

Methodologies and parameters used to determine the allowed or target revenue of gas transmission system operators (TSOs)

Final workshop
Brussels

20 September 2018

Agenda

▶ **Part I: Introduction**

- Recap of study aims

▶ **Part II: Description of EU Member State methodologies**

CEER Investment Conditions Report

- Lunch break -

▶ **Part III: Evaluation of EU Member State methodologies**

- Coffee break -

▶ **Part IV: Conclusions (EC and ACER)**

Part I: Introduction

Part II: Description of EU Member State methodologies

Part III: Evaluation of EU methodological practices

Study purpose

The need for the study derived from the provisions of the Code

Our terms of reference

- ▶ “...the Contractor will undertake an assessment of **methodologies and parameters** used in EU Member States to determine the allowed or target revenue of gas transmission system operators” (emphasis added)
- ▶ The objective of the Study is to provide a **systematic analysis of the current practice** for setting the allowed or target revenue of gas Transmission System Operators (‘TSOs’) across the EU (emphasis added)

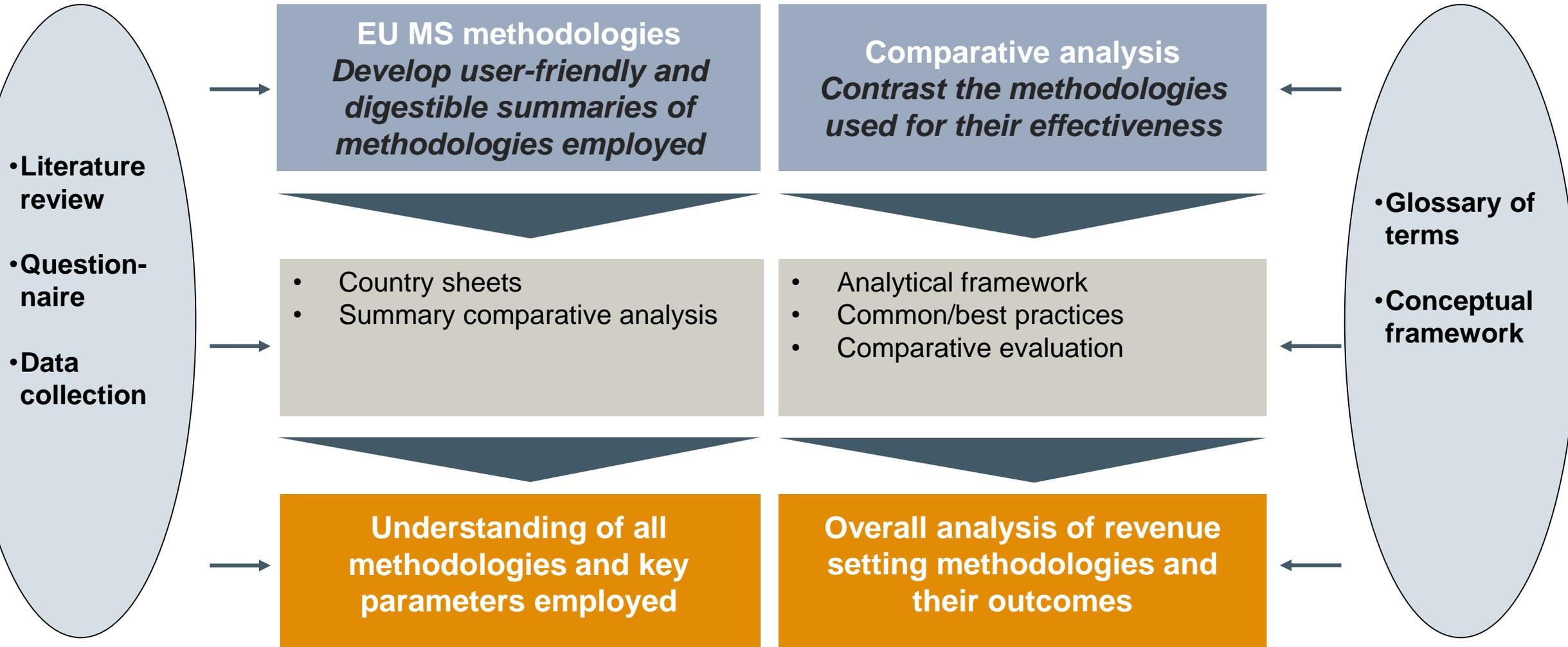
The network code

- ▶ “Before 6 April 2019, the Agency shall publish a report on the **methodologies and parameters** used to determine the allowed or target revenue of transmission system operators. The report shall be based on **at least** the parameters referred to in Article 30(1)(b)(iii).” (Article 34, emphasis added)

