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Evolution of DNO Regulation in the UK

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Outline

Background

Example of a distribution price control review

Performance of regulation in early years

A view into the future







DNO Regulation in the UK: Background





UK Experience in Regulated Industries (date of second price control period)

- ✤ Telecoms (1989)
- Gas (1992)
- Electricity Transmission (1993)
- Electricity Distribution (1995)
- ✤ Water (1995)
- Rail (2000)
- Airports (from 2003)
- Postal Services (from 2006)





The British Sector – History

- First electricity companies in late 1880s
- Early incentive regulation models
- Municipal and private firms the norm
- 1933-34: 635 utilities 19 systems
- 1947: 569 DISCOs at nationalisation
- Consolidation and standardisation of the industry





The UK ESI: Background

RECs privatised 1990

- ✤ NGC shares sold 1995
- Golden share lifted 1995 takeovers begin
- Separation of supply businesses 1999





- * Network asset ownership
- Secondary system assets ownership
- * Approval of new connections
- Realisation of new connections
- * Network maintenance
- Secondary system maintenance

- * Network operation
- * Asset management
- * Secondary system asset management
- * Customer services
- * Metering
- * Corporate activities







Distribution Price Controls in Britain

Year	England and Wales	Scotland	
April 1990-arch 1995	Post privatisation price control	Post privatisation price control	
Aprial 1995-March 1996	DPCR1		
April 1996-March 2000	DPCR2 after Offer reopened the price review in 1995		
April 2000-March 2005	DPCR3 after merger of the regulatory process for all British distribution companies		
April 2005-March 2010	DPCR4		
April 2010-March 2015	DPCR5		
April 2015-March 2023	RIIO-ED1		

Source: Meeus and Glachant (2018)





Distribution Price Controls in the UK (X-factors)

- 1990-91 to 1994-95: variable up to 2.5% above the inflation rate
- ✤ 1995 to 1995-96: 11-17% (average of 14%)
- ✤ 1996 to 1996-97: 10-13%
- 1997 to April 2000: average of 3% p.a.
- 2000 to 2004-05: one-off cut in distribution revenue by 23.4% in 2000-01; then a 3% p.a. fall in unit revenue until 2005





Elements of Incentive Regulation of Electricity Networks in Britain

- Operating expenditures: Benchmarking
- Capital expenditures: Assessment of spending and menu of contracts
- Quality of service: Performance targets
 Number of interruptions
 - Length of interruptions

Energy losses: Composite performance standard





Basic Characteristics of OFFER/OfGEM Approach

- Initial consultation document issued 18 months before end of current price control period
- Several subsequent documents with responses invited each time. Responses placed in library unless marked confidential
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DPCR4 (2005-2010)

- June 2004 Initial proposals
- September 2004 Update document
- November 2004 Final proposals
- December 2004 DNOs decide to accept/reject proposals
- Early 2005 License modifications or referral to Competition Commission
- April 2005 New price controls implemented





Waddams (EWEPA, 1999)

- 'Much of the political debate now centres around distributional issues, focussing on allegations that consumers have not received a sufficient share of the benefits....
- …Because the UK system depends on independent regulators who have used their (typically British) discretion to develop a variety of regulatory review procedures, they display considerable variation in using productivity studies...' (p.11)





Weyman-Jones (NAPW, 2006)

'The overwhelming impression of regulatory and governance case studies is that sample size, variable choice, model specification and choice of methodology has been governed by different objectives from those in the theoretical literature.' (p.25)





- Best to see process as involving 'interactive preference target setting' (Thanassoulis et al, 2008)
- ✤ A negotiation (Beesley and Littlechild, 1989)
- Competition Commission (CC) is an external restraint on use of regulatory models
- Mid Kent Water appealed against price control on basis of non-use of panel data. CC (2000) ruled difficult to decide between models
- CC has power to condemn approach of regulators (e.g. Ofgem on value of comparators)







GB regulator uses a range of techniques

- * No over emphasis on one method
- * Detailed cost analysis is important
- * Lack of transparency in GB over data and methods
- * However consultation and co-operation is high

Norwegian regulator relies heavily on DEA

- * Data accuracy checked carefully
- * DEA scores checked and scaled down for X setting
- * Norway has a lot of utilities for benchmarking
- * Moving away from pure DEA approach next time





Performance of DCPRs: Initial Years

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Sources of Price Reduction to Domestic Users 1991/92-1998/99

Source	%
Lower generation costs (mainly fuel)	10
Lower distribution and transmission charges	9
Lower supply business margin	1
Lower fossil fuel levy [*]	9
Total	29

* The fossil fuel levy was introduced to limit the effect of reform of the sector on coal industry. The levy was gradually phased out. Price reduction due to lower levy can therefore not be attributed to the effect of reform on prices.

