UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

The future of energy network regulation after RPI-X @ 20

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RPI-X@20

- Three key elements:
  - Increasing customer engagement
  - Achieving climate targets
  - Encouraging innovation

- My task today:
  - Long term context
  - Emergent themes in regulation
  - Tasks for future

Outline

- The traditional regulatory model
- Drivers and premises of future regulation
- The impact of a Global Deal
- The LENS scenarios and implications for 2050
- Key questions for regulators
- Some possible ways forward

The Traditional Best Practice Regulatory Model

- Competition in wholesale market
- Competition in retail market
- Regulation of network services via CPI-X
- Additional incentives for quality of service and loss reduction

- New Zealand has it right: ‘price-quality’ paths are what regulators already assess.

Drivers of Change

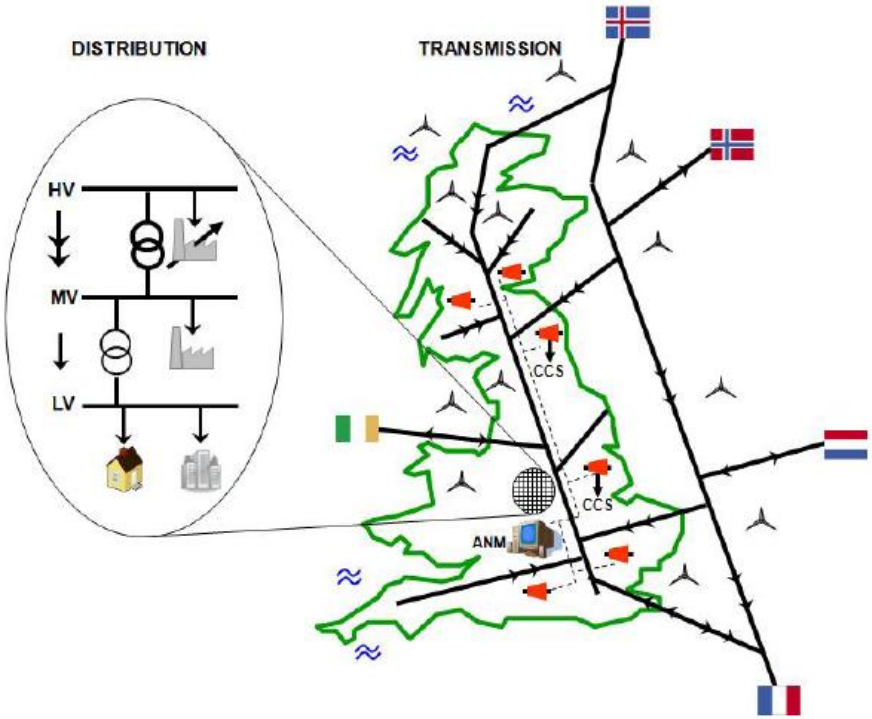
- Rising investment requirements
- Growing concerns about fossil fuel supply
- Increasing intermittent renewables on system
- Climate change policy set to tighten substantially
- Reality of climate change likely to lead to adaptation

Premises of future regulation

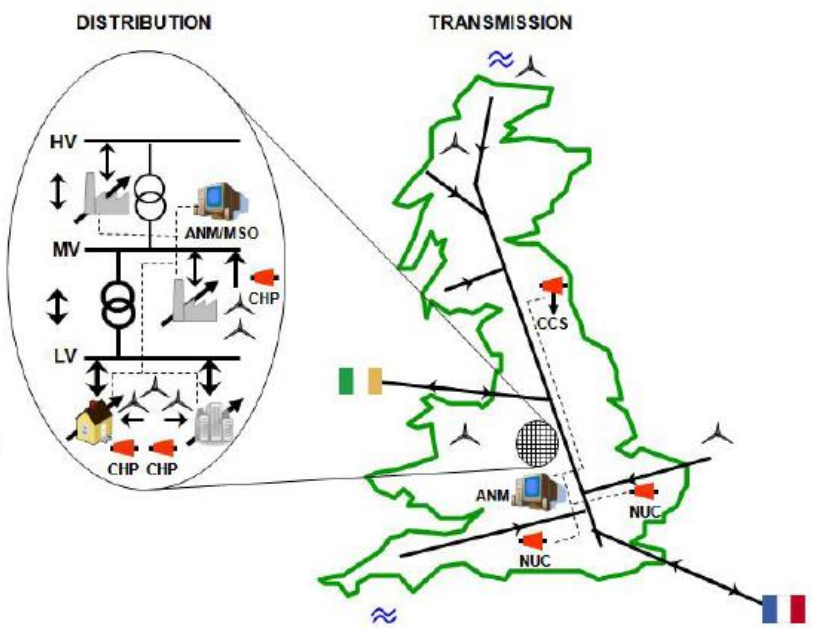
(Pollitt, 2008a)