Article 30(1)(b)(iii) parameters

- (1) types of assets included in the **regulated asset base** and their aggregated value
- (2) **cost of capital** and its calculation methodology
- (3) **capital expenditures**, including:
 - (a) methodologies to determine the **initial value of the assets**
 - (b) methodologies to **re-evaluate the assets**
 - (c) explanations of the evolution of the value of the assets
 - (d) **depreciation** periods and amounts per asset type
- (4) **operational** expenditures
- (5) **incentive** mechanisms and **efficiency** targets
- (6) **inflation** indices

The study was therefore centred on **documenting** methodological approaches in the EU and **comparing** them



Part I: Introduction

Part II: Description of EU Member State methodologies

Part III: Evaluation of EU methodological practices

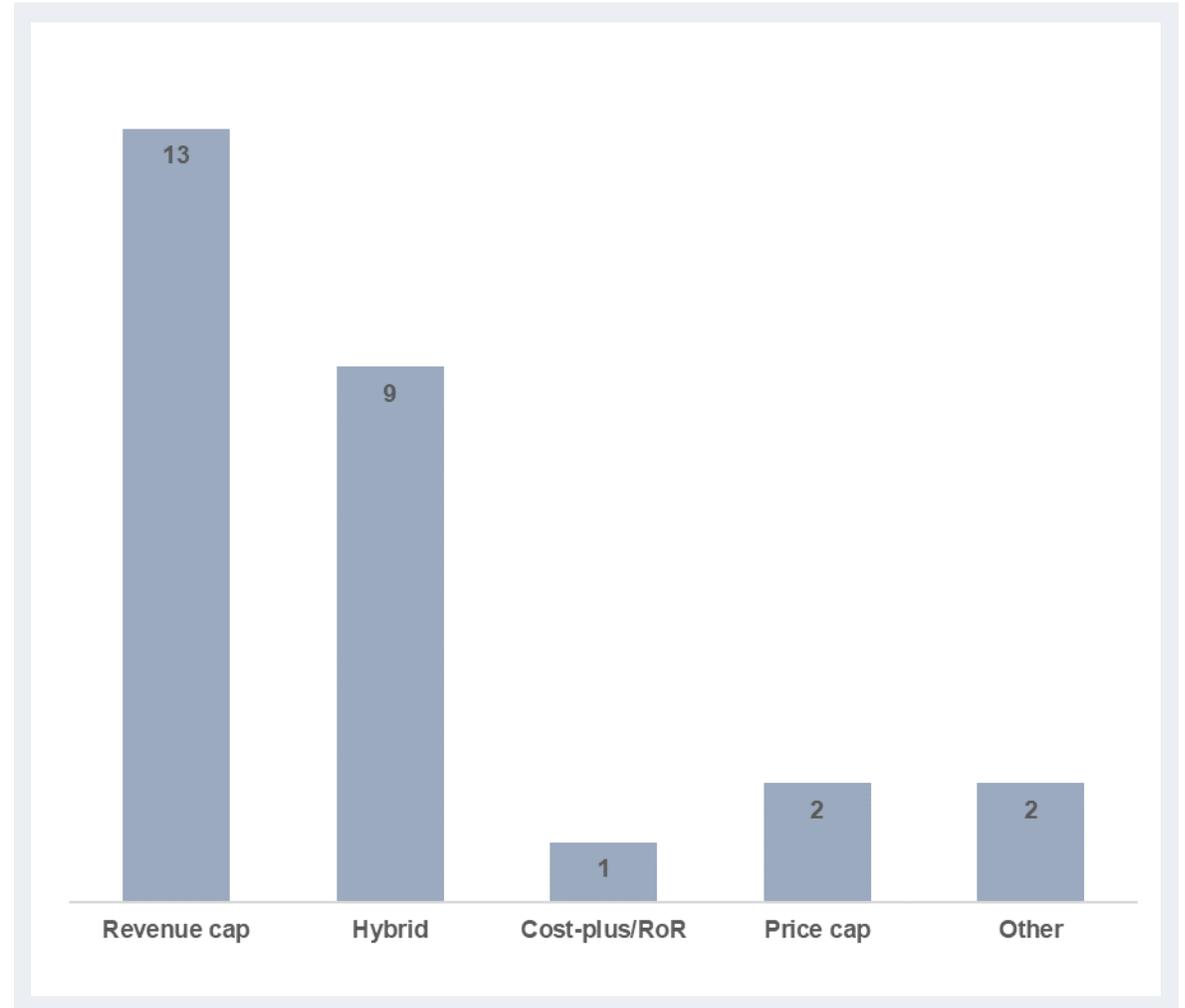
The study necessarily focused on a subset of the issues that could be explored

