1ˢᵗ Round Table – International comparison: the experience of multi-sector regulators and of the UK regulators network

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The cost of capital workshop – Club of Regulators

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1. Scene setting

2. Comparison of energy and telecoms (price) regulation

3. Energy sector: Incentive regulation in Germany

4. Telecoms sector: Pro-competitive regulation

5. Conclusions

1. **Scene setting**

2. Comparison of energy and telecoms (price) regulation

3. Energy sector: Incentive regulation in Germany

4. Telecoms sector: Pro-competitive regulation

5. Conclusions

- BNetzA is the German multi-sector regulator responsbile for the following network industries:
    - Telecommunications markets (1998)
    - Postal markets (1998)
    - Energy (electricity and gas networks, 2005)
    - Railway network (2006)
- With the exception of post all other networks are **capital intensive**
- Therefore determining the **cost of capital** is of key importance for those sectors a. always the most disputed part in price regulation proceedings
- The decision on the **methodology** used for calculating the cost of capital is thus also challenged before court in nearly all cases
- In order to ensure consistency in the calculation of the cost of capital and the methodologies used BNetzA set-up an (internal) **working group** looking at what was done in the different sectors
- Since 2011 the **CAP-Model** is used generally to determine the rate of return on equity, but small (technical) differences in the calculation of the parameters of the CAPM formula remain which are however justifiable
- The value of parameters mainly reflects differences in the **risk** of investing in that particular sector

- **Costs** = consumption/usage of the network (production capacity) and its elements to produce a service
- Cost categories:
- **CAPEX** = capital costs (costs of the investment, long term), which consist of
    - Rate of return (equity, debt, risk premium to reflect risk adequately; **WACC** = weighted average cost of capital)
    - Annualized investment (based on investment/asset to cover usage costs over the economic lifetime)
- **OPEX** = operating costs (i.e. costs of running the network daily, short term, e.g. for power, heating, housing)
- **Common costs** = for the usage of several services, require rules for the allocation of these costs to the different services: allocation keys

- OPEX for specific processes (e.g. non recurring ordering costs for the LLU):
  - Top-down calculation of efficient hourly wages
  - Activity based costing to calculate the cost of the process (bottom-up)
- OPEX for operation and maintenance of specific assets:
  - Top-down calculation of mark-up factor
  - Multiplication with volume of the assets employed in the efficient network

- **CAPEX**
  - Adjustments of the network structure (asset base, MEA concept). Analytical cost models are used, if required (e.g. *efficient invest* of the access network).
  - Adjustment to appropiate *replacement values* (CCA) using contract data and indices of the National Bureau of Statistics (valuation of assets).
  - Efficient *cost of capital* (rate of return, valued asset base) is determined by market data and capital structure.

1. Scene setting

2. **Comparison of energy and telecoms (price) regulation**

3. Energy sector: Incentive regulation in Germany

4. Telecoms sector: Pro-competitive regulation
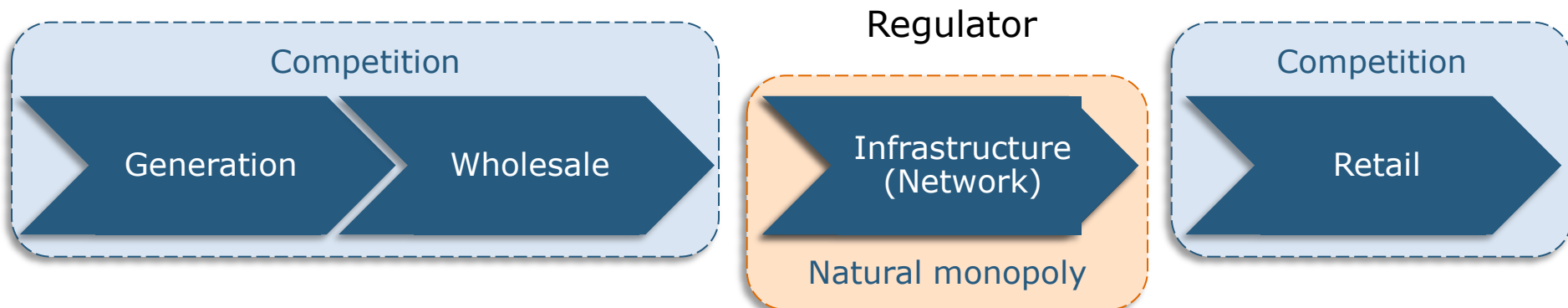
5. Conclusions

Sector / Criterion	Energy	Telecommunications
Concept / Type of regulation	Infrastructure regulation, each network op is regulated as a natural monopoly	Market regulation, only op. having SMP are regulated, infrastructure competition possible
Objectives	Competition in up-/downstream markets, capability to invest and viability of the grid	Competition on all levels, initiate market processes, competition drives efficient investment
Approach to price regulation	Minimum: set tariff methodology, maintain the grid	Cost-oriented price regulation, costs relevant for competition
Cost standard / Costing methodology (incl. cost of capital calc.)	Cost of efficient service provision of a structurally comparable op.; detailed provisions for RAB and reasonable rate of return on equity	Cost of effcient service provision, LRIC/CCA/MEA, reasonable rate of return (WACC)
EU legal provisions (2009) National legal provisions	Art. 37/Art. 41 Electricity/Gas Di. Sect. 21/21a Energy Act. 2011, Incentive Reguation Ordinance	Art. 13 Access Directive Sect. 27-38 Telecommunicat. Act 2012

Possible solutions

- Effective competition in up- and downstream markets
- Prevention of abuse of dominance (significant market power) by means of:

  - Unbundling
  - Non-discriminatory third-party-access
  - Ex-ante setting of network charges acc. to standardised rules
    -> Incentive Regulation

Competition

Generation → Wholesale

Regulator

Infrastructure (Network)

Natural monopoly

Competition

Retail

Types of regulation

- Cost Plus Regulation
    - markup on average costs
    - difficult to determine the appropriate markup
    - incentive to increase costs

- Rate of Return Regulation
    - predefined rate of return on capital
    - difficult to determine the appropriate rate of return
    - incentive to use too much capital

- Incentive Regulation (price cap or revenue cap)
    - Fixing revenues for more than one year (regulatory period)
    - Account for individual efficiency and general efficiency
    - Information asymmetry is reduced

Types of regulation

Concept of incentive regulation (1)
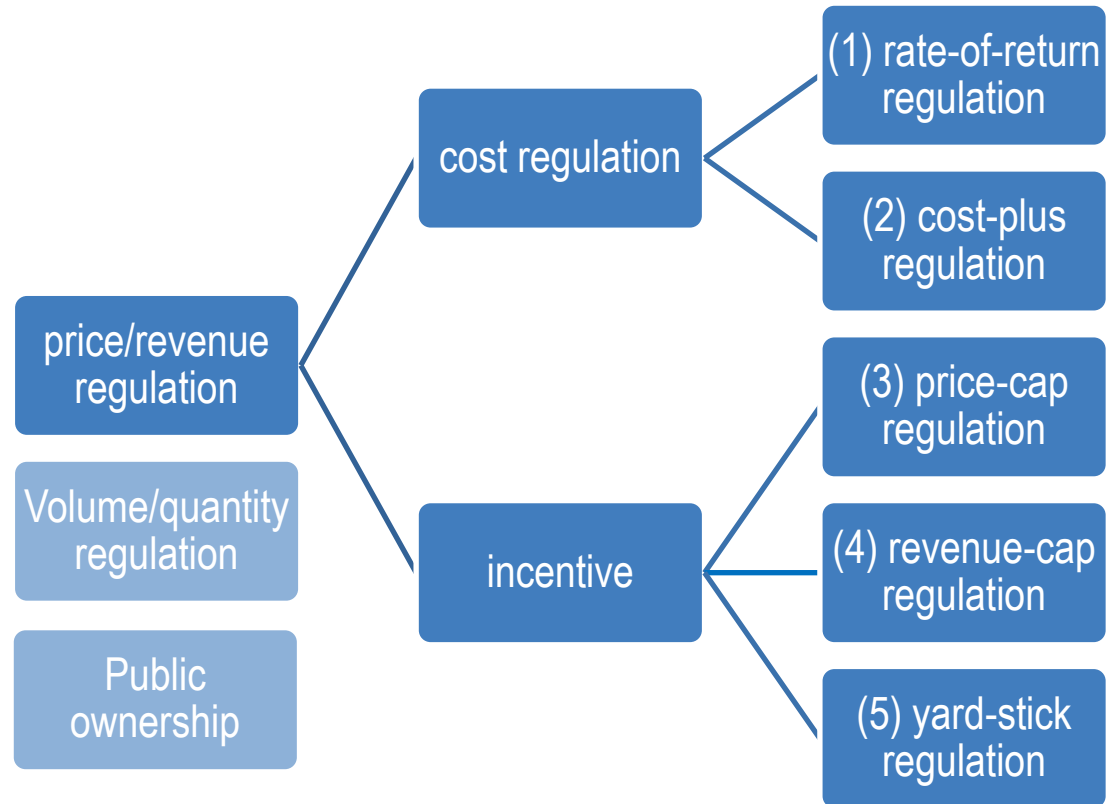
Incentive Regulation – general concept

- Individual revenue caps for each network operator
- Revenue cap is fixed for one regulatory period
- Network operators can set prices so that they do not exceed the fixed revenues (irrespective of actual costs)
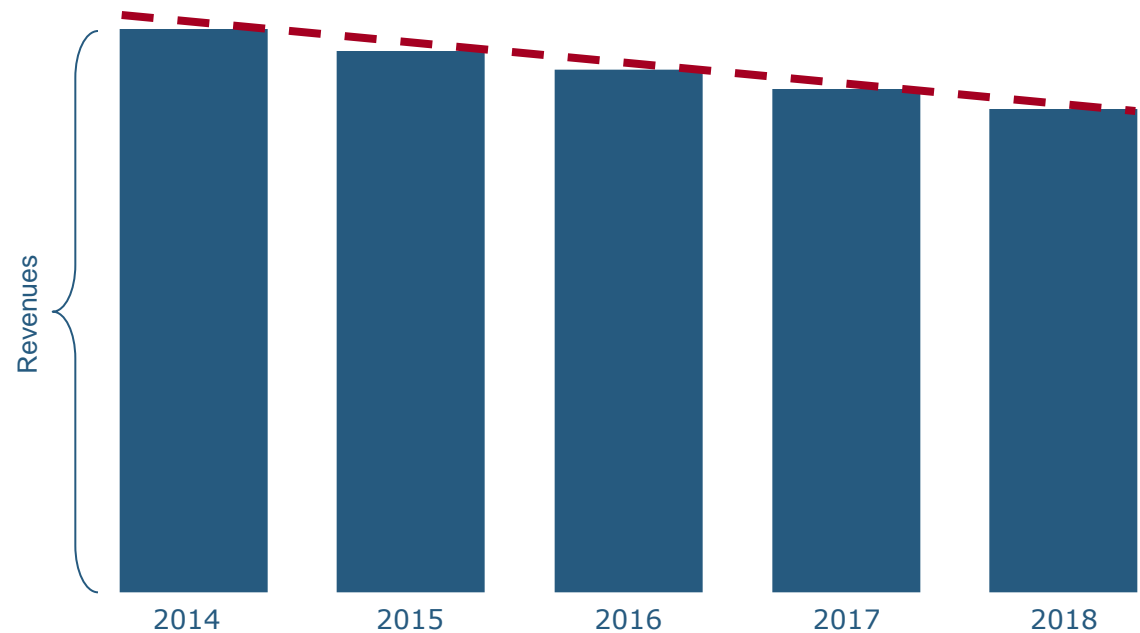
Incentive Regulation – general concept

