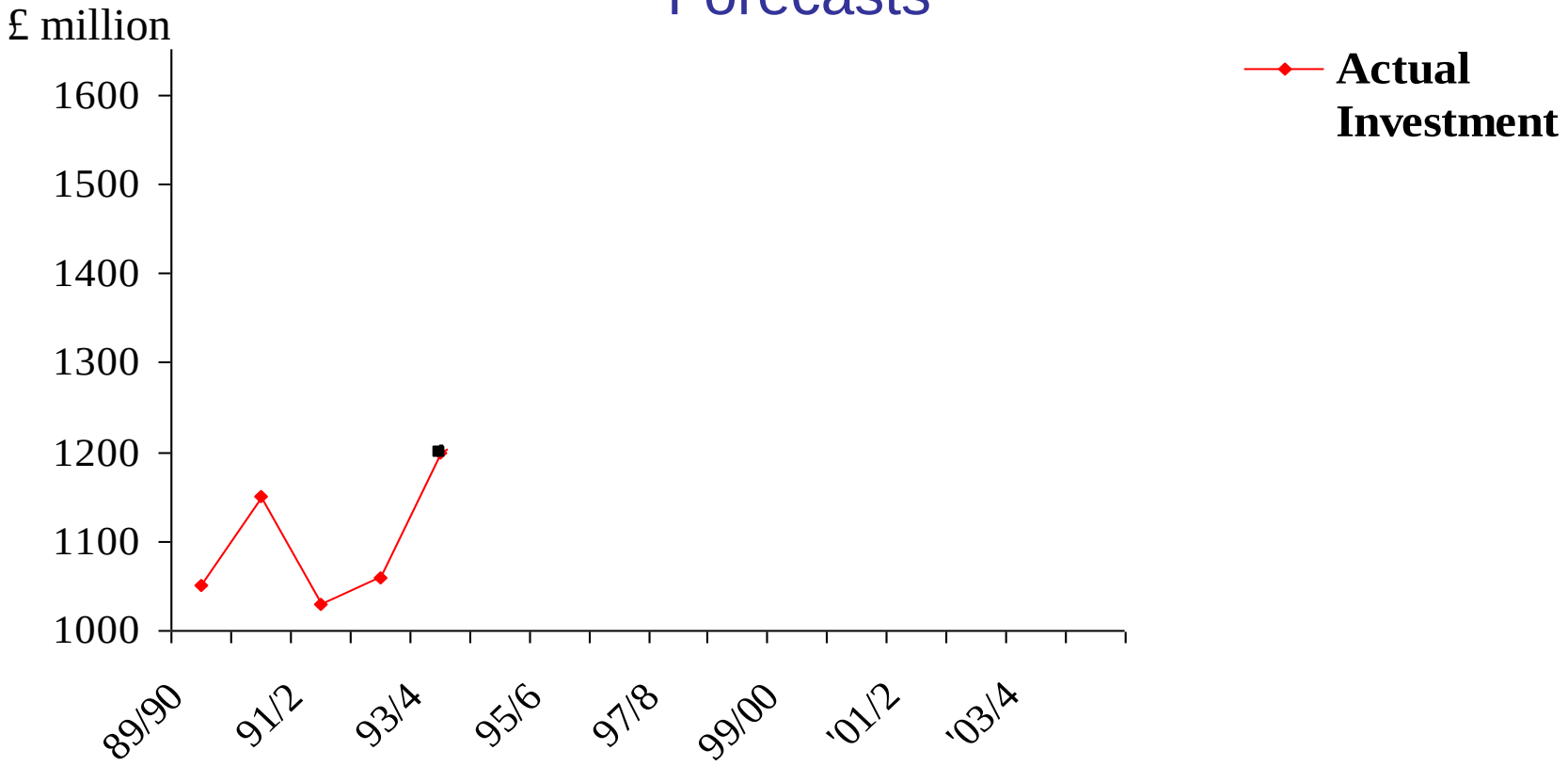
Electricity Distribution Investment

Forecasts



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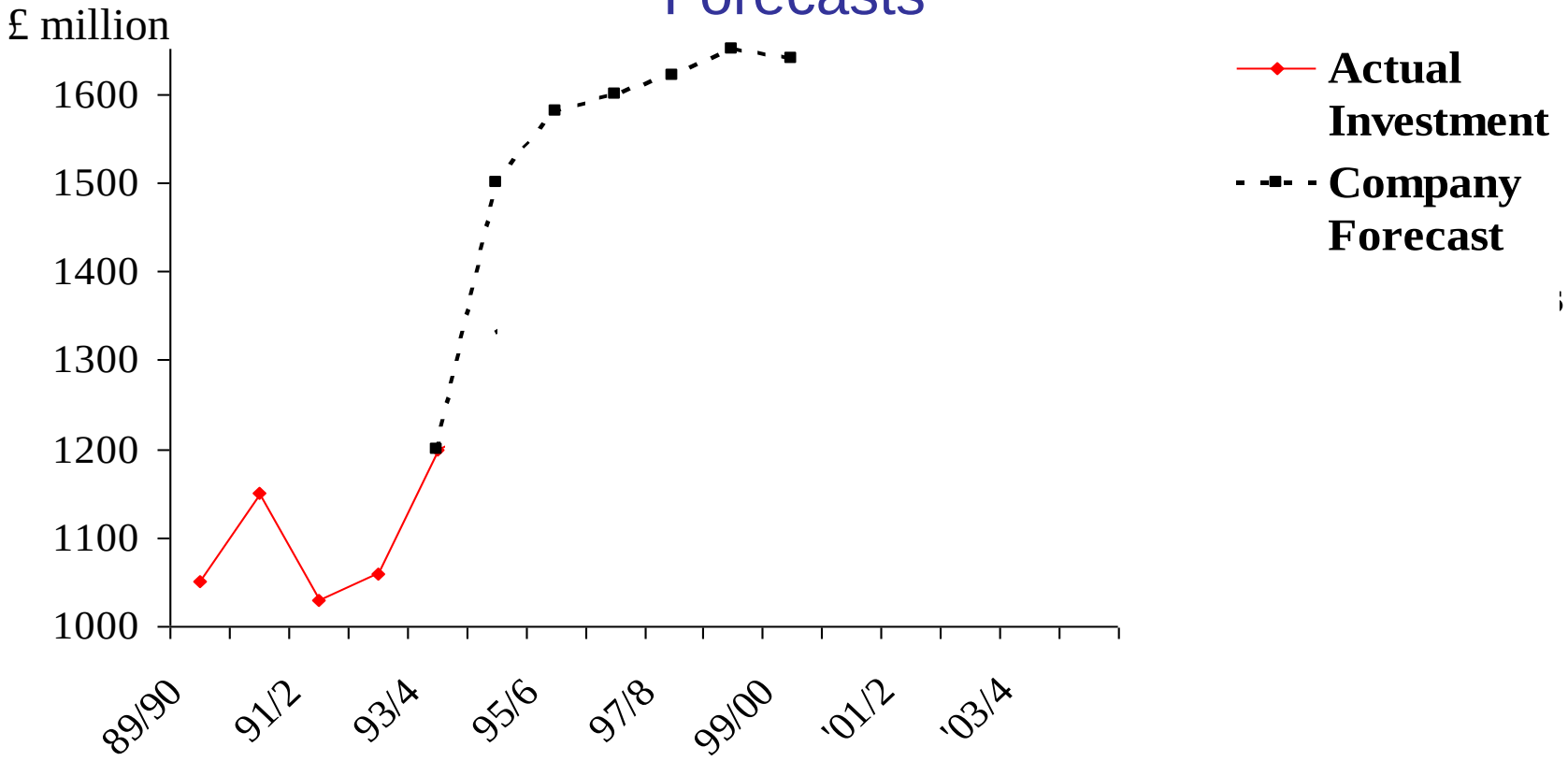

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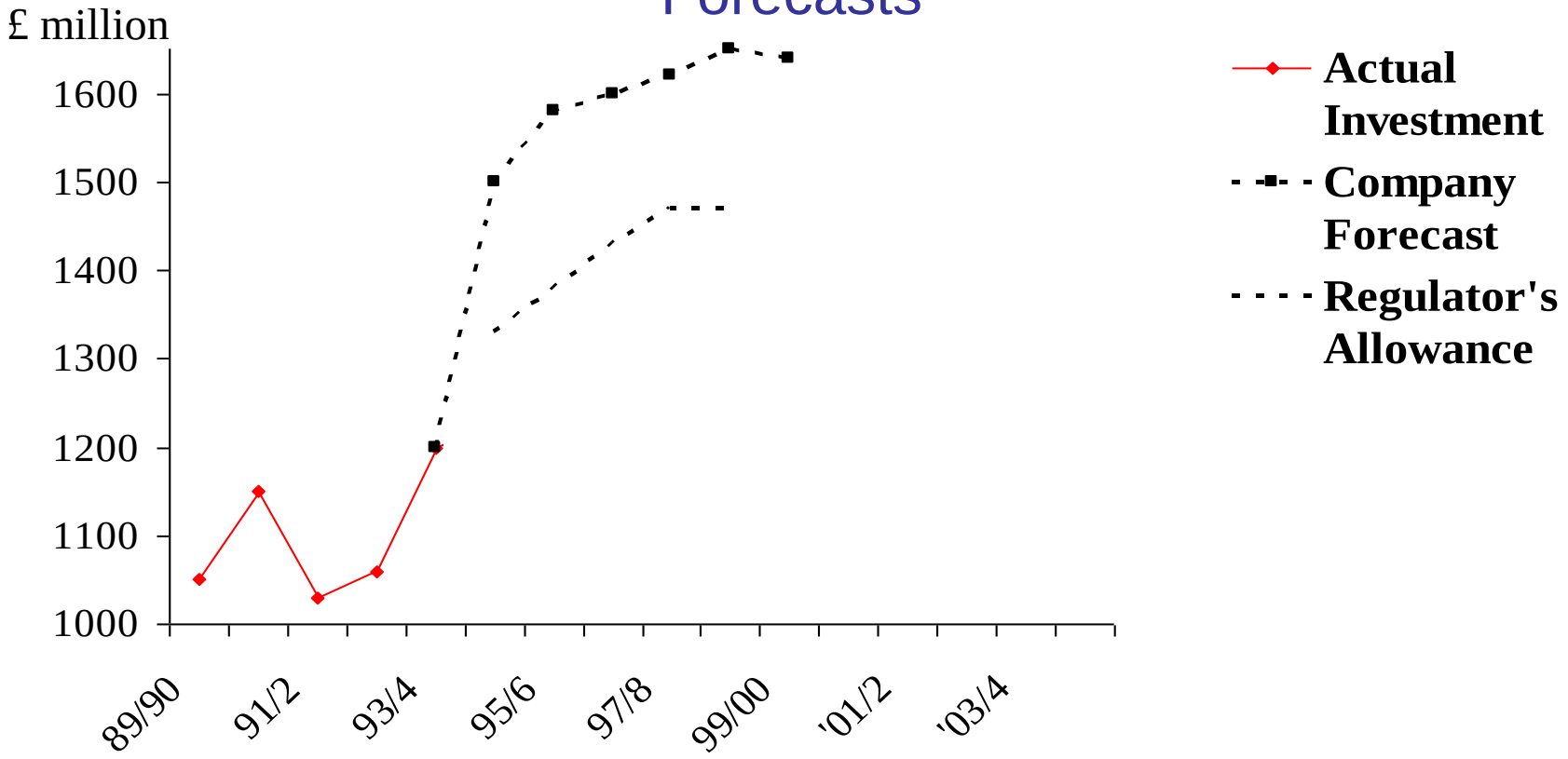

