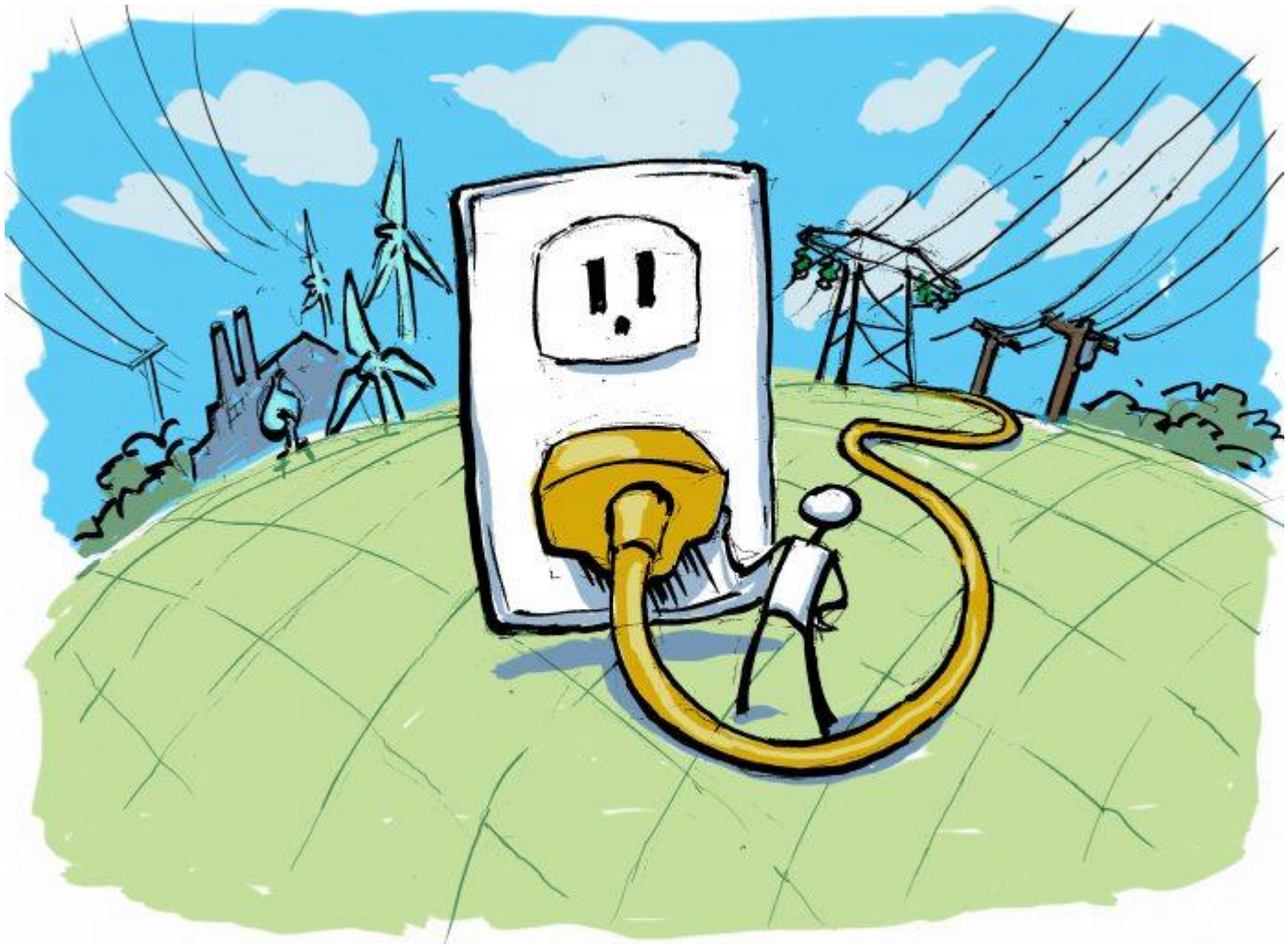
Bundesnetzagentur

# Bundesnetzagentur: Incentive regulation

Intercambio de OSINERGMIN y BNETZA

Dr. Stefan Arent, 01 06 2021

# The Grid is the Key



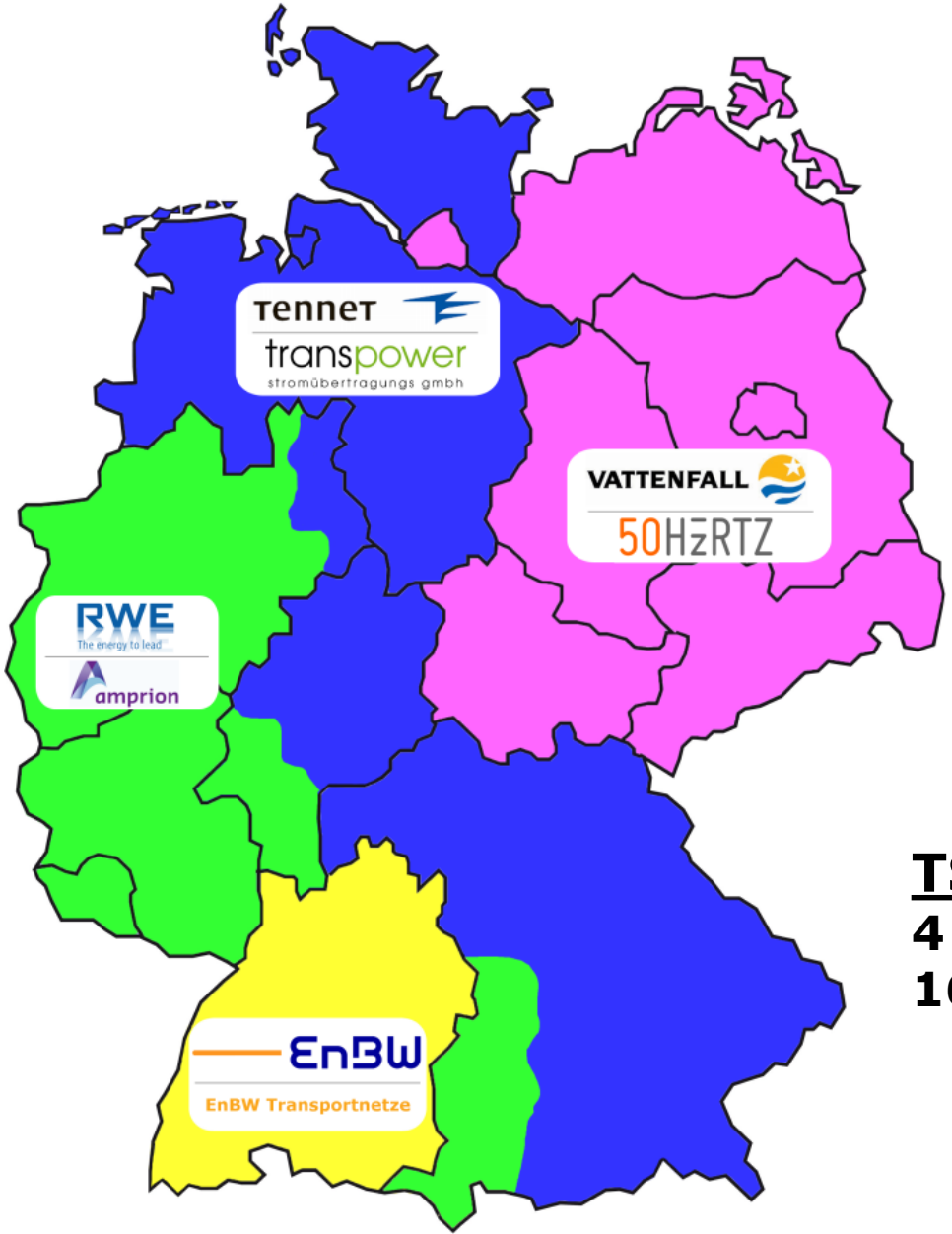
Source: (State Dept./Doug Thompson)

