

Regulation of Britain's Energy Networks: The RIIO Formula

4 July, 2019
Brasilia

Steve Thomas (stephen.thomas@gre.ac.uk)
Emeritus Professor of Energy Policy
PSIRU (www.psiru.org), Business School
University of Greenwich

Outline

- Current state of UK energy markets
- Regulation of energy networks from 1987-2013
- The RIIO formula: Incentives; Innovation; Outputs
- Measures of inflation
- Duration of regulatory reviews
- Allowed rate of return
- Company profitability

UK wholesale electricity markets

- Wholesale & retail have always been an oligopoly, since 2002, dominated by the 'Big 6' integrated generator/retailers (EDF, RWE, EON, Iberdrola, Centrica & S&SE)
- Wholesale markets have never had sufficient liquidity. They do not: set wholesale electricity price; provide investment signals; offer reliable entry to new companies
- Effectively all new capacity is now built outside the market. Feed-in Tariffs for small renewables (PV) & on-shore wind have provided significant capacity but have now been stopped.
- Capacity auctions used for larger renewables, but only off-shore wind eligible, no more on-shore wind allowed. Power sold under 15 year take-or-pay fixed price contracts to a government agency (LCCC) that sells the power on at cost to all retailers via Contracts for Differences (CfDs)
- Special arrangements for nuclear: bilateral negotiations & fixed take-or-pay contracts CfD for 35 years with LCCC but these are proving difficult to finalise. Target of 16GW of new nuclear by 2030 will fail, at most 3.2GW. Problem is lack of investors & difficulty arranging finance
- Government is becoming a 'single buyer'. Retailers obliged to buy their share of CfD power

UK wholesale electricity markets

- Concern about supply security lead to introduction of capacity payments in 2014. Allocated by auction & given to enough dispatchable plant to ensure supply security. Plants with government CfDs not eligible
- Most plants given payments are existing plants but a small proportion is new peaking plant. This is given guaranteed payments for 15 yrs. Payments expected to be large enough that plant not reliant on selling power. Scheme suspended pending investigation by the European Commission
- Since 2014, 'Big 6' forced to offer a proportion of their generation to the open market ('secure & promote' scheme). Appears to have allowed new entrant retailers into the market. But scheme likely to be ended in a year or two as Big 6 lose market share to renewables

UK retail electricity markets

- 2018: Composition of residential consumer bill: 38% wholesale power, 26% distribution, 17% retail costs & profits, 16% environmental & social obligations, 3% transmission
- Until Brexit when the value of the pound fell, UK electricity amongst the 3 or 4 most expensive countries (pre-tax residential tariffs) out of the 28 EU member states
- Up to about 2014, Big 6 retained about 98% of the residential market (industry & commercial much smaller than residential). They exploited consumers systematically, leaving consumers on old expensive tariffs, putting up prices when wholesale prices increased but not putting them down when they fell
- From 2014, unpopularity of Big 6 & liquidity measures led to new entrants taking a significant share of retail (~20%). But new entrants buying from Big 6. If they chose to, Big 6 could force new entrants out of the market. What will it take for the other 80% of consumers to switch?
- If Secure & Promote ended who will the new entrants buy power from? How can they offer cheaper power than competitors? In 2018/19, 10 new entrant retailers (800,000 consumers) collapsed

The Big 6

- The 5 major European utilities (EDF, RWE, EON, ENEL & ENGIE) are all in deep trouble due to large debts, nuclear liabilities, loss of generation market share to renewables
- RWE & EON have already split themselves into 2 with old businesses like fossil & nuclear generation going into 1 part, 'bad bank' & new businesses (renewables, retail & networks) going into a 'good bank. Will this work?
- EDF, ENEL & ENGIE likely to split
- In UK, loss of market share in retail has meant profitability of Big 6 in UK is poor
- RWE tried to merge its UK business with that of S&SE
- Centrica trying to sell its generation
- What will happen when/if Big 6 crumbles?

The networks: 2019

Electricity

- Transmission: 1 network, effectively ownership unbundled since 1990. Owner NGC
- Distribution: 14 networks, requirement for legal unbundling since 2002. In 2019, 10 networks ownership unbundled. Networks owned by 6 companies, largest Pennsylvania Power & Light (4 networks) & Cheung Kong (3 networks)

Gas

- Transmission: 1 network, ownership unbundled since 2000. Owner NGC
- Distribution: Distribution owned by British Gas/NGC till 2005. Regulator required system to be split into 8 networks & NGC had to sell 4 of them. In 2019, 6 ownership unbundled, 2 legally unbundled. Owned by 3 companies. Largest Cadent Gas (4 networks), a consortium of international investors
- Most electricity & gas distribution not owned by electricity companies

Regulation of networks 1987-1993

- RPI-X, RPI = Retail Price Index, formula initially used for all UK utility privatisations 1984 on (energy, telecoms, rail & water). Priority to avoid the complexity US rate of return regulation seen as creating. Regulated prices allowed to go up by the rate of inflation minus the X factor.