- Markets and incentive regulation can deliver
  - Competition in generation important
  - International trade can have large benefits
  - Incentive regulation of networks necessary
- Processes of regulation need to be improved
  - Smarter and more pro-innovation
  - Old measures of success unreliable
- Delivering emissions targets will be central
- Uncertainty high and good risk allocation important

Uncertainty about the Future: The UK power grid in 2050 (two scenarios)



Big transmission and distribution



Micro-grids

See: Ault et al., 2008

A Global Deal on Climate Change?

Targets and Trade:

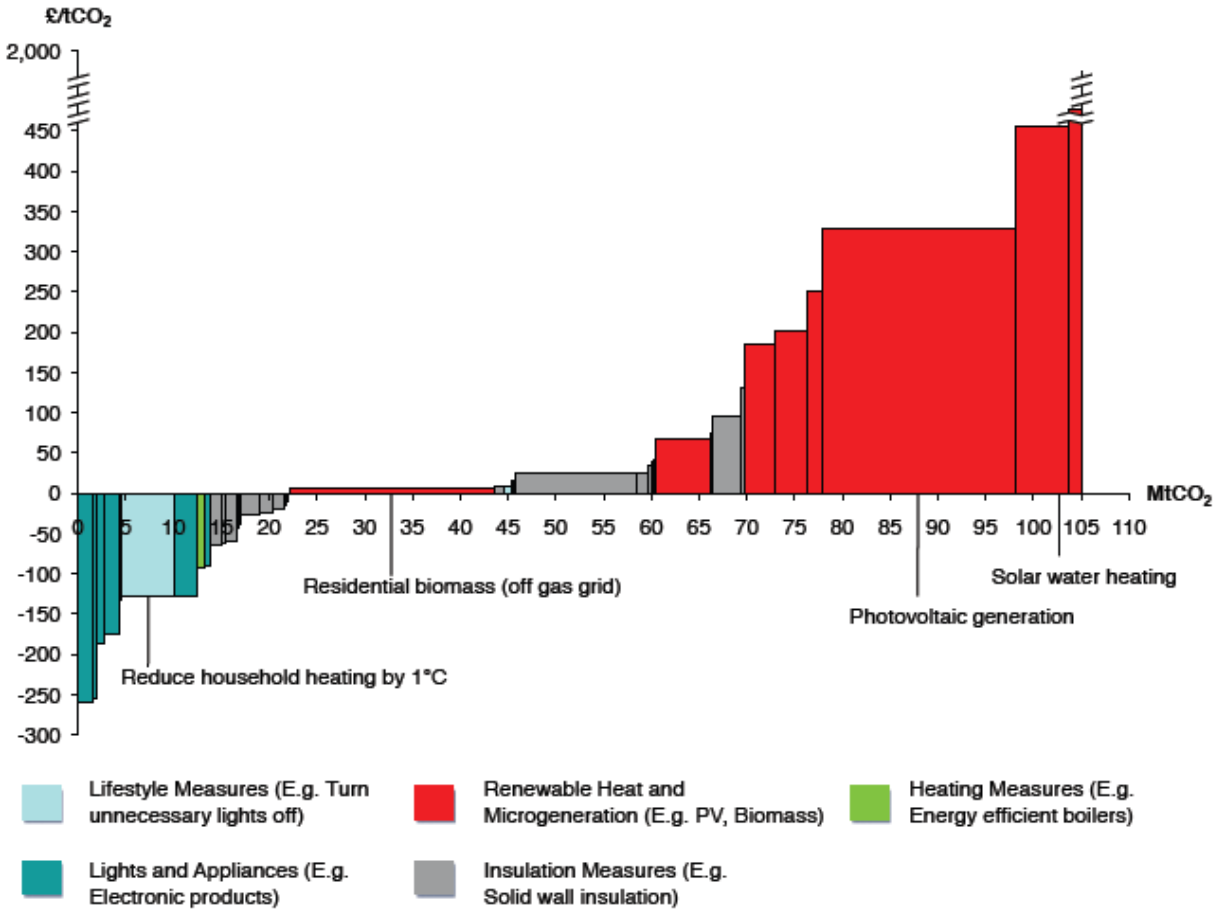
- 50 percent cuts in world emissions by 2050 with rich country cuts at least 75 percent.
- Rich country reductions and trading schemes designed to be open to trade with other countries, including developing countries.
- Supply side from developing countries simplifed to allow much bigger markets for emissions reductions: **"carbon flows" to rise to $50–$100 billion per annum by 2030.** Role of sectoral or technological benchmarking in "one-sided" trading to give reformed and much bigger CDM market.