# Transmission System Operators in Germany

<u>TenneT</u>
(formerly
E.ON Netz,
acquired by
TenneT,
publicly-owned
Dutch TSO,
Ownership
Unbundling)

<u>Amprion</u>
(subsidiary
of RWE,
a Vertically
Integrated
Undertaking)

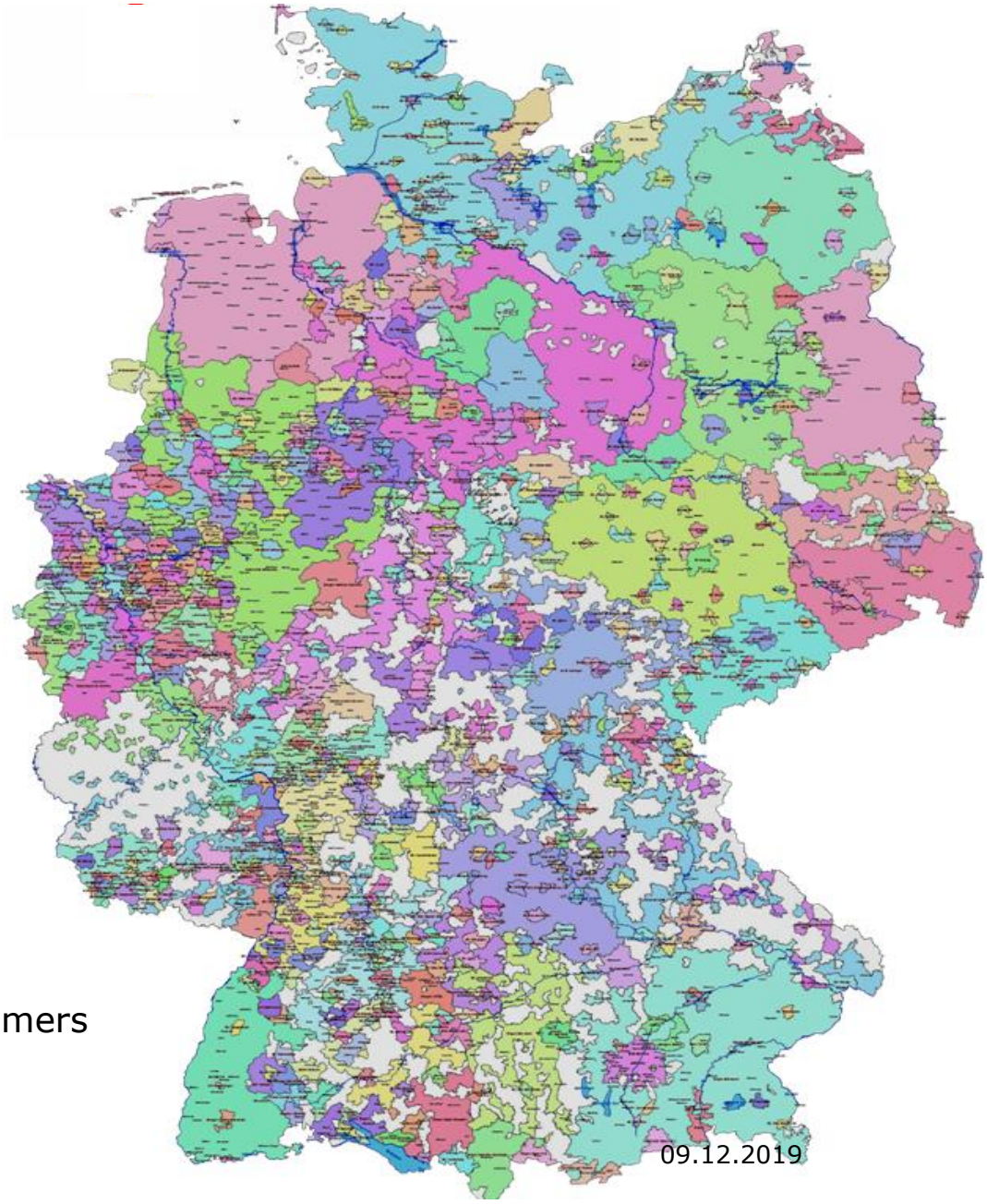
<u>TransnetBW</u>
(subsidiary
of EnBW,
a Vertically
Integrated
Undertaking)




<u>50Hertz</u>
(formerly
Vattenfall Europe
Transmission,
acquired by Elia,
publicly-owned
Belgian TSO
and IFM,
an Australian
investment fund,
Ownership
Unbundling)