- Reduction of revenues over time

- Without action network operators will reduce their profit over time

- If they reduce their costs beyond the efficient level they can generate extra profits

→ Thus, incentive to permanently increase efficiency
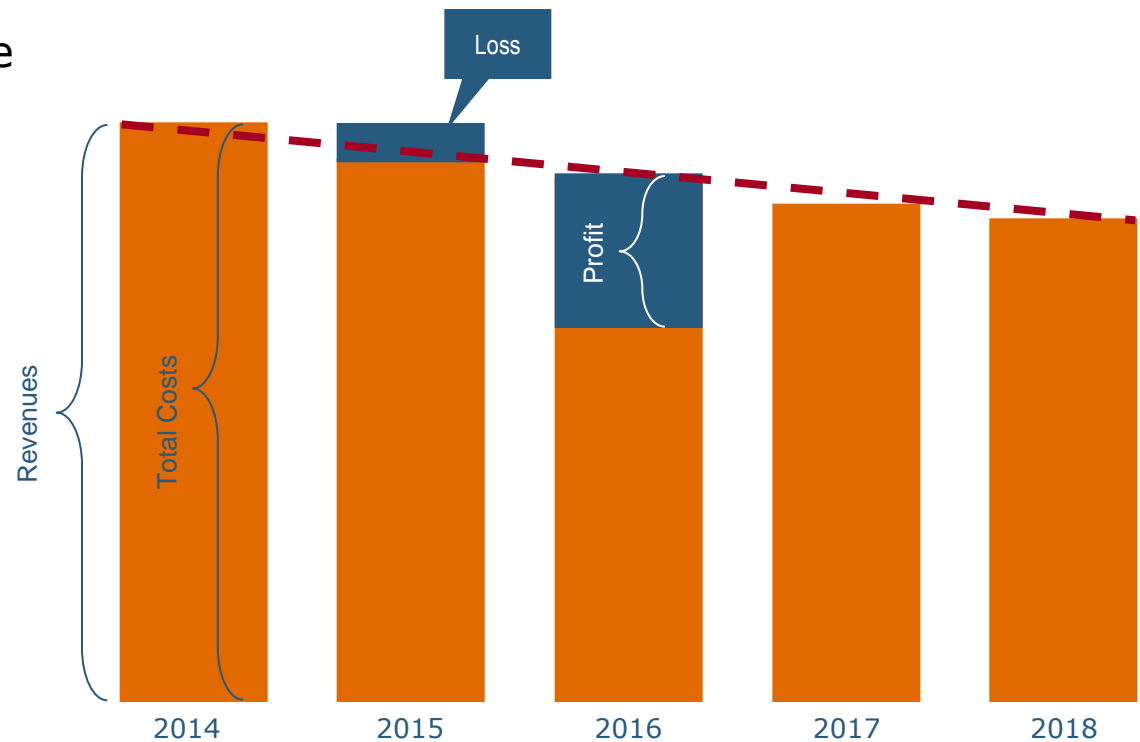
- Incentive Regulation in Germany: **TOTEX** approach
- Sect. 21a EnWG and Incentive Regulation Ordinance (ARegV)
- Set two regulatory periods with a duration of 5 years each (first regulatory period for gas operators to last 4 years only) starting in 2009, thus providing for a
- Longer planning horizon for operators: 5 years regulatory period
- Decouples revenues from costs:
  More efficient companies are granted higher returns as they can keep the profits until end of regulatory period when getting more efficient, less efficient companies receive lower returns
- Regulator seeks to incentivise network operators to identify further economies and increase profits,
  customers also benefit from efficiency increase
- Revenue "cap" set for each calendar year of the regulatory period (thus "**revenue path**") based on an efficiency benchmark
- Revenue cap ≠ price cap:
  Avoids giving network operators an incentive to increase sales
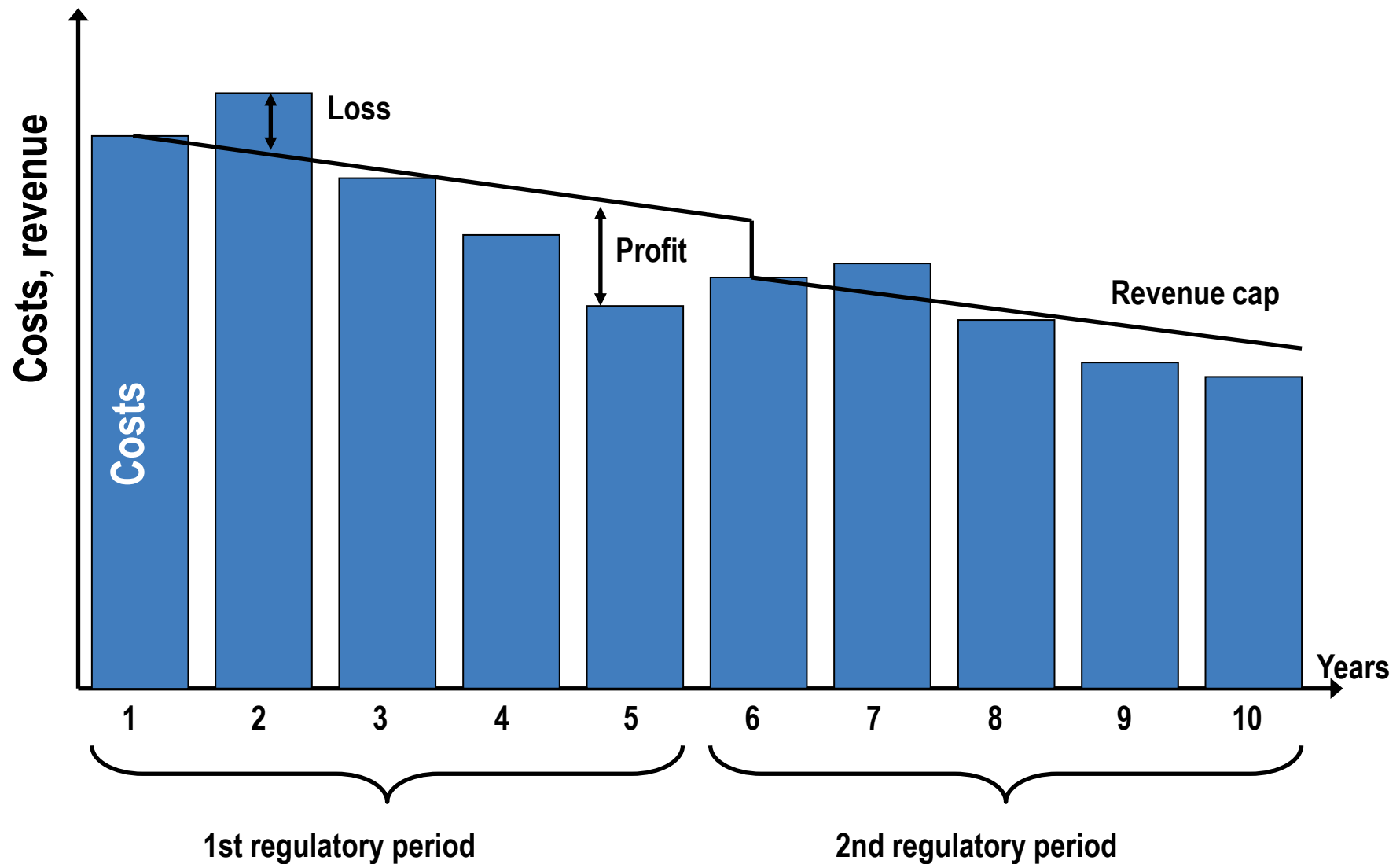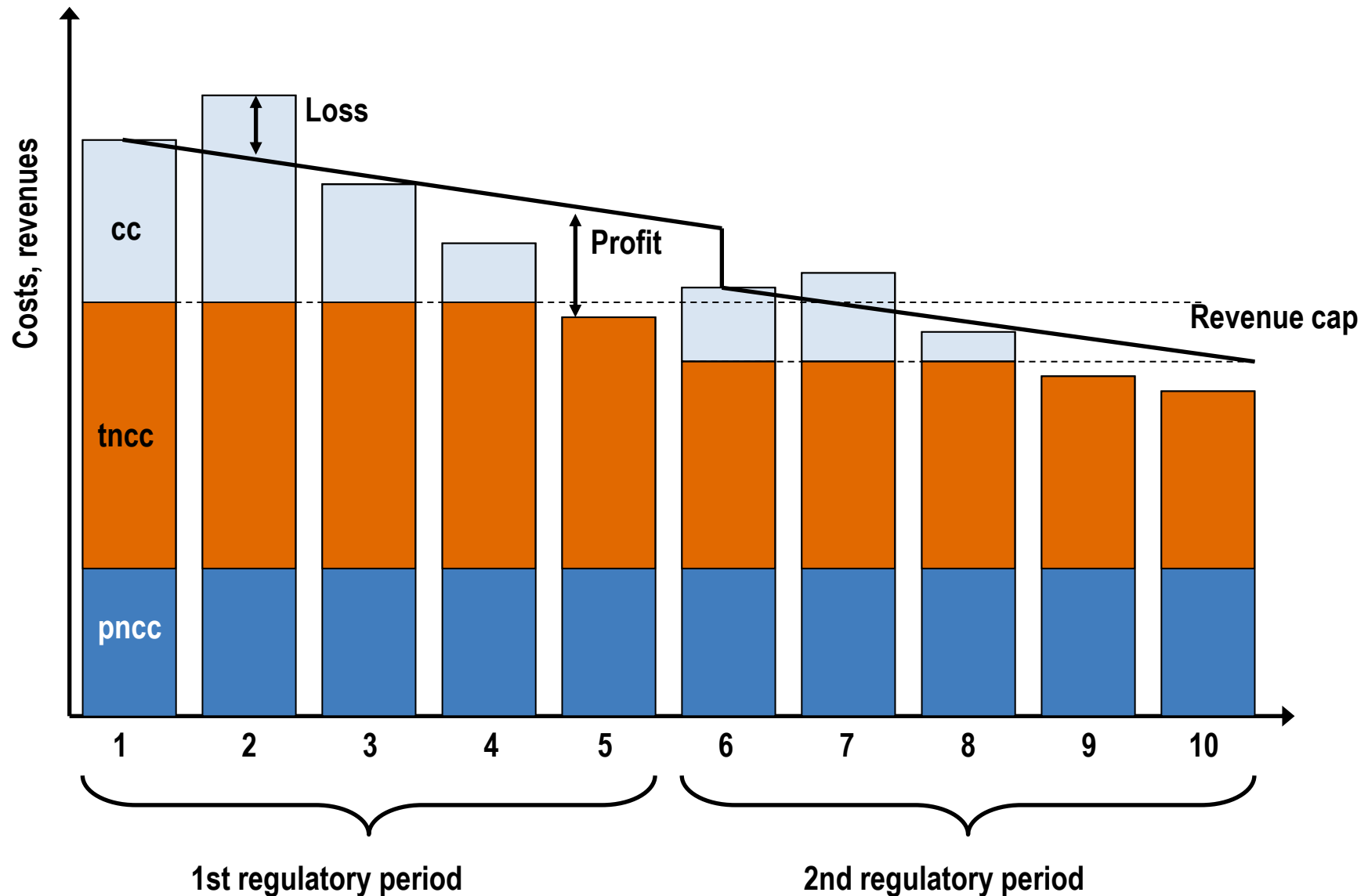
cc: Controllable cost
tncc: Temporarily non-controllable costs
pncc: Permanently non-controllable costs