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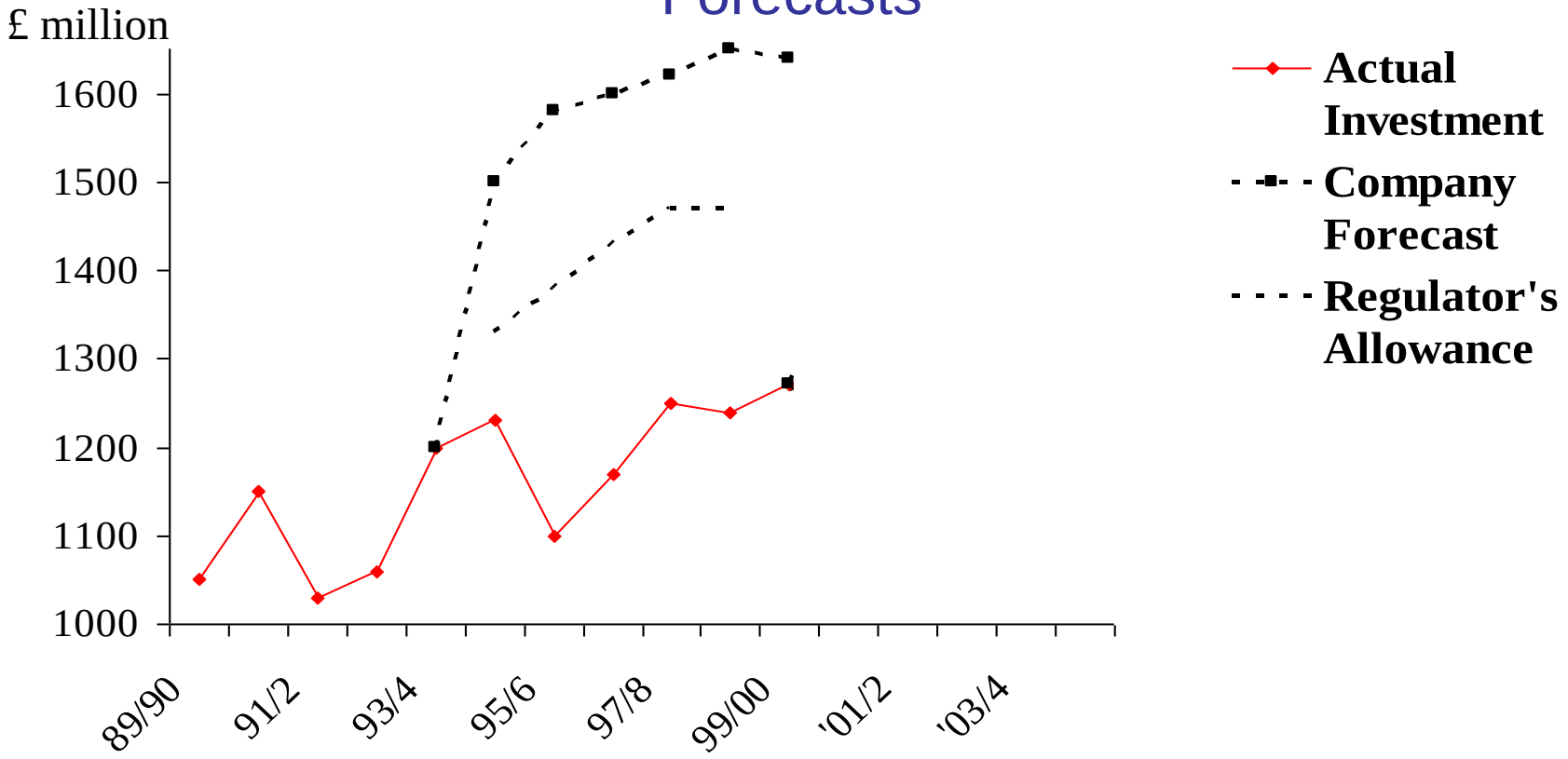

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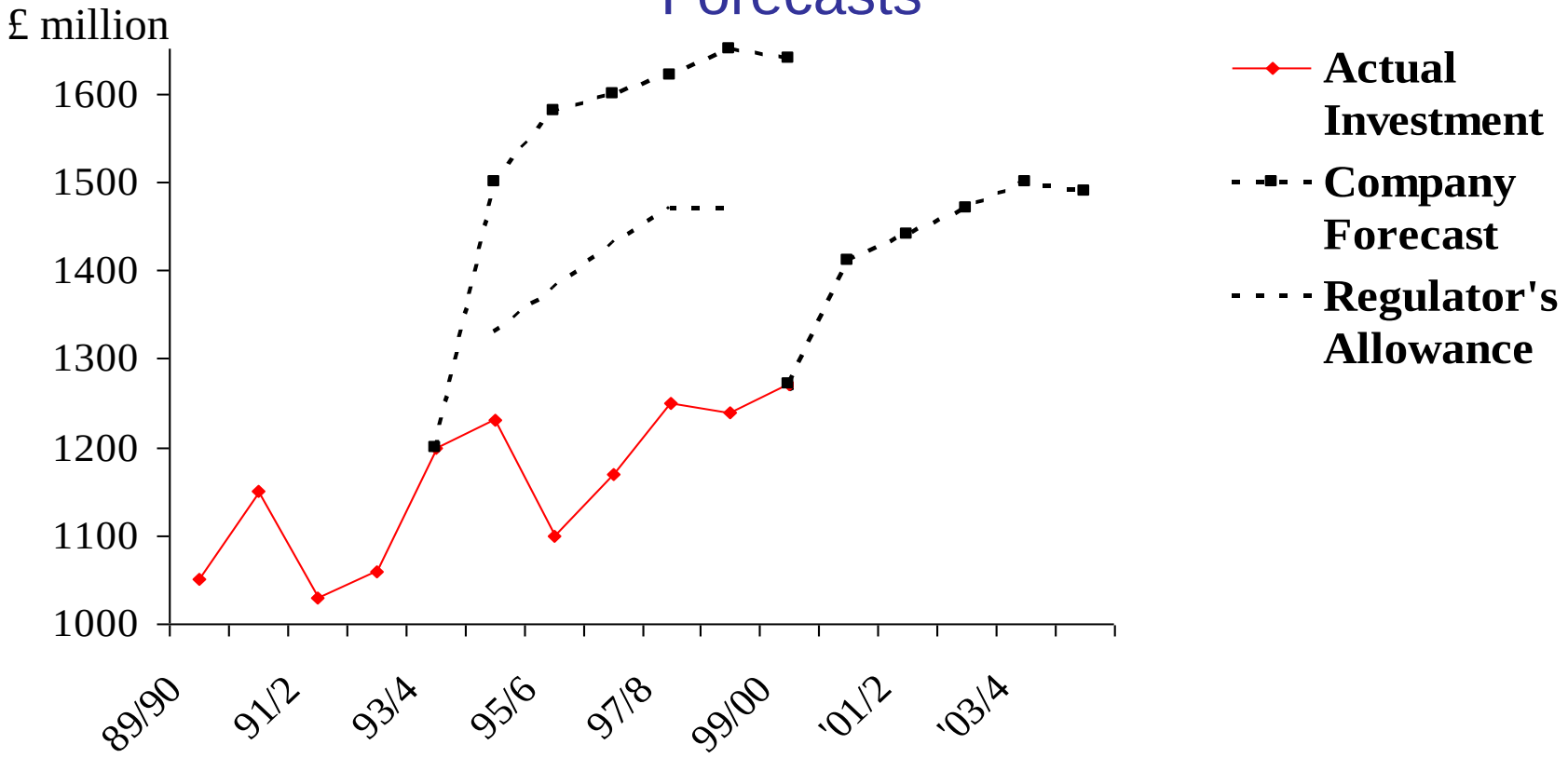

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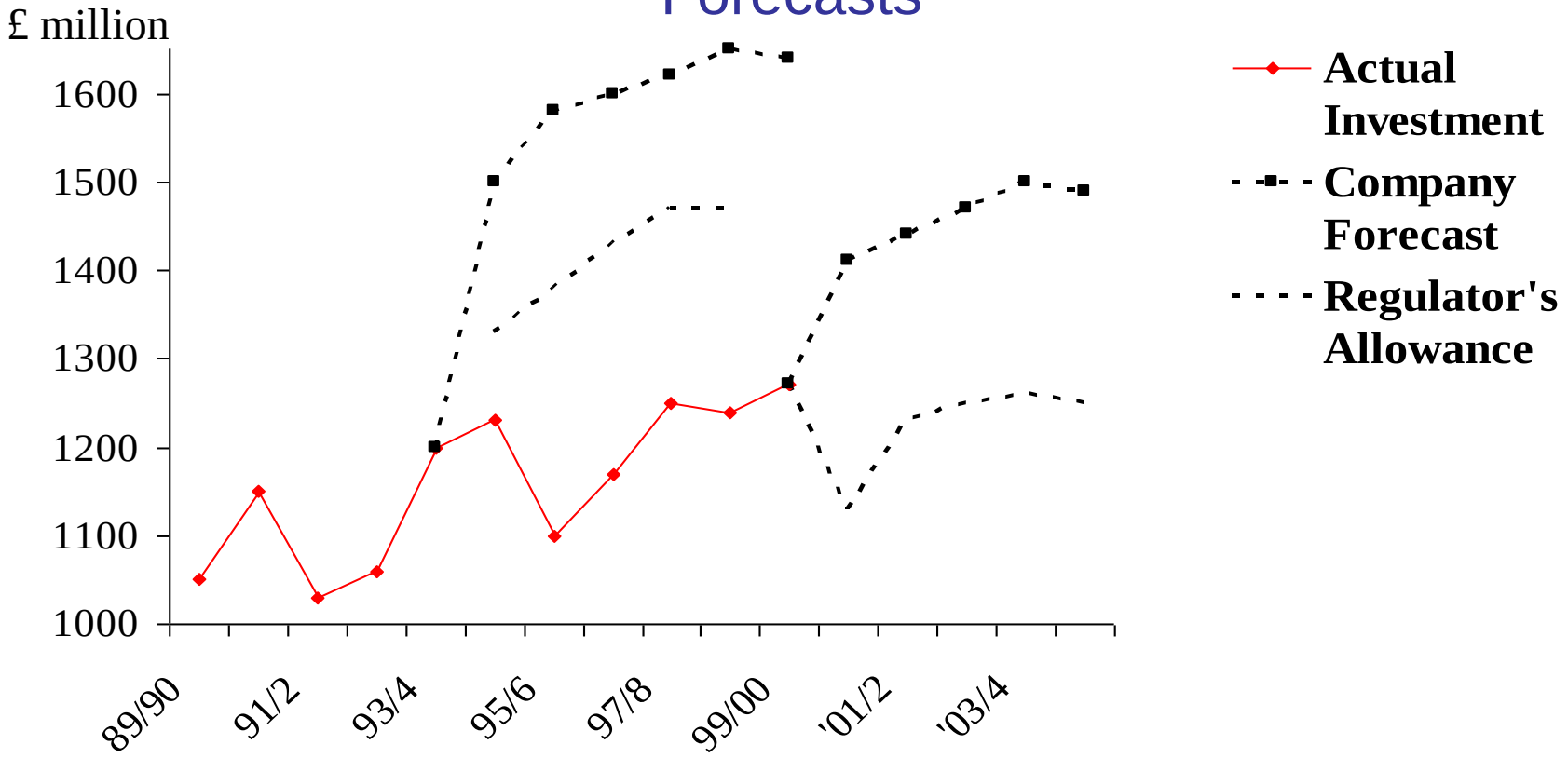

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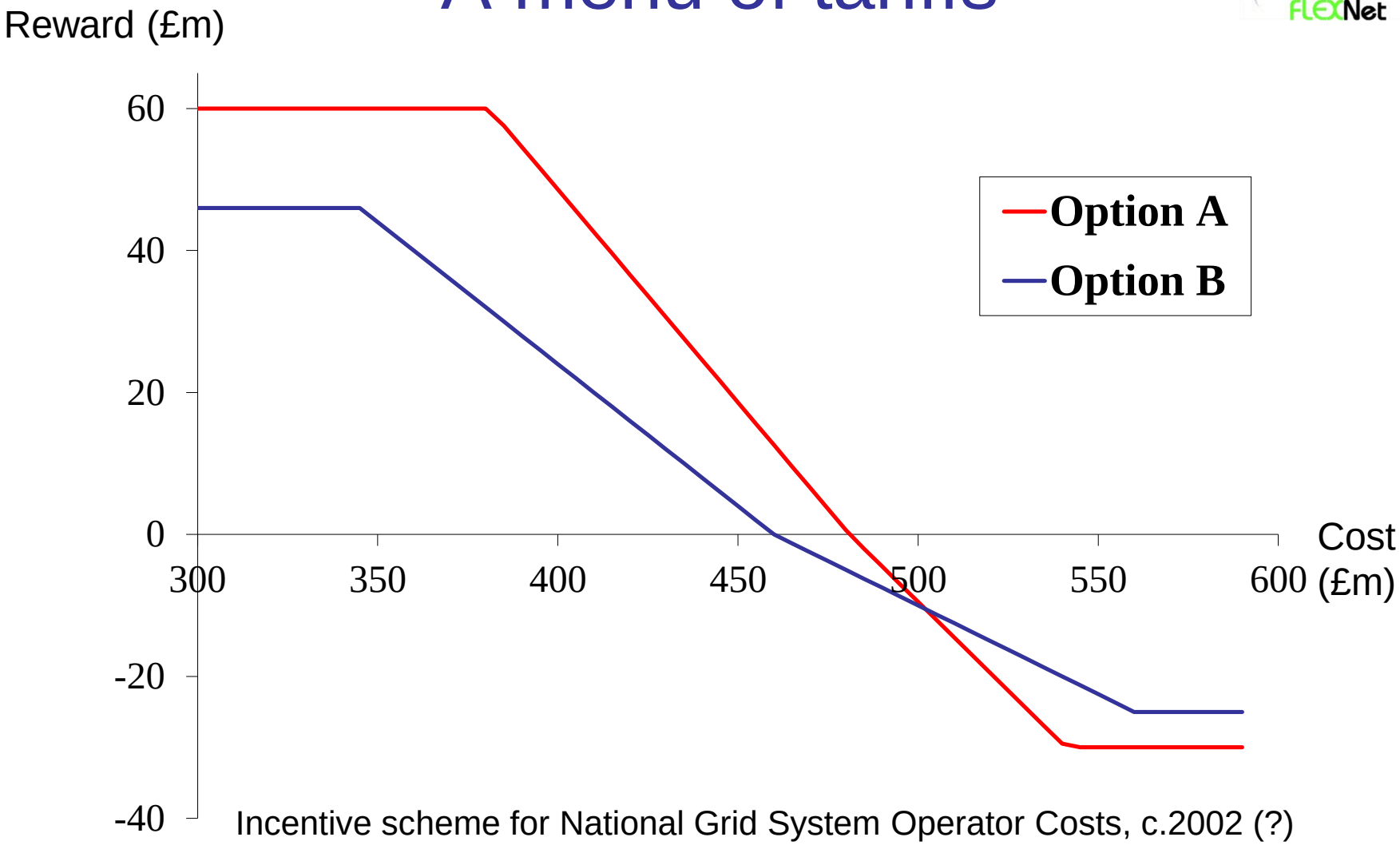
A menu of tariffs



Incentive scheme for National Grid System Operator Costs, c.2002 (?)