**<u>TSOs:</u>**
**4 electricity**
**16 gas**

# Distribution System Operators in Germany



09.12.2019

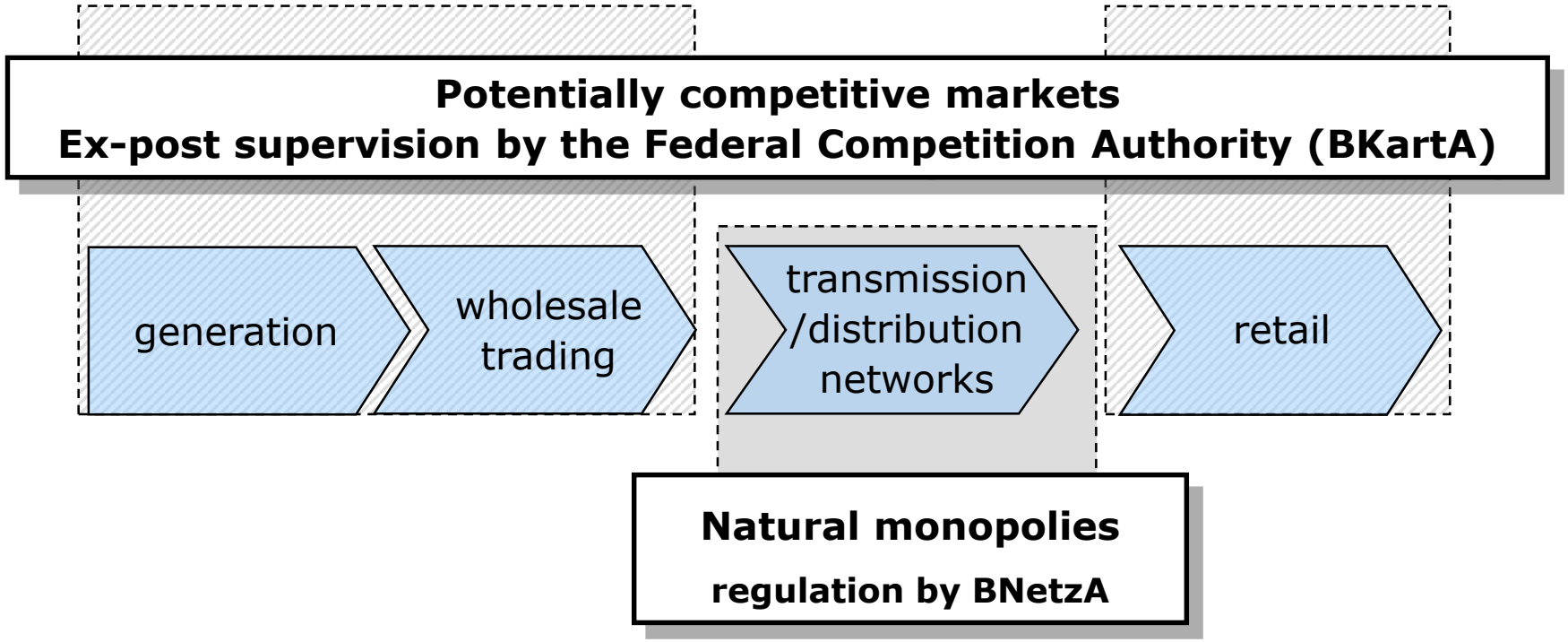
<u>DSOs:</u>

878 (797*) electricity (for 2017)

717 (692*) gas DSOs (for 2017)

* With less than 100 000 connected customers

# Classic Scope of Regulation




**BNetzA regulates:**

Fair **access** to electricity and gas networks for all market participants

Electricity and gas network **tariffs** → incentive regulation

# Rationale of incentive regulation

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**

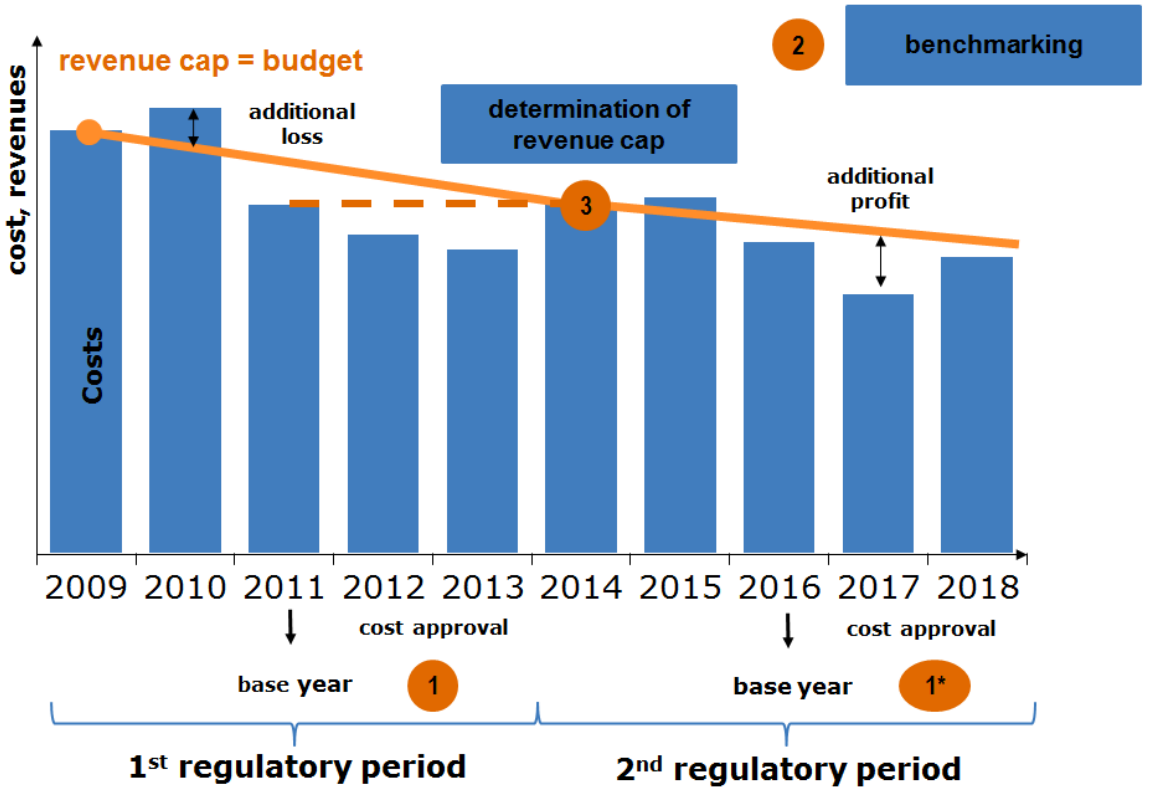
Revenue cap ≠ price cap:
Avoids giving network operators an incentive to increase sales

# Overview on the German incentive regulation

**Objective:**
Enhance the monopolist's focus on efficiency and quality of supply

**Type:**
Revenue-cap-regulation (not a price cap)

**Implementation**
Benchmarking:
- compare efficiency among network operators
- efficiency target (catch up to best in class)




**Key features:**
Revenues and costs decoupled for a regulatory period
- regulator approves **revenues** ex-ante (budget)
- regulatory periods of five years
- network operators control **costs** autonomously within regulatory period (losses and profits)

# Main features of German regime (1)

- Objective: enhance the monopolist's focus on **efficiency** and **quality of supply** and provide for an **adequate investment environment**
- **Revenue-cap-regulation (not price cap)**
- **No volume risk,** instrument of 'regulatory account' captures significant changes in volumes transported
- Regulatory periods of **five years**
- **Equity return** on capital invested is based on a regulatory decision, determined by the Ruling Chamber 4 based on transparent and sound methodology
- Incentive regulation **reform** as from 3rd regulatory period with CAPEX true up*, efficiency bonus*, more transparency

* only for DSOs

# Main features of German regime (2)

**Benchmarking**

- **compare efficiency** among network operators
- **mimic competition**
- **"x ind" as individual efficiency target** (catch up to best in class)
- inefficiencies must be reduced within five years

„x gen" as **general productivity factor** to reflect technological progress and sector specific price developments in the network industry

# Process of incentive regulation

**1** **TOTEX: 100**

## cost approval

- individual per network operator
- approval of OPEX and CAPEX (TOTEX)
- valuation of CAPEX using imputed costs
- imputed rate of return on equity
- distinction between ‘controllable’ and ‘non-controllable’ costs

