

Innovative Regulation for Intelligent Networks

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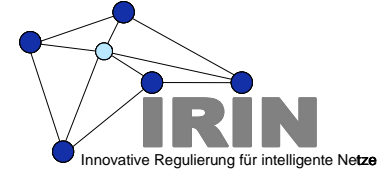
Innovative Regulierung für Intelligente Netze

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„smart regulation for smart grids“

<http://www.bremer-energie-institut.de/irin/>

General information: IRIN



Projectpartners

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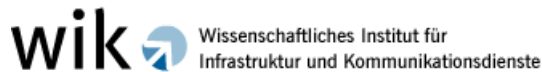


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Projekträger



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8 Theses

- **Thesis 1:**

- There are reasons to assume that pure price-based regulation, if applied too strictly, impedes network investment.

- **Thesis 2:**

- For an efficient development towards smart grids the incentive regulation will either need additional components fostering investment and innovation or will require thorough redesign towards a smart grid friendly framework.

- **Thesis 3:**

- Under price-based incentive regulation of the monopoly section, the revenue from innovation and R&D is partly spilled over to third parties. This external effect leads to too little engagement in innovation.

- **Thesis 4:**

- Output-based consideration of innovations and R&D tends to be problematic, as there are no appropriate output indicators.
- An input-based approach allows for innovation and R&D budgets.

- **Thesis 5:**

- Peak-load-pricing can contribute to make better use of available grid capacity as well as to avoid unnecessary grid investments.
- Under a „tariff basket“ approach, the grid operator can determine the structure of peak-load-pricing without intervention by the regulator.

- **Thesis 6:**

- Smart contracts that evolve within the market, supported by locational network charges where needed, can contribute to optimum usage of the network and avoid unnecessary grid investments.
- Incentive mechanisms can contribute to incentivize grid operators to find the optimum tariff and contract design by themselves.

- **Thesis 7:**

- The current unbundling rules (administrative unbundling) at distribution level do not do justice to a world with smart grids and are not in institutional equilibrium.
- The information and control point is central. Taking into account the need for coordination as well as competition an „ISO-like approach“ at distribution level might be considered.

- **Thesis 8:**

- For optimum coordination of the system flexible access to controllable load and generation is focal. Besides control agreements for load, flexible voluntary curtailment agreements for renewable generation maintaining feed-in priority would support this flexible access.