Original rationale:

- formula only appropriate if competition expected to make regulation redundant
- X should be set once only till competition takes over
- formula to reassure consumers that real prices would go down every year – X always negative
- All the regulator had to do was decide on a challenging but achievable X factor (1993 transmission review 6 pages). How the companies achieved it, investment or efficiency improvements, was their business. Detailed cost analysis not required
- By 1993, it became clear the basis of RPI-X was failing. No realistic prospects of networks not requiring regulation, X had to be reset every 3-5 years to reflect investment requirements, X was often positive, especially for water & rail

Regulation of energy networks 1995-2000

- In 1995, it was decided network prices had to be set by reference to investment needs
- An *ex ante* form of rate of return regulation was implemented. This still forms the basis for the RIIO system
- The value of existing assets was set & utilities asked to forecast their investment needs for the next 5 years to set up the 'Regulated Asset Value' (RAV) over the forward period
- Regulator & companies negotiated the investments that would be allowed into the RAV & the rate of return that would be allowed
- Operating costs are essentially passed through

Regulation of energy networks 1995-2000

- A major issue for the regulator was how to set the value of assets built before privatisation
- One option was to use the accounting value of the assets (minus depreciation), but the companies were sold for about a third of their asset value. So if this was used, the new owners would get an unearned return on investment
- So the regulator, rightly(?), set the asset value as the sale price
- This led to one-off price reductions for electricity of about 30% for distribution & 26% for transmission
- This accounted for about half of the 30% real price reduction for electricity from 1990-2000. Other half was achieved by shifting nuclear liabilities from electricity consumers to taxpayers
- Large price reductions for fossil fuels were not passed on & any efficiency gains were not passed on to consumers

Critique: regulation of energy networks 1995-2000

- *Ex ante* method means regulators are effectively making investment decisions
- Huge scope for companies gaming: delay investments until late in the period, argue for investments not needed ('gold-plating') etc
- Each resetting became more complex taking up to 3 years: only companies & regulator could effectively take part

Regulation of energy networks 2000-2013

2 modifications added from 2000 onwards

- Benchmarking of companies used so that poorer performing companies must move towards the performance of the best performing companies
- An element of the income depended on the performance/reliability of the regulated network. Ofgem: 'The incentive scheme may be symmetric, allowing rewards for over-performance and penalties for underperformance'
- Benchmarking a short term fix. Once poorer performers have improved, the cost of benchmarking probably not justifiable
- Only a small part of income dependent on performance, <4%. Large consumer-funded investment in network monitoring equipment. Good value for money?

RPI-X@20

- 2008, Ofgem announced a review, RPI-X@20, to assess whether the regulatory regime was fit to deal with ‘the need to accommodate targets for tackling climate change, maintaining security of supply, and undertaking widespread maintenance and upgrading of our ageing [?] networks.’
- Results of review published Oct 2010 recommending adoption of RIIO: Revenue = Incentives + Innovation + Outputs
- RIIO used for electricity & gas transmission & gas distribution in 2013 & 2015 for electricity distribution

RPI-X@20

- 12 elements identified by Ofgem. 5 most important ones are:
- **Outputs led:** At the price control review we will set the outputs that network companies are expected to deliver to ensure safe and reliable services, non-discriminatory and timely connection and access terms, customer satisfaction, limited impact on the environment and delivery of social obligations.
- **Ex ante control:** We will set an upfront price control, incorporating a return on the regulatory asset value and inflation indexation. We will retain the retail prices index (RPI) as the inflation index but will keep the case for moving to consumer prices index (CPI) under review at future reviews
- **Length of the price control:** The price control will be set for eight years, with provision for a midperiod review of the outputs that network companies are required to deliver
- **Incentives:** There will be transparent rewards/penalties related to output delivery, including a backstop threat of using our existing powers for enforcement action and potential licence revocation for persistent non-delivery. There will be transparent, upfront, symmetric efficiency incentive rates for under- and overspend
- **Innovation stimulus package:** We will introduce a time-limited innovation stimulus for electricity and gas networks. These will be open to projects at any point in the innovation cycle and to both network companies and third parties for innovation related to delivering the networks required for a low carbon energy sector. The innovation stimulus package will include substantial prize funds to reward network companies and third parties that successfully implement new commercial and charging arrangements to help deliver a sustainable energy sector

The need to accommodate distributed generation

- When RPI-X@20 was launched, a priority was expected to be accommodating distributed generation (solar PV, small on-shore wind)
- However, there is very little in RIIO specifically about distributed generation
- UK policy is that distributed generation will not expand further. Subsidies for solar PV removed in 2018 & no new on-shore wind projects will be licensed
- Renewables accounted for about 30% of generation in 2018 made up mainly of off-shore wind, on-shore wind & solar PV
- New generation will be off-shore wind (500+MW) & nuclear (if it can be financed)

