

# Regulatory (Dis-) Incentives

*for*

Efficient Investments  
into Electric Networks

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# Contents

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- **Introduction**
- **Findings of Cross-Country Analysis**
- **Conclusions & Recommendations**

# Introduction

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## Findings of Previous Reports

- Substantial scope for energy savings through use of *energy-efficient distribution transformers*

**BUT**

- Still limited and, arguably, even *decreasing market share* of energy-efficient distribution transformers (*examples of Spain and UK*)

**=> Impact of regulation ?**

# Introduction

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## Key questions to be analysed

- Does regulation provide sufficient *incentives for investments in general* ?
- Does regulation encourage an efficient *balance between the cost of investments and operational expenses* ?
- Does regulation provide for sufficient *consideration of the cost of losses* ?

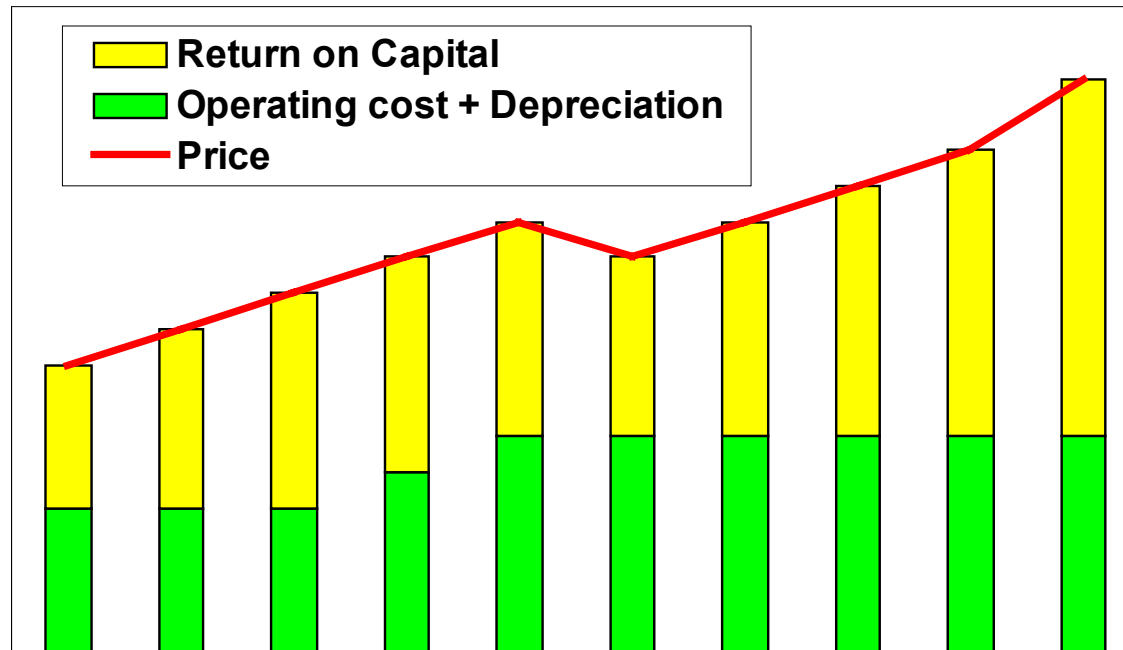
*(Analysis of 3 European countries – E, GB, NL)*