Funding Issues:

- Strong initiatives, with public funding, on deforestation to prepare for inclusion in trading. For $10–15 billion per annum could have a programme which might halve deforestation. Importance of global action and involvement of IFIs.
- Demonstration and sharing of technologies: e.g., $5 billion per annum commitment to feed-in tariffs for CCS coal could lead to 30 new commercial size plants in the next 7–8 years.
- Rich countries to deliver on Monterrey and Gleneagles commitments on ODA in context of extra costs of development arising from climate change: **potential extra cost of development with climate change upward of $80 billion per annum.**

(Stern, 2008b, p.31)

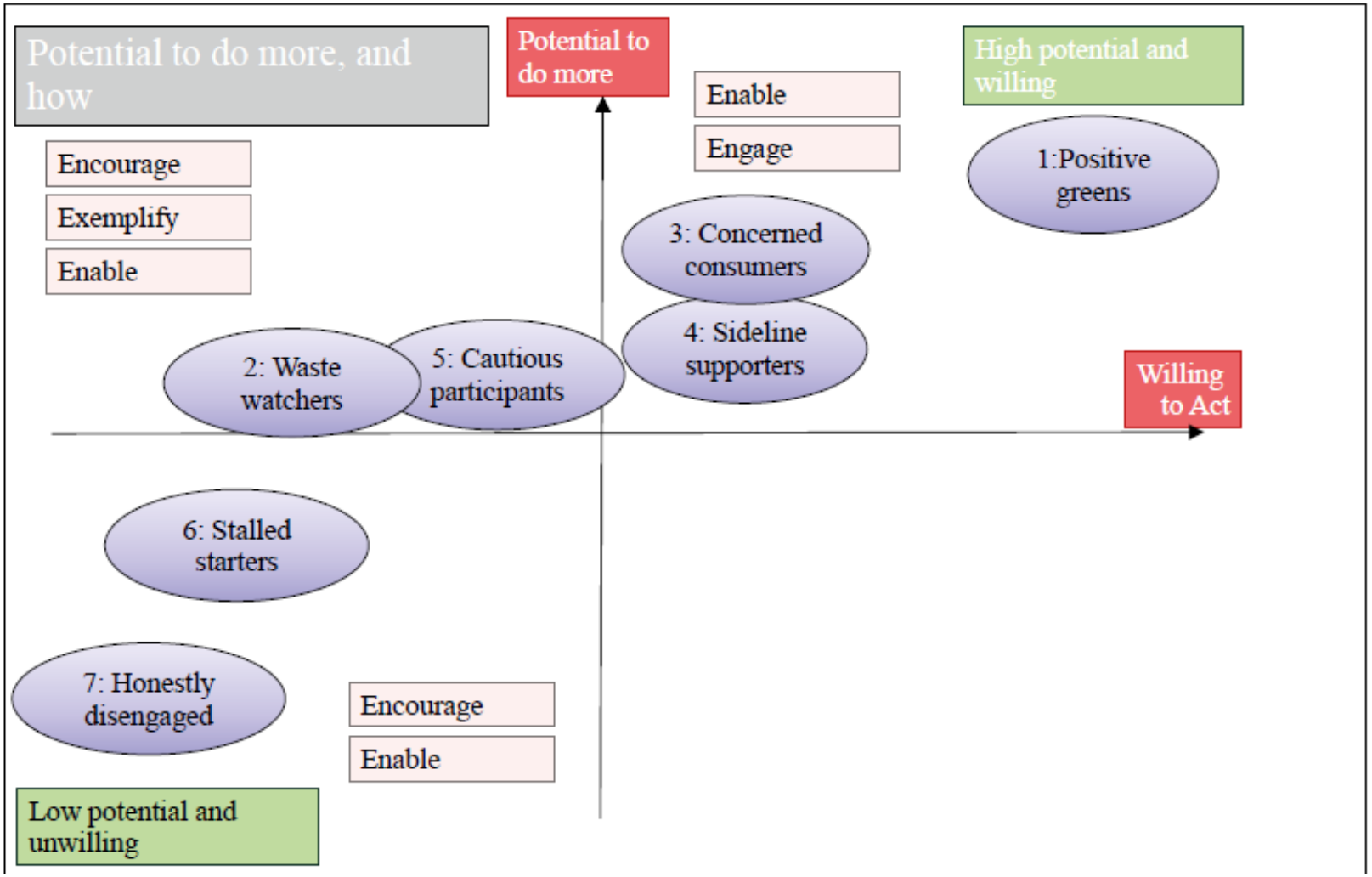
Figure 6.11 Residential sector MACC – technical potential in 2020 including hidden and missing costs and private discount rates and fuel prices



