Investment Incentives under Price Cap-Regulation – the Case of Energy

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Agenda

- Investment incentives and incentive regulation:
  - Theory
  - Issues
- International practice
- Regulatory perspective for Germany
- Conclusions
- Three issues for further discussion

Theory: From rate-of-return to incentive regulation (1)

Inefficiencies result in a paradigm change from cost-plus to incentive regulation.

Rate of Return	Incentive regulation
– Efficiency	+ Efficiency (s.t.)
– Cost reduction	+ Cost reduction
– Gold-plating	– Investments (l.t.)
+ Investment incentives	± Investment ability
± Risk and rate of return	± Quality of supply

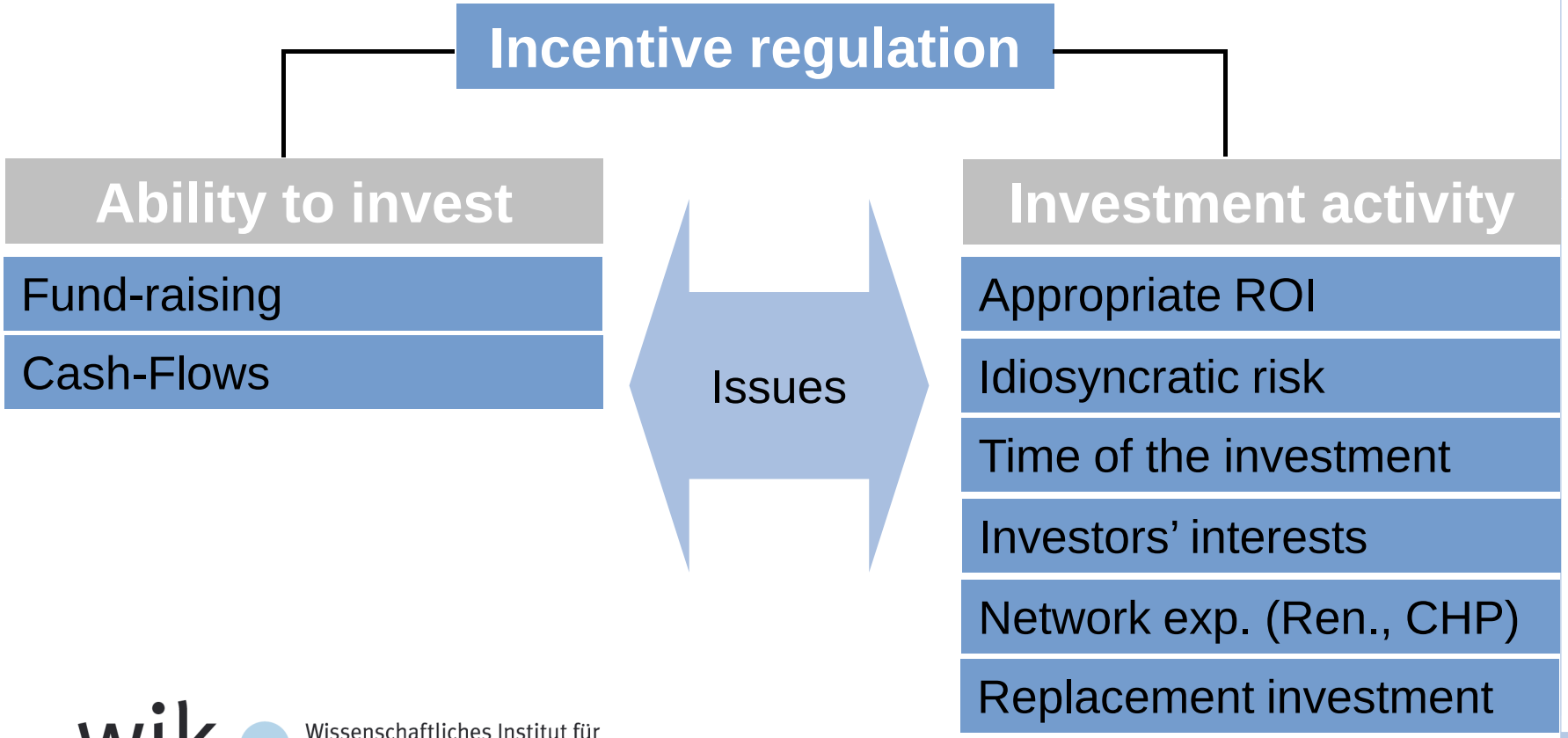
Incentive regulation stimulates cost reduction. But does it also stimulate long term investments? This leads to a trade-off situation.