**2** **x-factor: 10%, i.e. 2% p.a.**

## efficiency benchmarking

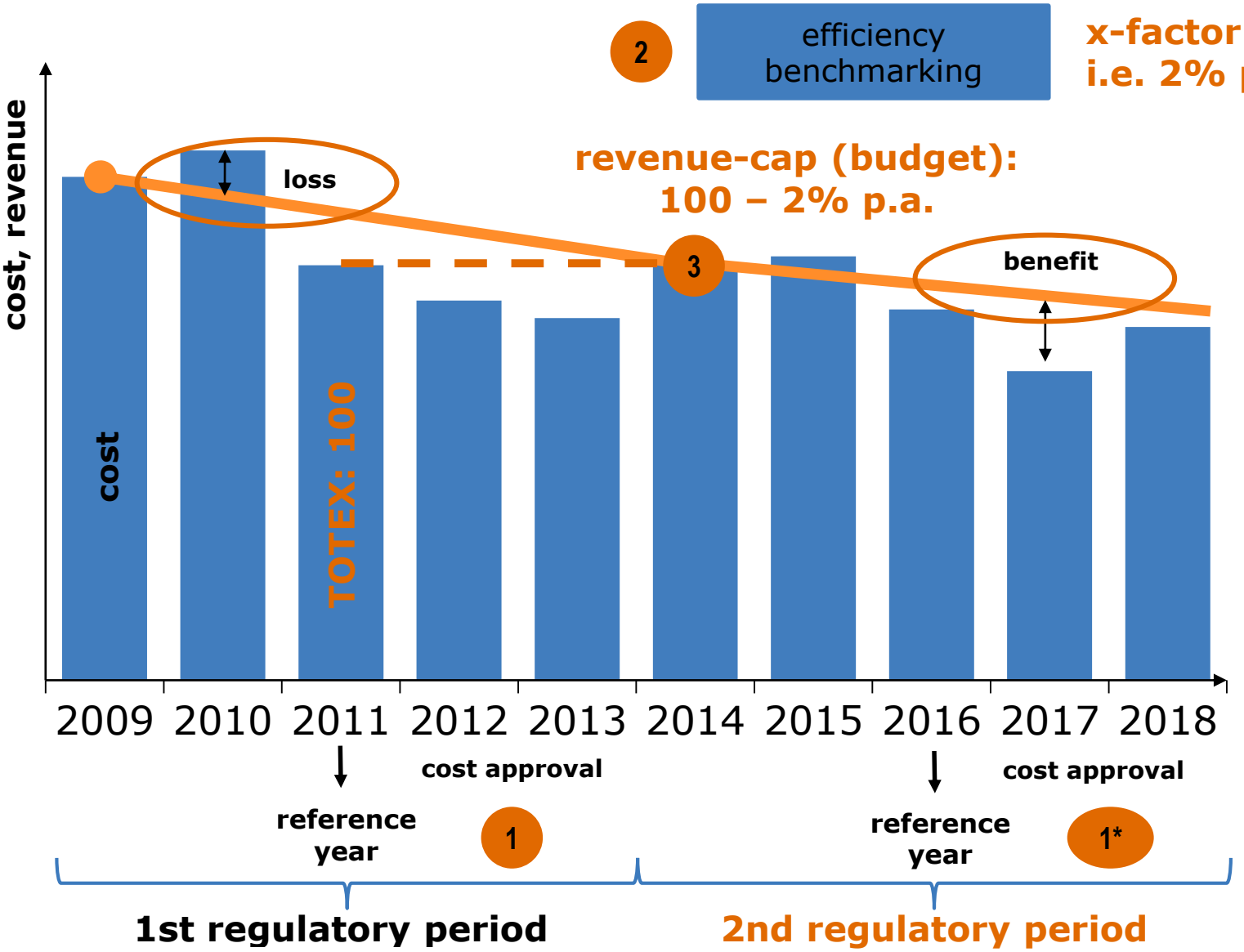
- individual network operators vs. peers
- only controllable costs
- TOTEX
- inputs (costs) vs. outputs (e.g. area supplied, network length)
- benchmark: individual efficiency vs. best in class (relative efficiency)

**3** **revenue-cap: 100 – 2% p.a.**

## determination of revenue cap (budget)

- individual per network operator
- inefficiencies identified in benchmarking must be eliminated over 5 years (x-factor)
- general productivity factor
- compensation for inflation
- no volume risk

# Incentive regulation



## 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")
- Adjustment factor (reducing inefficiencies over time, $A_t$)
- Expansion factor ($Ef_t$)
- Quality element ($Q_t$)
- Adjustments for prices $(CPI_t / CPI_0)$ and productivity $(PF_t)$
- Deviations from revenue cap are collected on a regulatory account and resolved at the end of the period ($S_t$)

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

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

- 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

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

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

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

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 reform 2016: Main changes for DSOs as of 3rd regulatory period

**Start:** Next regulatory period (gas 2018, electricity 2019)
**Field of application:** DSOs

**Interim regulation:**
Keeping in-period excess capital cost allowance ("Sockel") for 3rd regulatory period

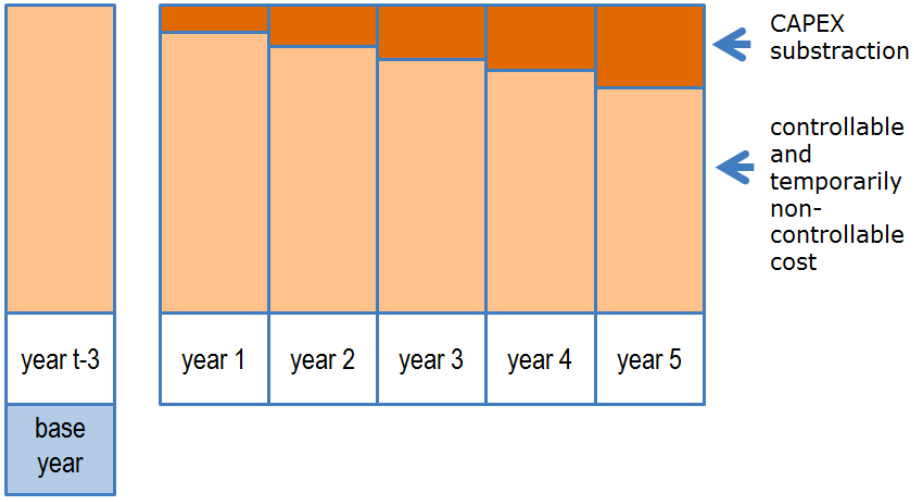
**Change** from budgetary approach to **CAPEX true up** (based on actual investments and depreciation)

- ex-ante: **CAPEX substraction**
- in period: **CAPEX in period top up**
- **OPEX:** budgetary approach