Incentive Regulation Procedure

- Initial Revenue Cap defined by individual total costs
    - Consideration of non-controllable costs
- Benchmark to determine individual efficient costs
- Target defined by individual efficient costs (& X-gen)
    - Obligation to cut inefficient costs over the regulatory period

Revenue Cap

Defined by Benchmarking

Total Costs

in-efficient costs

efficient costs

non-con-trollable costs

2014 2015 2016 2017 2018
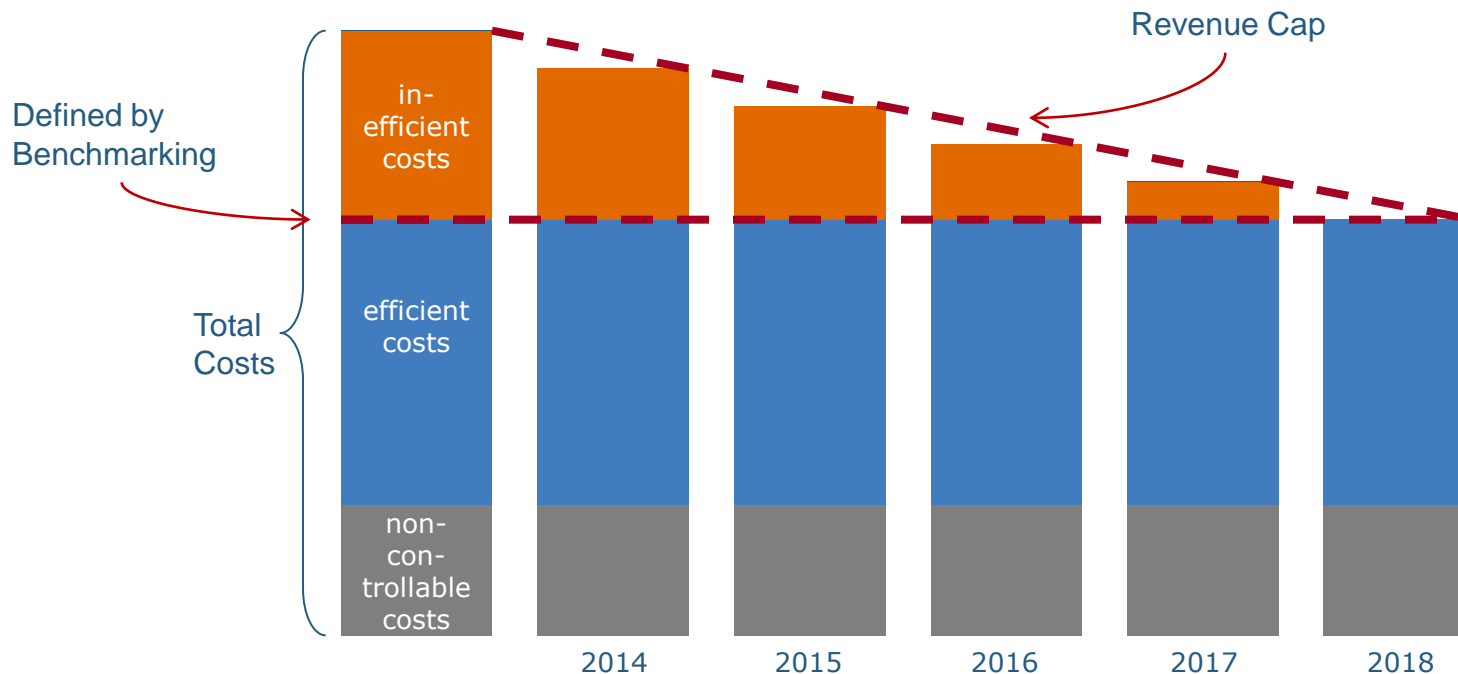
Incentive Regulation
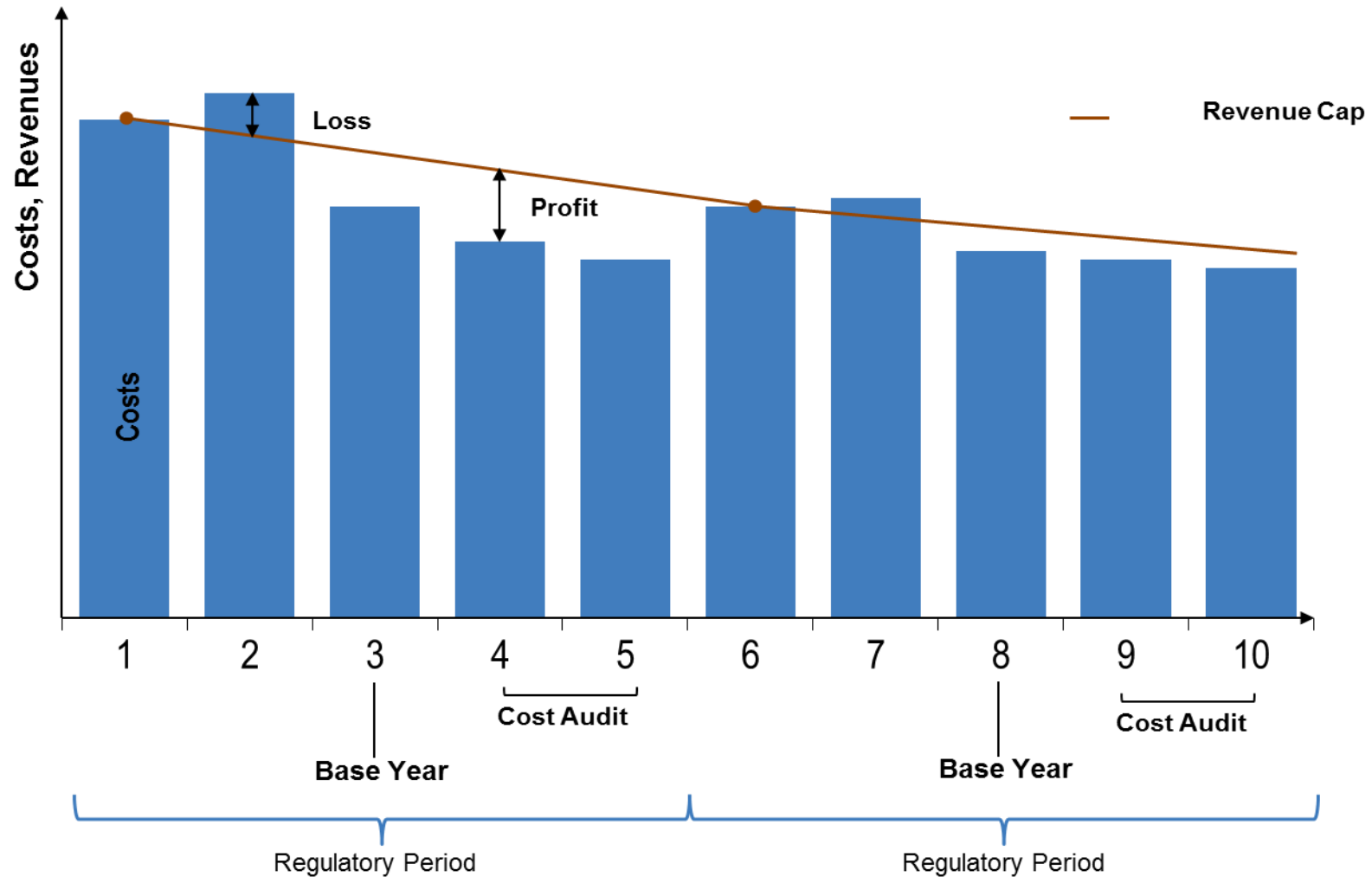
3 steps for incentive regulation

Determination of cost of network operation

- Based on actual network assets and operational expenditure
- Valuation of assets using imputed costs
- Imputed rate of return on equity
- Distinction between 'controllable' and 'non-controllable' costs

Efficiency benchmarking

- Network operators are benchmarked against each other
- Different tasks (e.g. number of connected customers) are controlled for
- Benchmark: 100% relative efficiency

Determination of individual revenue cap

- 5-year revenue cap
- Inefficiencies identified in benchmarking must be eliminated over 5 years
- General productivity factor
- Compensation for inflation

Incentive Regulation in Germany

- Incentive regulation in Germany
    - Legal basis: Incentive Regulation Ordinance
    - Incentive regulation started in 2009
    - 5 years regulatory period

- Individual, efficiency-based revenue caps

- Regular adjustments
    - Consumer Price Index (CPI)
    - Non controllable costs
    - Volatile costs

- Adjustments on request
    - Change of the expansion factor
    - Unexpected incidents (like 'force majeur')

Incentive Regulation in Germany

- Regulatory account
    - to balance differences of allowed and actually achieved revenues

- Inflation compensation
    - measured by Consumer Price Index (CPI) published by the Federal Statistical Office

- Sector-specific productivity factor
    - correction of inflation due to different development of productivity and input prices in network sector and whole economy
    - first regulatory period 1.25% per year
    - second regulatory period 1.5% per year

- Methods
- Revenue-cap-formula:
- $RC_t = RC_{t-1}(1+CPI) - X_{gen} - X_{ind}$
  - RC_t = revenue-cap in period t
  - RC_{t-1} = revenue-cap in period t-1 (or base-level $\rightarrow$ benchmarking)
  - CPI = consumer price index
  - X_{gen} = overall (general) productivity (rate)
  - X_{ind} = firm specific productivity (rate)/efficiency

■ Methods

1.
- Calculating the base-level (revenue) and the efficiencies (firm specific productivity) using efficiency cost-oriented methods (DEA, SFA, MOLS etc.) → benchmarking

2.
- Fixing the (individual) revenue-cap

3.
- Adjusting the revenue-cap (CPI, X-factor, firm-specific efficiency…)

4.
- Evaluating and adjusting the benchmarking methods (regulating periods)

Incentive Regulation in Germany

- Determination of individual efficiency requirements (X_{ind})
    - based on the relative efficiency of each system operator
    - by means of an **efficiency benchmark** on the basis of suitable efficiency benchmark methods
    - with standardized and non-standardized capital costs
    - Individual best-off solution in favor of the network operator
    - **TOTEX approach** (i.e. in principle all costs are subject to efficiency requirements)