Source: Littlechild (2000)





Performance of Distribution Network Regulation

Partial evidence

- * Electricity prices
- * Access charges
- * Quality of service
- * Network losses
- * Investments
- * Competitiveness/affordability

Efficiency and productivity analysis

Cost-benefit analysis





Source: Department of Trade and Industry



Distribution Access Charges















Cost vs. Quality of Service Benchmarking



Average annual company rankings from Models Opex, Totex, Quality and Totex-Quality (1 is best, 14 is worst) 1991/92-1998/99





Revenue Exposure to Quality of Service

Incentive Arrangement	DPCR3	DPCR4
Interruption incentive scheme: - Duration of interruptions - Number of interruptions	+/-1.25% +/-0.5%	+/-1.8% +/-1.2%
Storm compensation arrangements	-1%	-2%
Other standards of performance	Uncapped	Uncapped
Quality of telephone response	+/- 0.125%	+0.05% to -0.25%
Quality of telephone response in storm conditions	+/- 0.125%	0 initially +/-0.25% for 3 years
Discretionary reward scheme	Not applicable	Up to + 1m pounds
Overall cap/total	+2% to -2.875%	4% on downside No overall cap on upside





Quality of Service Performance



Average number of minutes lost per connected customer

Average number of interruptions per 100 customers

Source: Ofgem





Network Energy Losses







Capital Investments in Electricity Distribution Networks







Performance of Incentive Regulation

- End-use price (lower)
- Network access charge (lower)
- Quality of service (higher)
- Investments (sufficient)
- Competitiveness (higher)
- Affordability (higher)







ER









A Look into Future Regulation



Future Network Regulation

Ends

- * Investment efficiency
- * Smart grids
 - Large scale renewable
 - Active demand
 - Local solutions
- * Smart meters
- * Quality of service
- * Network losses
- * Security of supply
- * Fuel poverty
- * Innovation

Means

- * <u>New models</u> of regulation
 - Benchmarking
 - o Incentives
 - Access charging
- * New R&D arrangements
- * Use of competition and market
 - o "competition for markets" vs.
 - o "competition in markets"
- Reorganise existing <u>institutional</u> <u>responsibilities</u>





Search for New Regulation

Need to evolve as performance gap closes

Not useful as forward looking tools –
 e.g. investment, innovation

New benchmarking methods
 Sweden, UK (RPI@20), Peru, ...

Some use of norm models?





Some New Regulation Ideas

- The use of auctions in investments
- Negotiated settlements
- Consumer engagement
- Academic advisory panels





Contextual Factors to Watch

- Tension between market-driven power sector and climate policy objectives
 - Something may have to give in
- New conceptions of consumer as: Load, customer, citizens, ...
- Low-probability high-impact events
- High-level economic conditions







Revenue-Incentive-Innovation-Output

- * Companies activities should be customer-oriented and focus on:
 - **Outputs** to improve services to network users
 - Incentives for cost reduction
 - Innovation in order to provide new services and cost reduction in the long run ...





Output Categories

- * Customer satisfaction
- * Reliability and availability
- * Safety
- * Conditions for connection
- * Environmental impact
- * Social obligations

Criteria for Outputs

* Material

- * Controllable
- * Measurable
- * Comparable
- * Applicable
- * Compatible with promotion of competition and compliant with legislation





Some Lessons of Experience

- Incentive regulation and the wider reform
- Reform implementation
- Legislation and independent regulation
- Unbundling and ring-fencing distribution
- Quality of service
- Information and data requirement
- Number of networks and priorities
- Economies of scale and rationalisation
- Regulation for future electricity systems
- Ensure that benefits of reform are accrued to customers




Thank you!