Smart Regulation

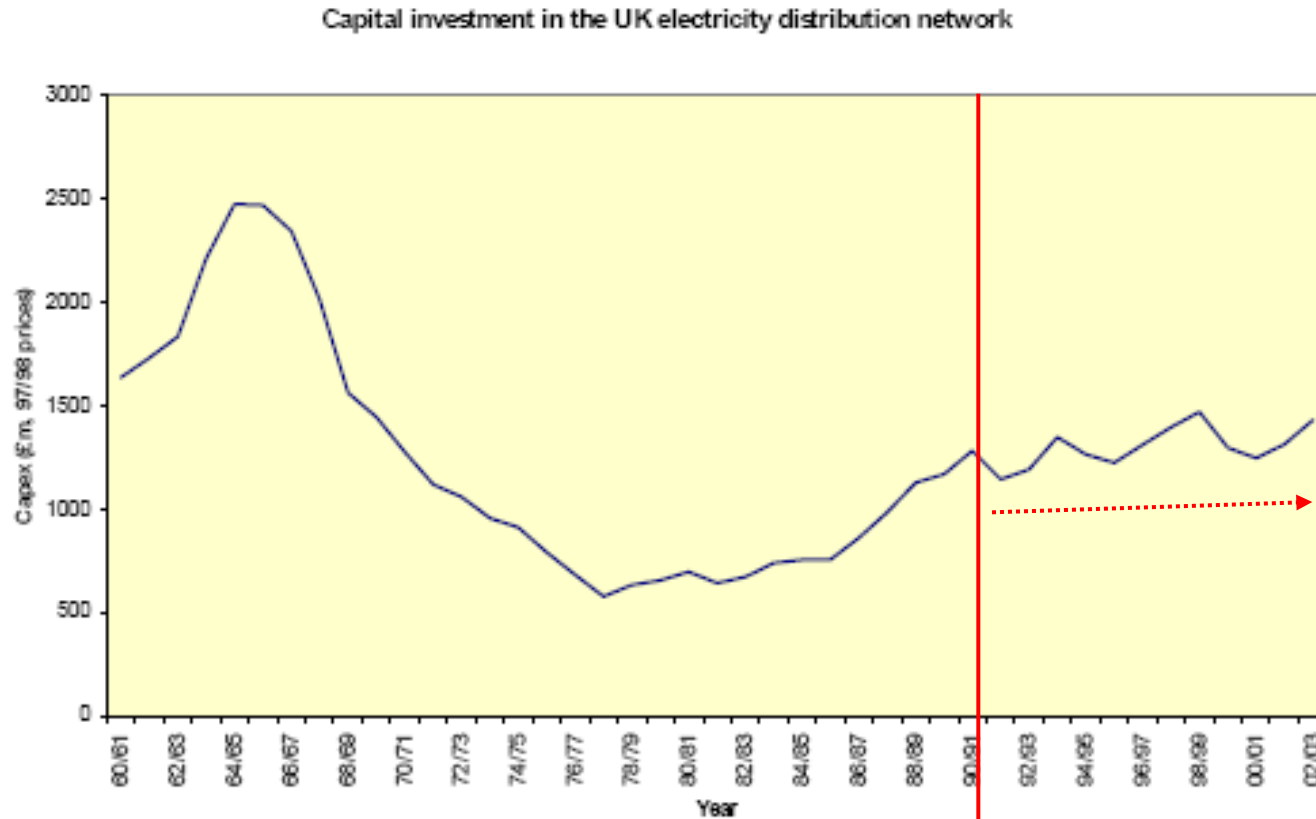
Efficient Investment Incentives

Price-based regulation is good for short-term efficiency, but what about incentives for long-term investment?

1. Price-cap regulation increases risk
2. Price cap repairs gold-plating effect
3. Price-cap regulation impedes quality
4. Price-cap regulation: more vulnerable to regulatory time-inconsistency problem
5. Price-cap regulation may decelerate investment

Brunekreeft G. & Borrmann, J., 2010, „The Effect of Monopoly Regulation on the Timing of Investment“, *Bremen Energy Working Papers*, No. 1, Feb. 2010, Jacobs University Bremen.

