

Economics of energy corporations

Regulation and governance

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- 1 Basic terms, definitions
 - Definition
 - Reasoning for regulation
 - Reasoning against regulation

- 2 Types of regulation
 - Traditional regulation
 - “Newer” forms of regulation

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Regulation I

- Regulation: enforcement of rules by government, typically threatening with penalties
 - to change the economic behavior in the private sector.
 - targeted at price(s), output, rate of return, ownership structure or setting up standards
- Energy sector typically rather highly regulated
 - both technical regulation (safety standards, technical norms, compatibility requirements, distribution network operation (subordination of production to transmission operator) - not as typical in the effort to influence the economic behavior of market actors
 - and economic regulation (regulation in "common understanding")

Regulation II

- Energy corporations often encounter situations when they might experience an incentive to exploit their advantage
 - information asymmetry
 - market power
 - energy (electricity?) as a necessity (?) - *universal access* (energy as social right?)
- Most typical types of economic regulation:
 - cost of service regulation, incentive regulation, conduct regulation, regulation by contract etc.

Historical influence

- Energy sector exhibits rather high degree of regulation
- Arguably high capital intensity, long-term investments
- Uncertainty regarding the profitability often motivated the intervention of public sector (remote / rural areas)
- Involvement of large number of stakeholders
- Distribution networks typically require certain safety standards and simultaneously incur limitations on the available space (difficult and inefficient to build multiple distribution networks in the same place (e.g. a city-wide area))
- Public ownership

Goal

- Increase efficiency (compared to the situation of no intervention)
 - assumes inefficient market outcome (market failure)
- Other (non-economic) goals
 - lobbyist groups, strategic games, politics, personal interests

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Reasoning for regulation

- To ensure competition (and minimize the appropriation of consumer surplus by producers)
- To avoid unnecessary expenses (e.g. natural monopoly (decreasing marginal costs: efficient operation implies one supplier))
- To prevent "excessive competition" - leading to less uncertainty for suppliers (regarding the potentially unstable quantity and price conditions - especially if large sunk costs are necessary)
- To "protect" consumers and ensure quality of the product or delivery
 - environmental or health and safety standards and requirements
- To maintain the level of control over "vital"/"strategic" field (?)
 - Utilities, prices of energy or fuels, use of nuclear/renewable energy as electoral topics
 - Security of supply - might be vital, but with a nature public good (non-excludable and non-rivalrous)
 - To keep prices low (even inefficiently low) ("social justice")
 - To prevent growth of "too strong players"

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Free market efficiency

- Pareto efficiency: such allocation of resources when it is impossible to make any single individual better off without making at least one individual worse off
 - Pareto improving action: a change in resource allocation that makes at least one individual better off without making any other individual worse off
- The so-called First Welfare Theorem: a system of free markets will lead to a Pareto efficient outcome
 - On the unhampered free market with well defined property right, the choices of the individuals lead to optimal situation
 - "Laissez faire" ("let them do as they will")
- Historical evidence of "monopoly" or market power abuse controversial
 - Hard to maintain, even harder to enforce (regulation as market entry barrier?)
 - Baumol's Theory of contestable markets: markets served by a small number of firms, showing competitive equilibria (as if perfect competition); because of the "threat of entry" (potential short-term

Pragmatic reasons against regulation

- (Even if market deficiencies plausible): problematic market outcome vs. regulatory practice
 - "Two wrongs don't make a right" and "Quis custodiet ipsos custodes?"
- Legislation: laws, regulations etc. complicated and costly (resource consuming)
- Oversight + prosecution: costly, might not be impartial, may be abused
 - Costs of regulation: US, 2009-2013: est. 494 billion USD in final rules
 - Office of Management and Budget (OMB): est. 128.7 billion USD in 2013
 - Competitive Enterprise Institute: est. \$1.9 trillion USD annually (US GDP ~ \$16.8 trillion USD)
- Regulatory lag: how flexible is the regulation?
- "Red tape"
- Regulation can limit or inhibit innovation and growth (less innovation)

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Self-regulation

- Firms/Organisations/(Private) Associations set up rules,
 - Rules are created "in-house"
 - Monitoring and enforcement by its own members
- Relatively uncommon in energy industry
- Can be cheap and efficient
 - Can be designed ostensibly, as self-serving (instead of "public interest")
 - Relatively weak powers of enforcement (association and its members)
 - Oversight of the "regulator" difficult

"Command and control" regulation

- Setting of rules and standards, along with criminal sanctions for disobeying
- Rules set up by law
 - might be too complex or too "legalistic" (adherence to the letter, not spirit of the law)
 - might be unnecessary (over-inclusive regulation)
 - typically not flexible and hard to adjust
 - costs of enforcement relatively high
- Regulatory capture
 - close relationship between regulators and business under command and control
 - strong incentive for the regulated to procure their own interest (facing relatively low incentive of regulators to procure public interest)