- Quality Regulation
    - To avoid cost savings at the expense of quality of supply
    - Bonus and Penalty on revenue cap

Incentive Regulation in Germany

- Expansion factor and investment budgets for appropriate investment conditions

- Expansion factor
  - For DSOs
  - Adjustment of revenue cap with regard to changing supply task

- Investment measure (formerly investment budget)
  - (mainly) for TSOs
  - For investments that are necessary for
    - Stability (of the grid)
    - International (cross-border) grid connections
    - Appropriate grid expansions (such as needed for the *Energiewende*)

Setting the cost basis: appropriate rate of return

- BNetzA has set the rate of return on equity at **9.29%** (before tax) for all DSOs and TSOs (for new investments) on 7 July 2008

- Rates apply for the 1st regulatory period (2009–13 in electricity, 2009–12 in gas)

- Elements
  - Risk free rate: 4.23%
  - Risk premium: 3.59% (using the **Capital Asset Pricing Model**):
    - Market risk premium: 4.55%
    - Beta (risk measure for the operation of electricity/gas networks): 0.79
  - Corporate tax (trade tax covered outside RoE)
  - $R_E = R_F + \beta_E * P_M = 4.23\% + 0.79*4.55 \ (= 7.82\%)$

- Rate of return on equity for 2nd period: 9.05% (2 Nov. 2011)

Financing the energy transition

- **Rate of return** on equity for investment in new and expansion facilities has to be attractive

- importance to reduce risk through safeguards implemented in the regulatory regime
  - → no need for higher returns

→ Regulatory framework should provide an **economically interesting** and **legally stable** environment: **predictability** is key for investors' confidence

→ it has to be **flexible** to adopt and implement **future European developments**

Basic principle: All Projects should be

- Network is refinanced by the users (rolled in network charges)

- In case a network operator is unable to organize the financing of the needed measures involvement of financial investors possible

- No scarcity of capital, investment budgets/measures approved by BNetzA for all but one project

BNetzA's philosophy on returns

✅ More important than the <u>nominal</u> rate of return is the <u>sustained</u> profitability of the investment, generating steady, stable cash flow.

✅ Providing certainty to investors: regulation is predictable

Return on equity for new facilities as per section 7(4) StromNEV and GasNEV

The allowed rate of return on equity needed for new installations <u>may not exceed</u> the average **current yield** for the last ten full calendar years **on fixed interest securities of domestic issuers** as published by the Deutsche Bundesbank, plus an **appropriate mark-up to cover entrepreneurial risk specific to network operation**.

The following factors must be taken into account in determining the mark-up to cover entrepreneurial risk specific to network operation:

- situation on national and international capital markets and the assessment of network operators in these markets

- average return on the equity of operators of supply networks in foreign markets

- observed and quantifiable entrepreneurial risks

Capital Asset Pricing Model (CAPM)

Required return on equity = risk-free rate +

beta factor * market risk premium

$$R_E = R_F + \beta_E * P_M$$

Current yield development in Germany

Current yield for domestic issuers — 10-year average
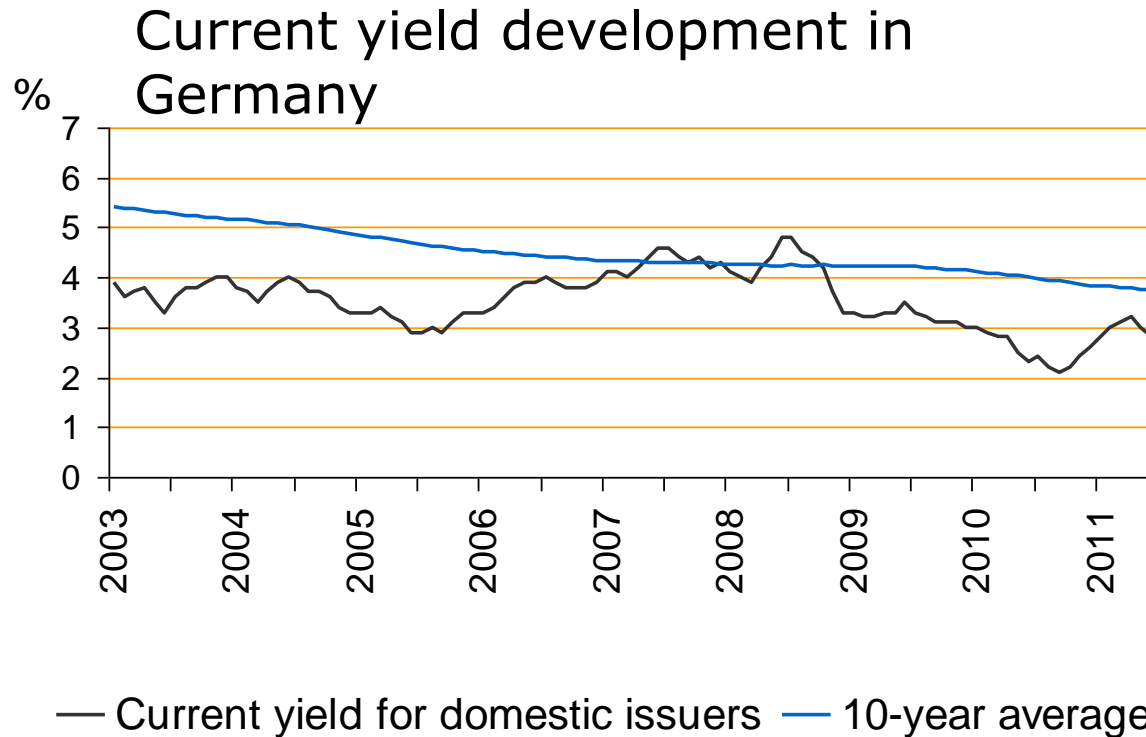
- There is a recognisable trend towards lower yields
- Fixing the risk-free rate for the next regulatory period is advantageous, even, for the network operators

The beta factor denotes the risk of investing in a network operator in relation to investing in the market as a whole

Peer group	
UK	National Grid
Italy	Snam Rete Gas
	Terna
Spain	Enagas
	Red Electrica
US	Boardwalk Pipeline Partners
	TC-Pipelines
	TC-Pipelines
New Zealand	Vector Limited

Pie chart: UK 11%, Italy 22%, Spain 22%, US 34%, New Zealand 11%

Legend: UK, Italy, Spain, US, New Zealand
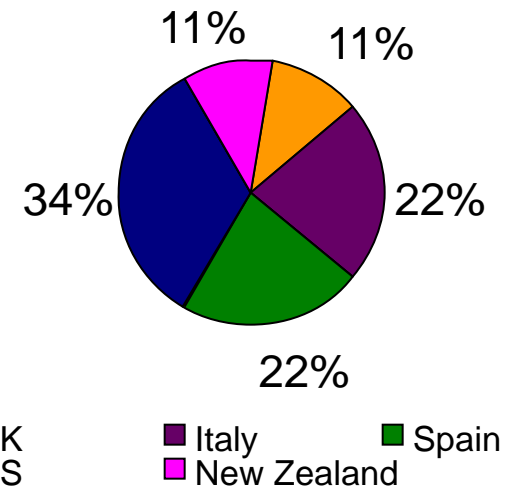
- The beta factor is established by looking at various listed electricity and gas network operators with comparable risk

- A comparable risk is guaranteed in particular by the criterion of 75% network operation

- One-sided distortion is avoided by including a number of other countries

- Network operators have a return of 6.70% with a beta factor von **0.66** (4.4% market prem.) Energy suppliers have a return of approx 7.50% with a beta factor of 0.73

Relation between risk and return for a network operator compared with other industries (after taxes)
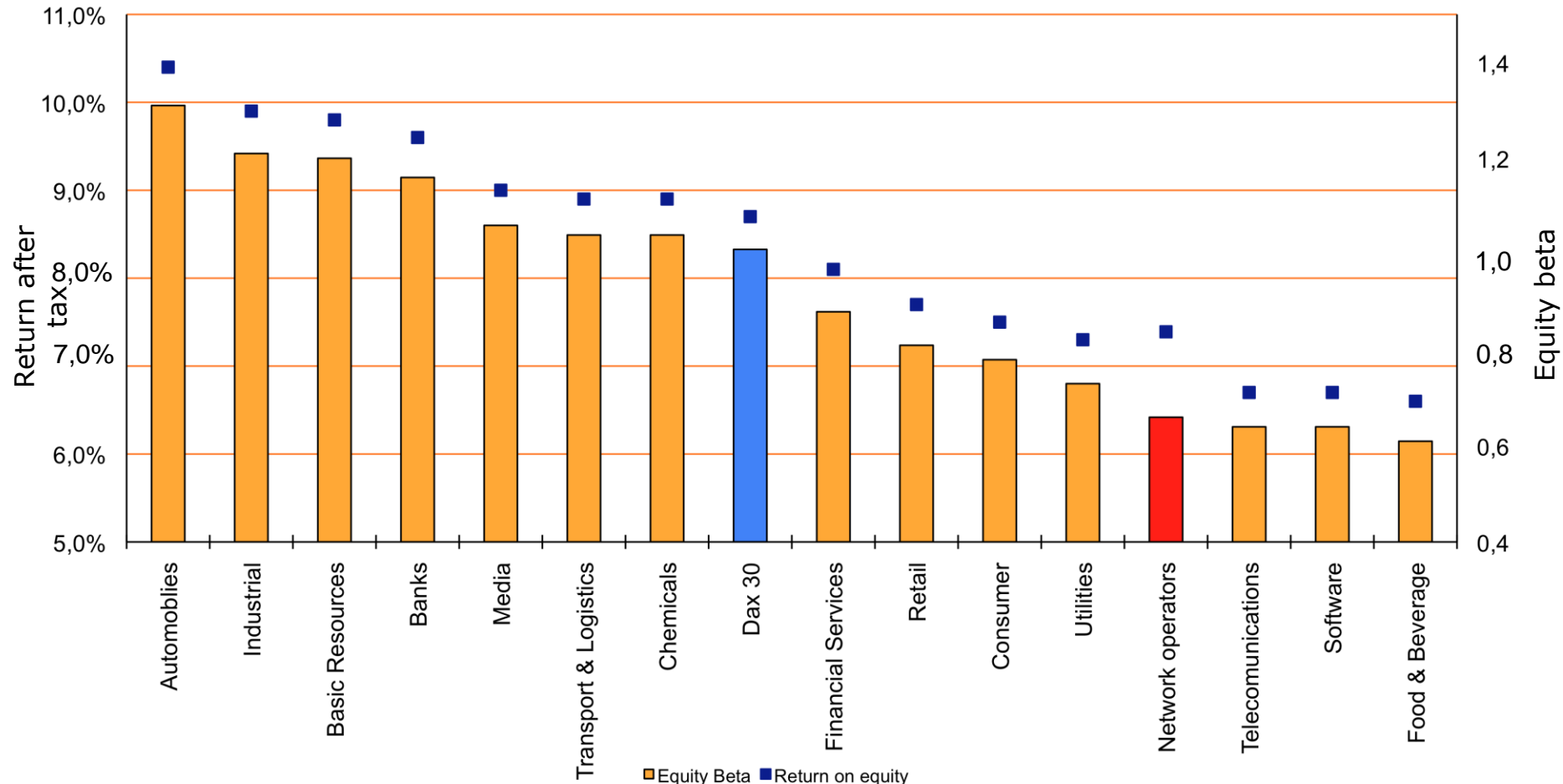
- Dividend yield (2011) for individual companies
    - Commerzbank   0%
    - Deutsche Post   4.81%
    - Deutsche Telekom   6.18%
    - E.ON   6.55%
    - Fresenius MC   1.29%
    - Münchener Rück 5.43%
    - RWE   7.57%
    - Volkswagen   1.71%