Questionnaire	Country fact sheets	Descriptive comparison
1. <i>Regulatory, market and policy framework</i>	1. <i>Regulatory, market and policy framework</i>	
2. <i>Regulatory governance and process</i>	2. <i>Regulatory governance and process</i>	
3. Overall framework for setting allowed revenues	3. Overall framework for setting allowed revenues	➔ Overall regulatory framework
4. Determining and setting operating expenditures	4. Determining and setting operating expenditures	➔ Determining and setting expenditures
5. Determining and setting capital expenditures	5. Determining and setting capital expenditures	➔ The regulatory asset base
6. Regulatory asset base	6. Regulatory asset base	➔ The cost of capital
7. Depreciation	7. Depreciation	➔ Other regulatory mechanisms
8. Cost of capital and financeability	8. Cost of capital and financeability	
9. Other regulatory mechanisms	9. Other regulatory mechanisms	
10. <i>Regulatory reporting</i>	10. <i>Regulatory reporting</i>	
Glossary of terms	Key information sources	

Types of regulation

Most NRAs follow a revenue cap or hybrid approach

- ▶ Revenue caps and hybrids are the most prevalent (22 out of 27 NRAs)
- ▶ **Five NRAs follow different approaches**
 - Greece uses a **cost-plus** regime
 - Estonia and Poland employ **price cap** regimes
 - Denmark has a **variant of a cost-plus** regime
 - Slovakia **benchmarks tariffs** against competing pipelines
 - We understand that both Denmark and Slovakia's regimes are currently under review