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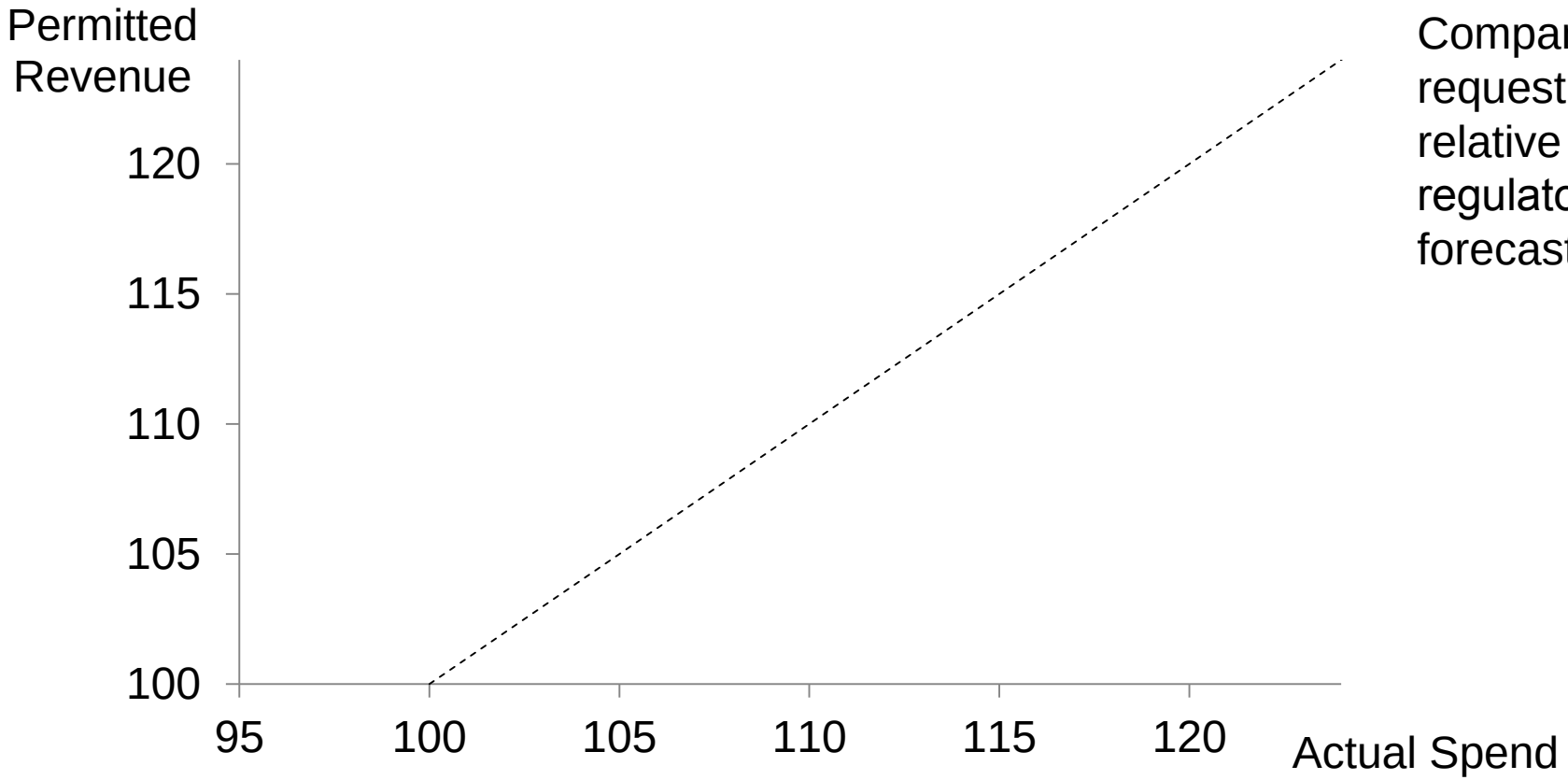
Information Quality Incentive



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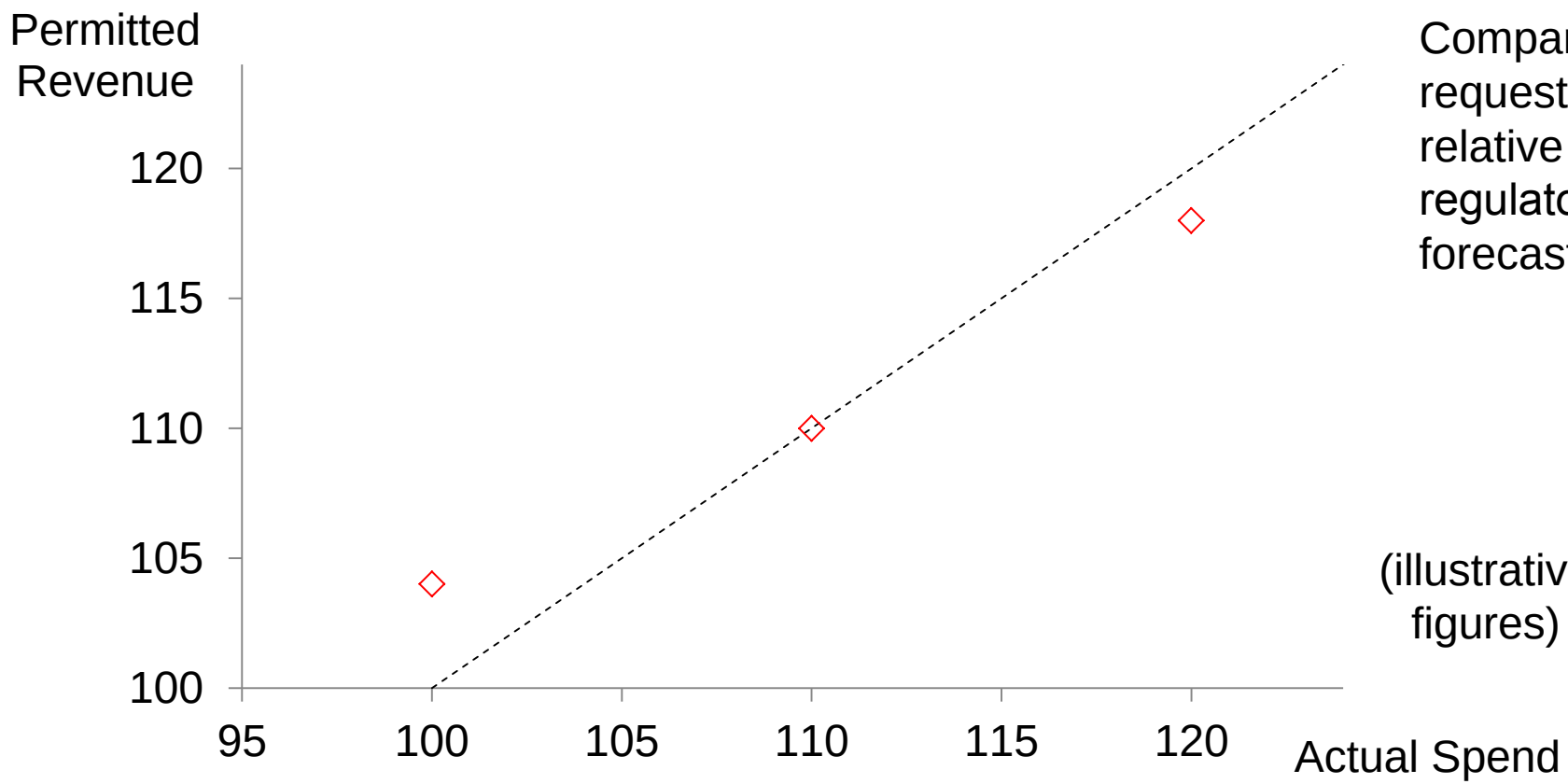

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(illustrative figures)

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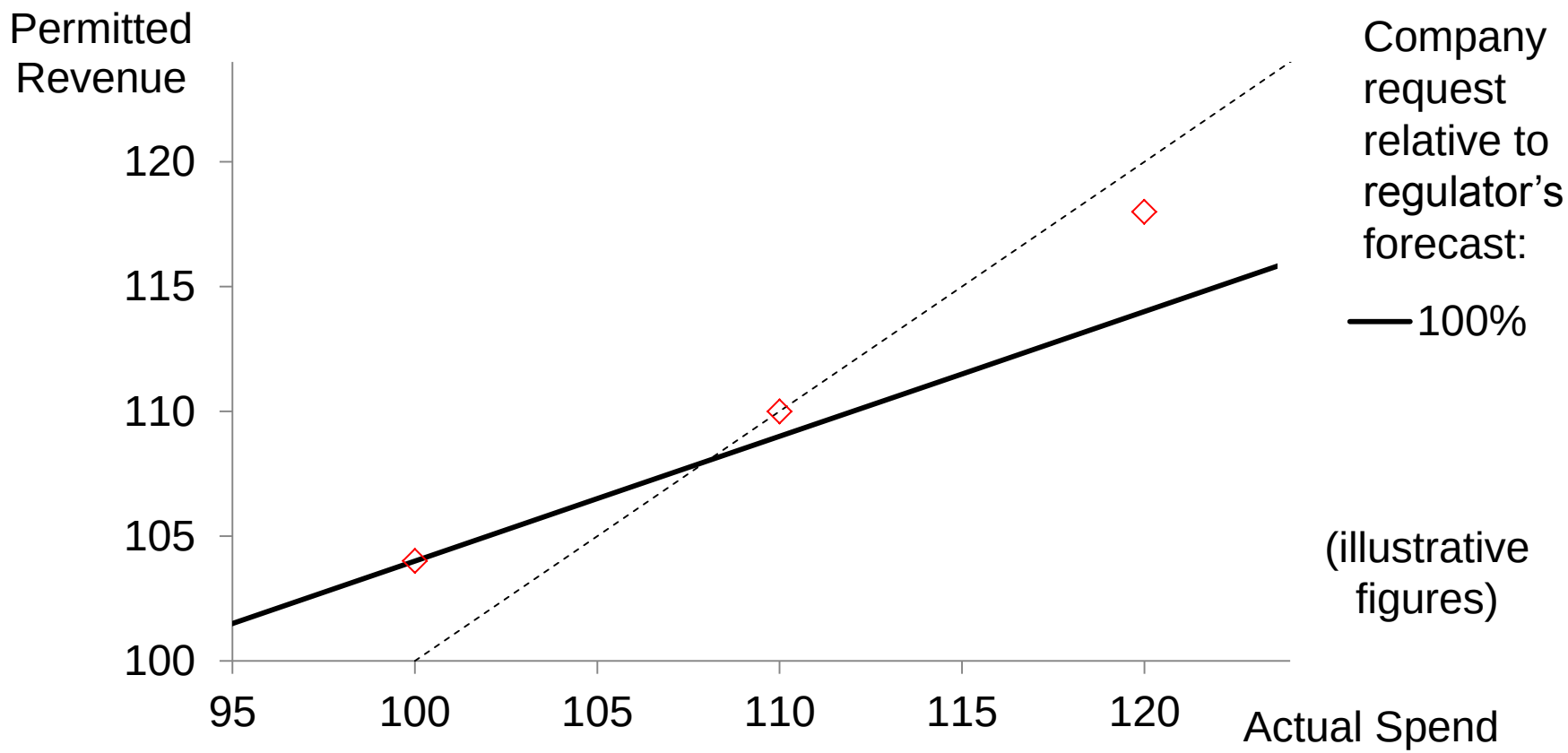