Main differences between RIIO-1 and RIIO-2

Incentive mechanism	RIIO-1	RIIO-2	Rational for change/Possible impact
Length of price control	8 years	5 years	Rational: Reduces risk of setting too high/low allowances ex-ante due to asymmetry of information Possible impact: Might impact expenditure on innovation as shorter time period to recover cost of any investment
Totex incentive mechanisms	Information Quality Incentive (IQI)- consisting of an upfront penalty/reward	None	<u>Rational:</u> incentive did not operate as intended possibly due to assumptions on which it is based not holding in reality
	Sharing factors (ranged from 47%-70%)- each company had a different sharing factor determined by the IQI	Blended sharing factor (15-50%) derived as average of sharing factors assigned to different cost categories based on historical cost information	<u>Rationa</u> l: from initial analysis it does not appear to be any relationship between sharing factors and how much companies underspent the totex allowances in RIIO-1. It makes therefore harder to justify a higher sharing factor
Incentive on business plans	Fast-tracking – early settlement of the price control. Companies received the highest sharing factor available (without going through the IQI process). An additional upfront reward equivalent of 2.5% of totex	Business plan Incentive- upfront reward/penalty equivalent to a maximum of +/- 2% of totex with competed pot of money.	Rational: provide companies with an additional incentive to reward effort for ambitious service quality and cost targets. Also intended as reward for specific information that might be revealed and used for other companies in the same sector (eg better understanding of risks, uncertainty, particularly those that do not go in favour of regulated companies) Possible impact: from feedback received from companies, proposed size of reward might not be enough to incentive participation and effort.





Incentive mechanism	RIIO-1	RIIO-2	Rational for change/Possible impact
Output delivery incentives	Targets for different output set ex-ante for the entire RIIO period.	Dynamic targets which might change throughout the RIIO-2 period depending on relative performance	<u>Rational</u> : Targets were achieved early in RIIO-1. Proposal for RIIO-2 removes risks associated with setting outputs at a low level by maintaining flexibility to increase targets for these outputs over time
Innovation	 Innovation stimulus provided as part of the price control through three mechanisms: 1) Annual Innovation Competition- worth \$500m over RIIO-1 2) Network Innovation allowance awarded to each company (0.5-0.7% of each company's allowed revenues≈\$500m over RIIO-1) 3) Innovation Roll-out mechanism –funding to enable transition of innovation into business as usual 	Remove 2) and 3). Companies should use totex allowance to finance innovation projects Replace 1) with a new pot focussed on big strategic innovation challenges and open to third parties	Rational: evidence that 2) has been used to finance operational and maintenance works which should have been funded through the totex allowance. Difficult to track benefits achieved from these type of projects Possible impact: More operational and maintenance works funded by totex for those innovations close to transition into BAU. Might reduce scope for innovation for innovation at early stage of development. Complexity on governance on new form of 1) might further reduce scope for innovation when at early stage





Incentive mechanism	RIIO-1	RIIO-2	Rational for change/Possible impact
Allowance for cost of equity	6-7% (real terms)	3-4% (real terms)	Rational: Align allowed cost of equity with risk faced by regulated network companies and to account for expectations of outperformance due to asymmetric of information Possible impact: Likely to reduce overall return on regulated equity but it might affect cost capital in future
Asset resilience	Some measures included in RIIO-1	Enhancement of previous measures to further constrain companies' ability to cut expenditure on asset maintenance.	<u>Rational</u> : No possibility of underspending cost allowances by deteriorating health of assets.
Return adjustment mechanisms	None	Considering company specific sculpting for ET and GT and anchoring for GD if return deviate ±3%.	Rational: protect consumers against excessive returns which result from information asymmetry faced by regulator in setting level of revenues. Protecting investors from downside risk Possible impact: Might distort companies incentives in terms of efforts to achieve higher return and affect totex submission
Cash flow floor	None	Introduction of cash flow floor	Rational: protect debt investors from downsize risk





Relationship of quality, efficiency and firm size

Subadditivity in network industries: <u>m</u>



Efficiency rises with firm size





Socio – economic optimization







Electricity

- * Availability and reliability of service is of great economic value
- * A clean energy source at consumption but related to a variety of environmental aspects at production
- * Homogenous product
- Non-storable supply and demand matched continuously and instantaneously
- * Capital intensive industry
- * Large sunk costs
- * Long economic life of assets







Vertically independent activities

- * **Generation:** Production and conversion of electric energy
- * **Transmission:** Transportation of electricity at high voltage over long distances
- Distribution: Transportation of low voltage electricity in local networks - consists of overhead lines, cables, switchgear, transformers, control systems, meters
- **Supply:** Sale of electricity to end-users metering, billing, purchasing, contracting





Elements of Electricity Reform

- * Unbundling and restructuring
 - * Generation and supply competitive
 - * Transmission grid and distribution networks monopolies
- * Competition
- * Regulation
 - * Access for competition over networks
 - * Incentive regulation for improving efficiency
- * Privatization





Incentive Regulation of Distribution Networks

- * From an economic point of view, the aim of electricity reform in general and incentive regulation of networks in particular is to provide utilities with incentives to improve their operating and investment efficiency and to ensure that consumers benefit from the gains
- Incentive regulation aims to achieve these objectives through financial reward or penalty incentive schemes
- * A price or revenue cap is set and the company retains the profit from achieved cost savings
- * Benchmarking in modern incentive regulation





What is benchmarking?