**Expected Result:**

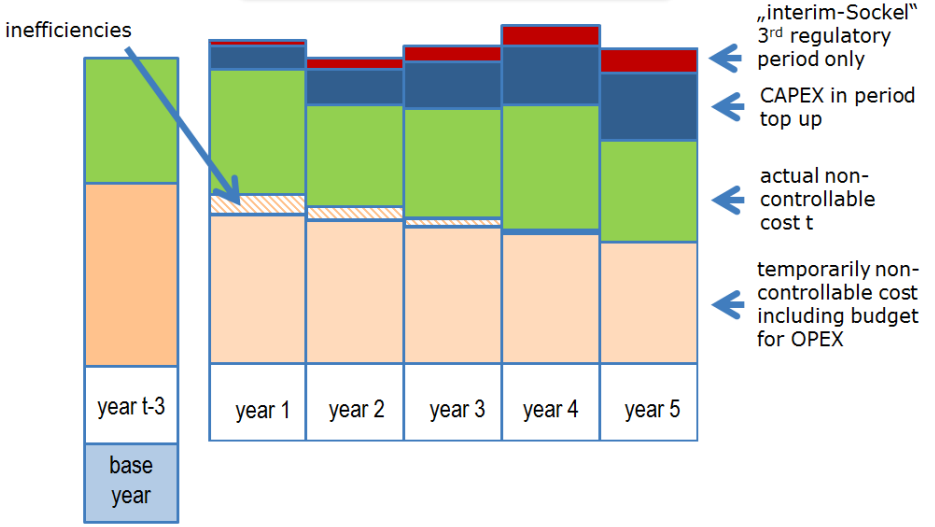
- Reduced inefficiencies within 5 years
- More transparency

## CAPEX Substraction



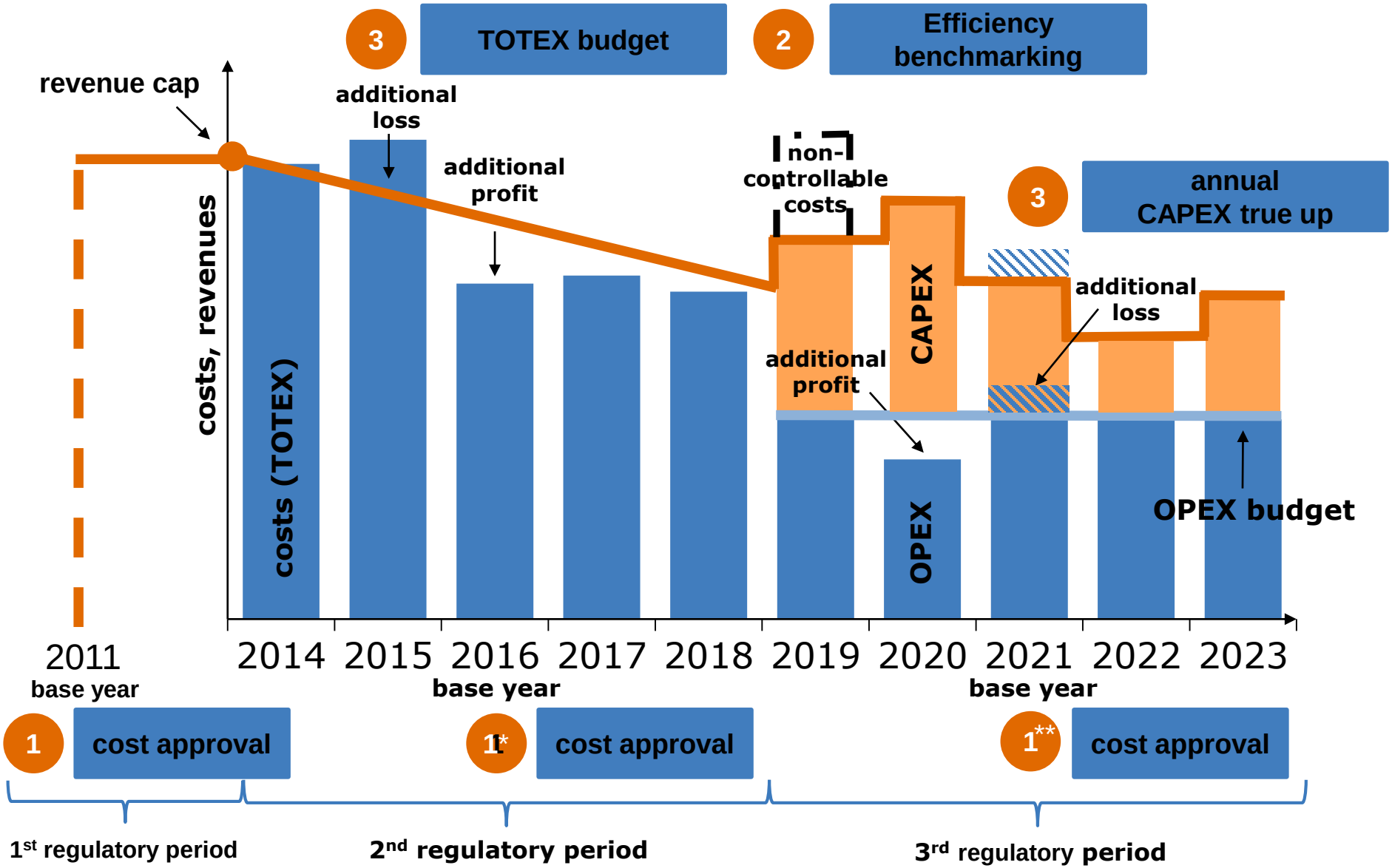

Decreasing CAPEX are determined ex ante, prior to the regulatory period; actual reduction of CAPEX reflected in revenue cap.

## CAPEX in period top-up




True up for investments, after the base year. No expansion factor and investment measure for DSOs.

# Principles of incentive regulation for DSOs (3rd regulatory period)



# Stable regulatory framework for TSOs

No incentive regulation reform for TSO (electricity/gas)

- keeping budgetary approach (and inherent benefits) and investment measure (IM)
- IM: costs are included in revenue cap in the year of activation and are temporarily exempted from efficiency benchmarking
- only adjustment regarding IM: deduction of project specific share for replacement from allowed IM; no adjustments for IM already approved

# Further changes

determination of the x-factor:

- no compulsory parameters (cf. § 13)
- keeping best-of-four (cf. § 12)
- constant returns to scale (cf. appendix 3)

efficiency bonus (cf. § 12a)

more publications/more transparency (cf. § 31)

changes to effective date for non-wage labour costs (cf. § 11 section 2 sentence 1 number 9)

changes to regulatory account (cf. § 5)

Link Incentive Regulation Ordinance:
https://www.gesetze-im-internet.de/bundesrecht/aregv/gesamt.pdf

# Assessment of 2016 Reform

- TOTEX benchmarking is an established and accepted regulatory tool.
- TOTEX benchmarking and bonus are technologically neutral, but OPEX-CAPEX bias through annual CAPEX true up and certain OPEX classified as non-controllable costs.
- Bias in parameters may disincentivize alternatives to copper (importance of cost driver analysis). Issue increases with increasing smartness and heterogeneity of network operators.
- Methodology is complex and provokes lawsuits.
- Increased transparency is a pivotal asset for all parties involved.

