UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

Network Regulation in the light of the Climate Change Act

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Outline

- A short history of RPI-X
- A new paradigm for energy
- The implications of government targets
- Possible network futures
- Implications for regulation

The Original Idea: Littlechild (1983)

- RPI-X fixed for five years on monopoly services.
- X a matter of negotiation between company and ‘regulator’.
- In place until ‘adequate competition develops’.
- Alternatives: No explicit constraints, MRR, OPRL, Profit Ceiling.

Criteria for Evaluation

	NEC	RPIX
• Protection Against Monopoly	5	1
• Efficiency and Innovation	1=	1=
• Burden of Regulation	1	2
• Promotion of Competition	1	2=
• Proceeds and Prospects	1=	1=

Source: Littlechild, 1983, p.37.

- NEC= No explicit constraints, 1=best scheme

The UK Energy Market

- 2007 Sales to final electricity consumers: £26.4bn
- 2007 Sales to final gas consumers: £14.0bn
- Source: DUKES, 1.1.6 (includes relevant VAT)

- Electricity Distribution revenue: ~£3.2bn (12%)
- Electricity Transmission revenue: ~£1.4bn (5%)
- Gas Distribution revenue: ~£2.4bn (17%)
- Gas Transmission revenue: ~£0.5bn (4%)
- Source: Price control reviews final statements inflated to 2007.

RPI-X in Energy

- DNOs successors to ABs
- NG successor to CEGB / BG

- Monopoly power still with networks
- Planning function still with successor cos

- RPI-X fulfils same function now as in 1990.

RPI-X in Energy

- Price controls have been successful in cutting cost of network service until 2005.
- However price reviews increasingly complicated.
- No sign of significant reduction in scope, innovation or new entry.
- Lots of add-ons for: QoS, Investments, Losses etc.
- Incentive properties increasingly unclear.

Drivers of change in RPI-X regulation in energy (Pollitt, 2008)

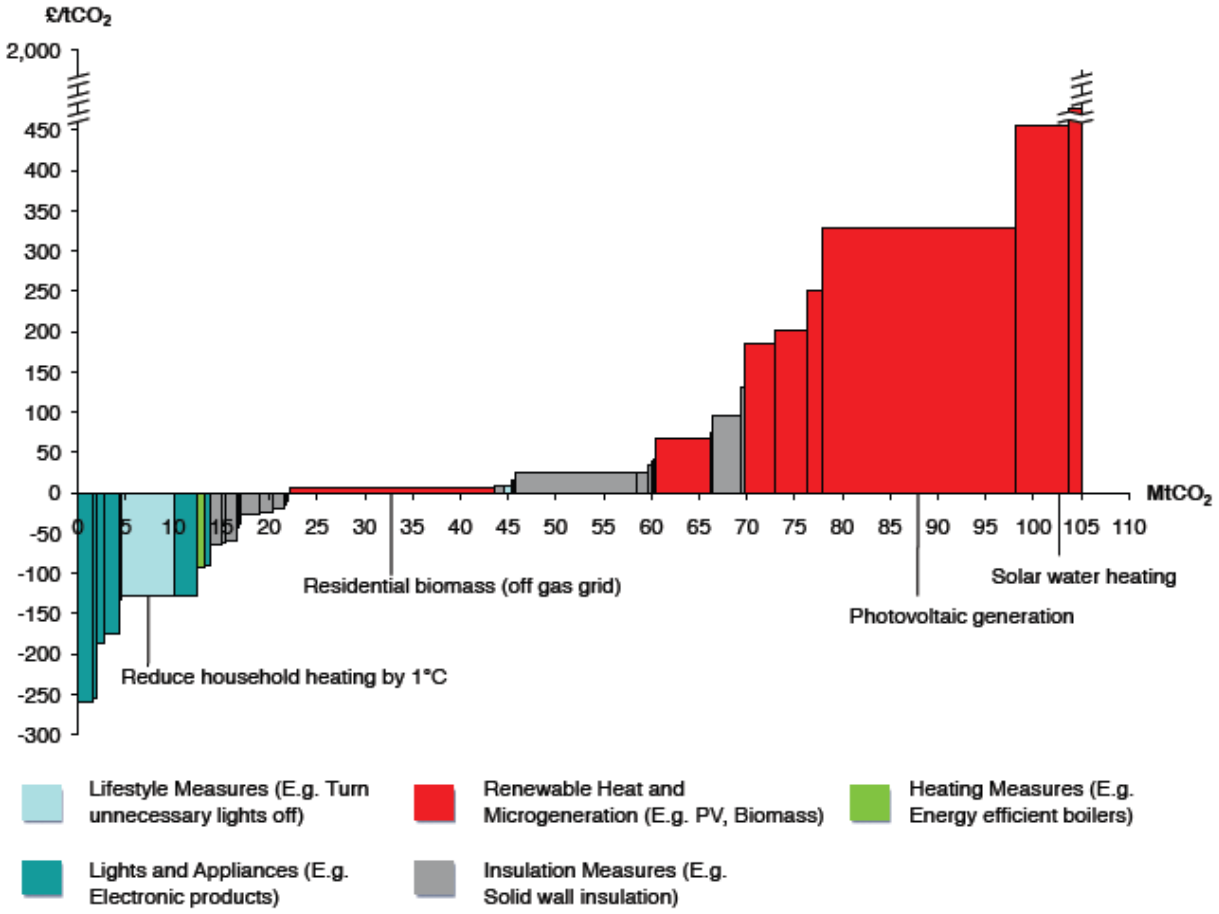
- Maturity of existing model
  - Not delivering against original Littlechild criteria
- Changing circumstances
  - Not RPI-X any more but *PPI+X+/-Y; (Y<X)*
- Climate change policy