Source: CCC

Source: CCC First Report, 2008, p.226.
Note: Complete decarbonisation of residential building sector possible.

Figure 6.14 Segmented strategy for encouraging pro-environmental behaviours



Source: CCC First Report, 2008, p.228.
Need to harness market to engage consumers.

UK CCC Targets for 2022

Table 6.6 Emissions Reduction Potential from Energy Use in Buildings and Industry ($MtCO_2$)

	Technical Potential	Current Ambition	Extended Ambition	Stretch Ambition
Residential	105	13	29	32
Non-Residential Buildings	33	5	11	11
Industry	11	4	6	6
CHP	8	1	1	1
Total	**152**	**23**	**47**	**50**

Source: CCC

Extended ambition meets EU GHG 20% reduction target.

Source: CCC First Report, 2008, p.247.

Table 1: The LENS scenarios

Big Transmission and Distribution (T&D) – in which transmission system operators (TSOs) are at the centre of networks activity. Network infrastructure development and management continues as expected from today's patterns, while expanding to meet growing demand and the deployment of renewable generation.
Energy Service Companies (ESCOs) – in which energy services companies are at the centre of developments in networks, doing all the work at the customer side. Networks contract with such companies to supply network services.
Distribution System Operators (DSOs) – in which distribution system operators take on a central role in managing the electricity system. Compared to today, distribution companies take much more responsibility for system management including generation and demand management, quality and security of supply, and system reliability, with much more distributed generation.
Micro-grids – in which consumers are at the centre of activity in networks. The self-sufficiency concept has developed very strongly in power and energy supplies. Electricity consumers take much more responsibility for managing their own energy supplies and demands. As a consequence, microgrid system operators (MSOs) emerge to provide the system management capability to enable customers to achieve this with the new technologies.
Multi-purpose Networks – in which network companies at all levels respond to emerging policy and market requirements. TSOs still retain the central role in developing and managing networks but distribution companies also have a more significant role to play. The network is characterised by diversity in network development and management approaches.

Source: Ault et al., 2008, Forward by Stuart Cook.

Source: Ault et al., 2008, p.xi.

LENS scenario implications: Some principles

- Presumption of engagement between players
- Use of competitive mechanisms where possible
- Role of differentiated pricing
- Value in keeping options open at start
- Need to be consistent in climate change agenda

LENS: Possible structural and market design changes

- Unblocking of Transmission for large scale renewables
- More regulator led auctions for T capacity
- More customer involvement in network decision making
- Locational pricing in T and D
- DNO/retail ownership unbundling
- ISO-ITO split
- New kinds of licenses (e.g. for heat/ESCOs)
- Regulation for intermittency
- Development of PPP for power

LENS: Implications for competition in generation/supply

- Facilitation of private wires
- Local wire unbundling
- Tendering for right to build new assets
- Targeted support for new entrants
- More active policy towards competition in generation/retail
- Financial regulation of new energy companies
- Stranded asset recovery mechanisms more necessary

LENS: Role for wider energy policy

- High regulatory uncertainty bad
- Subsidies important for scenarios
- Carbon policy strength important
- Tougher building standards
- Tougher white goods standards
- Near term government policy decisions important
- Tougher vehicle emissions standards important

LENS: Changes to nature of regulation

- Future proofing approach to network regulation
- Need for wide-ranging consumer engagement and education
- Interaction between electricity/heat/transport important
- Wide ranging review of institutions of regulation (EST/CT/OCC/Ofgem/DECC)

Two core questions for energy regulators

- How should new network investments be decided upon?
- How do we ensure investments are carried out as cheaply as possible?
- Quality is an integral part of this decision making.