- Shleifer (1985) suggests that incentive regulation can mimic the outcome of competitive markets by setting an external performance standard that represents some average industry performance excluding the firm in question.
- * Benchmarking can broadly be defined as comparison of some measure of actual performance against a reference or benchmark performance.
- * The main issue is the choice of benchmark
- * Incentive regulation and benchmarking mimic market pressure in regulated companies.





Best practice efficiency analysis (f.Lovell, 2006)

- * DEA / SDEA / COLS / SFA
- * Large / high quality dataset
- * Panel data
- * Consistency with engineering / well behaved
- Bootstrapping / confidence interval
- * Consistency with non-frontier methods
- * Quality / environmental / input price variables
- * Value added in efficiency analysis





- * 1 transmission company
- * 18 distribution utilities
- * Electricity Act 1998
- Consultation document July 99
- * Draft benchmarking results Jan oo
- * Guidelines for price cap regulation Feb oo
- * Final Results Aug oo
- * Revised X factors Sept oo
- * Competition Authority Hearing March 01





Company Strategy under Benchmarking

- 1) Recognise that price review is a negotiation and is not subject to legal standards of proof
- 2) The regulator is in the superior position:
 - Legislative backing
 - Political support
 - * Future reviews
- 3) Techniques not robust and subject to specification and measurement errors







- 5) Engage in debate about model specification
- 6) Check information provided and verify workings
- 7) Produce own analysis





From Benchmarking to price-cap setting

Dr Michael Pollitt Judge Institute of Management University of Cambridge





Questions for this session

- * How do benchmarking exercises translate into price caps?
- * What are the debates surrounding the determination of price caps?
- * How should a company engage with these debates?





Outline of Session

- * How benchmarking results translate to Xs for UK Regional Electricity Companies (RECs)
- * How the distribution price controls were set
- * How the supply price controls were set
- * The use of benchmarking in transmission
- * The use of benchmarking in Norway
- Company Strategy under benchmarking





Structure of the UK

- * 5 major Gencos
- * National Grid Company
- * 14 Distribution businesses
 - * 2 fully vertically integrated
 - * 2 merged with regional water company
 - * 2X2 horizontally merged
- * 19 supply businesses for domestic customers
 - * 14 related to local distribution businesses
 - * 2 owned by major Gencos
 - * some being merged





The UK ESI : Background

- * RECs privatised 1990
- * NGC shares sold 1995
- * Golden share lifted 1995 takeovers begin
- * Separation of supply businesses 1999
- * Distribution price controls:
 - * 1990-95 RPI-0; 1995-6 RPI-14; 1996-97 RPI-11.5;
 - * 1997-2000 RPI-3; 2000-01 RPI-23.4; 2001-05 RPI-3
- * Supply price controls (on costs to 1999):
 - * 1990-95 RPI-0; 1995-98 RPI-2; 1998-99 RPI-5;
 - * 1999-00 RPI-3; 2000-01 RPI-5.7 (Economy 7, 2.1)





From Benchmarking to X setting: Southern and NORWEB

- * See Tables
- * WACC = 6.5%
- * Line 3: From estimates of required CAPEX
- * Line 8: From estimated cost of capital (WACC)
- * Line 10: From efficiency studies
- * Line 13: Is the regulated revenue required
- Actually, there exists an infinite combination of P_os and Xs for every regulated revenue.





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Distribution Price Control 2000-2005 (1)

- * Consultation paper (July 98 replies 25 Sept)
 - * To be considered in review:
 - * Statistical analysis of costs
 - Best operating practices
 - * Attributions between supply and distribution
 - * Examination of company forecasts
 - * Consideration of accounting policies
 - Consultants to be appointed
- * PES business plans (Dec 98 replies 2 Mar)
 - * Some companies e.g. NORWEB mention COLS efficiency score





Distribution Price Control 2000-2005 (2)