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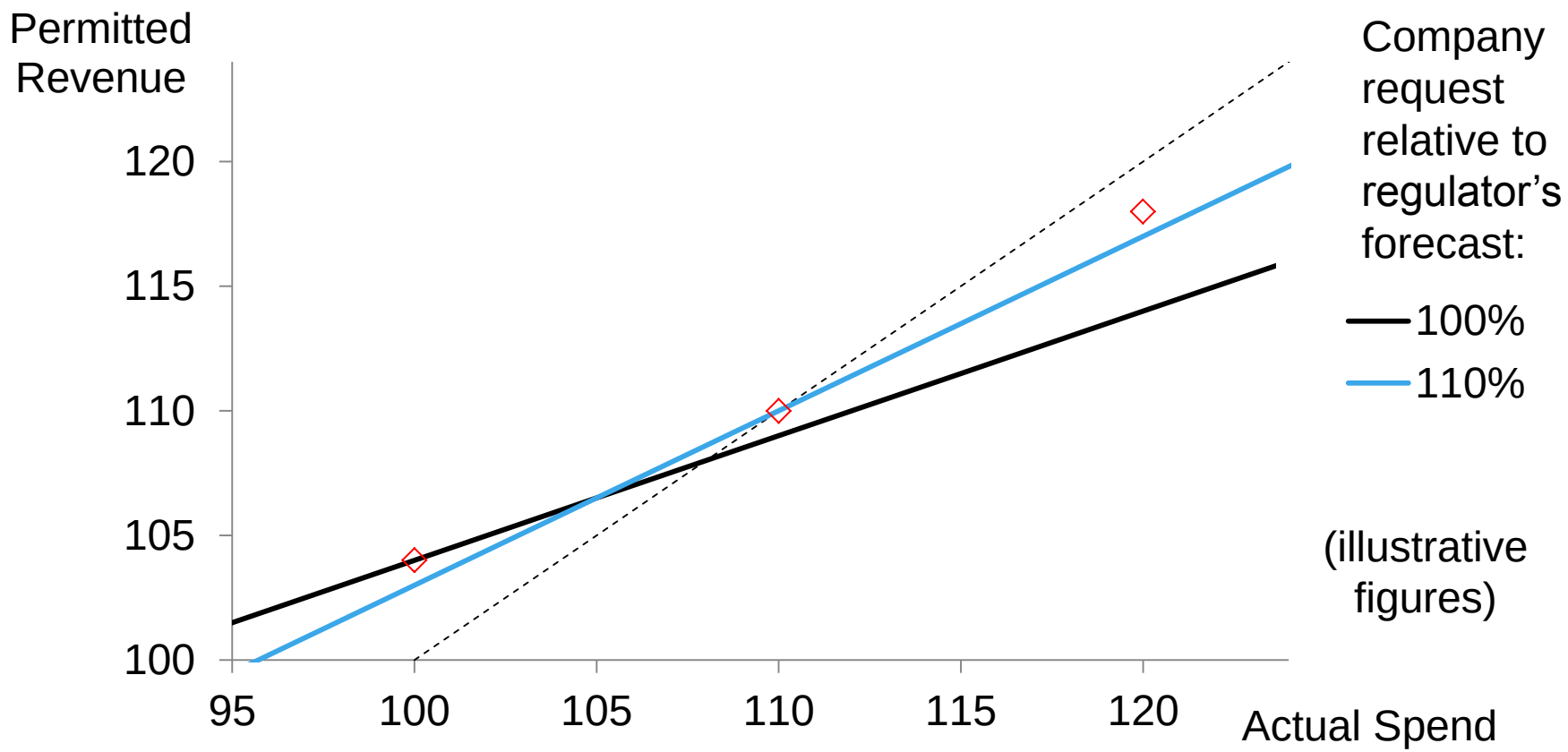

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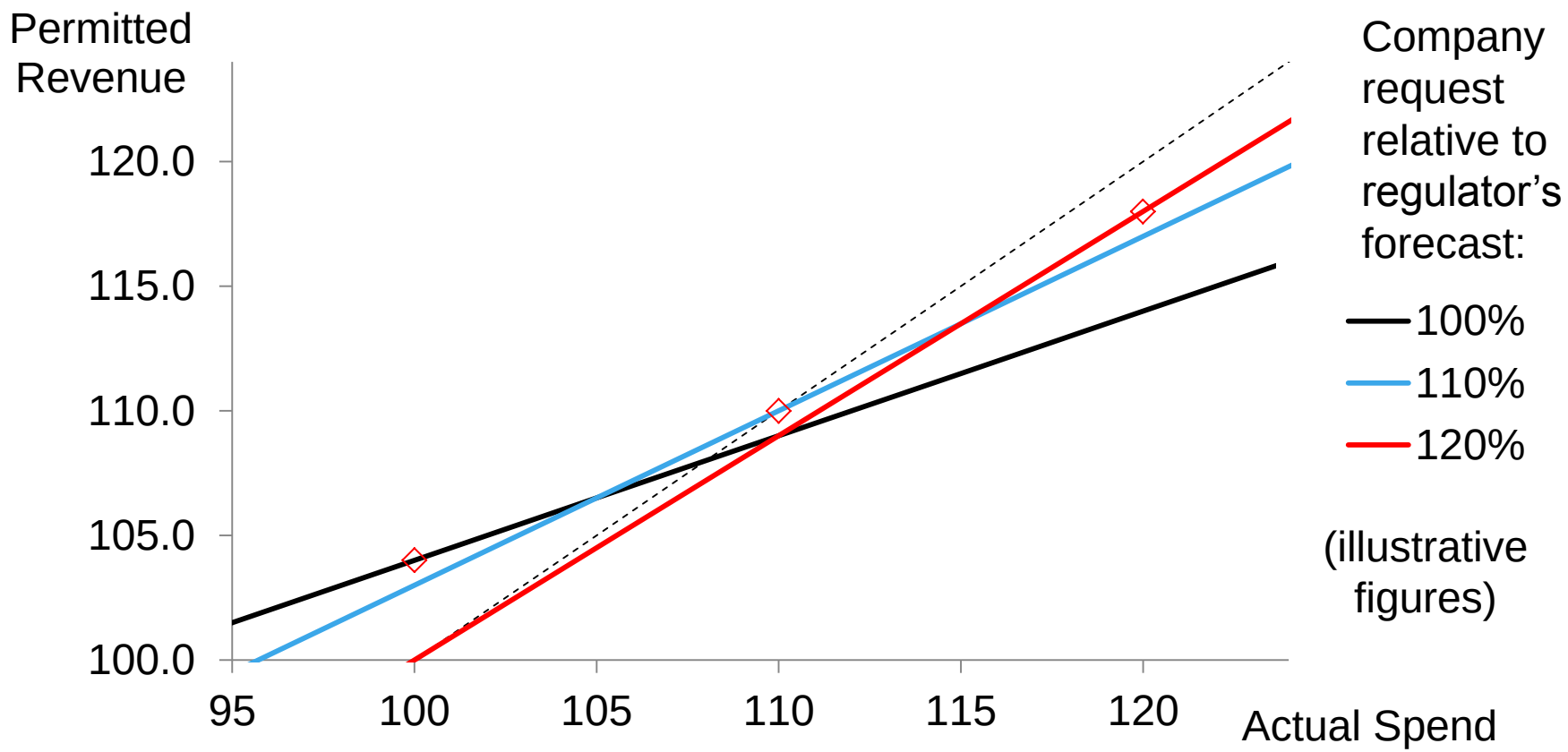

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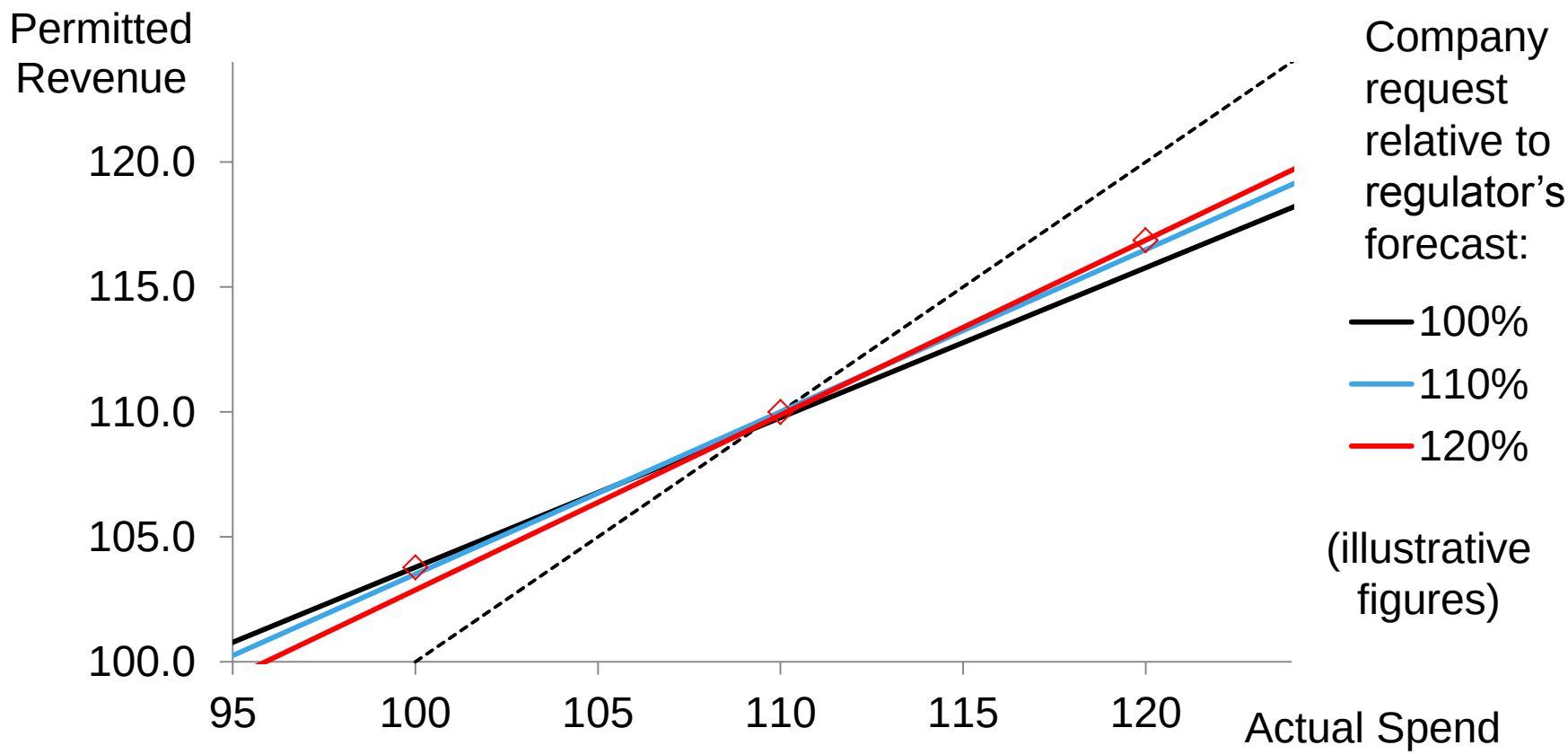

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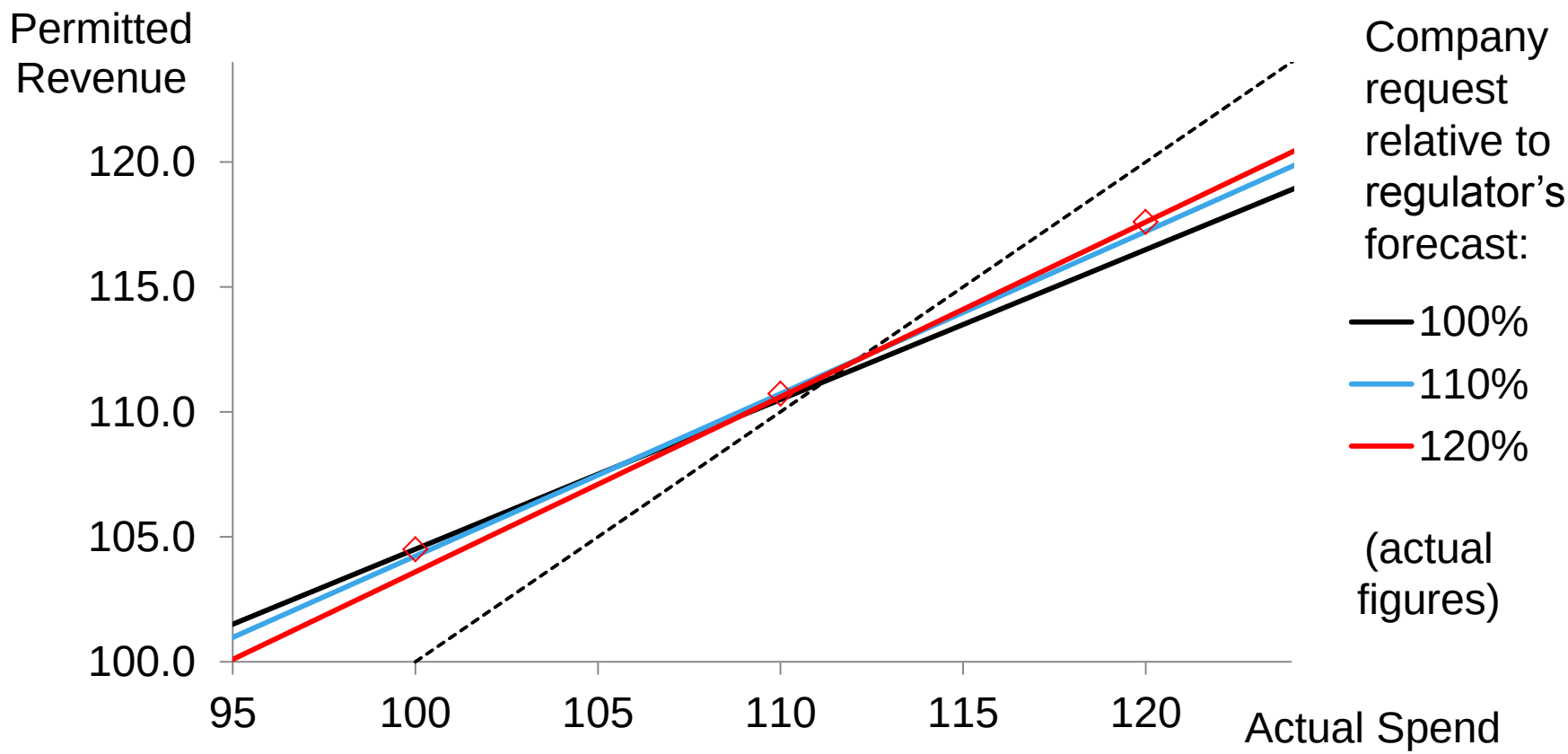