Theory: From rate-of-return to incentive regulation (2)

- Rate-of-return regulation
  - Allows for an adequate return on investment
  - Investment incentives are high
  - In case of cost reduction revenues need to be adjusted
  - No incentive to increase efficiency (gold-plating effect)
- Price-based regulation (e.g. RPI-X)
  - Ex-ante definition of development/change of revenues
  - Development determined by RPI-X
  - If network operator performs better than X he is allowed to retain efficiency gains during the regulatory period
  - Efficiency incentives are high (cost reduction)

Theory: Incentive regulation and network investments

Incentive regulation will have an impact on the ability to invest and on the investment activity of the network operators. This may be related with a number of issues.



Investment related issues

- Long-term character of investments (sunk costs)
- Cost-based regulation: based on appropriate rate of return
- Incentive regulation:
  - Allows deviations from appropriate rate of return in both directions (profit and losses possible)
  - Timing of the investment vs. time lag of the return of invested capital

Risk related issues

- Regulatory regime has an impact on market risk
- Rate-of-return regulation: Buffering hypothesis[1]
  - Low risks
  - Low but predictable profitability
- Incentive regulation:
  - Higher risk translates into higher cost of capital
  - Rate of return is not predictable in the long run
  - Lack of regulatory commitment (time inconsistency problem) independence hampers investments

→rate-of-return to be higher in price-based regulation

[1] Peltzman (1976)

Quality related issues

- Rate-of-return regulation: tendency of too high quality
- Incentive regulation:
  - Additional investments bring benefit to consumers while they cannot be earned back by the NO
  - Tendency of low investment incentives in quality
- Quality regulation is required, but:
  - How to integrate quality components in the allowed revenues?
  - How to determine an adequate quality level?
  - How to deal with the time lag between network investments and their impact on quality?

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International Practice
- NL -

- Quality regulation
  - Yearly interruptions determine allowed revenues (penalty and reward system)
  - DSO to report on network extension planning
- Investment incentives (recent examples)
  - Previous investment barriers regarding expansion investments (renewables, CHP) settled via an increase of allowed revenues
  - Cost of debt in responsibility of DSO

International Practice
- UK -

- Quality regulation
  - Guaranteed standards require compensation payments in case of underperformance
  - Allowed revenues influenced by time and duration of interruptions, service quality for phone calls
- Investment incentives
  - Introduction of a menue of sliding scales (flexible CAPEX)
  - Options: cost- or price-based regulation
    - NO with a low investment need (low CAPEX) tend to chose price-based regulation (low allowance)
    - NO with high investment needs (high CAPEX) tend to chose cost-based regulation (high allowance)

International Practice
- No -

- Quality regulation
  - Impact of CENS on allowed revenues (since 2002)
  - Setting of annual quality targets
    - Settlement of actual vs. planned CENS
    - Difference leads to lower or higher allowed revenues
- Investment incentives
    - Allowance for investments (AI) to compensate for the loss in present value created by the time lag in revenues from investments in the year t-2
    - Allowance for replacement investments and network expansion