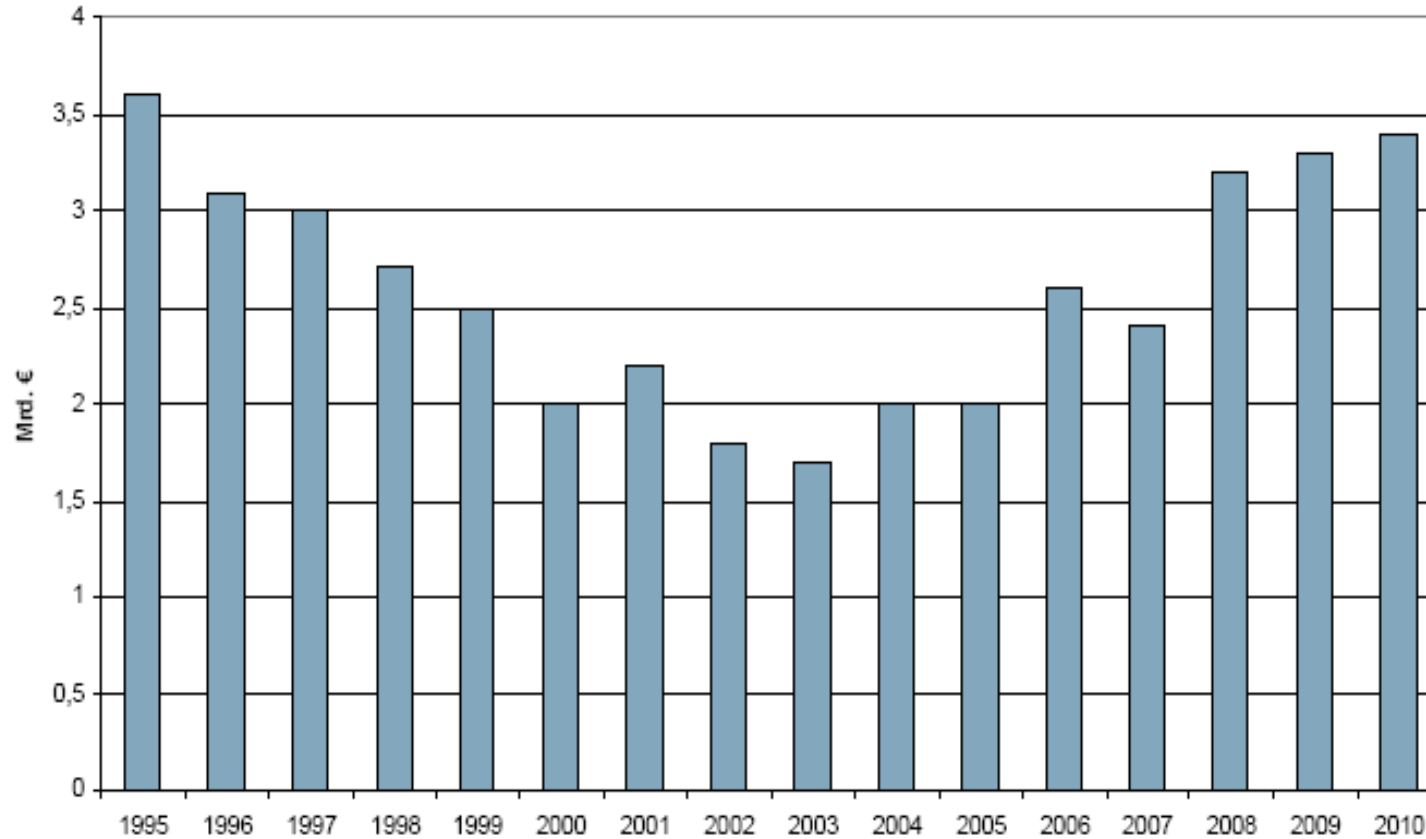
DNO Investment in the UK



Capital investment in the UK electricity distribution network

Source: Ofgem (2006)

Network investment in Germany



Source: BDEW, 2009

Note: Data 2008 – 2010 are planned investments, not actual values!

- **Current regulation for DNOs has been designed for cost-reductions**
 - Problem: development to smart grids causes cost-increases
 - Approach: adjust the regulatory model
- **Underlying problems:**
 - Investment
 - Uncertain
 - Demand driven
 - Uncertain future developments
 - High investment needs: cost increase
 - Innovation and R&D
 - Necessary
 - Monopoly or not?

- **Three alternatives:**

- **„BAU-plus“**

- BAU = Business as usual.
 - Usual incentive regulation, with additional investment-enhancing cost-based components

- **DG-based regulation**

- DG = distributed generation
 - Instead of volume (kWh) as revenue driver, a smart-grid output indicator should be revenue driver in the cap and in benchmarking.

- **„As-if“-Approach**

- „As-if“ projection is regulatory reference for an „as-if“-world with DG, but without smartness
 - Sliding scales as incentives for DNOs to improve as compared to the reference.

- **BAU-plus:**

- Pure price-based regulation seems to impede investment.
- Additional cost-based elements can promote investment
- BAU-plus is a hybrid approach of price-based regulation and additional cost-plus elements

- **Approaches:**

- Top-ups and rate-of-return adders
 - Existing vs. New assets
 - E.g. USA, France, Italy
- OPEX – CAPEX split
 - UK
- Investment allowances plus cost-pass-through factors
- Accelerated depreciation rules
- Quality regulation
- Innovationsbonus and R&D-budgets

***USA:* Adders as part of „incentive-based rate treatments“**

- Economic and reliability investments.
- Level of adders is determined for each individual case and lies between 1 and 3 percentage points.

***Italy:* Adders for specific expansion investments**

- 3 percentage points for investments that reduce congestion within or between market areas (including cross border capacities).
- 2 percentage points for investments that increase transmission capacity or network reliability.

***France:* Adders for gas network investments**

- 1.25 percentage points for all gas transmission investments brought into service from 2004.
- Adder may be increased by up to 3 percentage points for projects which are important for market development.

- **FERC Order 679 (2006): Promoting transmission investments by Incentive-based rate treatments.**
- **8 measures to incentivize investments:**
 - Rate of return adders („Incentive-based rate treatments“)
 - Cost recovery for construction work in progress
 - Hypothetical Capital Structure
 - Accelerated Depreciation
 - Recovery of Costs of Abandoned Facilities
 - Deferred Cost Recovery
 - Single-Issue Ratemaking
 - Transco ROE Incentive

Note: Only for TSOs and federally regulated assets.

“Decoupling between profits and volumes of electricity in grids”

Expert Group 3 of the EU Task Force for Smart Grids Steering Committee (June 2010)

- **Output of a smart grid is not a kWh**

- But then what ...? For instance:

- # MW DG
 - Value added
 - Efficient treatment of fluctuating feed-in
 - Network capacity („Leistungsfähigkeit“)
 - Avoided CO₂
 - Saved energy