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Future challenges

- Ageing infrastructure
- New generation sites
  - Wind in Scotland and offshore
  - Distributed generation
- The opportunity for a smarter grid
- Investment need: £32 bn by 2020
  - Current RAV £43 bn (all energy networks)

The Response: RIIO

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The Response: RIIO

Revenue = Incentives + Innovation + Outputs

RIIO building blocks

- 8-year price control periods
- Companies to deliver specified outputs
- Outputs can be adjusted mid-period
- No difference between Capex and Opex
  - Fixed proportion of total spend added to Regulatory Asset Value
- Cost of capital adjusted each year

Output-led

- Primary outputs:
    1. Customer satisfaction
    2. Safety
    3. Reliability and availability
    4. Conditions for connection
    5. Environmental impact
    6. Social obligations
  - Secondary deliverables that provide options for the next control period can be added

Output criteria

- Material
- Controllable
- Measurable
- Comparable
- Applicable
- Compatible with promoting competition
- Legally compliant

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Possible output measures

	Distribution	Transmission
Customer satisfaction	1. Broad measures of satisfaction reflecting consumer and network user experience 2. Qualitative survey evidence	
Safety	1. Legal compliance with minimum requirements 2. Additional initiatives if in public interest	
Reliability and availability	1. Customer interruptions 2. Customer mins lost / Energy Not Supplied	1. Energy Not Supplied 2. Constraint measure
Conditions for connections	Time to connect 1. Generation 2. Demand	Time to connect 1. Generation 2. Demand

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Possible output measures

	Distribution	Transmission
Environmental Impact	1. Carbon footprint of network including losses 2. Proportion of new low carbon generation 3. Other emissions 4. Visual impacts 5. Role in consumer energy efficiency	1. Carbon footprint of network including losses 2. Proportion of new low carbon generation 3. Other emissions 4. Visual impacts
Social Obligations	1. Targets for vulnerable customers such as Public Service Obligations	

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Well-justified business plans

- Companies to develop plans
  - Focus on outputs
  - Consider the longer term
  - Consider alternative options
  - Link costs to outputs
- Ofgem will scrutinise or fast-track

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Engaging stakeholders

- Civil Aviation Authority encouraged "constructive engagement" at airports
- Ofgem wants companies and itself to engage with stakeholders
- Stakeholders have the right to ask for a Competition Commission Review
  - If they have engaged and can pay the costs

Incentives for companies

- Information Quality Incentive for good forecasts
- Incentives & penalties on deliverables
- Gain-sharing incentive for efficiency
- Possible uncertainty mechanism for large unanticipated changes

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Evolution or Revolution?

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Moving the wind to the customers

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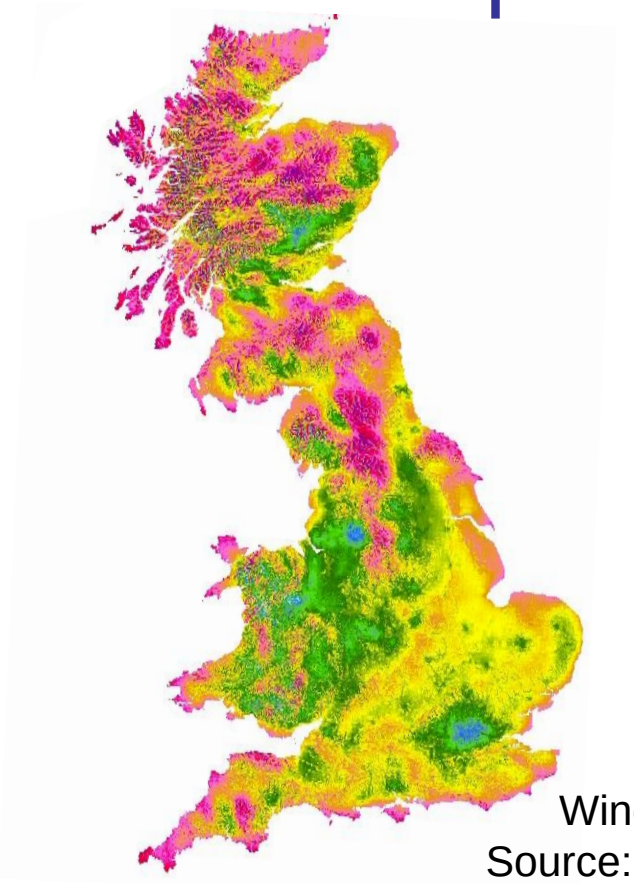
Where should I build my power station?



Wind resource map
Source: GL Garrad Hassan

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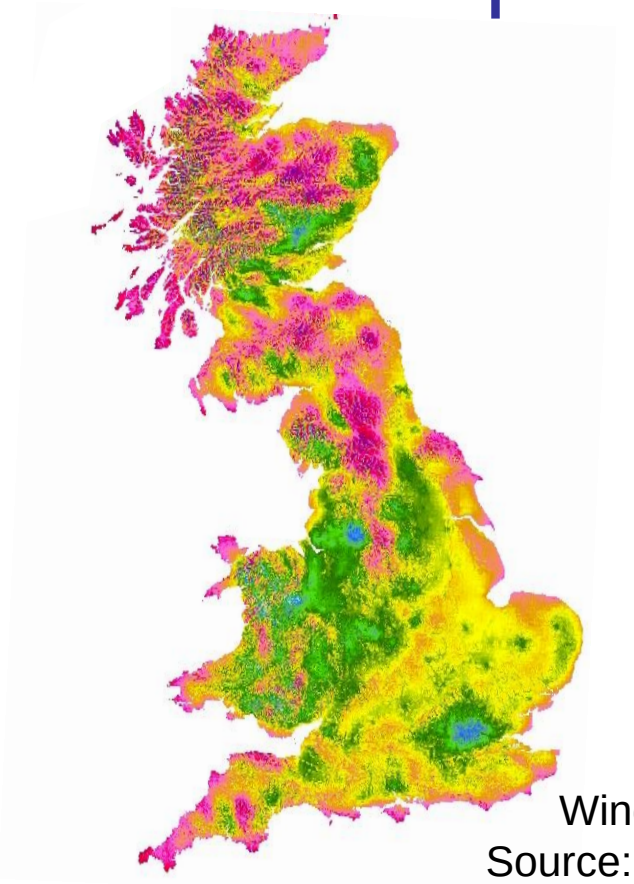
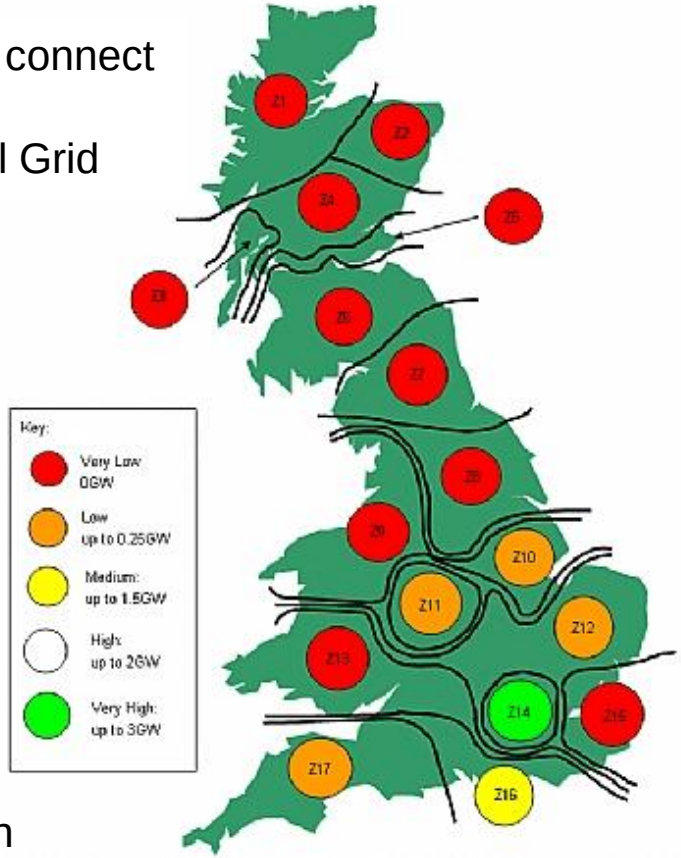


Wind resource map
Source: GL Garrad Hassan

Opportunities to connect power stations
Source: National Grid



Transmission arrangements

- Charges based on long-run incremental cost, £/kW of generation capacity
- Various tries at charging for losses failed
- New plant had to join the GB queue: “invest then connect”

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(and socialise)

Who should pay for congestion?

- New generators in a constrained area?
  - Reduces profitability of entrants *for a given market price and level of renewable support*

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- All ~~generators~~ customers

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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?

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Academic Reports

- Cambridge, US, Strathclyde/Birmingham
- Two reports favoured nodal pricing
- One noted its advantage of cost reflectivity but its 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

Ofgem's response

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Retail market competition

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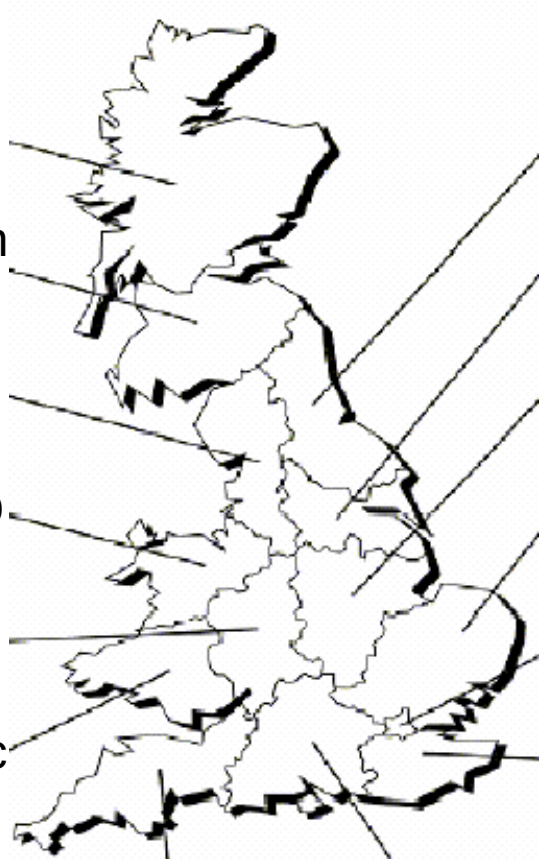
Britain's electricity markets



Retail Competition

- Large customers (1 MW) from 1990
- Medium customers (100 kW) from 1994
- “1998” happened in phases in 1998-99
  - Electricity regional incumbents could not compete until their own market was open
- Price caps set for 1998-2000 and 2000-02
- Price regulation lifted in 2002