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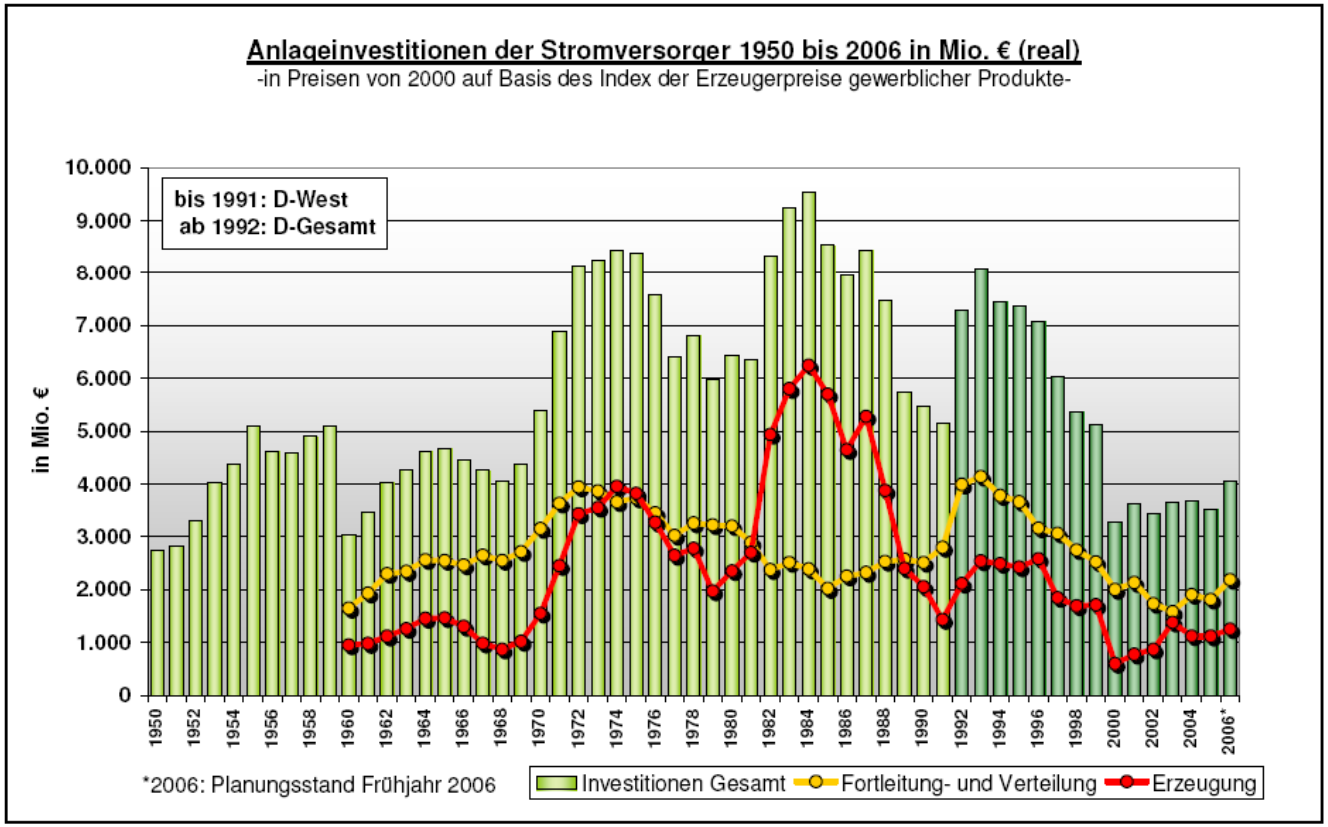
Investments in Germany (1)