# BNetzA evaluation of incentive regulation

**Main findings in BNetzA‘s Evaluation Report of the German incentive regulation:**

Report (acc. to sect. 33) published in January 2015

Regulation has not had any negative impact on the investment activity of network operators

The incentive regulation provides network operators with incentives to operate the network efficiently

The quality of supply remains high despite the gains achieved in efficiency

Some adjustments will have to be made to the current scheme:

- Additional incentives that incentivise network operators to invest in intelligent solutions through an “efficiency-carry-over” or “bonus” for very efficient network operators
- Making investment conditions more compatible with the *Energiewende*

Annual adaption of the cost of capital dismissed as it would give a wrong incentive towards capital-intensive grid expansion strategies

# Summary Incentive regulation

Germany uses an incentive regulation regime with a **Revenue Cap**

- Network operators decide about investment (level and costs)
- Investments to quality (enhancement) is incentivized by quality element → but investment strategy is chosen by firms, SAIDI values remain high
- Investment measures allow to take account of new investment during the regulatory period, included in the efficiency benchmarking only in the next period
- Expansion of the network is considered by expansion factor → factor does not consider the quality element for one regulatory period
- All investments are cost- and quality benchmarked at least in the next regulatory period
- **The overall cost and technical quality of an investment/network is determined by the market(simulation) [=benchmark]**

# Determination of the rate of return on equity

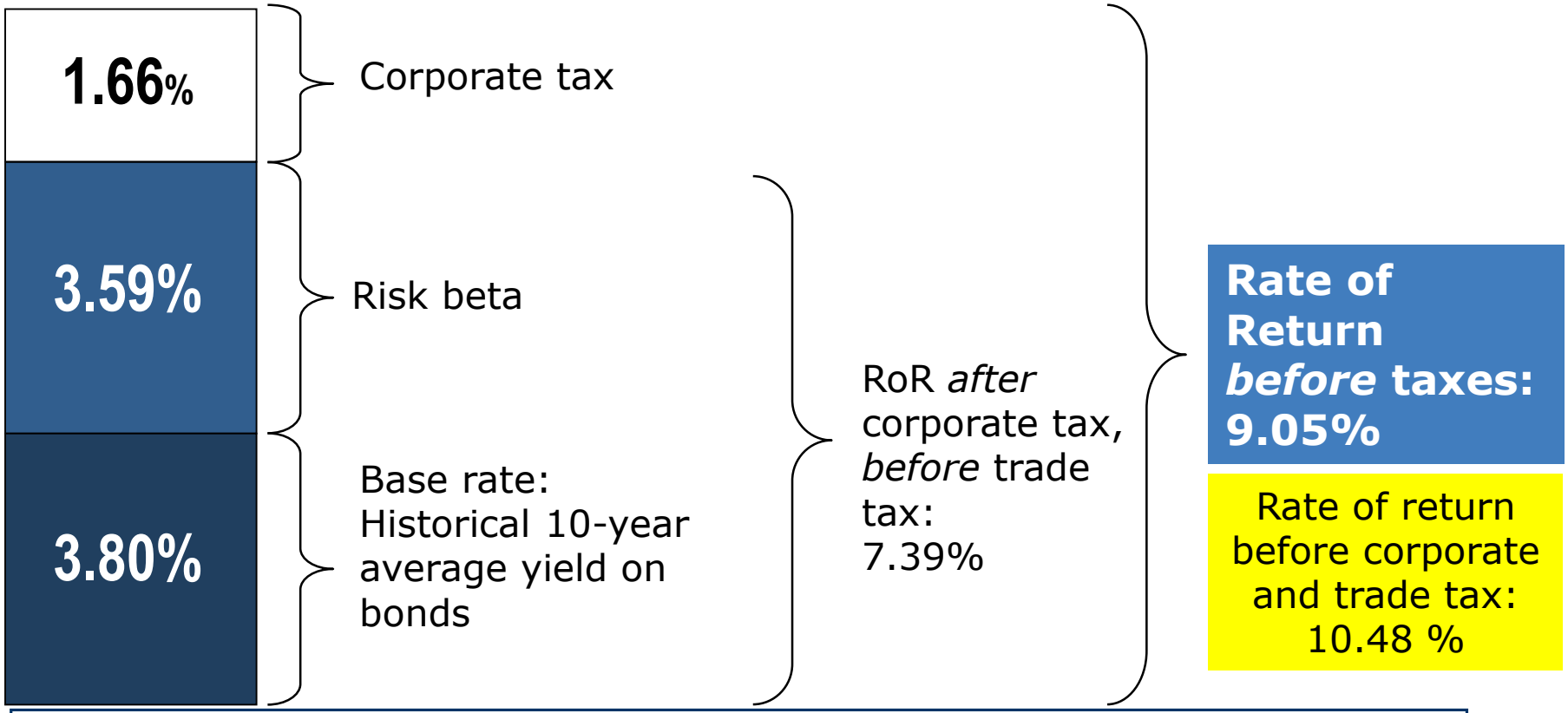
# Regulated rate of return on equity (1)

Setting the cost basis: appropriate rate of return for the 1st regulatory period

- 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)
  - $R_E = R_F + ß_E * P_M = 4.23\% + 0.79*4.55$ (= 7.82%)
- Rate of return on equity for 2nd period: 9.05% (2 Nov. 2011): next slide