# Contents

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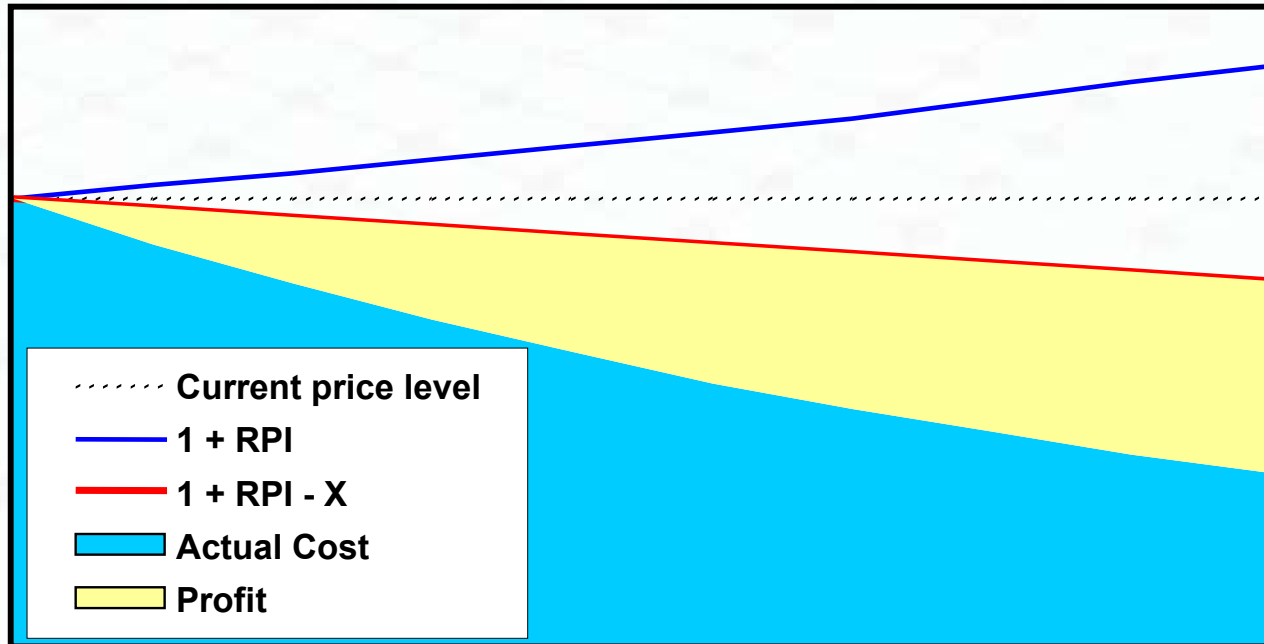
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# Excursion: Rate of Return Regulation



$$\text{Prices} = \text{Operating cost + depreciation} + \text{Return on capital}$$

# Excursion: Cap Regulation



“Imitate competition”

Decouple prices & cost, and allow companies to retain benefits of cost savings beyond regulatory targets

$$P_t = (1 + \text{RPI} - X) \cdot P_{t-1}$$

# Rate of Return vs. Cap Regulation

## Risk of Over-/Under-Investment

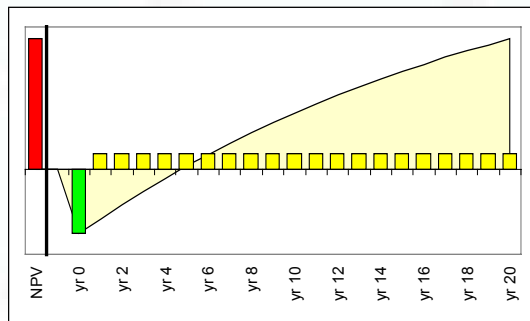
- *Rate of Return regulation* may generally induce *over-investment* into fixed assets.
  - Cap regulation provides strong incentives to reduce cost and prevent over-investment.
  - However, cost may also be reduced by e.g. decreasing quality...
- => ***Risk of under-investment under cap regulation***



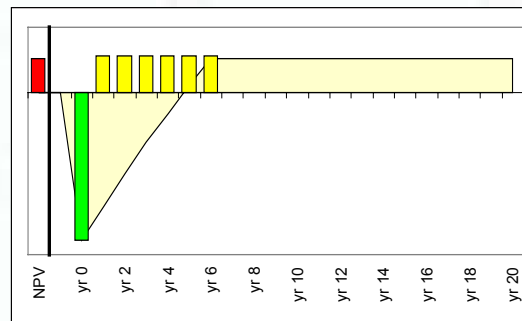
# Frequency of Regulatory Reviews

- Removal of benefits at regulatory review reduces incentives for efficient investments.
- Distortion the larger the *shorter* the length of regulatory periods

## Example: Investing into energy-efficient distribution transformers



**Benefits fully retained**



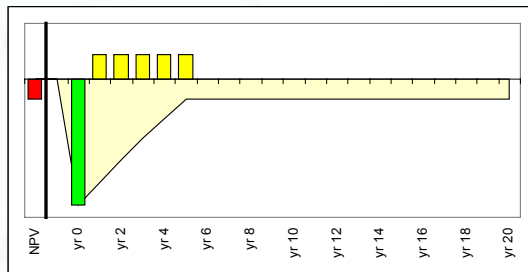
**Benefits fully removed at review**

Legend: Investment premium (green), energy savings (yellow), net present value (red)  
 400 kVA C-C' vs. A-A'; 5% discount rate (real); energy valued at 35 €/MWh