- Dividend yield (2011) by indices
    - DAX   2.76%
    - MDAX   2.08%
    - SDAX   1.9%
    - TecDAX   1.6%
    - ÖkoDAX   1.26%

    Average for all companies listed in the index

- For comparison purposes: Rate of return on equity after taxes 6.70%

Rate of return for the 2nd regulatory period

1.66%	corporation tax
3.59%	risk premium
3.80%	Risk-free rate: historic 10 years average yield on bonds

Rate of return after corp. taxes: 7.39%

Rate of return before corporation tax: 9.05%

Rate of return before corporation and trade tax: 10.48 %
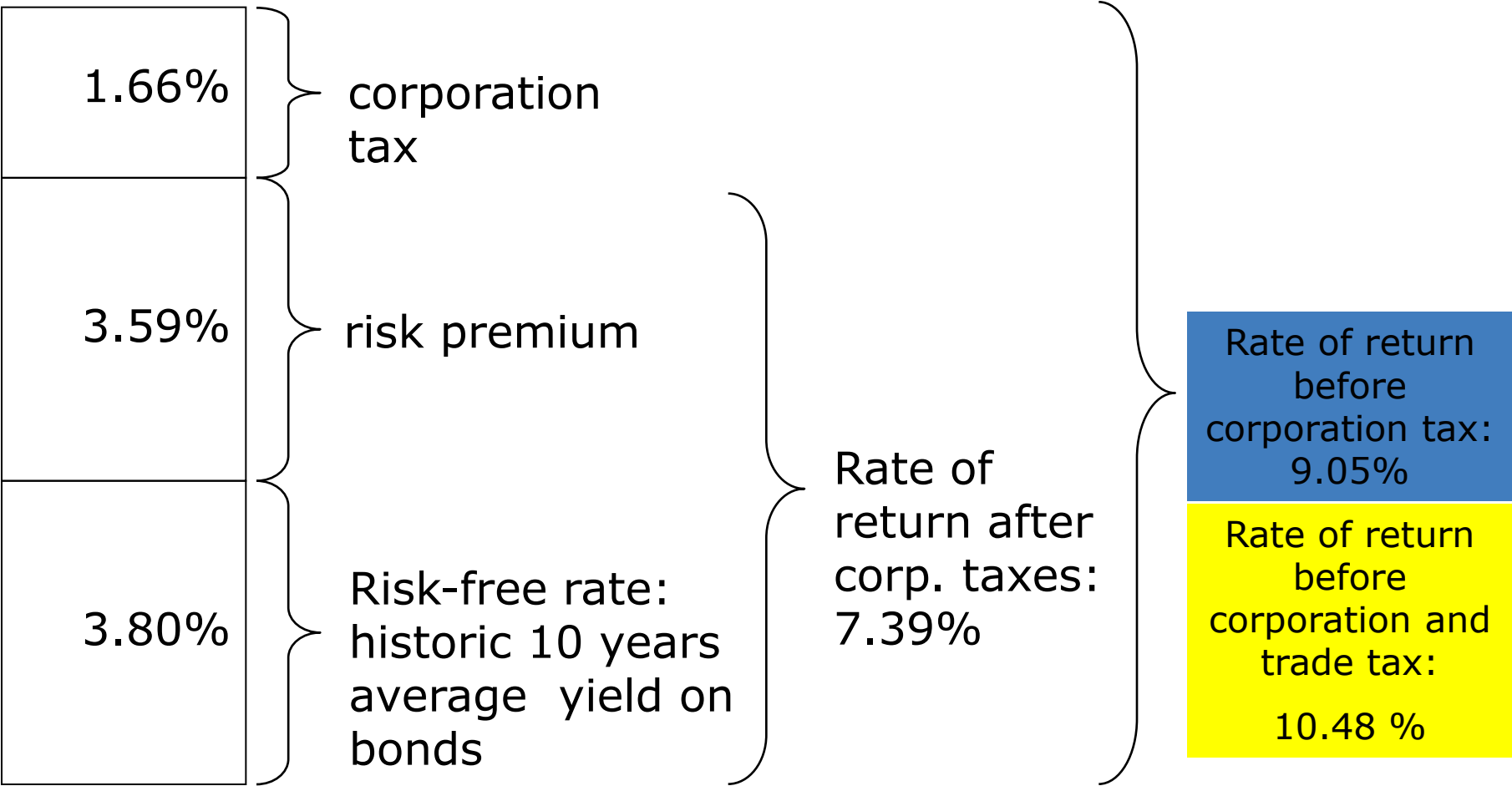
The full RoR is paid on up to 40% of the necessary assets.
The regulated RoR on equity exceeding the 40% share is currently ca. 4 %.
The cost of debt is passed through as long as it corresponds to current market rates (ca. 3%).

How to account for new investment <u>during</u> the regulatory period?

- 2 mechanisms:

    - **"Investment measure"**
      Costs are included in revenue cap in the year of activation and are temporarily exempt from efficiency benchmarking
      → mostly used at TSO level

    - **"Expansion factor**"
      Changes in the supply task (e.g. increase in connected customers or decentralised generation) raises the budget during the regulatory period;
      → used at DSO level

- While DSOs may primarily benefit from the Expansion Factor, TSOs may apply for ‚Investment budgets' [„investment measures"] for expansion projects:

  - Connection of offshore-facilities to the grid

  - grid extension measures to connect new power generation

  - integration of Renewable Energy/Cogeneration facilities

  - development of the gas transport capacities between market areas

  - development of interconnection capacities

  - underground cables

  - restructuring measures to ensure technical network security

  - cable temperature monitoring and operation of high temperature cables

- Individual applications will be checked ex ante for costs and the necessity of the project

- Approved costs will be treated as "non-controllable costs" for one or two regulatory periods in general, i.e. increasing revenues directly
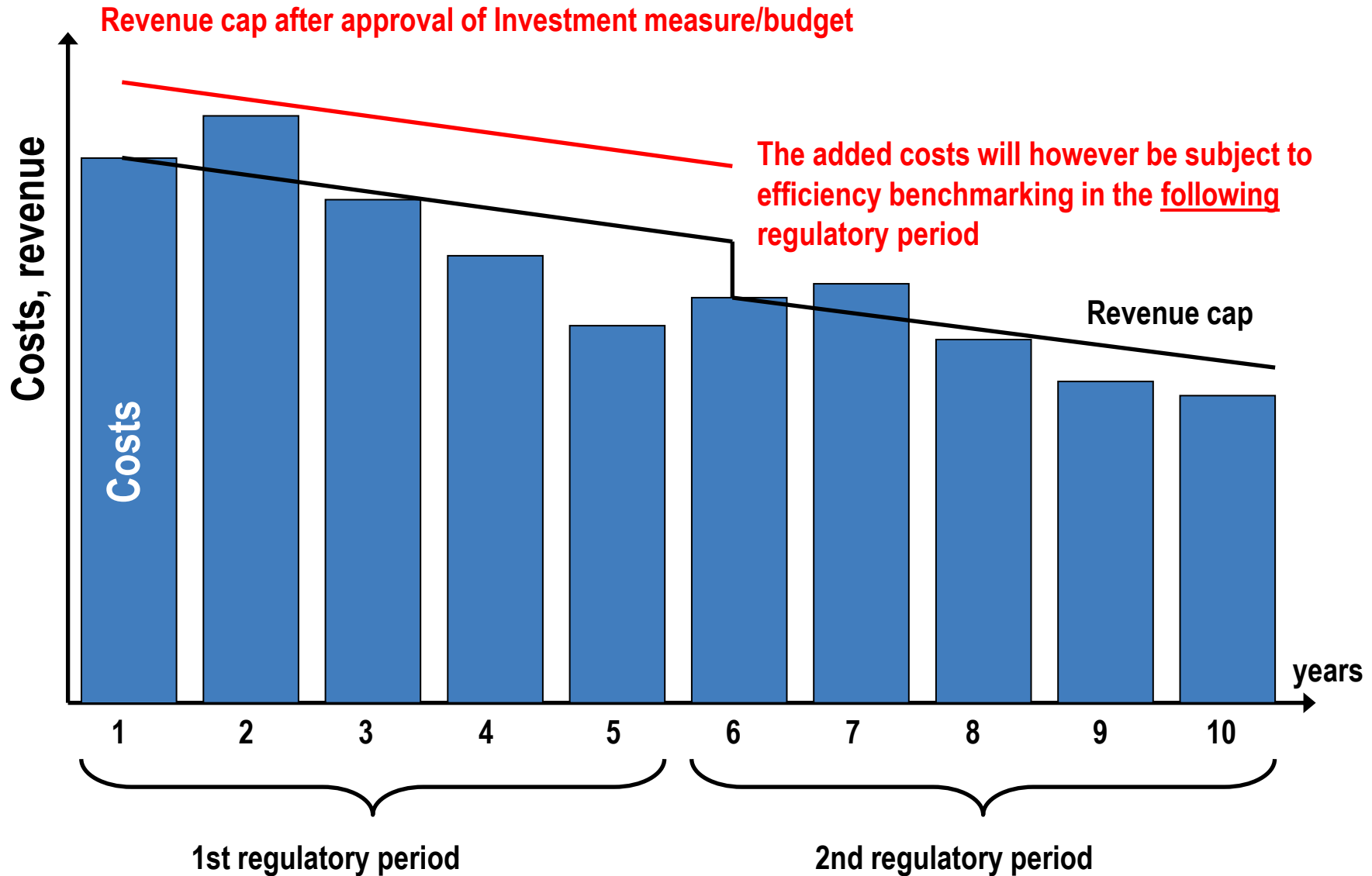
Revenue cap after approval of Investment measure/budget

The added costs will however be subject to efficiency benchmarking in the **following** regulatory period