- * Consultation paper (May 99 replies 2 July)
 - * Some Issues:
 - * Context past forecasts higher than actual
 - * Problems with capitalisation of costs
 - * Mis-allocation of costs to distribution
 - * Advertising and marketing should be zero
 - * Customer services
 - * Corporate overhead (D=90%, S=10%, later D=2/3, S=1/3)
 - * Key factors in past efficiency improvements:
 - Organisational structures; Outsourcing and procurement;
 Engineering policy; IT strategy; Corporate costs





Distribution price control 2000-2005 (3)

- * Efficiency analysis of OPEX to be conducted by PKF/PB Power for 1997-98, specifically looking at:
 - * Engineering costs
 - * Customer service costs
 - * Corporate costs
- * Regression analysis of costs:
 - * Composite size = 0.7 customer numbers, 0.15 units, 0.15 network size
 - * Regress base operating cost on composite size variable





Distribution Price Control 2000-2005 (4)

- * Draft proposals (Aug 99, replies 17 Sept)
 - * Regression analysis:
 - Composite output: 0.5 customer numbers, 0.25 units, 0.25 network length
 - * Efficiency study:
 - * Engineering costs:
 - * Cost per km based on costs from 4 best RECs
 - * Based on asset profile and best practice cost
 - * Historic cost savings achieved
 - * Review of field efficiency and practices
 - * Metering costs Costs per customer in 4 better RECs
 - * Corporate costs 4 better RECs averaged
 - * Customer service costs Savings small





Distribution Price Controls 2000-2005 (5)

- * Calculating X:
 - * Previous cost savings passed to customer
 - * Further cost savings of 7.5% expected for most efficient firms
 - Inefficient firms assumed to close gap with most efficient by end of period
 - * Merger savings (1/2 of fixed costs saved passed to customers)
 - * X=3 and P_o adjusted to maintain NPV
 - * Average demand growth of 1.25% assumed within revenue cap





Distribution Price Control 2000-2005 (6)

* Final Proposals (Dec 99)

- * +/-1% for quality of supply from 2002/3
- * Standardised costs increased slightly
- * Slight increase in efficiency study savings
- Inefficient firms go 3/4 to frontier by 2001/2 and then retain relative position
- * IT costs and separation of supply allowances
- Frontier not tightened from 1998/99 onwards





Supply price restraints 2000-2002 (1)

- * Context of supply liberalisation
 - Large customers from 1990
 - * Medium customers from 1994
 - * Full supply competition from 1998 (?)
- * Consultation paper (July 98 replies 25 Sept)
 - Nothing about efficiency
- * Consultation document (June 99 replies 4 July)
 - * Three options:
 - * A revised price control
 - * Relative price control (to competitive tariff)
 - * No price control





Supply price restraints 2000-2002 (2)

- * Initial Proposals (Oct 99 replies 29 Oct)
 - * Prices to be set high to encourage switching
 - * Only domestic tariffs to be regulated
 - * Regulated price is sum of:
 - Allowed generation cost
 - * Profiled pool price+allowed losses+fixed premium
 - * Passed through transmission and distribution cost
 - * Allowed supply business cost
 - * Fixed element + per customer allowance
 - * Allowed supply margin
 - * Fixed at 1.5%
 - * Levy





Supply price restraints 2000-2002 (3)

- Final proposals (Dec 1999)
 - * Factual changes lead to falls in X
 - * Generation loss factors added
 - * Fixed cost £8.3m, cost per customer £31.30
 - * Based on weighted average of 12 businesses
 - Fixed cost per customer= (average fixed cost per company) x (share of domestic customers in first tier sub 100KW costs) / (number of domestic customers less 19%)
 - Variable cost per customer is similarly calculated and adjusted for data management services revenue, separation costs and working capital
- * Note: Efficiency analysis as such is not used





NGC transmission price controls: Background

- * NGC created from CEGB 1990
- Privatised as part of Regional Electricity Companies (RECs) Dec 1990
- * Floated Dec 1995
- * Energis telecoms division established 1993
- * Energis part floated Dec1997 (retains 48.3%)
- * Transmission Price controls:
 - * RPI-0 (1990-3)
 - * RPI-3 (1993-7)
 - * RPI-4 (1998-01, P_o reduction = 20%)





NGC Price Control 1997-2001 (1)

- * 1st Consultation Document (CD) Nov 95, replies by 31
 Jan 96 no mention of efficiency analysis
- * 2nd CD Mar 96, replies by 18 Apr 96 mentioned as being difficult
- * 3rd CD May 96, replies by 14 Jun 96 no mention of efficiency analysis
- * 4th CD Aug 96, replies by 10 Sept 96
 - * OPEX examined by PKF, management consultants
 - * CAPEX reviewed by Merz and McLellan