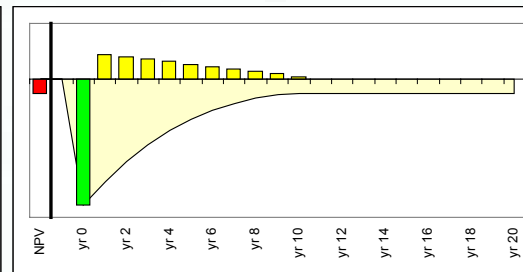
# Efficiency Carryover

- Some regulatory schemes allow companies to retain part of the benefits.
- This **efficiency carryover** helps to preserve incentives for efficient investments.

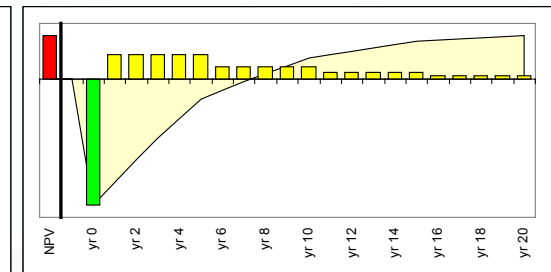
## Redistribution of benefits



**Benefits fully removed**



**10-year floating average**



**50% removal at review**

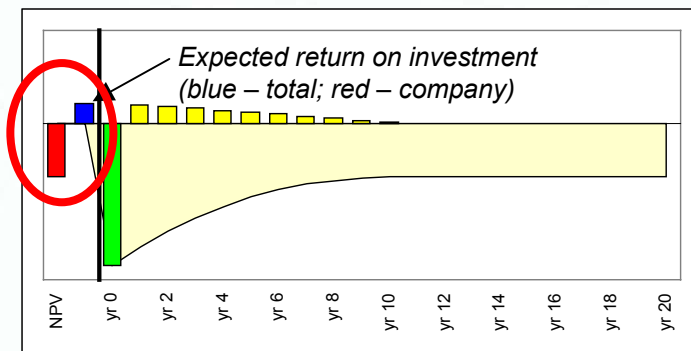
*400 kVA C-C' vs. A-A'; 5% discount rate (real); energy valued at 28 €/MWh*

*Note: Firms not generally able to eternally enjoy full benefits in competitive industries.*

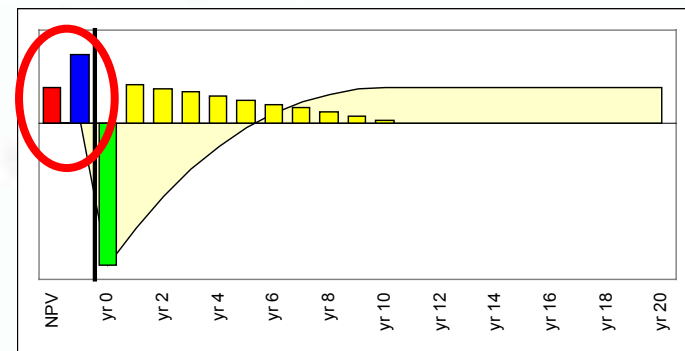
# Reduced Incentives for Innovations

- Different treatment of gains and losses under cap regulation:
    - Benefits => Shared with consumers
    - Costs => 100% paid by company
- => Socially beneficial investments may become unprofitable for the firm itself !**

## Impact of cap regulation on investments under risk



Negative outcome (-160)



Optimal outcome (+120)

KEMA

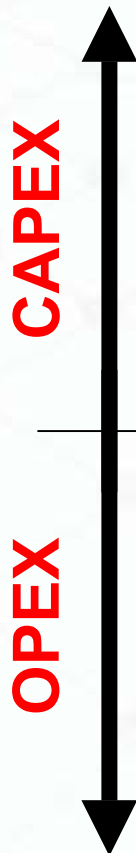
KEMA Consulting

# Capital vs. Operating Expenses

- **Different treatment of CAPEX & OPEX:**
  - CAPEX based on existing assets
  - OPEX often measured against external indicators (benchmarking, yardstick)
- **Different nature of CAPEX & OPEX:**
  - CAPEX bound for full life time (zero flexibility)
  - Option to flexibly adjust OPEX (at least for limited time)