Since 1960: grid investment cycles in ten year intervals

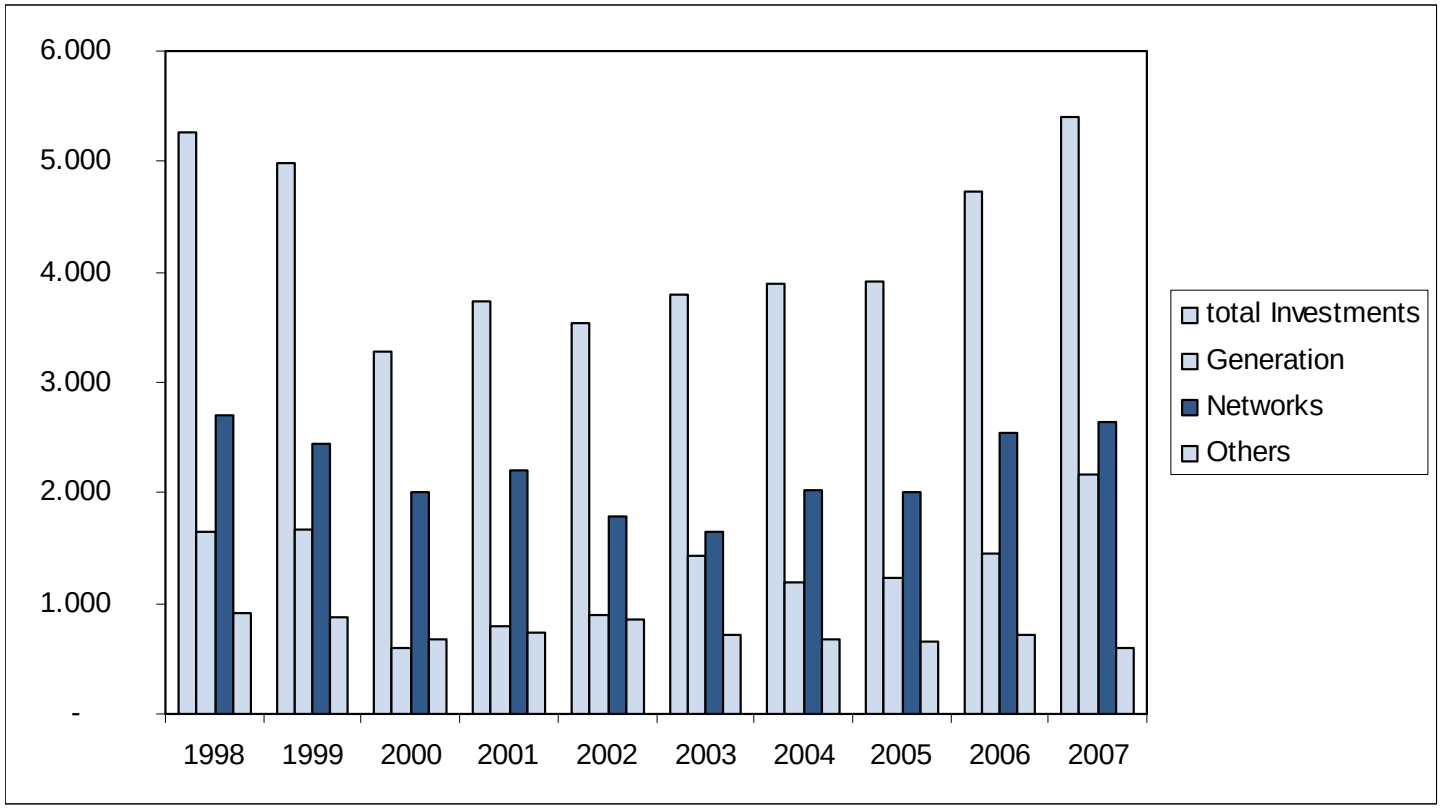


Source: BDEW, Markt und Daten 2007

Investment situation in Germany (2)

Network investment declined in the end of the past decade.