Rate of return regulation

- Total revenue should match total costs (+ “reasonable profit”) (sometimes called “cost plus” regulation)
 - No (economic) profit generation (typically publicly owned utilities) or fixed economic profit
 - Regulator defines total permissible expenditure
 - Targeting the rate of return! (profit defined as $s \cdot RB$, with preset s) (RB - rate base (total investment), s - preset rate of return)
 - Renewable support in CZ: feed-in tariffs calculated to “generate” 7% rate of return on investment to RES (in practice led to profitability above 15%)
 - If strictly enforced: No need for innovation or efficiency: “profit stays the same no matter what”
- Necessity of detailed information regarding the costs
 - possibility of cost misreporting
 - difficulty of adjusting depreciation rate allowance (capital intensive industry!)
 - imprudent expenditures (“overinvesting” into unnecessary/unprofitable ventures)

Incentive regulation

- Regulation should not inhibit incentives based on profit maximization
 - "competition better than regulation" or "competition under regulation" (information asymmetry between regulator and regulated company: since regulator lacks information over the level of *efficient costs* for the company (as required under RoR regulation))
- Commonly based on price or revenue capping
- Performance based regulation (comparative efficiency and productivity analysis, "benchmarking")
- Menu of contracts regulation, Market-based regulation

Price cap

- The regulated firm can set individual rates, but has to match certain average price (for instance overallly match the previous year's level + inflation) - the firm may rise certain prices, provided it lowers prices elsewhere
- Typically price cap based on pre-defined formula (price growth path adjusted for inflation (incr.) and productivity improvement (decr.) and other factors)
 - (sometimes called "CPI - X regulation" or "CPI - X + Z")
 - "inflation factor" (CPI)
 - "X factor" (productivity offset),
 - "Z factor" (optional)
 - exogenous factors, e.g. policy options (energy efficiency), "structural breaks" (changes in laws or administrative procedures), political events (wars, price shocks) etc.
- Rate of return regulation sets the prices according to costs,
 - price cap can lead to prices well in excess of costs (so-called "excessive overprofit")

Revenue cap

- $TR = RB * WACC + C_{operating} + d + T$
 - RB - rate base, $WACC$ - "profit rate" (Weighted Average Cost of Capital: the average interest rate to pay to all its security holders to finance its assets), $C_{operating}$ - all operating expenses (material, labor, other items for resale in short run etc.), d - annual depreciation expenses , T - taxes
- Might be in a form of setting a maximum profit (total or (more often) per a customer)

Sliding scale regulation

- A compromise between rate of return regulation and a price cap
- Sometimes called "Earnings sharing", "revenue sharing", "hybrid price caps"
 - regulator defines a band in which the firm is free to keep all earnings (to motivate efficiency in production)
 - if profits are higher than the permitted ceiling, the regulated firm must share these gains with customers
 - if profits are below the band, the regulated firm is allowed to increase prices
- Incentive for efficiency (cost reduction), + no "abnormally high" regulated profits
- If prices are reduced, consumer demand will rise (incentive for capital adjustment)

Menu of contracts

- Regulator offers the firm *a menu of incentive plans* (usually designed to provide constant consumer welfare)
 - Regulated company can choose among the variants - they can choose the strategy that will satisfy the regulator and simultaneously try to maximize the profit
 - The selected contract suits the regulated company the best
 - This approach reduces the information asymmetry between the regulator and the regulated company
 - Difficult implementation, regulator needs to set up a variety of complex strategies, simultaneously they have to allow the firm to cover its costs
 - Proposed menu might be unsuitable

Performance based regulation

- Benchmark competition, yard stick competition (performance of other similar firms as a benchmark in order to set the regulated prices)
- *Measurable* outcomes defined *ex ante* that the regulated firm should achieve, BUT not defining *how* these results should be achieved
 - Regulated prices (or revenues) of a company depend on the performance of other companies
 - Typically some form of frontier analysis (typically econometric assesment or Data Envelopment Analysis, DEA) - distance of the company to the efficiency frontier
 - Customers should benefit from lower prices and improved quality
 - BUT this framework is set beforehand (benchmarks and/or targets might be set incorrectly)
- Less reliance on costs, less interest in earnings, more emphasis on prices
 - but with emphasis on reducing costs, it might cause underinvestment in operations and management (in effort to generate profit by reducing costs)

Market-based regulation

- Competition laws
- Tradeable permits (cap and trade)
- Advantages: flexible, low enforcement costs, relatively high efficiency once the system is set
- Uncertainty + "unnecessary" transaction costs
- Might create market entry barrier

General challenges of regulation practices

- Inappropriate pricing and/or pricing rules
- Poor financial performance of publicly-owned utilities
 - inefficiency of capital investment
- Managerial and/or technical deficiencies
- Sustainability of subsidies (recall the RES support in CZ)
- Private sector participation
- Low motives for innovation and investments
- Low quality or low availability of service

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New roles of regulatory bodies

- Development of competitive markets
 - Typically participation on liberalization, unbundling, building of customer awareness, customer switching rules and terms
- Monitoring market performance
 - Disclosure of energy generation, ownership structure etc.
 - Decrease information asymmetry
- Ensure safety, reliability and security of operation and/or infrastructure
- Inclusion of environmental factors into utility planning and operation
- Coordinate policies and procedures with EU laws and international agreements