Revenue cap

Costs, revenue

Costs

years

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

1st regulatory period

2nd regulatory period

40
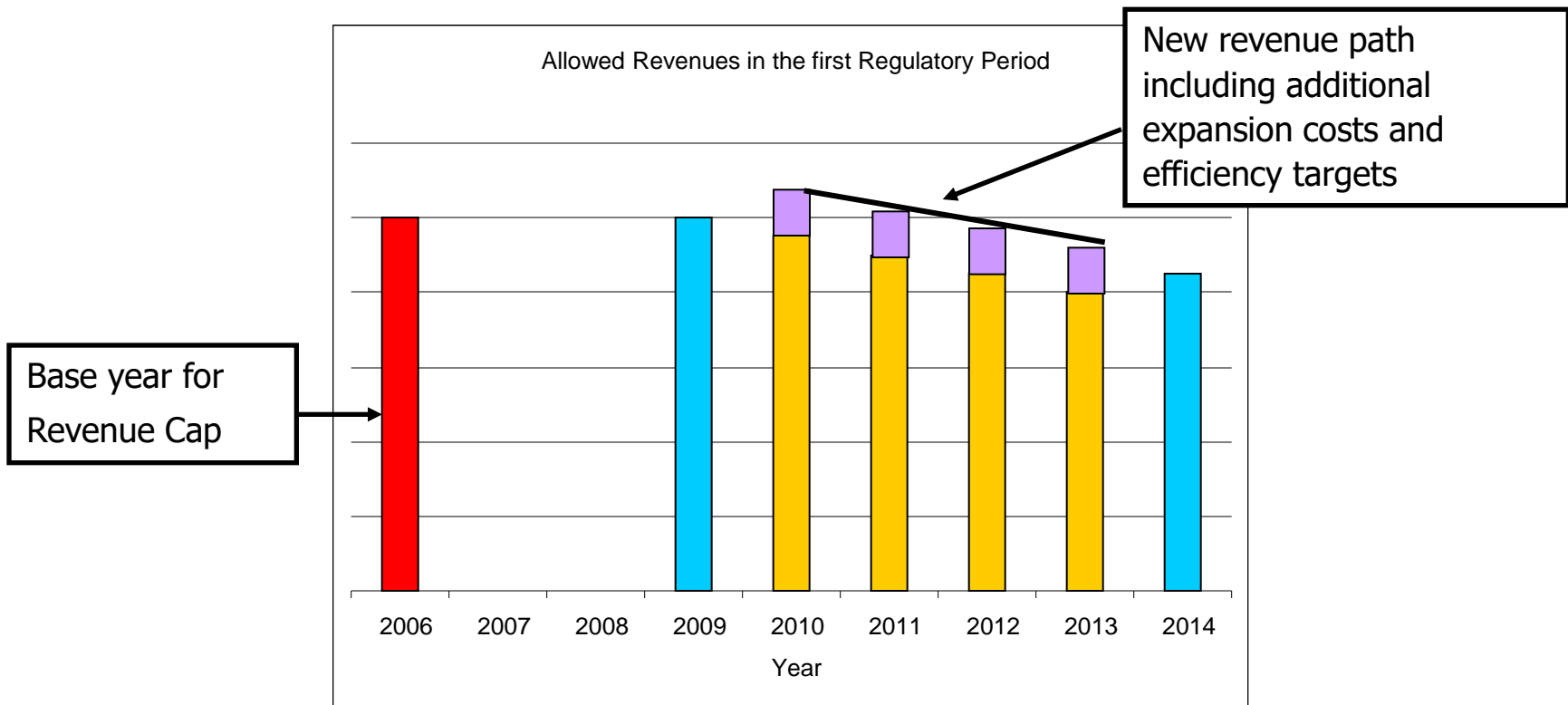
The German Incentive Regulation Ordinance (ARegV) provides for the possibility for network operators of including costs for investments in expansion and restructuring in the network tariffs,
<u>over and above</u> their approved revenue cap.

Statutory requirements for investment plan approval:

- Application is made no later than 31 March of the year
  prior to the first cost-effectiveness,
  e.g. before initial capitalisation of assets under construction or finished plants

- Expansion or restructuring investment
  and necessary for (at TSO and high voltage levels):

  - Stability of the overall system or

  - Integration into the national or international network or

  - For a targeted expansion of the power supply system
    according to § 11 of the Energy Act

Investment measures – examples

Non-exhaustive catalogue of measures supported

1. Connection of power generation plants

2. Integration of renewable energy and CHP plants

3. Expansion of interconnectors

4. Expansion of gas transmission pipelines between market areas

5. Offshore Wind Park connections

6. 110-kV underground cables

7. Investments to ensure the technical security

8. Monitoring temperature and high-temperature conductors

9. HVDC systems and cross-border HVDC interconnections

Approval procedure for an investment measure (in substance)

1. Request of the network operator with a description of the investment measure and data entry form with data plan

2. If necessary arrangement / confirmation of investments to ensure the technical security or proof of total cost at 110 kV underground cables

3. Power calculations for the determination of the principal expansion needs

Once approved (in principle, not quantitatively), an annual review of the actual investments must take place (ex post control) .

Capital and operating costs calculation follows a determination of the regulator (Ruling Chamber 4 decision BK4-12-656)

1. Annual submission of a data entry form

2. Assets under construction and acquisition and production costs must be fully registered, submission of relevant evidence from the Asset Accounting

3. Evidence on public funding

4. Evidence to be received investment grants

5. Evidence in line with market practices of debt applied interest rate

- Incentive regulation works well as it provides incentives both for efficiency as well as investments
- Strict continuation of the calculation methodology ensures rates of return that are predictable and that can be planned for in the long term
- There is almost no risk for German network operators as a result of the incentive regulation (accounts for a number of risks and individual consideration of the cost of debt)

- Reasons for incentive regulation (revenue cap):
  - Monopolistic markets need to be regulated
  - Asymmetry of information necessitates alternative regulatory approach (instead of cost-plus, rate-of-return)
    - Efficiency benchmark, yardstick etc.

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5. Conclusions

- **ECNS: Electronic Communications Networks and Services Framework 2009**
- **3 Stages:**
  - market definition: relevant market (list of 7 markets)
  - market analysis: designation of SMP operator(s)
  - choice of remedy: imposition of regulatory obligation(s)
- If an operator is found to be dominant (either individually or jointly), at least one specific regulatory obligation must be imposed, which must be **proportionate** to remedy the problem, justified in the light of the Art. 8 FD objectives and **based on the nature of the problem**
- Instead of the former automatism, NRAs are now given the **flexibility** (discretion) to choose the **appropriate** remedy: **increased role** for NRAs
- Remedies must be **effective**: solve the lack of competition
- Remedies are to be chosen from the list in the AD/UD ("*toolbox*")
- Remedies on the retail level to be applied only in case wholesale obligations do not work (concept of the **priority** of strict wholesale reg.)
- Notification (consolidation/co-regulation) procedure acc. to Art. 7/a FD: **Veto power** on stages 1 + 2 (market definition + SMP), but **no veto power** on the application of remedies (stage 3), only comments and the recommendation addressed to the NRA which have to be taken into *utmost account* by the NRAs when adopting the final measures

EC level

Recommendation on Relevant markets
2007/879/EC; 2014/710/EU

Guidelines on market analysis and assessment of significant market power

- Art. 7/a FD

National level

(NRA)

Art. 14-16 FD

Definition of relevant market Market analysis

Assessment of effective competition or significant market power (SMP)

Results can be vetoed

Cancellation, confirmation or imposition of obligations

Remedies cannot be vetoed

➡ Remedy should be effective ↱ solve the lack of competition
Important role of NRAs to choose the appropriate remedy

On the wholesale level:

- Art. 9 AD – Transparency obligation
- Art. 10 AD – Non-discrimination obligation
- Art. 11 AD – Accounting separation
- Art. 12 AD – Access obligation
- **Art. 13 AD** – Price control + cost accounting obligations
  cost orientation: cost of efficient service provision

Additional remedies:

- Art. 13a AD – Functional separation (ultima ratio)
- Art. 13b AD – Voluntary separation

On the retail level in case wholesale remedies do not work:

- Art. 17 USD – Regulatory controls of retail services

- To make the access obligation effective, generally a price-control obligation is needed: cost-orientation + cost-accounting obligations acc. to **Art. 13 AD** (sect. 30, 31 Tel. Act 2012)

- The regulator is placing himself in the same situation as a new operator having to make the investment decisions related to market entry now:

- By setting prices equivalent to the **costs of efficient service provision** the regulator anticipates future prices prevailing on a fully **competitive market** reflecting the costs of efficient service provision (defined as CCA/LRIC/MEA) thus simulating competition and thereby stimulating the process

- As **competition** is the **best driver** for investment the regulator is at the same time incentivising **efficient investment**

- **Cost-orientation** is especially important as it allows to steer the market forces in the right direction by ensuring the optimal allocation of resources at the same time, i.e. creating competitive pressure for economically rational behaviour, no market distortion

- Principles of (efficiently incurred) cost recovery and cost causality

- **Costs** = consumption/usage of the network (production capacity) and its elements to produce a service
- Cost categories:
- **CAPEX** = capital costs (costs of the investment, long term), which consist of
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- OPEX for specific processes (e.g. non recurring ordering costs for the LLU):
  - Top-down calculation of efficient hourly wages
  - Activity based costing to calculate the cost of the process (bottom-up)
- OPEX for operation and maintenance of specific assets:
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  - Multiplication with volume of the assets employed in the efficient network

- **CAPEX**
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  - Efficient *cost of capital* (rate of return, valued asset base) is determined by market data and capital structure.

Cost of capital: **investment value** is the basis for determining the monthly costs for the usage of the telecoms network infrastructure

Might be modelled on a bottom-up calculation (e.g. BNetzA)

This results in an average investment value per access line copper/ fibre

The definition of access may become more complex, when new unbundling technologies are available (e.g. unbundling of colours)

Should take new efficient infrastructure into account at an appropriate point of time (MEA = modern equivalent asset)

- **Cost of capital**: the investment value is the basis for determining the monthly costs for the usage of the telecoms infrastructure and is spread over the economic lifetime of usage of the assets (depreciation)

- **Return on investment**: to determine an adequate return on capital employed BNetzA takes into consideration:

  - The capital structure (equity/debt ratio) of the SMP operator

  - The situation on national and international capital markets and their evaluation of the regulated entity

  - Requirements for the return on investment including the **risk** of the investment and specific risks of the capital employed

  - The long-term stability of the economic framework incl. the competitive situation of the telecommunications markets

The **cost of capital** is defined to be

- the weighted average cost of debt for the different forms of debt held by each operator
  plus

- the **cost of equity** as measured by the returns that shareholders require in oder to invest in the network, given the **associated risks**
  each multiplied with the the shares of debt and equity

- The **rate of return on equity** reflects the **risks**:
  - Competition risk (losing customers to competitors);
  - Technological risk (e.g. more efficient technologies providing the same service (or a better quality) cheaper thus replacing current technologies (could be e.g. migration from copper to fibre lines);
  - Other risks

WACC (II)

Calculation without considering taxes:

$$WACC = \frac{R_E * E}{(D + E)} + \frac{R_D * D}{(D + E)}$$

R_E = cost of equity   E = total value of equity

R_D = cost of debt   D = total value of interest-bearing debt

Calculation when considering taxes:

$$WACC = \frac{R_E}{1 - t_E} * \frac{E}{(D + E)} + R_D * \frac{Debt}{(D + E)}$$

E/D = equity / debt ratio

t_E = taxation

The **Capital Asset Pricing Model** (CAPM) is used to calculate the risk factor when determining the cost of capital for equity. Long term government or company bonds are the basis for the risk free rate.

$$R_E = R_F + \beta_E * P_M$$

R_E = equity rate

R_F = risk free rate

β_E = risk of the regulated asset relative to market risk

P_M = market premium

- Determining the cost of capital:

  - *Return on equity*: determined to be a long-term average value of returns on the German capital market

  - *Return on debt*: determined according to company bonds with a medium remaining time to yield of 9-10 years

  - *Equity ratio*: weighting of the equity ratio according to the liability side of the SMP operator's balance sheet

  - *Rate of return*: assesses the risk of investing

  - *Inflation rate*: projection from the yearly report for the price development of the GDP to calculate the *real rate of return* as CCA is used (covering the price risk in the investment base)

BNetzA implements a basic constant annualisation formula

I = Investment at current costs (gross replacement value)

r = real WACC

T = economic live of the replacement asset

$$a = I_t \frac{(1+r)^T \cdot r}{(1+r)^T - 1}$$

Note: because of price changes and technical progress, BNetzA revaluates the assets replacement value and the cost of capital in the next regulation period. The time span of the regulatory period in Germany is usually two years.