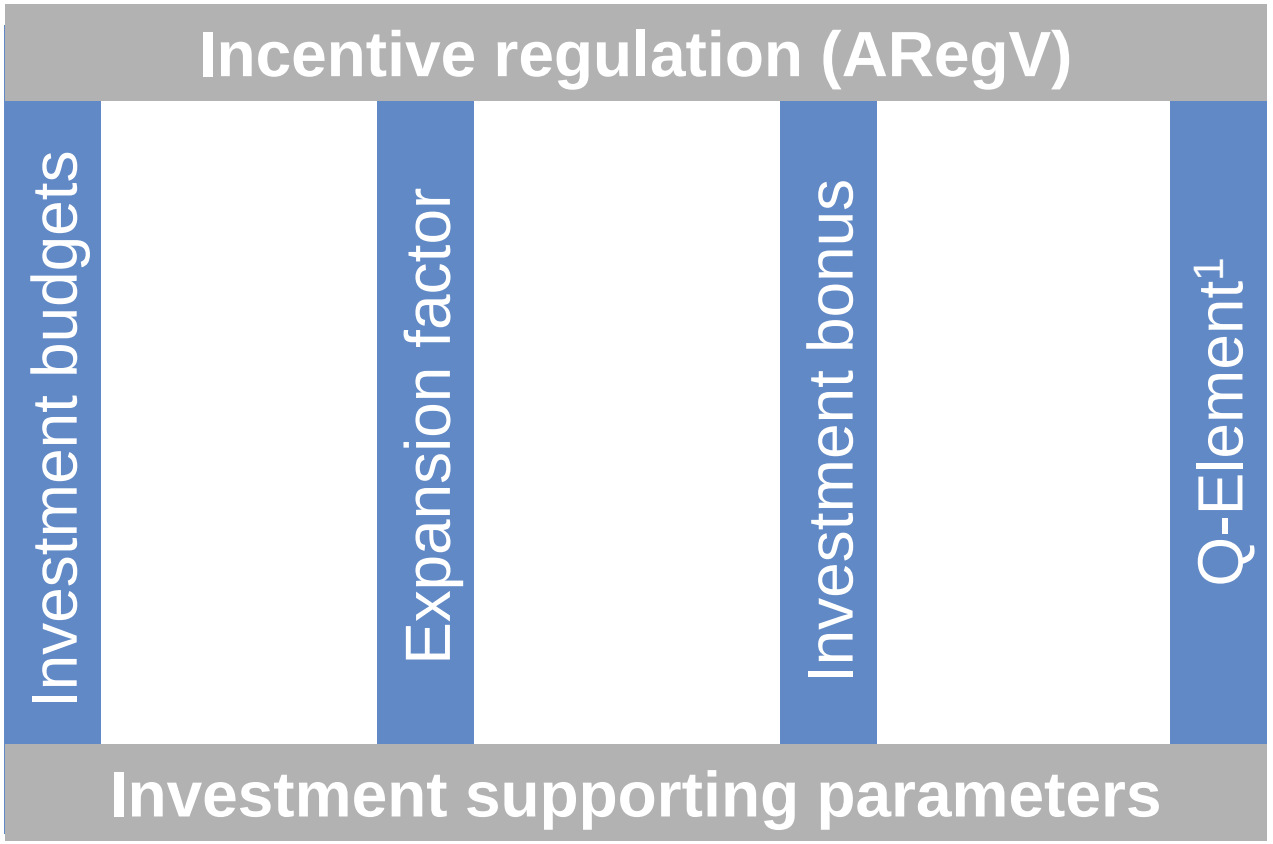
A slight increase can be recorded since 2004.



Source: BDEW, Markt und Daten 2007

Regulatory perspective for Germany

The practical implications of investment supporting parameters of the ARegV are still open.



[1] as from/during the 2nd regulatory period (Electricity/Gas)

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Conclusions (1)

- **Change from Rate-of-Return** to incentive regulation requires discussion on ability to invest and investment activity
- **Trade-off:** efficiency increase vs. investments and quality of service
- **International regulatory regimes already deal with this trade off**
  - Allowance for investment promoting parameters in the revenue cap (No, UK, NL)
  - Support of efficiency oriented incentive regulation with integrated regulation of quality (No, NL, UK)

Conclusions (2)

- The German ARegV provides for **investment supporting parameters** but practical implications are yet open
- Topic to become especially important because of **undercapitalized municipal** utilities in Germany
- New regulatory regime in Germany has to prove how **interdependencies between Cash-Flow funding, ability to invest and investment activity** interact
  - Conditio sine qua non: are network operators able to maintain the operation of the networks?
  - Sufficient condition: are network operators able to earn their cost of capital?

Three issues for further discussion

1 How to set **adequate incentives** in a **long term regulatory investment strategy** and therefore **promote the investment activity?**

2 How to **guarantee** that returns on investments allow for a **long term ability to invest** under the **conditions of dynamic markets (regulatory commitment)?**

3 How to determine the **optimal timing** and the **optimal size of the investments** and how to adequately **adjust network charges** in this context?