# Capital vs. Operating Expenses

## Possible distortions towards...



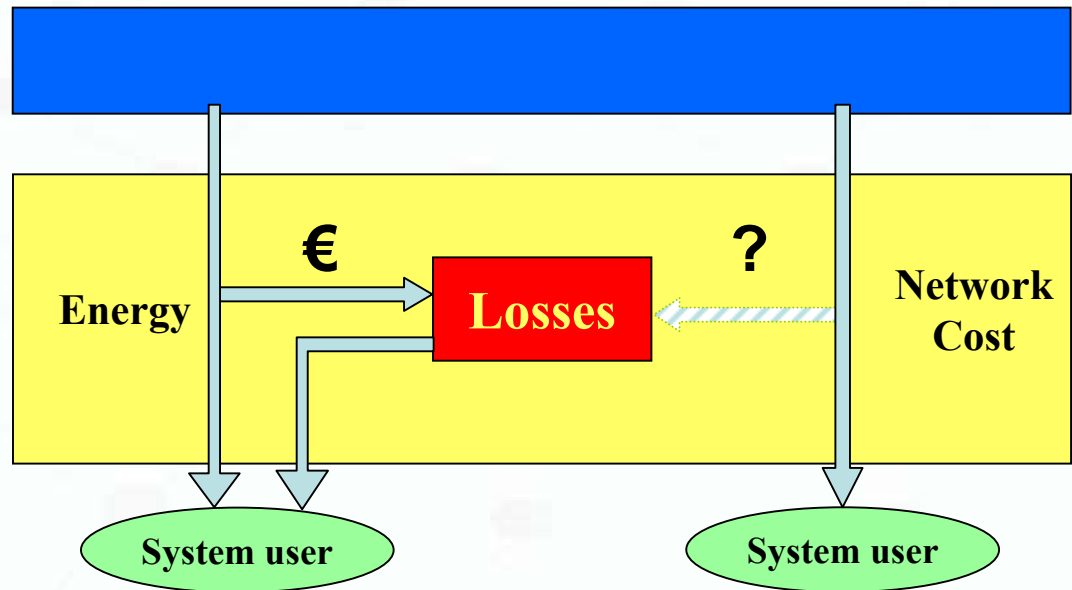
- Pass-through of CAPEX
- Limitation of benchmarking / yardstick competition to OPEX
- Long-term investments as “*sunk cost*” vs. flexibility of OPEX
- Regulatory uncertainty
- Small efficiency carryover

# Value of Losses

- Correct indicator for long-term marginal cost of network losses (energy price)?
- Network cost usually not considered

HV network

Distribution network



# Contents

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# Conclusions (1/3)

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- **Cap regulation** alone does **not** generally provide sufficient incentives to **prevent under-investment**.
- The **redistribution of savings** under cap regulation **reduces incentives for investing in efficiency**.
- The **asymmetrical treatment of gains and losses** by cap regulation may **not promote innovations**.

## Conclusions (2/3)

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- The realisation of long-term, capital-intensive investments strongly depends on **asset valuation and regulatory risk**.
- The **different treatment of capital and operating expenses** may provide **incentives for distorted spending**.
- Regulation **measures does not** generally **support the concept** of taking investment with a focus on **short-term performance** decisions on the basis of **lifetime cost**.

## Conclusions (3/3)

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- Treating **network losses as non-controllable** cost provides **insufficient incentives** to reduce losses and increase efficiency.
- Current regulatory models seem to **under-estimate the economic cost of network losses** with a view to long-term investments.

# Recommendations (1/2)

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- Regulators should consider **network losses** as (partially) **controllable cost** and include them into the regulation of network companies.
- **Network companies might be incentivised** to take investment decisions based on an evaluation of the '**lifetime cost**'.
- Care should be taken to consider the **true cost of network losses** for regulatory purposes.

## ***Recommendations (2/2)***

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- Cap regulation should allow for an **efficiency carryover**.
- **Special incentives might be introduced** to promote the use of loss-reducing equipment with higher investment cost.