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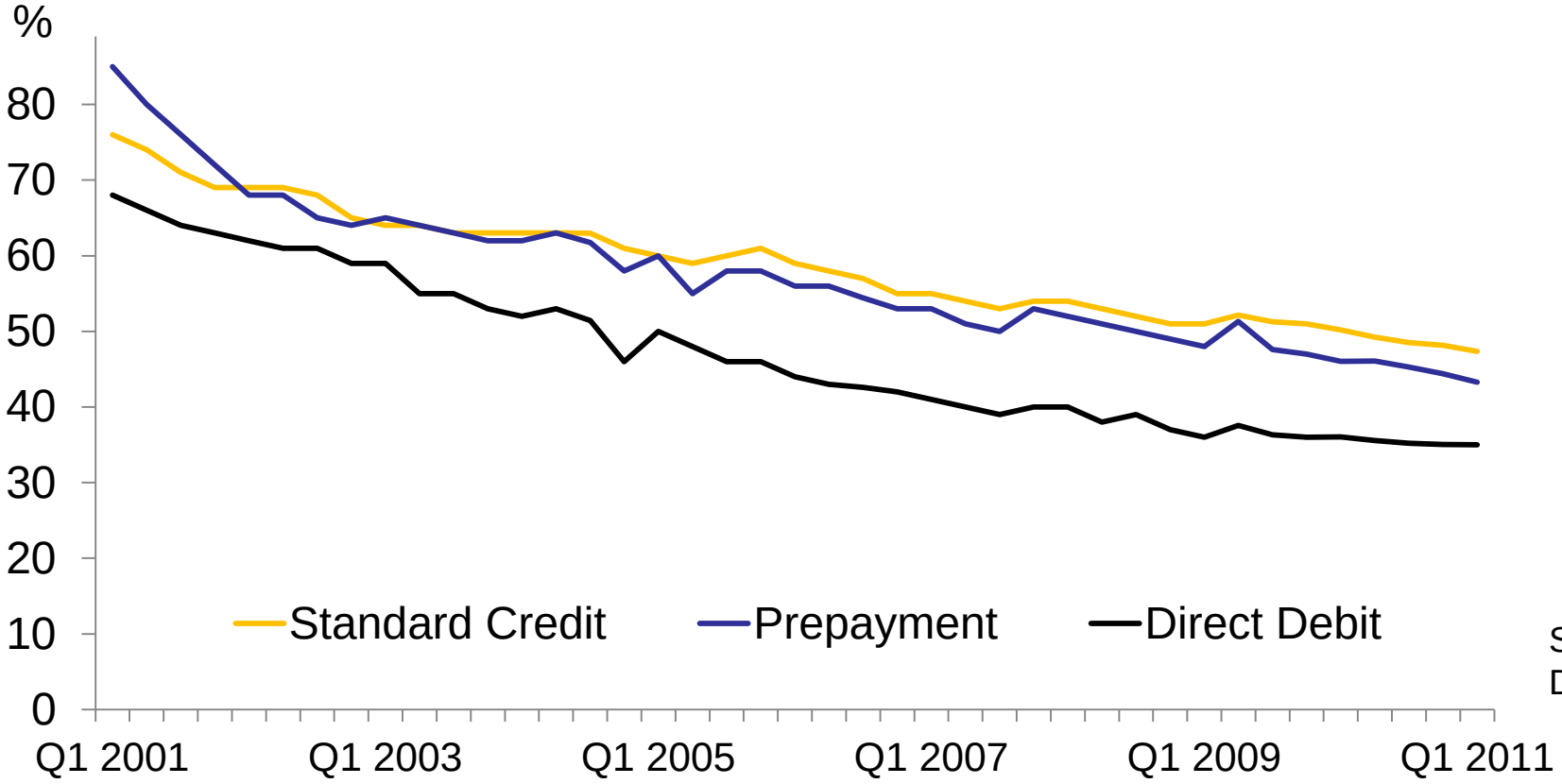
Incumbent market shares



Source: DUKES

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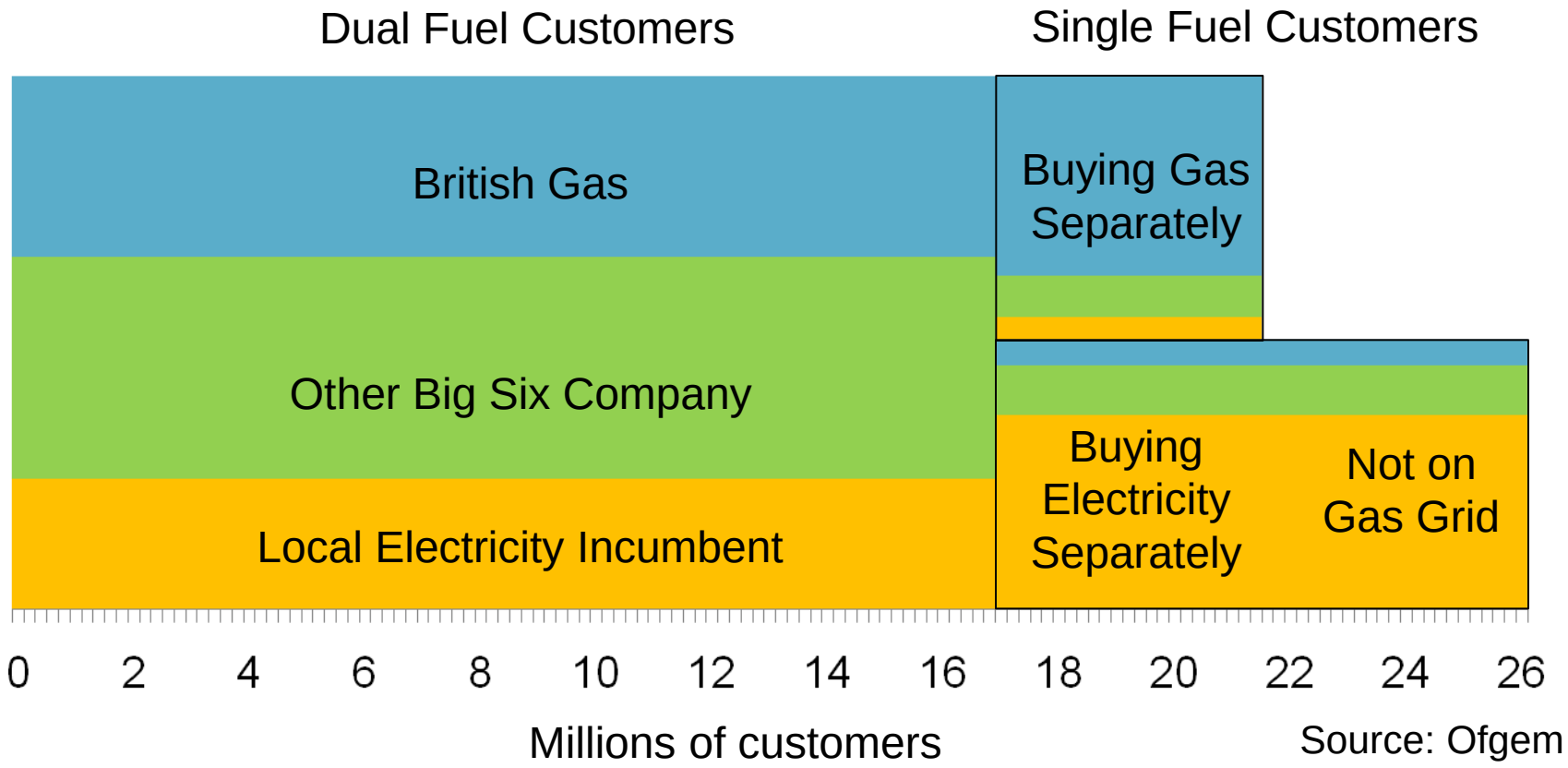
Domestic energy market shares

August 2010, Great Britain



Source: Ofgem

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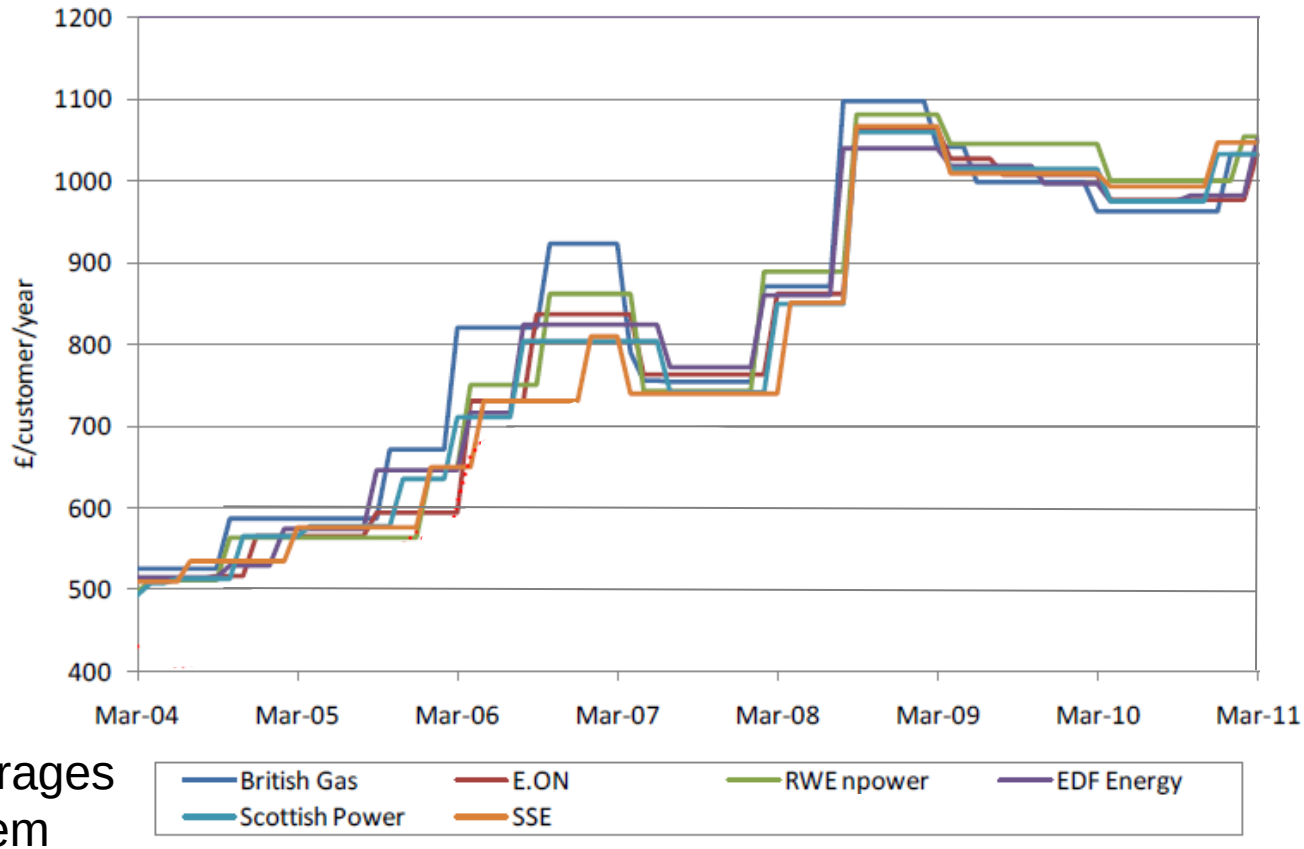
Dual Fuel bills



National Averages
Source: Ofgem

The regulator's concerns

- Non-switching customers get a bad deal
  - Action to reduce price differentials

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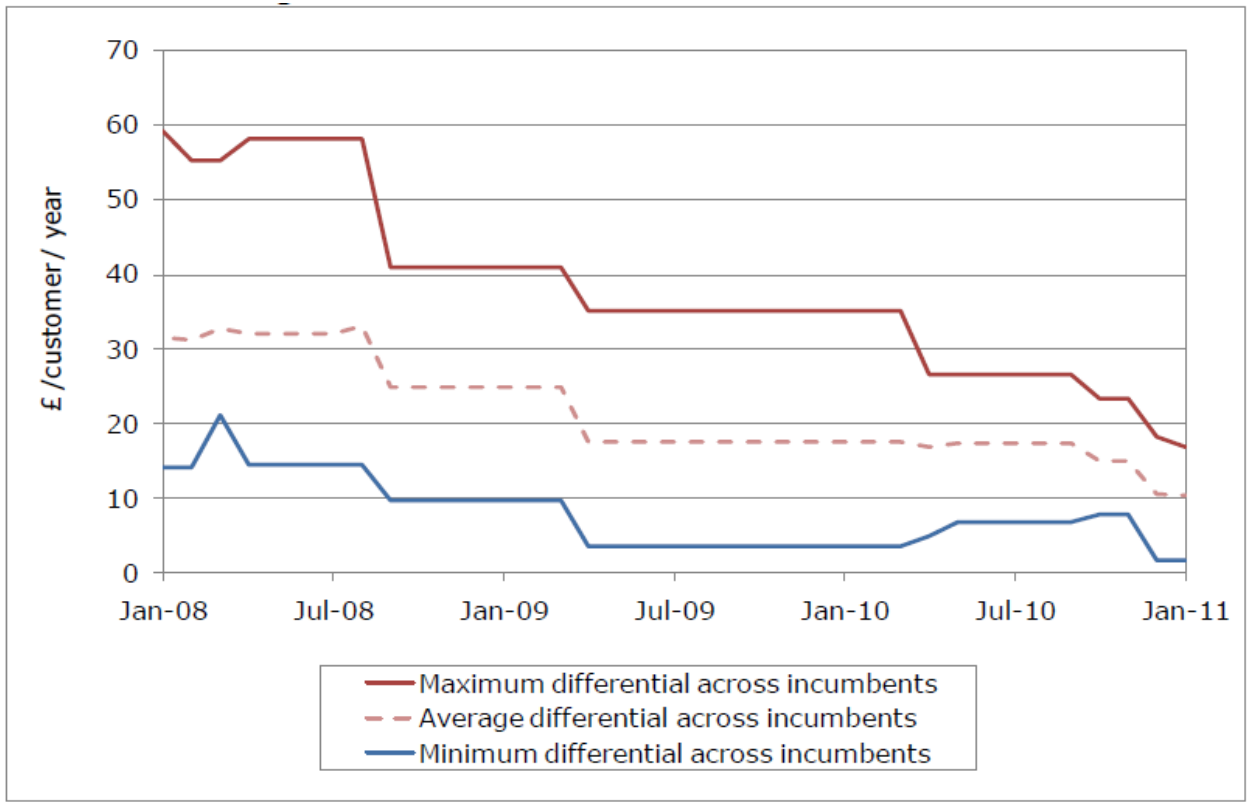
The cost of not switching