See: Guthrie (2006) and Ofgem (2009)

How do we decide on new investments?

- Who gets to decide?
  - Regulator/government
  - ISO
  - Incumbent network companies
  - New entrants
  - Generators/retailers
  - Final customers
- Process of decision making?
  - Guiding mind
  - Negotiation between parties
  - Expert review/audit
  - Regulator/government

How do we decide on new investments?

- Need to think about:
  - Risk allocation in decision making
  - Incentives on parties
  - Role of competition / market testing
  - Removing constraints
  - Location of expertise / possible synergies

- Quality in this context:
  - Incentives for over-investment
  - Possibility of differentiation (e.g. local co-ops)

How do we carry out investments as cheaply as possible?

- New vs replacement investment
- Options for efficient investment:
  - Prudency review
  - Menu regulation
  - Tender auctions
  - Risk allocation and reopeners
- Some issues:
  - Competition in the contracting market
  - Output based incentives for delivery

What is wrong with CPI-X as practised?

- UK Distribution Price Control Review 2010-15
- Three observations:
  - Rate of return above target level
  - Operating costs above target level
  - Incentive payments for quality outperformance high
- What does this mean?
  - Separate analysis of quality and cost performance wrong
  - Yu, Jamasb and Pollitt (2009) show this clearly.

New ideas: Telecoms

- Core questions:
  - ‘End of Regulation’ vs ‘Regulation forever’
  - Regulation for innovative investment
- Core lessons (Hausman and Sidak, 2007; Pollitt, 2009):
  - Competition and consumer choice important
  - Strategic withdrawal of regulation possible
- Transferability:
  - Limitations: consumer role and rate of innovation
  - Facilitation: climate change concern

New ideas: Auctions for network investments

- Core questions:
  - Minimising build cost
  - Inducing new entry and innovation
- Core lessons (Littlechild and Skerk, 2008):
  - Can be very effective in keeping costs down
  - Makes subsequent price regulation easy
- Transferability:
  - Already advanced proposals for Offshore transmission auctions in UK
  - Facilitation: large new network investments required

New ideas: Negotiated Settlements

- Core questions:
  - Is creation of buy side for network services possible?
  - What facilitates sensible/timely negotiation?
- Core Lessons (e.g. Doucet and Littlechild, 2006, Littlechild et al., 2008):
  - Appropriate forum necessary
  - Strong regulatory threat and decisions on key issues
- Transferability:
  - Clear in electricity and gas transmission
  - Market structure changes likely to be necessary in distribution

New ideas: Consumer Advocate

- Core questions:
  - Is there a cheaper way to negotiate price plans?
  - Is a dedicated office the best way to deal with consumers?
- Core Lessons (e.g. Littlechild, 2007):
  - Democratic accountability is a powerful enforcer
  - Costs of regulation can be reduced
- Transferability:
  - Works well in US legal system
  - Could a modified system be implemented in UK via Consumer Focus or Ombudsman system?
  - Would a transfer of powers weaken regulatory agencies?

Old ideas that may resurface

- Role of ISO in proposing new investments (Pollitt, 2008b)
  - Need to split ISO / ITOs
  - Need to split DSO / DO
- Nodal pricing in the distribution system (Jamasb et al., 2005)
  - Correct pricing of services to network from DG
- Length of regulatory review period (Ofgem, 2009)
  - Variable length for different assets
  - More reopeners/renegotiations on discrete issues
- Re-emergence of smaller ESCOs (Pollitt, 2009)
  - Substantially price-quality deregulated
- Need for more investment in R&D (see Cave, 2009)
  - Innovation funding mechanisms important

RPI-X@20

- Already obvious:
  - Competition in connections
  - Extension of nodal pricing
  - Extension of auctions
  - Introduction of Negotiated settlements
- Near term likely:
  - Improved consumer advocacy
  - Improved Innovation Funding Incentive
  - Stream lined 5 year price review
  - Separate DNO / Retailer

Conclusions

- CPI-X as practised in energy networks is scarcely fit for purpose.

- Economic regulation must focus on achieving climate change targets (or abandon targets).
- This requires:
  - More decentralisation of investment decision making.
  - Clear signals for least cost investments.

- There are some clear directions for future regulation.

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