If a regulator decides on longer regulation periods, a tilted annuity adjusted for price evolution / technical progress might be better suited.

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- Application of Deutsche Telekom received on 20 Jan. 11: 12.90 €

- New copper ULL monthly price as of April 1st 11:
  10.08 € based on the WIK Bottom-up-Model with CCA/LRICs
  (efficient investment sum of 1,051.77 € per line; 8.12 €)

- BNetzA is using the WIK **bottom-up analytical cost model** since the beginning: thus ensuring a the highest predictability

- **Cost of capital: 7.11% real rate of return (WACC), equity: 11.16 % pre-tax rate, which was calculated for the first time with CAPM:** $R_E = R_F + \text{ß}_E * P_M$

  - $\text{ß}_E = 0.78 * P_M = 4.73\% = $ risk premium $= 3.69\%$

  - $R_E = 4.07\% + 3.69\% = 7.76\%$ (nom., after tax, tax-factor: *1.44)

  - $R_F = 4.07\%$; $R_D = 4.07\% + 1.70\%$ (debt risk premium)

  - Inflation rate: 1.02%

- 2011: **Rates** approved for access at the MDF: **€ 10.08** (monthly rental) (reduced from 10.20 €)

- Access to the local loop at the street cabinet: **€ 7.17/month** (price for subloop unbundling)

  Cost increasing effects:

  – Increase in the investment level due to a rise in several price positions (e.g. civil engineering)

  – Lower economies of scope in shared use of other infrastructure

  – Decrease in unit provision in copper access networks

  Cost decreasing effects:

  – Decrease of efficient operating costs due to other calculation components such as leasing expenses and operating and fault clearing costs

- Prices approved for 2 years until **June 16th 2013**

- **Fibre loops:** access obligation, but ex-post price obligation

- 21 March 2011
  - last Regulatory Order covering Market 4, *inter alia* mandating access to the ULL and SLU
  - Copper lines regulated ex-ante
  - Fibre lines are regulated ex post

  - ULL decision in 2011 fixed the price at 10.08 €
  - Draft ULL decision published for consultation on 10 April 2013
  - ULL monthly rate slightly increased for copper access to **10.19 €** a. slightly decreased for SLU to **6.79 €** (from 7.17 €)
  - Prices entered into force on 1 July 2013 and be valid for 3 years
  - Consultation period ended on 24 April 2013
  - Art. 7a Notification to the Commission on 22 May 2013
  - Comments received on 24 June 2013
  - Final decision published on 26 June 2013 confirming the preliminary rates

- All assets valued at current replacement costs as the best **make-or-buy-signal** for investment as in all previous decisions

- BU-LRIC+ analytical cost model of WIK used to calculate the efficient costs of rebuilding a modern access network

- Depriciation period for the feeder cable (and buried cable) shortened from 20 to 15 years and prolonged for the distribution cable incl. buried cables from 20 to 25 years as technology is being moved down to the street cabinet

- Civil engineering: 40 years (before 35 years)

- **Rate of return: 6.77% (lower than in 2011: 7.11%)**, due to extremely low government bonds interest rates (reference for risk free rate)

- Investment per local loop: 1,115.71 € (2011: 1051.77); cost of capital: 8.15 € (ar. 80% of monthly rate)

- Investment per subloop: 793.35 €:

- Investment signals encouraging competition at the street cabinet level

- Further prices fixed for e.g. multifunctional cabinet and duct access (0.09 € per meter per month)

BNetzA still sees BU-LRIC CCA as the asset valuation method, that best reflects cost of opportunity for an efficient entrant (gross replacement costs).

At present in Germany the copper pair is still regarded as the modern equivalent asset (MEA). The same method would be applied to fibre in case costs are to be calculated. The decision which access infrastructure is regarded as MEA depends on individual national circumstances.

BNetzA sees this method as appropiate to promote effective competition <u>and</u> efficient investment. Devaluation of alternative investment is avoided.

Regulation is only one factor influencing the investment decision
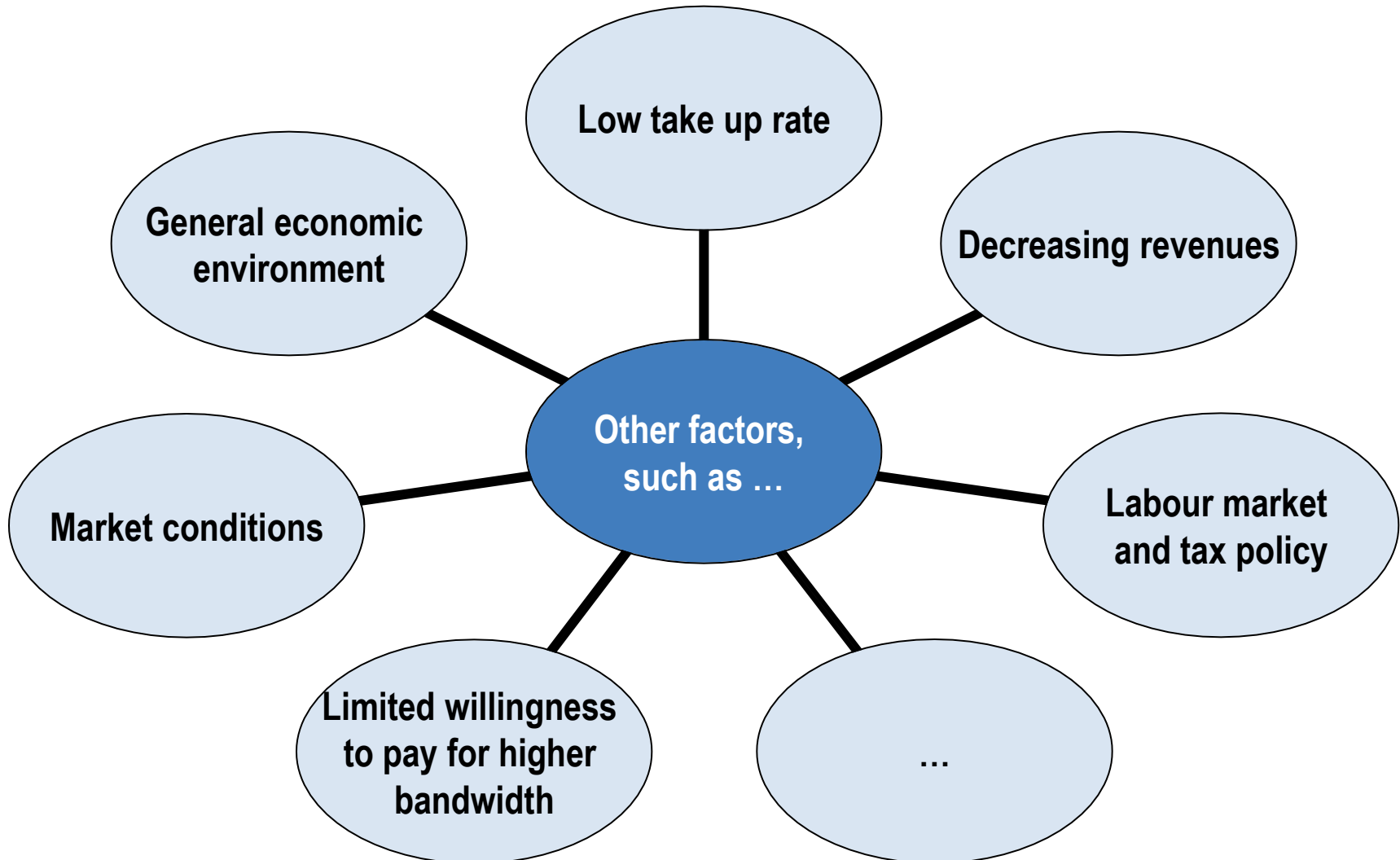
1. Scene setting

2. Comparison of energy and telecoms (price) regulation

3. Energy sector: Incentive regulation in Germany

4. Telecoms sector: Pro-competitive regulation

5. **Conclusions**

Comparison – Cost of equity calculation 2011

Sector/ CAP-M Parameter	Energy	Telecommunications
β_E	0.79 [0.66]	0.78
P_M	4.55% [4.40%]	4.73%
Risk premium $= \beta_E * P_M$	3.59% [= 2008]	3.69%
R_F	3.8%	4.07%
$R_E = R_F + \beta_E * P_M$ (nom. after tax)	7.39%	7.76%
Tax factor (t): $R_{E\ before\ tax:} = R_{E\ after\ tax} * t$ $R_R = R_{nom} - \pi$ (inflation rate)	1.224 **9.05%**	1.44 11.16% 11.16% - 1.02 = **10.14%**

- Regulation is only one factor influencing the investment decision
- A risk adequate rate of return is important to incentise investment, however the rate of return should not distort the investment rationale/calculation of the operator, if e.g. the risk of investment in NGA infrastructure increases, the risk premium will reflect this
- **Predictability** is key for investors' confidence as uncertainty increases costs, therefore regulators should:
  - Announce the regulatory strategy (*commitment*)
  - Long and stable regulatory periods (*continuity*)
  - Implement the strategy as announced (*credibility*)
- Regulation cannot „*regulate away*" the risk which is still born by the investor for which he gets the risk premium, the choice of the project to invest in stays with the operators/investors (no investment planning by the regulator)
- Regulation can also not grant more than the market premium, i.e. „*add-on*" as this would incentivise inefficient (stranded) investm.
- Regulation does not create a „*regulatory risk*", as long as it aims at following the calculation of an efficient investor, i.e. calculates a risk adequate rate of return

- Energy: focusing in maintaining the viability of the grid

- More TD when fixing the RAB, more detailed provisions regarding cost accounting etc., less discretion

- Telecoms: focusing on competition as the driver for efficient investment, different transmission mechanism as it aims at incentivising market processes, i.e. ensuring investments also from alternative operators (competitors)

- More BU when calculating the investment value, less detailed provisions, more discretion

- Setting the reasonable rate of return needs to reflect the risk, which is different across the sectors, also important: how the investment/asset valuation is done

- All parts of the cost calculation are subject to the efficiency requirement (efficient investment, no over-capitalization)

- Both, in energy as well as in telecoms regulation the CAP-M (financial market model) is used to determine the rate of return on equity