Climate Change Policy and UK electricity

- CCC First Report:
- 80% GHG reduction target (on 1990) by 2050
- 26% (21% or 31%) reduction (on 2005) by 2020
- 100% decarbonisation of electricity 2030
- Projecting 25% rise in electricity price by 2020

- Targets very ambitious by any standard, especially history of UK (worldwide only French Nuclear ramp-up comparable for 2020 target)

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

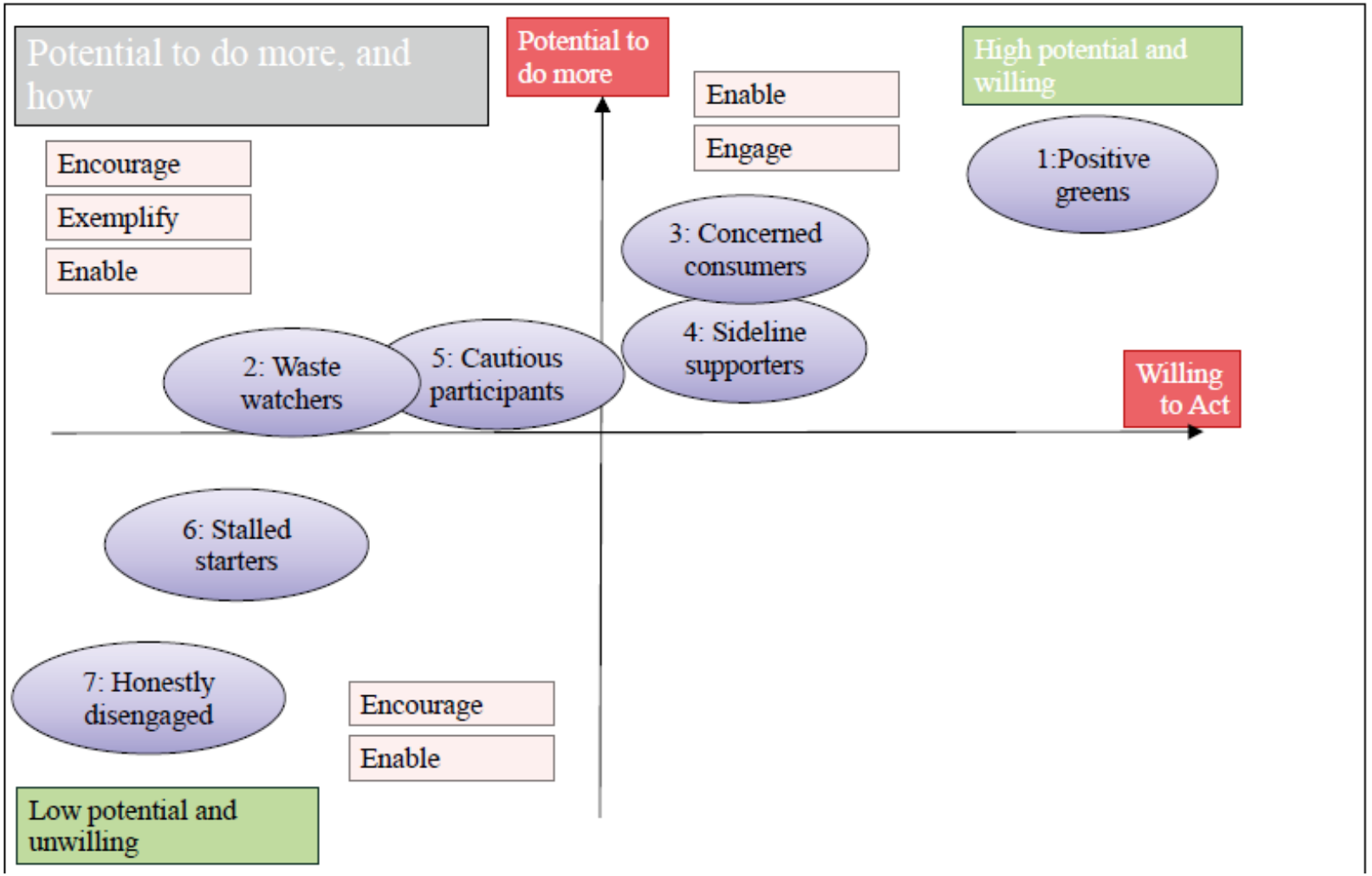


Source: CCC

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.

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.

How much will this cost?

Table 1.5 Annual Total Costs and Benefits by 2020, (2008 prices)

		Renewable Scenarios		
	Conventional	Lower	Middle	Higher
New Generation capacity (£ billion)				
Renewable Capacity	2.3	50.1	60.2	77.4
Non- Renewable Capacity	14.9	12.6	12.3	12.0
Total	*17.2*	*62.7*	*72.5*	*89.4*
Network (£ billion)				
Offshore wind connection	0.0	8.4	10.6	14.1
Onshore wind connection	0.1	1.0	1.2	1.4
Other reinforcement	0.8	0.8	0.8	0.8
Total	*0.9*	*10.2*	*12.6*	*16.3*
Total Grid Investment Costs (Generation+network)	**18.1**	**72.9**	**85.1**	**105.7**
Marginal Generation cost	35.9	25.0	22.6	18.9
Cost per MWh produced (£/MWh)				
Generation costs (Fixed and variable)	46.8	51.9	52.6	54.5
Balancing and intermittency	1.7	6.3	7.2	8.7
Grid expansion for renewables	0.1	3.5	4.1	5.2
Total Cost including network (£/MWh)	**48.6**	**61.7**	**63.9**	**68.4**

Source: SKM (2008, p.8)

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)

Some unfashionable truths about the future