Source: Ofgem analysis on data from TheEnergyShop.com

Differences between areas in which each company is an incumbent and those where it is an entrant, annual bill for credit electricity customers, corrected for network charges

The regulator's concerns

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    - nb there are two ways to reduce (A – B) …

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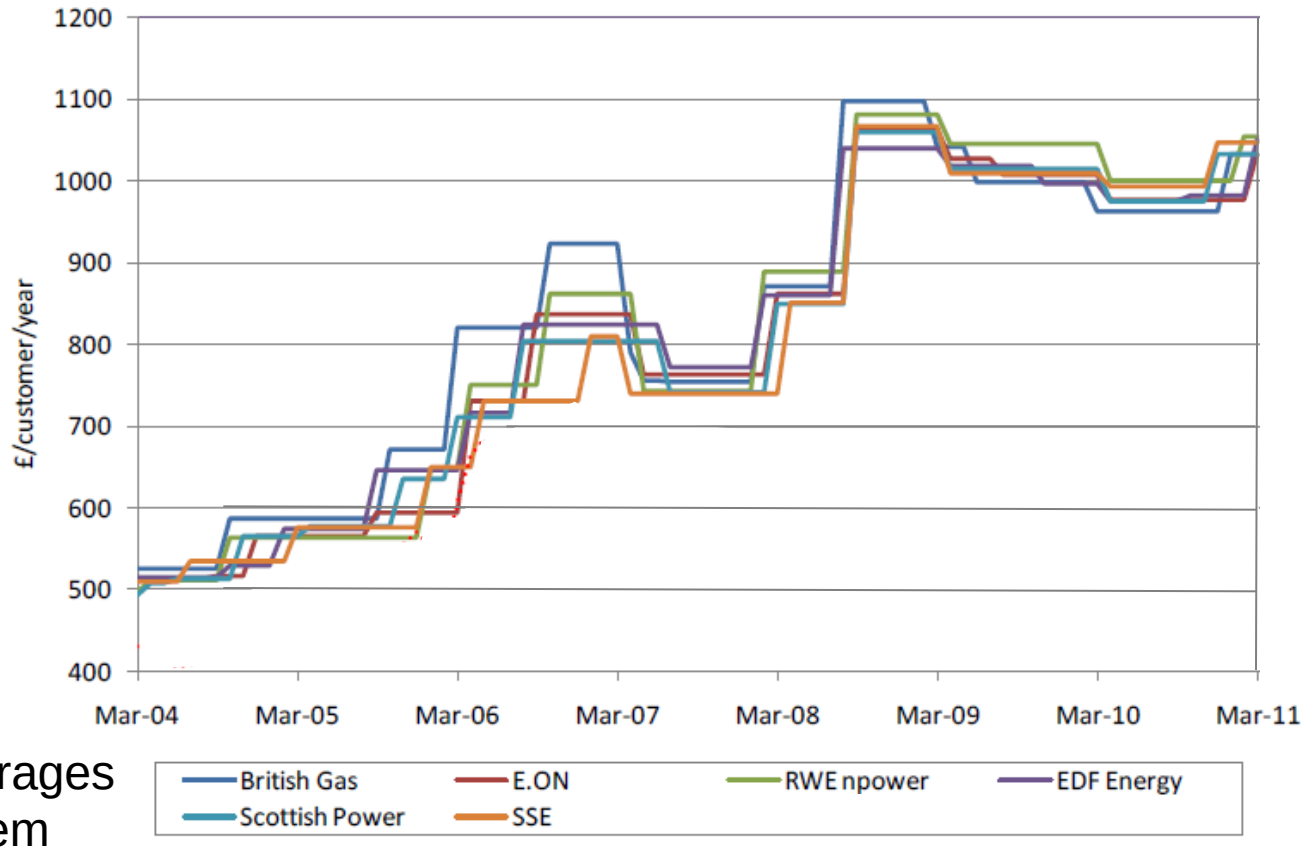

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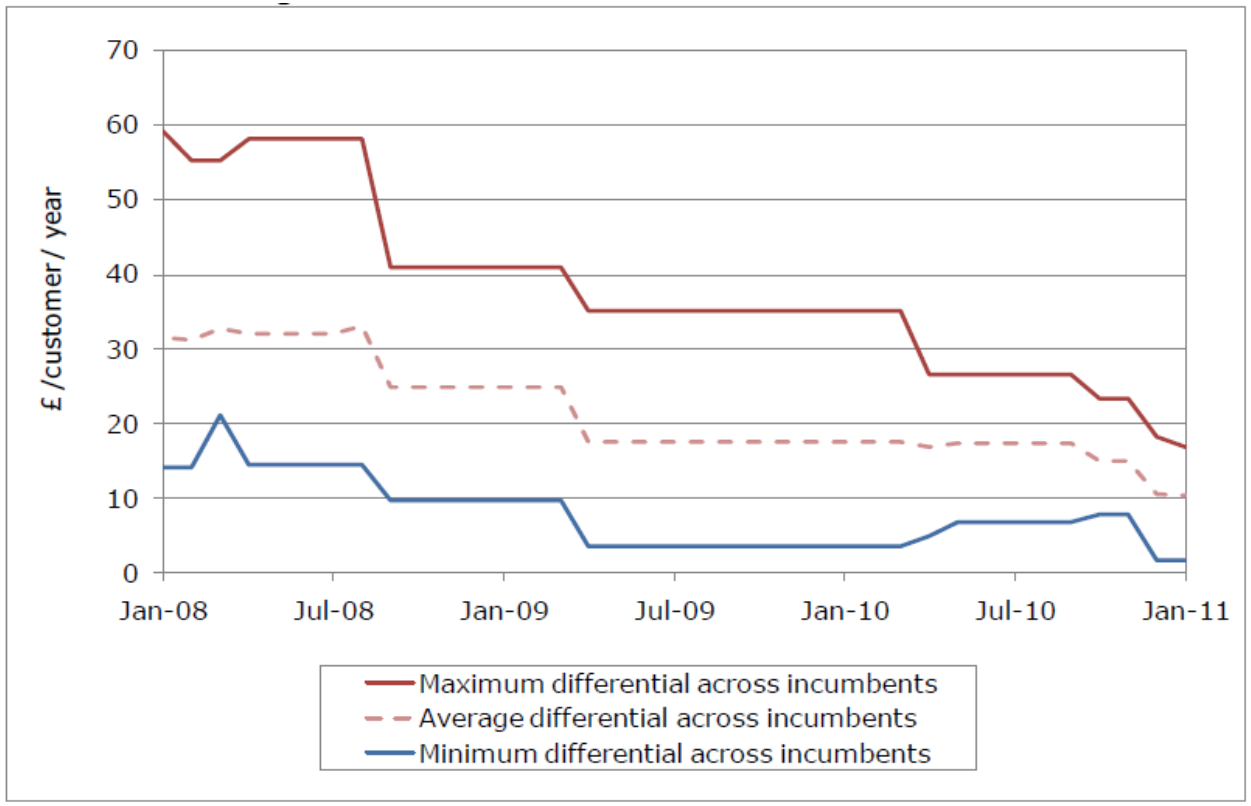

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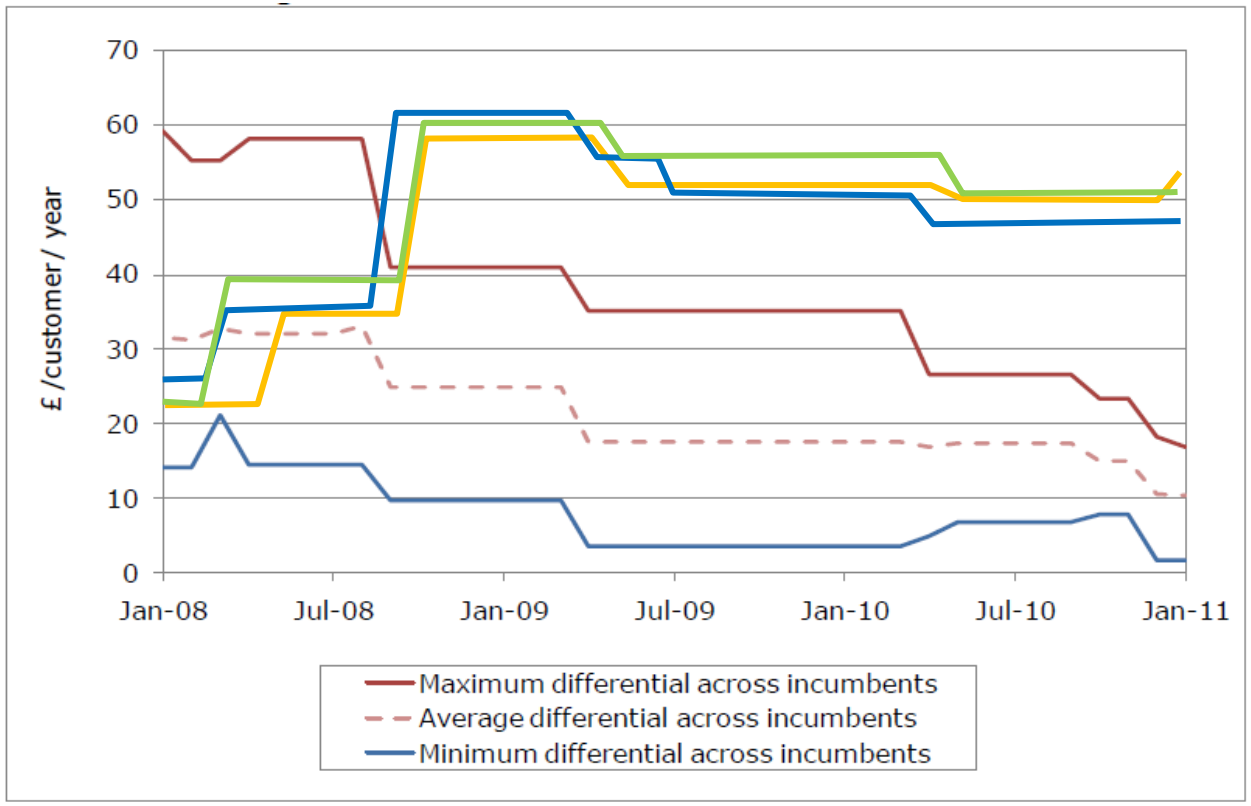

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- Non-switching customers get a bad deal
  - Action to reduce price differentials
    - nb there are two ways to reduce (A – B) …
- Vertical integration reduces wholesale market volume and transparency
  - Proposing Mandatory Market Making and Mandatory Auctions by incumbents

The elephant in the room…

Energy efficiency policies

- Carbon Emissions Reduction Target
  - Obligation on energy suppliers, now targeted on insulation and low-income customers
- Community Energy Saving Programme
  - Energy saving measures in targeted areas installed on a street-by-street basis
- Warm Front grants from DECC
  - Insulation for low-income consumers

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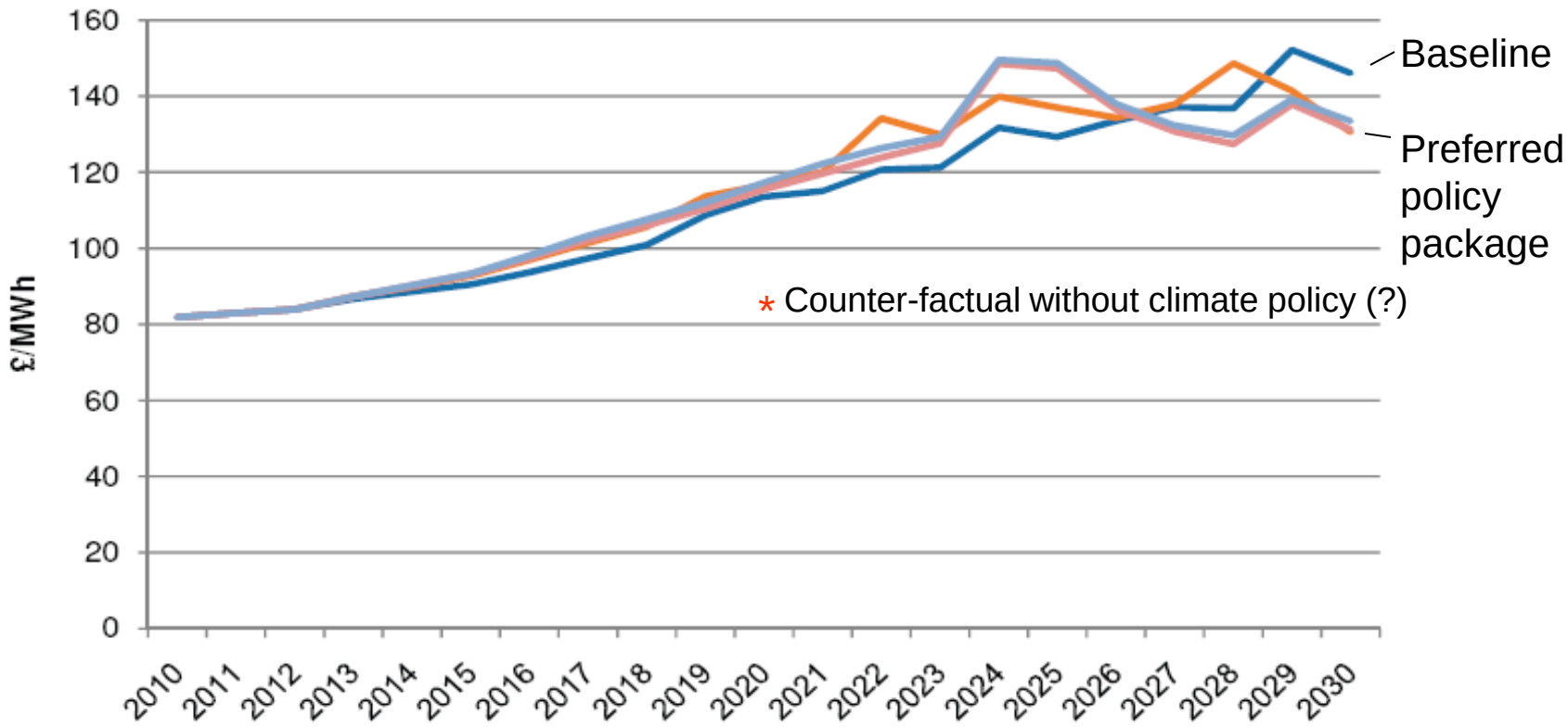
Price predictions - DECC