RAV & Rate of return

- Despite the name, RIIO is substantially the old *ex ante* rate of return regulation methodology, which still determines the vast majority of regulated income. All the existing issues of gaming, the regulator making investment decisions remain
- Operating costs, now called 'fast money', are still largely a cost pass-through

Incentives & Outputs

- Incentives in place since 1990 but pursued more since 2005. However, by 2010, Ofgem said it had ‘few output measures; that is measures of what DNOs [Distribution Network Operators] deliver in return for the revenues they collect from customers. In particular there is no measure of what customers gain from investment in network assets, which can account for a high proportion of network costs.’
- ‘Output’ measured by 6 indicators: customer satisfaction; reliability & availability; safe network services; connection times; environmental impact; social obligations
- Payments under this scheme accounted for only 4.6-9.3% of the 6 distribution companies income
- Only payments, no penalties. What happened to incentives being ‘symmetric’?

Incentives & outputs

- Indicators appear simplistic, e.g., environmental impact is measured as length of overhead cable undergrounded in National Parks etc
- Reliability & availability accounts for >70% of incentives income. Measured as the number of interruptions experienced by customers & the average length of interruptions
- Customer satisfaction accounts for 20% of payments, assessed mainly by survey
- There are no payments for 'safe network services' & payments under 'connection times' & 'social obligations' are minimal

Innovation

- Innovation element is via annual competitions (largest Network Innovation Competition (NIC)) bidding for a consumer funded money to introduce new technologies. Budget for electricity distribution £70m, small element of income
- Such a scheme could have been introduced regardless of how prices are set
- Example: UK Power Networks. Four-year project to ‘develop two new types of network equipment to direct power flows across the distribution network.’ Awarded £13.8m of NIC funding supported by £3.1m from UK Power Networks and £1.3m from their partners.
- Will the result be that regulated companies only innovate when paid to do so by consumer funds?

Measures of Inflation

- Retail Price Index is the traditional measure of inflation & its part in regulation dates back to the original RPI-X formula. It was meant to assure consumers that prices would fall in real terms
- But RPI now widely acknowledged as a poor measure of inflation. Consumer Price Index (CPI) is a better measure & is consistently about 0.5% per year less than RPI
- Over the 30 years since electricity privatisation, if the difference was 0.5% pa, over 30 years, consumers would be paying 16% too much
- But now that RPI-X has been abandoned, shouldn't the measure of inflation be one that reflects the costs incurred by the regulated companies, e.g., an engineering-based index?

Duration of review

- Since RPI-X was abandoned, length & complexity of the process of setting prices has increased. Is the increase in length of settlement to 8 years simply to reduce workload on the regulator because of the complexity & length of the process?
- In a personal communication, a senior former UK energy regulator commented: 'the recipients [regulated companies] seem to be coining it in over 8 years, and Ofgem finds it difficult to intervene to do anything about it. Companies told me that it really was impossible to forecast or plan anything accurately after about 3 years, so even internal company plans would be revised at least that frequently.'
- Ofgem chose not to carry out a mid-term review for electricity distribution

Allowed rate of return

- The allowed real rate of return should equate to the rate of return available for investments of comparably low risk in the rest of the economy
- It is not under the control of the regulator or the companies but is the most important element in determining allowed income
- Low interest rates worldwide are expected to allow reductions in regulated prices for all UK network industries from 2020 onwards
- The regulators are trying to take credit for these price reductions but when interest rates increase again, prices will go up again
- Interest rates have been low since 2010, why have consumers had to wait for 10 years

Company profitability

- Network ownership is a low risk business, so profits should be low
- But average profitability about 10% compared to 4% for generation/retail.
Allowed rate of return 6% so companies seem to be too smart for the regulator
- Incentives scheme seems to offer extra income, not penalties
- RIIO has been ineffective in ensuring benefits of cost reductions are passed on to consumers

Evaluation of RIIO

- Ofgem has always over-claimed for its performance. RIIO is much less innovative than it is presented as.
- The high profits of electricity distributors suggests the formula is not effective in ensuring consumers get their fair share of efficiency improvements
- Even before RIIO, rate setting was very complex & time-consuming, RIIO has made things worse
- It is hard to understand how a duration of 8 years can be justified. Technology is changing rapidly in the face of climate change & forecasting investment 10+ years forward is too long
- The innovation element is separate to rate-setting. It remains to be seen if it stimulates innovation or just means companies only innovate when paid to do so by consumers
- Allowed rate of return is the key parameter but is not under the control of the regulator or the regulated companies. Low world interest rates are allowing short-term price reductions but these are reversible