- We just don’t know the best scenario.
- Incumbents want money to do more of the same.
- Waiting, learning and experimenting have high option value at present.
- Innovation is necessary because likely to be higher resistance to higher bills in its absence.
- Government policy towards climate change is theoretically confused, changeable and creating uncertainty and delaying investment.

Some relevant economic principles

- Economic regulation should only be used where markets clearly fail.
- The market is brilliant at innovation while governments and regulators are terrible at it (esp. in UK).
- Subsidies are easy to waste in the absence of market testing and complete transparency.
- Markets protect industries from political interference *because* problem (and blame) is decentralised.

Best Practice ideas in *current* regulation

- Constructive Engagement (airports, gas, electricity)
- Tendering (gas, electricity networks)
- Unbundling (electricity distribution-supply)
- Longer term settlements (electricity and gas)
- Consumer advocates
- Complete deregulation (telecoms)

- ‘Regulation Forever’ vs ‘End in Sight’?

Conclusions

- RPI-X has ***already*** run its course in energy networks.

- Economic regulation must focus on achieving climate change targets.
- This requires:
  - More decentralisation of investment decision making.
  - Clear signals for least cost investments.
- This implies RPI-X@20 should focus on:
  - Constructive Engagement
  - Tendering
  - More Locational Pricing
  - Facilitation of entry by innovative players

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