# Regulated rate of return on equity (2)

## Rate of return for the 2nd regulatory period



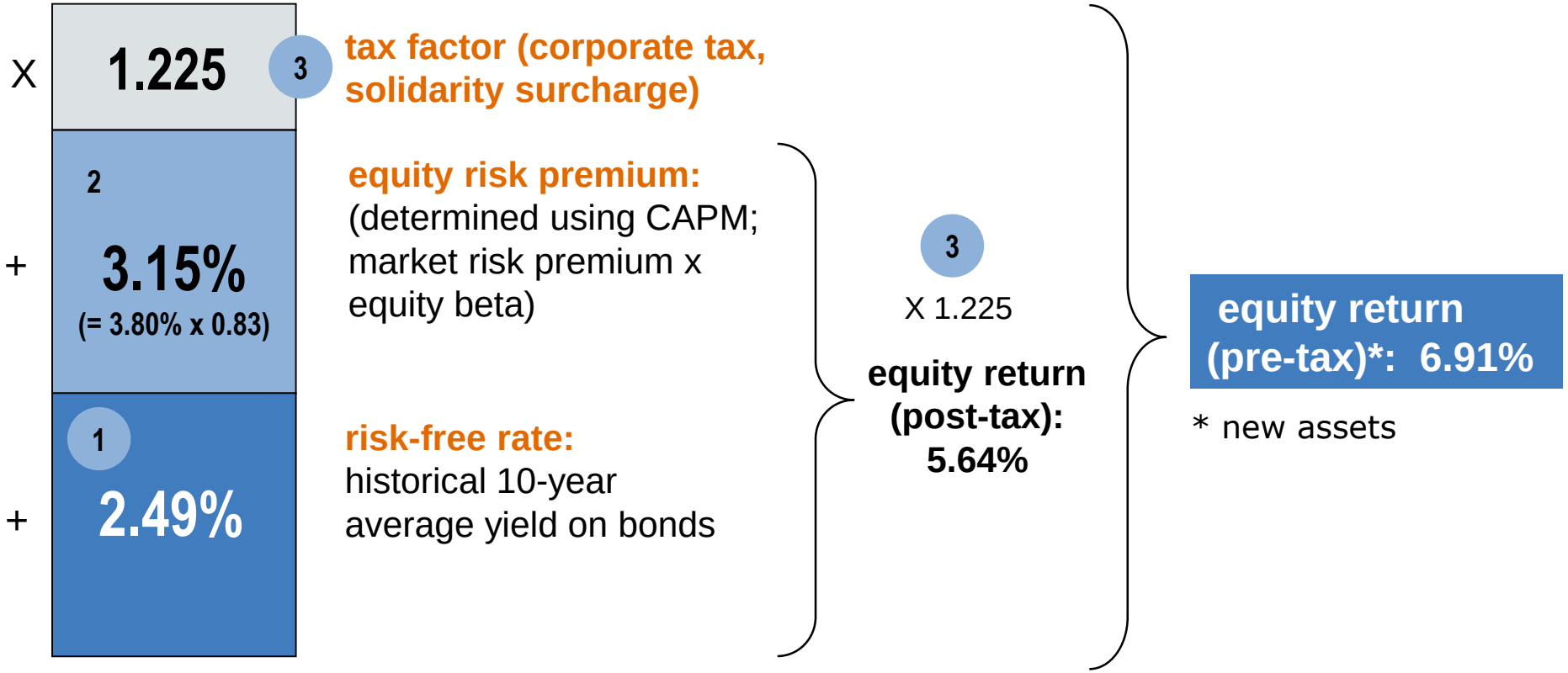

The full RoR is paid on up to 40% of the necessary assets.
The regulated RoR on equity exceeding the 40% share is currently ca. 4 %.
The cost of debt is passed through as long as it corresponds to current market rates (ca. 3%).
Decision of BNetzA was confirmed by the Court in Duesseldorf on 18 May 2017

# Regulated rate of return on equity (3)

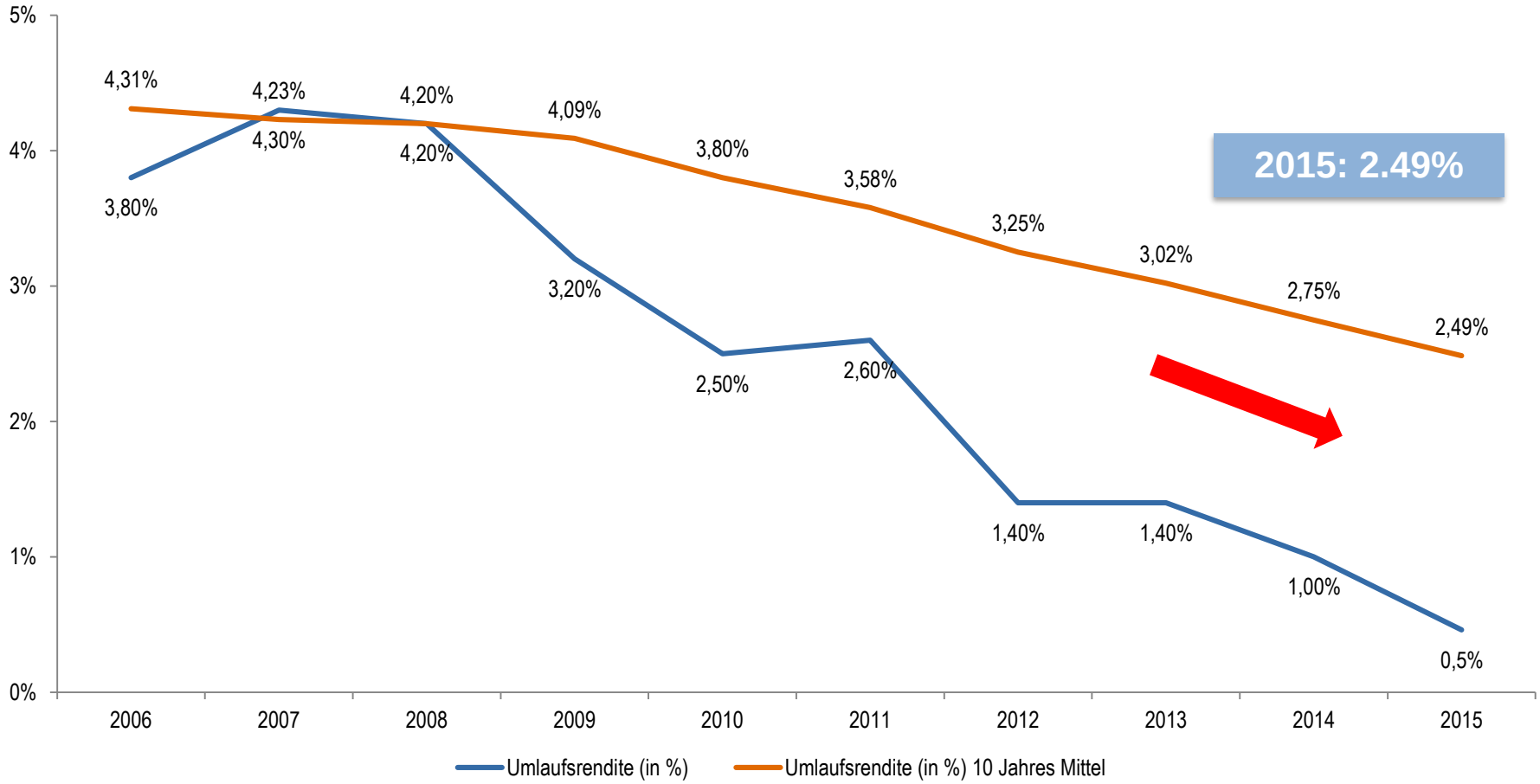
**The equity return is determined by the Ruling Chamber 4.**

**Determination from 05.10.2016 for the 3rd regulatory period.**

**Determination for electricity and gas.**



# 1 Building block 1: risk-free rate




**Current average risk-free rate 2016: 0.25%**

# Building block 2: equity risk premium

equity risk premium = market risk premium x ß

market risk premium (3.8%):

- Premium on investments in a fully diversified portfolio
- long-term time series over > 100 years
- world wide approach (23 countries: AU, AT, BE, CA, CN, DK, FI, FR, DE, IE, IT, JP, NL, NZ, NO, PT, SA, RU, ES, SE, CH, UK, USA)
- Determination as average of arithmetic average and geometric average based on the time series from Dimson/Marsh/Staunton

ß (equity beta = 0.83)

- company specific risk
- 14 network operators from 8 countries

equity risk premium 2015* = 3.8% x 0.83 = **3.15%**

*equity risk premium 2007: 3.59%, 2010: 3.59%

# Building block 3: taxes

imputed taxes

tax factor for corporate tax and solidarity surcharge

**1.225**

trade tax reflected in tax factor; considered as seperate cost categorie in cost approval