- Cf. Also Ofgem’s 2010 RIIO for a similar approach

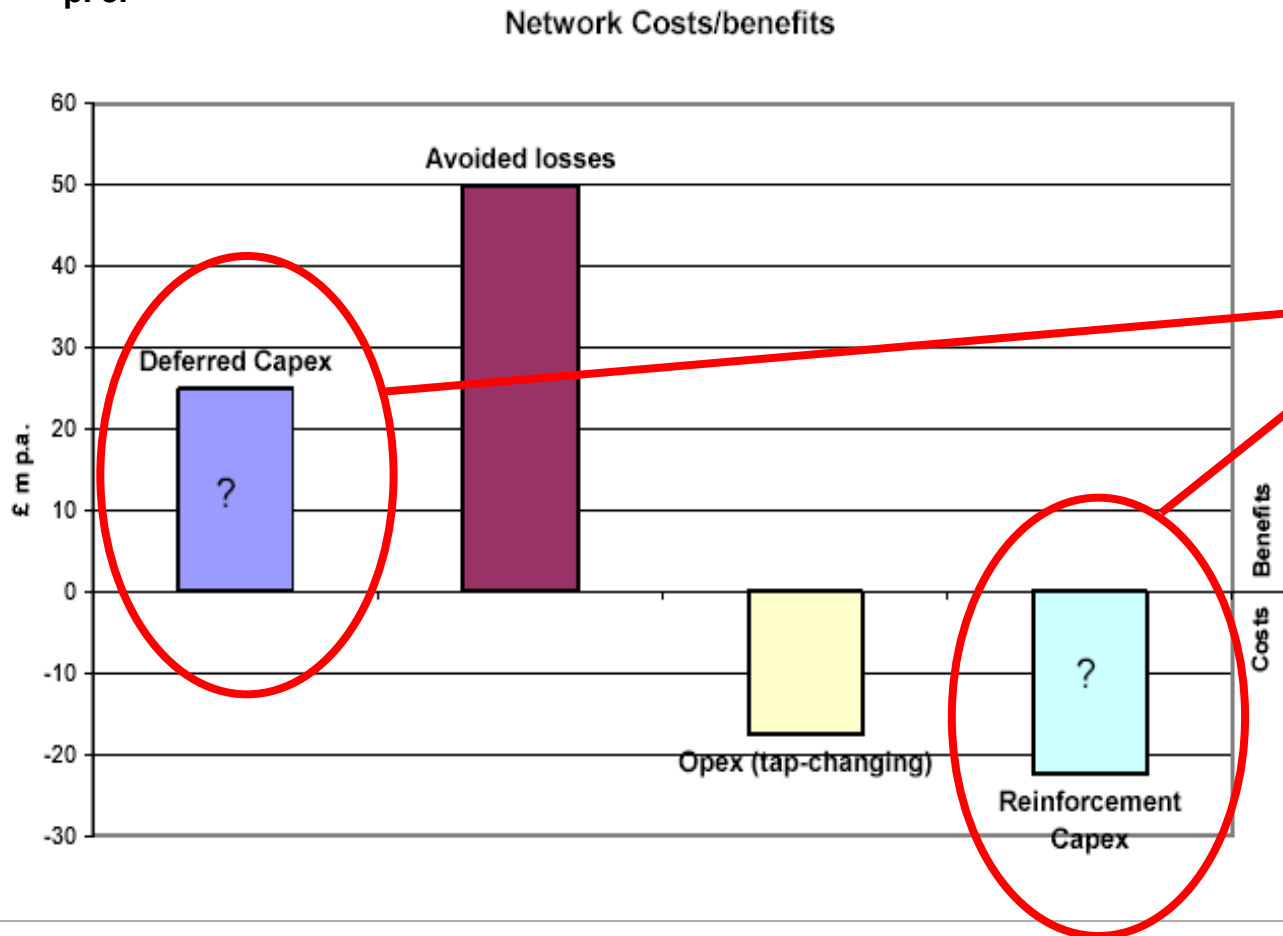
- **Incentive regulation**

- Connected DG capacity should be a key revenue driver
 - DG should be output factor in benchmarking

Network Investment and Distributed Generation

Figure 1-2: Network Costs and Benefits Arising from High Scenario 2020

Source: MacDonald, DTi, 2004,
p. 8.