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Appendix

International experiences
- NL (1) -

- 3rd regulatory period 2007-2009: Yardstick Competition
  - Simulate competition among DSO
  - Differentiation between financial and technical regulation
    - **Financial regulation: X-Factor (since 2001):**
      - Yearly average productivity change
      - Equal for all DSO since 2007 → “level playing field”

International experiences
- NL (2) -

- **Technical Regulation: Q-Factor (since 2005):**
  - Quality assessment based on average yearly interruptions per low voltage customer (> 50 kV)
    - Reward of investments in infrastructure upgrade: increase of the revenue cap (max. 5%) to balance efficiency incentives and investments
    - Penalty on insufficient quality measure with a decrease of the revenue cap (max. 5%)
  - „Kwaliteits- en kapaziteitsdocument“: DSO are obliged to report to DTe on network expansion planning
    - Planned outage and interruption frequency
    - Capacity planning
    - Investment planning
    - Maintenance planning

International experiences
- NL (3) -

- Ability to invest and investment activity
  - Replacement investments financed by revenues from network charges → DTe not involved
  - Expansion investment (Ex. current regulatory practice)
    - Connection of new generation units requires network upgrade (Renewables, CHP)
    - Issue: generators do not pay network charges but only connection fees

    → DSO can request an increase in revenue caps
  - Cash-Flow Problems due to high interests on debts (Ex.)
    - Responsibility is with DSO; solution via shareholders

    →DTe does not intervene

Potential investment barriers with expansion investments are settled via an increase of allowed revenues.

International experiences
- UK (1) -

- 4th regulatory period 2005-2010: Price Control Review (RPI - X)[1] via building blocks
  - OPEX
  - CAPEX
  - Financial analysis
  - Performance output

  } Ofgem conducts a quantitative and qualitative Analysis to determine the „cost allowance“ and „performance target“

- Quality regulation:
  - Guaranteed standards require compensation payments in case of breach
  - Allowed revenues influenced by time and duration of interruptions, service quality for phone calls

[1] Option to adjust the formula RPI + X when investment ability too low

International experiences
- UK (2) -

- Ability to invest and investment activity
  - Low investment level detected by Ofgem
  - Implementation of a „menue of sliding scales“ to hold the level of allowed CAPEX flexible
    - Options: cost- or price-based regulation
      - NO with a low investment need (low CAPEX) tend to chose price-based regulation (low allowance)
      - NO with high investment needs (high CAPEX) tend to chose cost-based regulation (high allowance)

  → Additional costs/profits are partially borne/kept by the firm and partially passed through to the end-user

Decrease risk that regulation results in a deficient investment activity and that NO with high investment needs draw high profits form low investments. Quasi cost-based regulation regains territory[1]

[1] Brunekreeft (2008)

International experiences
- No (1) -

- 4th regulatory period 2007-2011: Revenue Cap
  - The revenue cap formula includes an addition for investments (AI)
  - AI is a compensation for the loss in present value created by the time lag in revenues from investments in the year t-2
  - AI is given as a yearly nonrecurring compensation, and is calculated through the following rule:
  - AI_t = (Investments, year t-2)*(regulatory interest rate)*1.6[1]

[1] The factor 1.6, for a given interest rate and the economic lifetime of the investments, seeks at removing the loss in present value created by the two year time lag

International experiences
- No (2) -

- Quality regulation
  - Impact of CENS on allowed revenues (since 2002)
  - Taking account of planned and unplanned interruptions below three minutes
  - Setting of annual quality targets
    - Settlement of actual vs. planned CENS
    - Difference leads to lower or higher allowed revenues
  - Direct compensation scheme for interruptions above 12 hours (since 2007)

International experiences
- No (3) -

- Ability to invest and investment activity :
  - Measures to improve the investment climate in the current regulatory period
    - Increase of equity β to 0,875
    - Allowance for new investments in revenue cap
    - Allowance for replacement investment and network expansion in the revenue cap
    - Allowance for AI based on investments from t-2 (to compensate for the loss in present value

Norway is one of the pioneers in incentive regulation with a gradual enhancement of the regulatory regime from period to period including a provision for the 2 years time lag