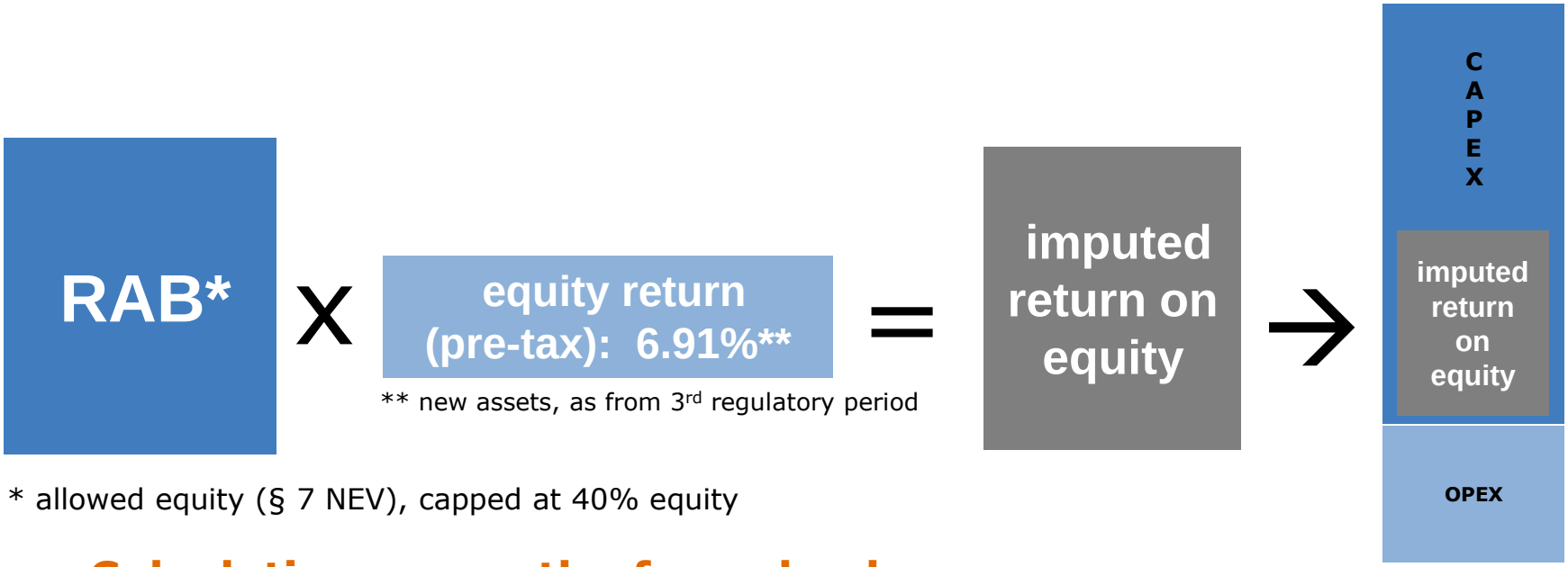
Comparison Rate of return on equity:

| Asset type | Rate of return on equity for the 2nd period (before tax) | Rate of return on equity for the 3rd period (before tax) |
|---|---|---|
| New assets (activated as of 1 Jan. 2006) | 9.05% | 6.91% |
| Old assets (activated until 31 Dec. 2005) | 7.14% | 5.12% |

# Calculation of imputed return on equity

**Rate of return for the 3rd regulatory period**

revenue cap
= cash flow




** new assets, as from 3rd regulatory period

* allowed equity (§ 7 NEV), capped at 40% equity

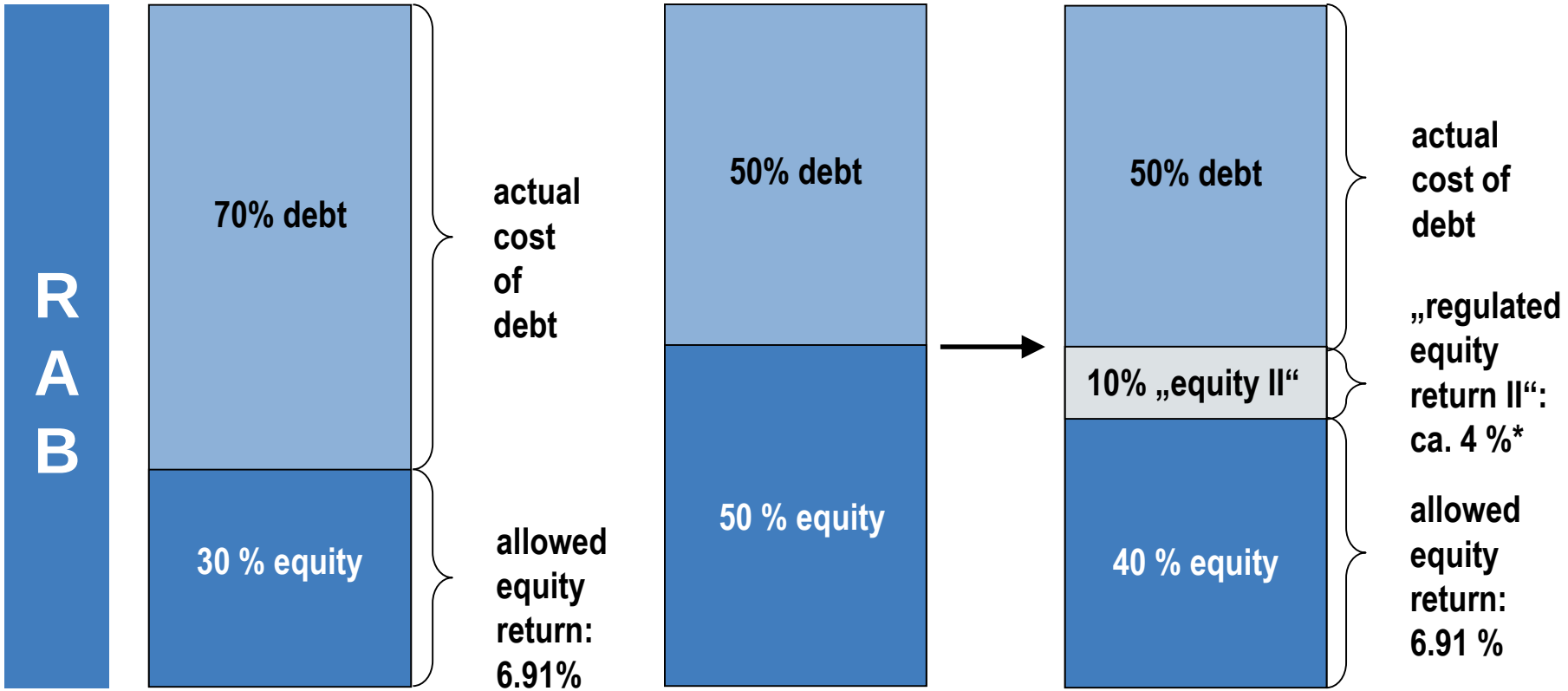
**Calculation as per the formula above.**

**Imputed return on equity is part of the cash flow (revenue cap).**
**Imputed return on equity does not reflect the actual return on investment! ROI may deviate from equity return (6.91%)!**

# Treatment of different capital structures (RAB)

Case 1:
RAB with equity ≤ 40 %

Case 2:
RAB with equity > 40 %




* 2nd regulatory period

# Regulated rate of return on equity evolution