"Time-weighted consumer electricity prices" Sources: DECC, EMR Consultation & "Estimated Impacts", 2010

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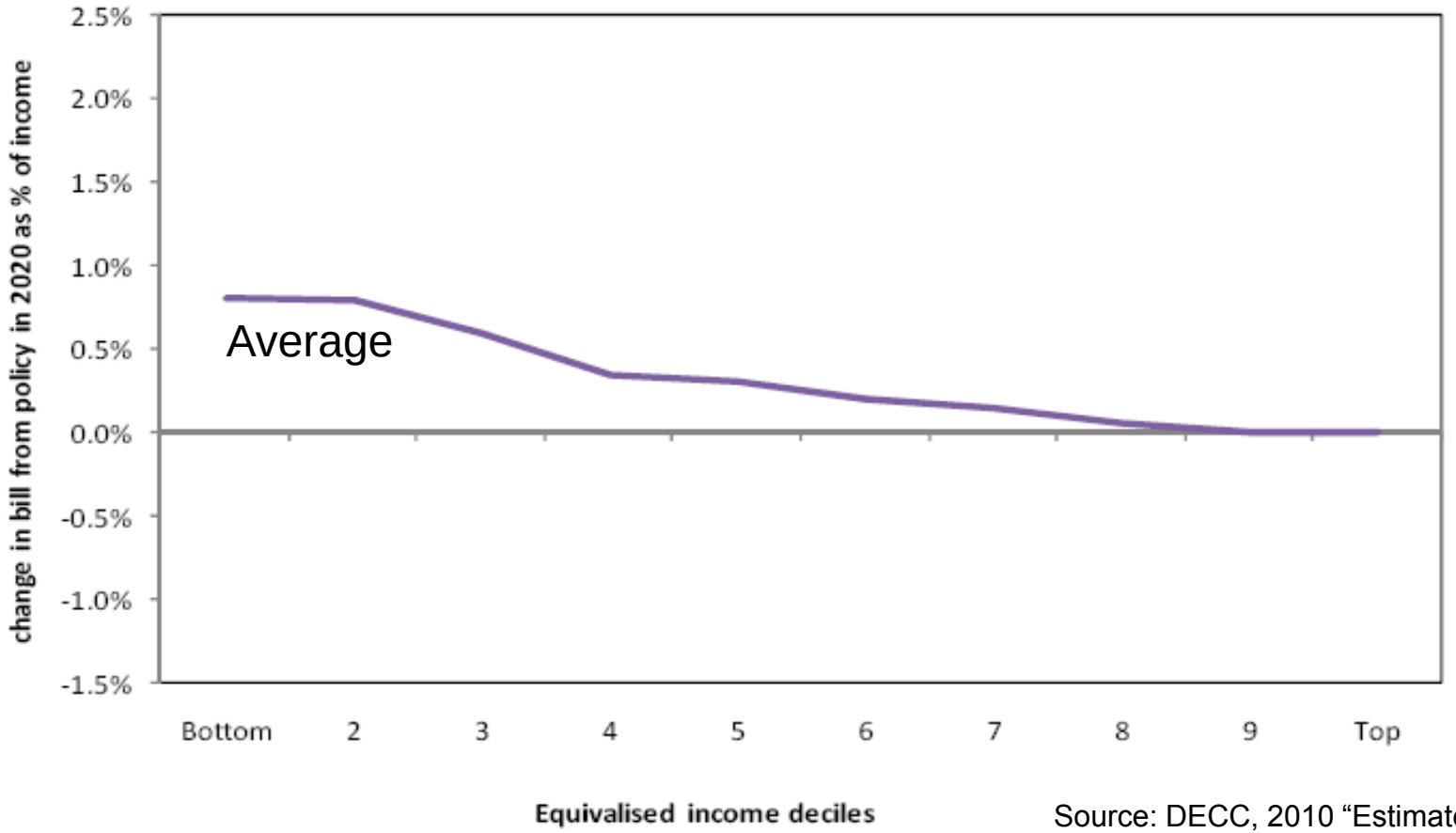
Impact on bills by income



Source: DECC, 2010 "Estimated Impacts of Energy and Climate Change Policies"

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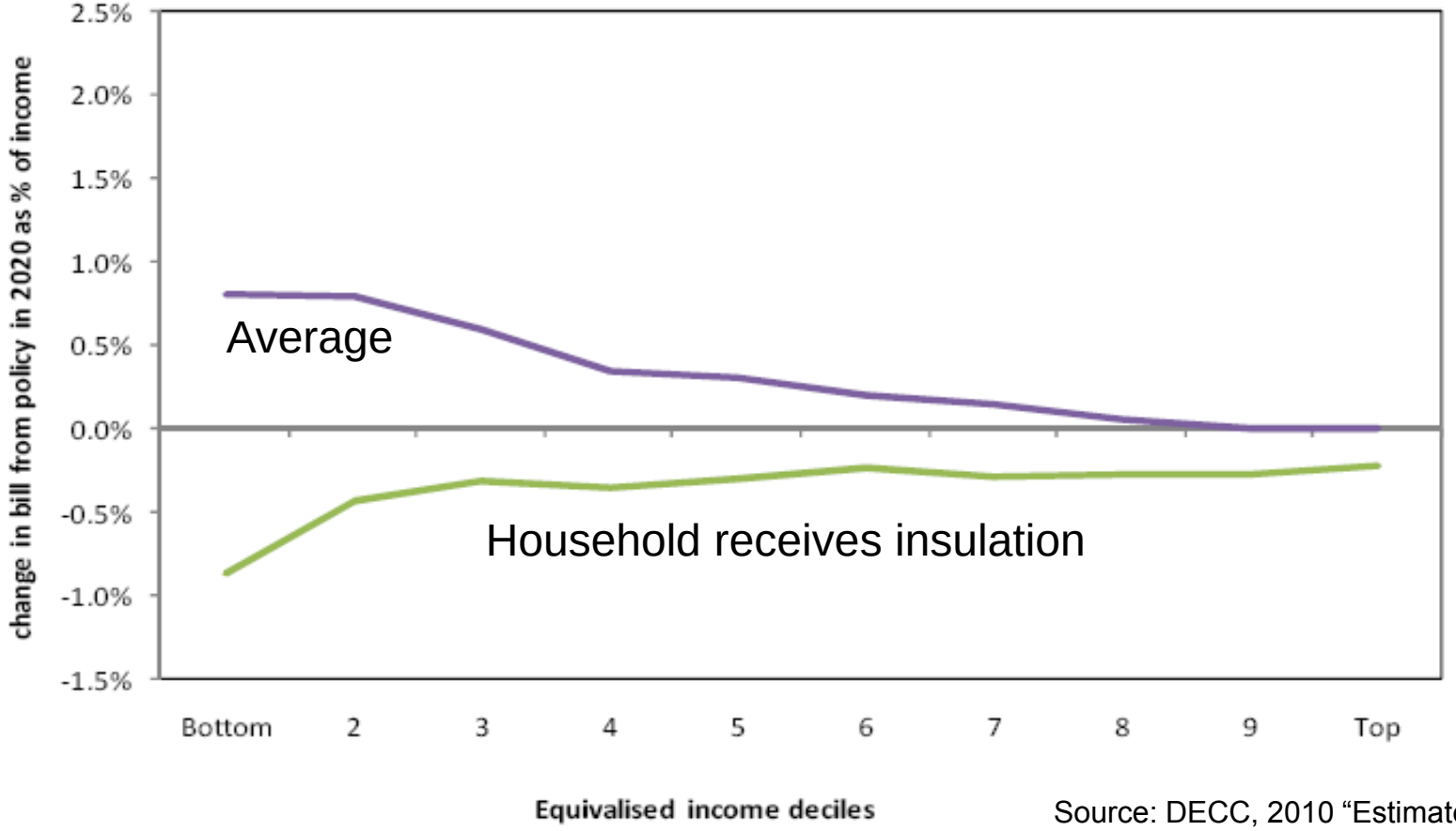

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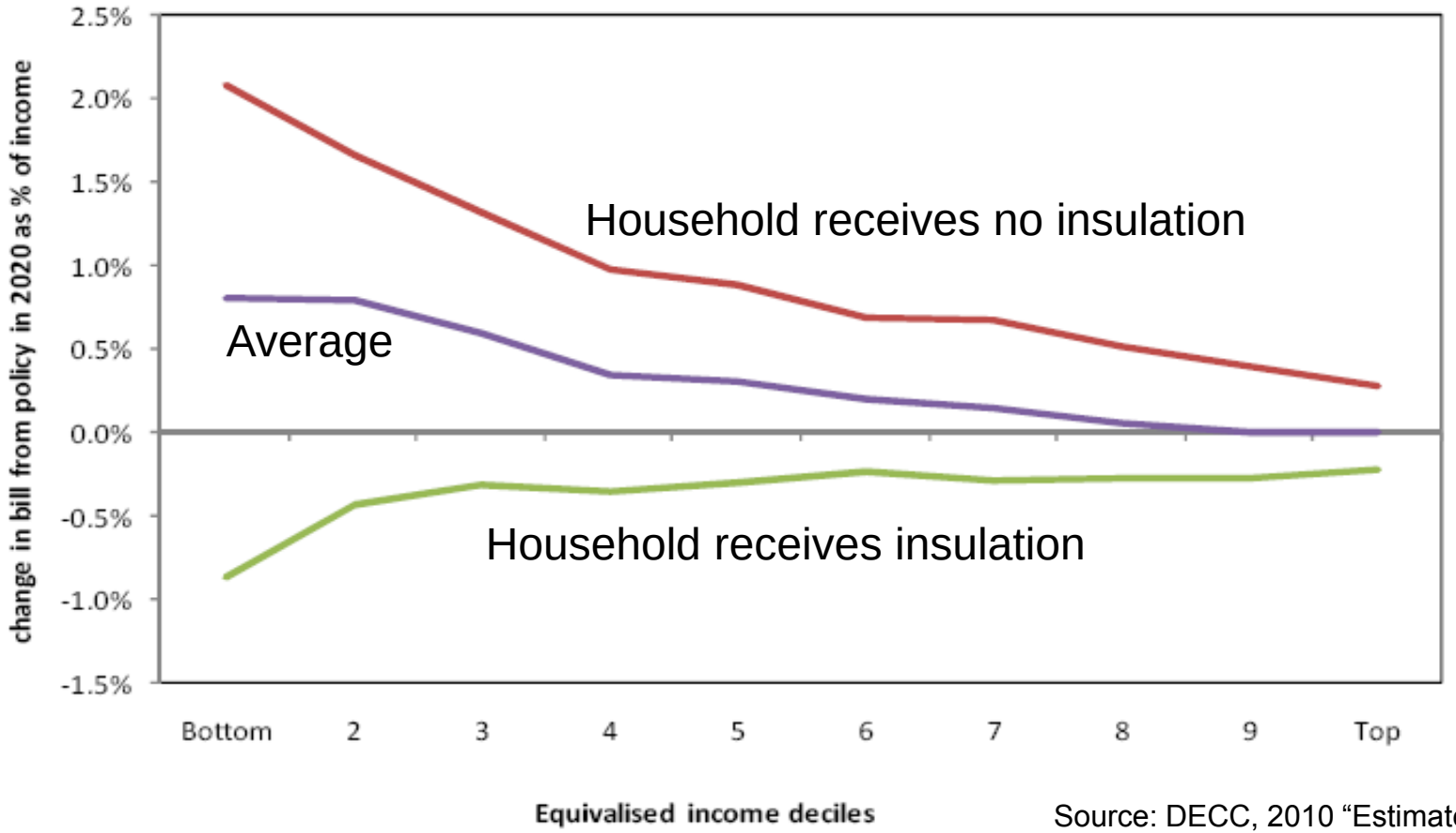

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The Green Deal

- Investments in energy efficiency at no upfront cost to the customer
- Expected savings should exceed cost
- Repaid through future energy bills
- Energy Company Obligation
  - Additional support for consumers with low incomes or hard-to-treat homes