- Internal working group: remains in place to analyse future academic and other developments to determine the rate of return (risk assessment) and to continue to ensure consistency of cost of capital calculation across sectors

Thank you for your attention

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Back-up

Determinants of the revenue cap

$$RC_t = C_{pnc,t} + [C_{tnc,0} + (1- A_t) * C_{c,0}] * ((CPI_t/CPI_0) - PF_t) * EF_t + Q_t + (VC_t - VC_0) + S_t$$

- Different cost-categories ("controllable", "non-controllable", "temporarily non-controllable", "volatile")

- Expansion factor

- Quality element

- Adjustments for prices and productivity

- Deviations from revenue cap are collected on a regulatory account and resolved at the end of the period

- Simplified Revenue cap

$$EO_t = KA_{dnb,t} + [KA_{vnb,0} + (1-V_t) \cdot KA_{b,0}] \cdot [(VPI_t/VPI_0) - PF_t] \cdot EF_t + Q_t$$

- Different cost-categories (**non-controllable**, **temporarily non-controllable**, **controllable**)
- Expansion factor
- Bonus/malus quality of supply (quality element)
- Adjustments for prices and productivity
- Deviations from revenue cap are collected on a regulatory account

- Simplified Revenue cap

$$EO_t = KA_{dnb,t} + [KA_{vnb,0} + (1-V_t) \cdot KA_{b,0}] \cdot [(\textbf{VPI}_\textbf{t}/\textbf{VPI}_\textbf{0}) - \textbf{PF}_\textbf{t}] \cdot \textbf{EF}_\textbf{t} + \textbf{Q}_\textbf{t}$$

- Different cost-categories (non-controllable, temporarily non-controllable, controllable)
- **expansion factor**
- **Bonus/malus quality of supply**
- **Adjustments for prices and productivity**
- deviations from revenue cap are collected on a regulatory account

Regulatory formula to calculate the revenue cap

$$EO_t = \left[KA_{dnb,t} + KA_{vnb,0} + (1 - V_t) \cdot KA_{b,0} \right] \cdot \left(\frac{VPI_t}{VPI_0} - PF_t \right) \cdot EF_t + Q_t + \left(VK_t - VK_0 \right) + S_t$$

- Elements fixed before regulatory period is started

  - Costs
    - Permanently Non-Controllable Costs (KA_{dnb})
    - Temporarily Non-Controllable Costs(KA_{vnb})
    - Controllable Costs (KA_b)
    - Volatile Costs (VK)

  - Allocation-factor (V) → splits the inefficiency over the regulatory period

  - Productivity factor (PF) → often called X-gen

  - Balance of the regulatory account (S)

Regulatory formula to calculate the revenue cap

$$EO_t = \boxed{KA_{dnb,t}} + \left[KA_{vnb,0} + (1 - V_t) \cdot KA_{b,0} \right] \cdot \left(\boxed{\frac{VPI_t}{VPI_0}} - PF_t \right) \cdot \boxed{EF_t} + \boxed{Q_t} + \left(\boxed{VK_t} - VK_0 \right) + S_t$$

- Possible adjustments during the regulatory period

  - Costs

    - Permanently Non-Controllable Costs(KA_{dnb})
    - Volatile Costs (VK)

  - Consumer Price Index (VPI)

  - Expansion Factor (EF)

  - Quality Element (Q)

Incentive Regulation in Germany

- Simplified procedure
  - Valid for DSO (on request) with
    - less than 15,000 customers (Gas-DSOs)
    - less than 30,000 customers (Electricity-DSOs)

  - At this moment approximately 2/3 of the DSOs join the simplified procedure
  - General allocation of costs (45% non-controllable, 55% controllable)
  - Common efficiency for all network operators
    - 87.5% (Electricity/Gas) within the first regulatory period
    - 96.14% (Electricity) and 89.97% (Gas) within the second regulatory period

- **No planning and approval costs**, ie the costs incurred before a line is taken into service are borne by the consumer

- **Cost increases are recognised fully** where there is proof of good reason for the increase

- There is no risk for **German network operators** as a result of the incentive regulation account and individual consideration of the **cost of debt**

- **"Stranded investment" costs are borne entirely** by the consumer (for instance, if the line is built but the wind farm doesn't materialise)

- **No risks from fluctuating capacity**
  - as a result, for instance, of weather-reflective feed-in, or
  - cyclical consumption, or
  - technical faults in the generating facilities (eg wind farms)

- Proposal of BNetzA: Strong limitation of liability. Regarding construction and operation of <u>offshore connection lines</u> TSOs are liable for claims of offshore-operators only with respect to intention and gross negligence. Liability for damages due to gross negligence is limited. Any additional liability of TSOs is excluded.

- Real time refinancing; investors earn money from the very first day

- Actual cost of debt are remunerated, if the cost of debt correspond to market condition

- Strict continuation of the calculation methodology ensures risk-adequate rates of return that are predictable and that can be planned for in the long term

9.05 % = Rate of return on equity for investment in new and expansion facilities is attractive !

Via leverage a raise to double-digit returns is realized !

BNetzA's philosophy on returns

More important than the nominal rate of return is the sustained profitability of the investment, generating steady, stable cash flow.

To sum it up:

Unique combination of rate of return and investment certainty

Investors, also abroad, generally confirm that this approach is appropriate, after the financial crises investors are looking for safe harbors – utilities can take over the role of government bonds

- Determining:
    - the appropriate capacity to satisfy the forecasted demand and the appropriate investment parameters
    - an appropriate rate of return
    - the appropriate asset valuation method
    - the appropriate time of depreciation for each cost component
    - the appropriate cost annualisation method (spreading the initial investment outlay over time = annualised investment cost)
    - the appropriate time allocations for various processes (OPEX)
    - the appropriate rental charges and overheads
    - the appropriate allocation of common costs (allokation keys)

Estimated costs for nationwide fibre roll-out: 70 to 80 bn €

Synergies (infrastructure sharing)

Open Access

New technologies, e.g. Vectoring

Possible means to reduce required investment

Mix of technologies

Pro-competitive SMP regulation

Karte: GinkGoMaps
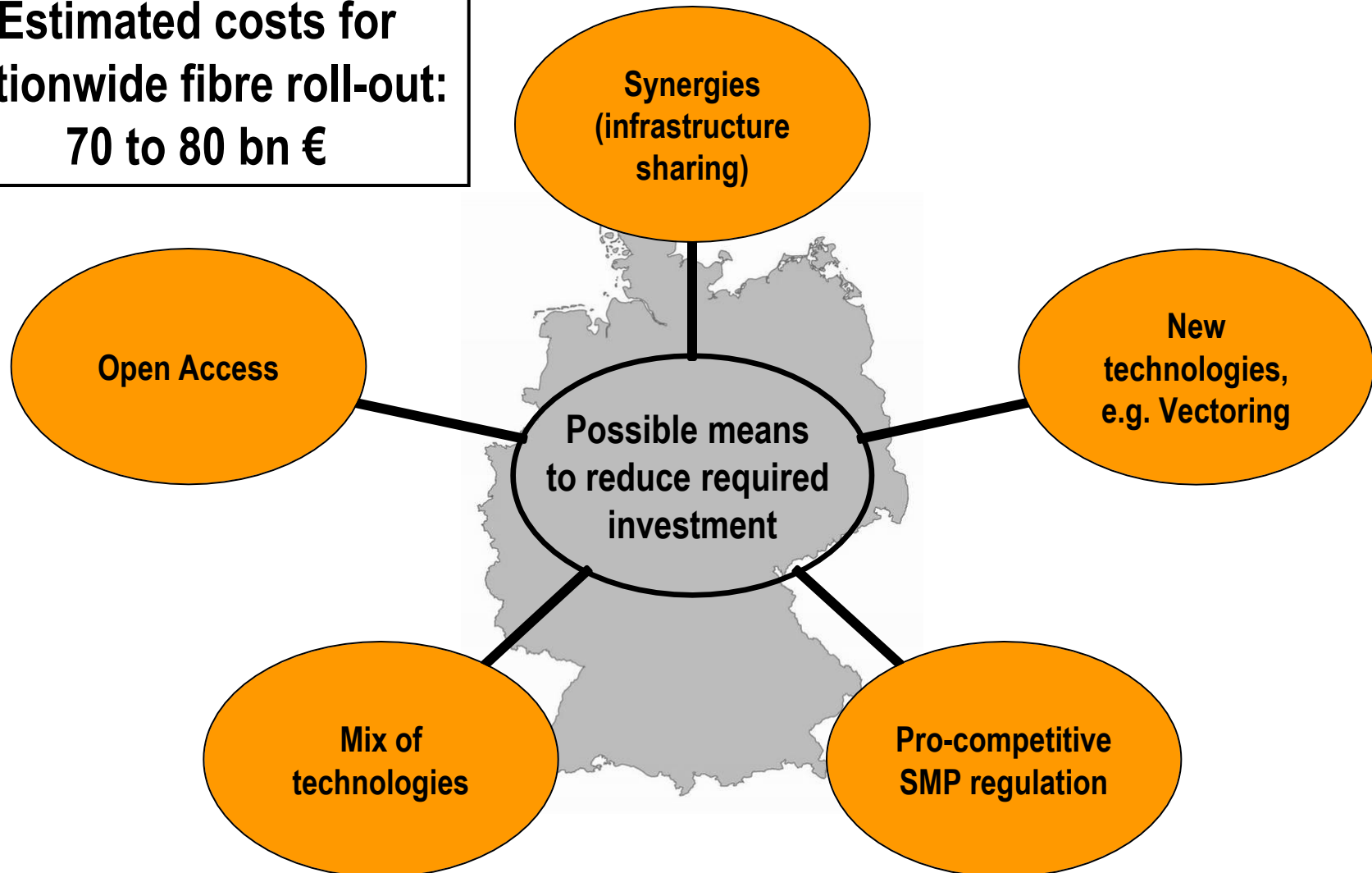
- Independent higher federal authority in the scope of business of the Federal Ministry of Economics and Energy

- **Sector-specific regulator** tasked with **ensuring effective competition** in 5 network industries:
    - **Telecommunications and Posts** (since 1998),
    - **Electricity and Gas** (since 2005), and
    - **Railways** (since 2006)

- Electricity and **network planning** (since 2011), and network permitting (2013)

HQ in Bonn

- BNetzA employs ar. 200 staff in energy <u>regulation</u>, up to 240 staff are being recruited for electricity network <u>planning and permitting</u>
Overall headcount for <u>all</u> sectors: ar. 2700 staff members

- Budget: 207m euro (2015), BNetzA is tax funded

BNetzA Organisation

Litigation Office

Management Office

President

Vice President   **Vice President**

Press Office

President's Chamber
(Ruling Chamber 1)

Ruling Chambers

2

3

4

5

6

7

8

9

Human Resource & Accounting Department

Information Technology and Security

Department for Economic Regulation Telecoms incl. numbering

Department for Legal Telecoms Regulation, Frequency Manage.

Department for Technical Telecoms Regulation incl. standardization

Department for International Relations & Postal Regulation

Department for Energy Regulation

Department for Grid Planning (NABEG)

Department for Railway Regulation

30 Regional Offices of BNetzA