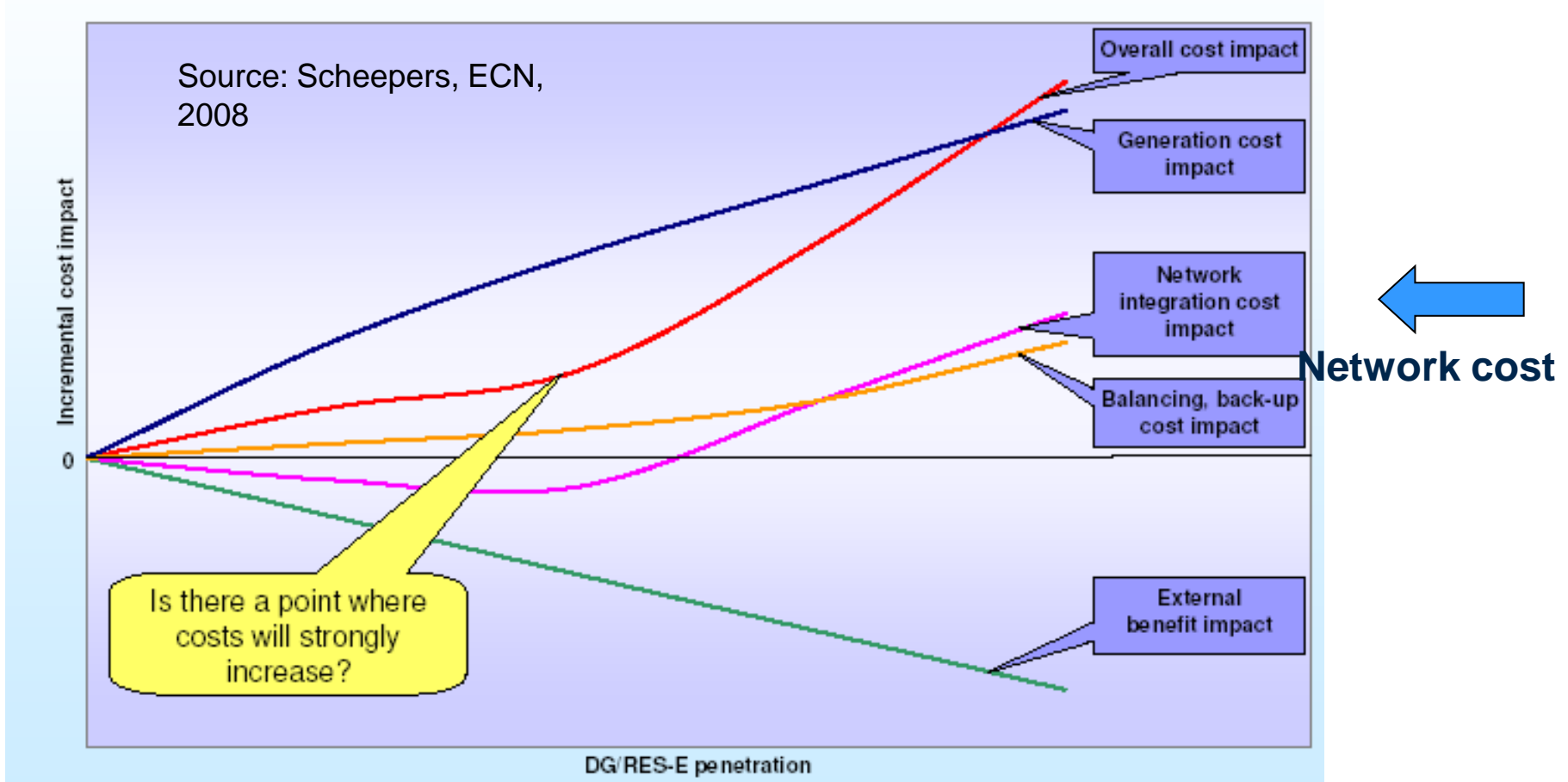


**Effect of significant
DG depends on the
context**

Numbers are for UK for
ca. 17 GW Micro-
generation-capacity
connected to distribution
network

Cost and benefits of DG

Expectation is that network cost will increase



- **Step 1: 2010/1 Status-Quo is reference for IR of the core network of the old world**
 - Usual incentive regulation as usual
- **Step 2: 2011 is snapshot year for „as-if“ projection**
 - Simulated development of networks with DG but without smartness
 - Use of analytical cost models
- **Step 3: reference for investment requirement and investment allowances**
 - „Menus of sliding scales“ as incentive mechanism
 - DNO participate in capital over- and underspend
 - Incentives to avoid inefficient investment
 - Effective treatment of risks
 - Incentives for innovations
 - Incentives for „smart pricing“ und „smart contracts“

- **Regulation can differ for different parts of the smart system**
 - Some tasks in smart systems are not part of the monopoly
 - Cf. Regulatory approach in telecommunications
- **Menu of sliding scales is at odds with benchmarking**
 - Only general X factor?
- **Gaming and strategic behavior might be a problem**
 - How can we avoid „strategic capital underspend“?
- **Small DNOs could be optionally under standard DG-based regulation, relying on benchmarking**
 - Note: adjust benchmarking to include DG

Thank you very much

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