NGC Price Control 1997-2001 (2)

- * Regulator proposes 4-6% fall in controllable costs
 - NGC benchmarking study of 15 transcos on unidimensional measures
 - * AA survey of energy utility execs predict further cuts of up to 15%
 - * LE DEA of 40 transcos world-wide
 - * PKF analysis of costs suggests 2.5-3% p.a. possible
- * Debates about proposed CAPEX
- * Proposals Oct 96 respond by 30 October
 - Proposals 'on basis of consultants, international policies and policies of well managed companies'





Conclusions

- * GB regulator uses a range of techniques
 - * No over emphasis on one method
 - * Detailed cost analysis is important
 - * Lack of transparency in GB over data and methods
 - * However consultation and co-operation is high
- * Norwegian regulator relies heavily on DEA
 - * Data accuracy checked carefully
 - * DEA scores checked and scaled down for X setting
 - * Norway has a lot of utilities for benchmarking
 - * Moving away from pure DEA approach next time





Norway

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Norway: Regulatory Background

- * 1991 Deregulation
- * Regulator NVE
- * 200 Distribution and regional network utilities
- * Stattnet Transmission utility
- * 1994-1997 Revenue Cap: RPI-0
- * 1997-1998 Revenue Cap: RPI-2
- * 1998-2001 Revenue Cap: X=1.5-4.5





Norway: Price Cap Implementation

- Rate of Return regulation until 1997: allowed revenue includes 8.3% return on capital
- * From 1997 Xs based on 1994-95 efficiencies
- * Co-ordinated annual data collection
- * Data provided to regulator in pre-formatted form
- * Data audited and fines for mis-reporting
- * DEA used to calculated individual Xs





Norway Inputs (Distribution utilities) (see Kittelsen, 97)

- * Labour (hours)
- * Transmission losses (MWh)
- * Capital (lines, transformers, connectors) (Kr)
- Goods and services (Kr)





Norway: Outputs (Distribution utilities)

- * Number of customers
- * Energy delivered (MWh)
- * Distance Index (min)
 - = travel time from each basic district to the municipal centre average for all basic districts multiplied by number of customers



Norway: Estimating technical Efficiency

- The underlying rate of technological progress needs to be estimated
- * This can be done using measures of TFP
 - * Tornqvist Index
 - * Malmquist Index
- * This measure may be based on other industries
- It is not clear whether there are any efficient firms to act as benchmarks





Norway: Setting the Price Cap

- * If measured DEA score is 70%
 - * Target reduction is 3%p.a.
- * If measured DEA score is 100%
 - * Target reduction is o%p.a.
- * Linear scale between 0 and 3%
- * In addition utility has to meet the general productivity requirement of 1.5% p.a.
 - * X is between 1.5% and 4.5%





Norway: Setting the Price Cap from 2001

- NVE has indicated it will supplement future DEA analysis
- Price cap regulation has resulted in under-investment as quality was not included
- Next regulatory period (from 2001) will incorporate losses and companies will be penalised if their delivered quality is low





Terms

- * OPEX = operating expenditure
- * CAPEX = capital expenditure
- * WACC = weighted average cost of capital
- * RECs=regional electricity companies
- * COLS = corrected ordinary least squares
- * DEA = data envelopment analysis





Price Controls

***** Distribution price controls:

- 1990-95 RPI-0; 1995-6 RPI-14; 1996-97 RPI-11.5;
- 1997-2000 RPI-3; 2000-01 RPI-23.4; 2001-05 RPI-3;
 2015-2023 RIIO
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1999-00 RPI-3; 2000-01 RPI-5.7 (Economy 7, 2.1);
 2018, Retail price control





Anatomy of a Distribution Price Control: DPCR 2000-2005





Distribution Price Control 2000-2005 (1)

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Some Issues:

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 - $\circ\,$ Advertising and marketing should be zero
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 - Corporate overhead (D=90%, S=10%, later D=2/3, S=1/3)

***** Key factors in past efficiency improvements:

* Organisational structures; Outsourcing and procurement; Engineering policy; IT strategy; Corporate costs





Distribution Price Control 2000-2005 (3)

Efficiency analysis of OPEX to be conducted by PKF/PB Power for 1997-98, specifically looking at:

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Regression analysis of costs:

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Distribution Price Control 2000-2005 (4)

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Regression analysis: Composite output (0.5 customer number, 0.25 units, 0.25 network length)

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