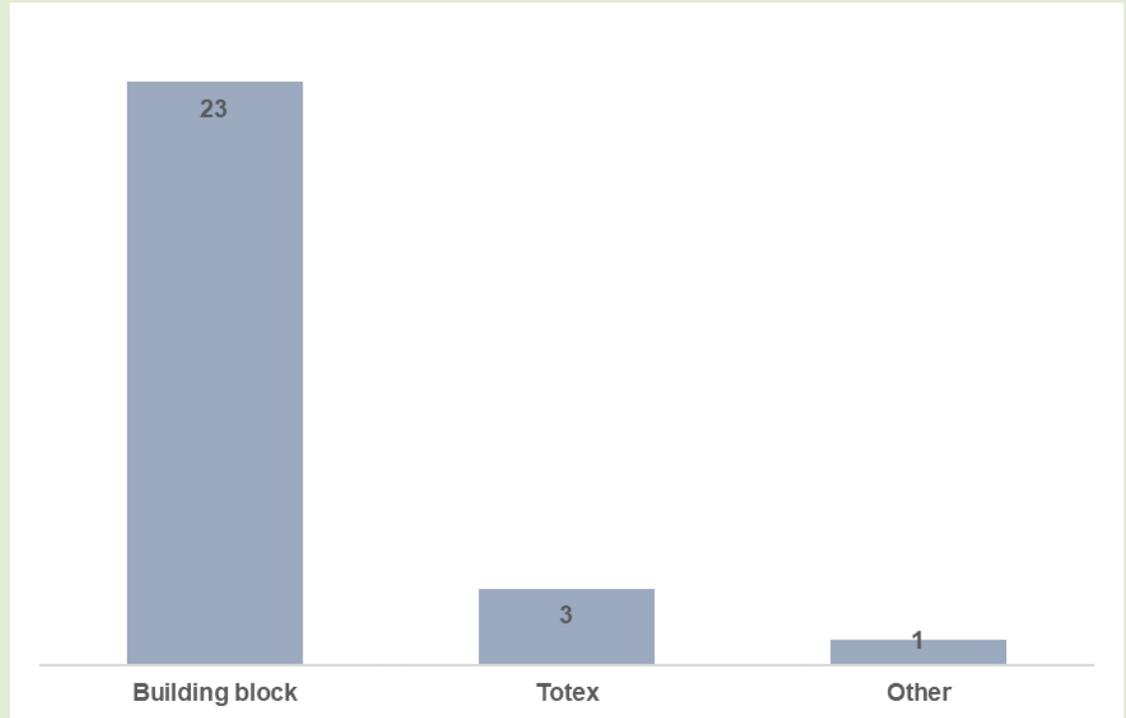


Cost base assembly

Building block approach is most common

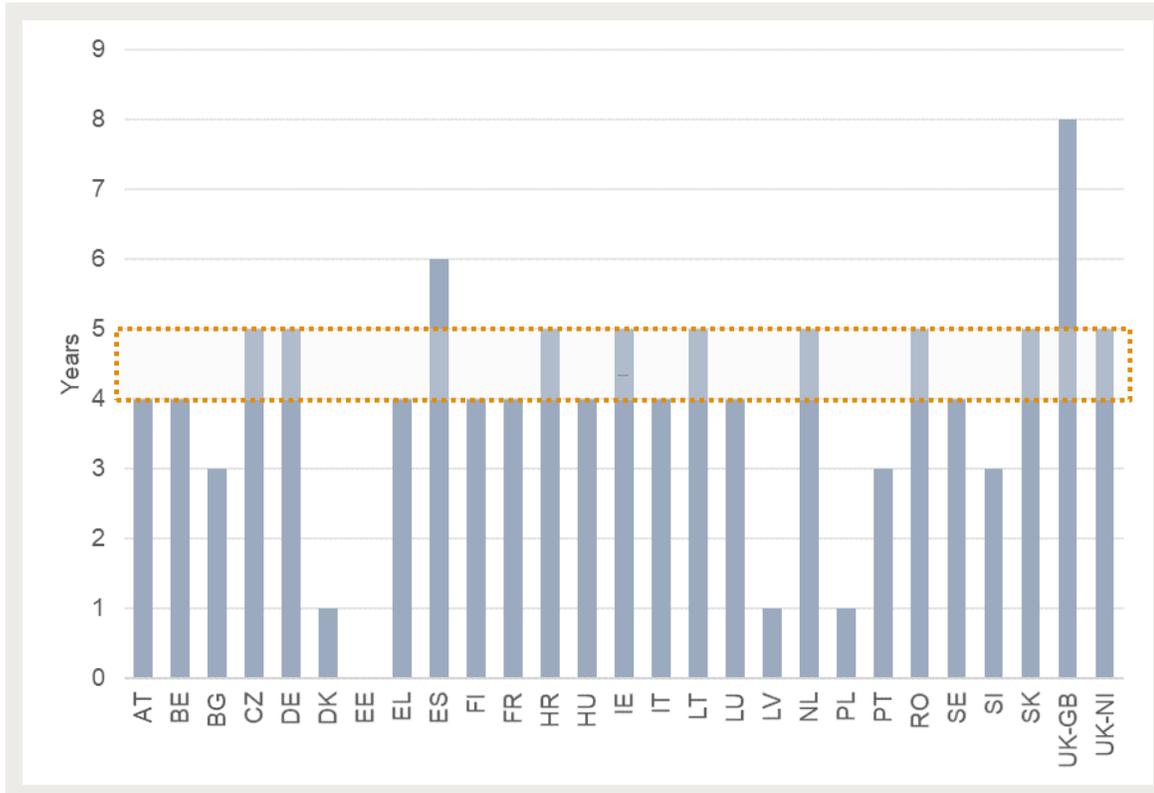
- ▶ **23 of 27 NRAs use a building block approach**
 - Separate assessment of cost components (capital and operating expenditures)
- ▶ **Three NRAs employ TOTEX approach**
 - Germany
 - Netherlands
 - Great Britain
- ▶ Not relevant for Slovakia (due to its tariff benchmarking approach), but information on incurred costs *is* considered

Approach to assembling the cost base



Length of regulatory period

Most countries have adopted four- or five-year regulatory periods



- ▶ **Four-year or five-year** period employed by 18 NRAs
- ▶ Three NRAs have **three-year** periods
 - Bulgaria, Portugal and Slovenia
- ▶ Three NRAs have **one-year** periods
 - Denmark, Latvia and Poland
- ▶ Exceptions
 - Spain has a **six-year** regulatory period
 - Great Britain currently has an **eight-year** term
 - Estonia does not have a defined regulatory period

Length of revenue review and decision process

High variance in the length of the process

Time period	NRAs/countries
0-6 months	Belgium, Bulgaria, Estonia, Greece, Spain, Croatia, Hungary, Italy, Lithuania, Luxembourg, Latvia, Poland, Romania, Sweden, Slovenia, Slovakia
7-12 months	Portugal, Great Britain, Northern Ireland
13-18 months	Czech Republic, Ireland
19-24 months	Finland, France, Netherlands
>24 months	Austria, Germany
<i>Ad hoc</i>	Denmark

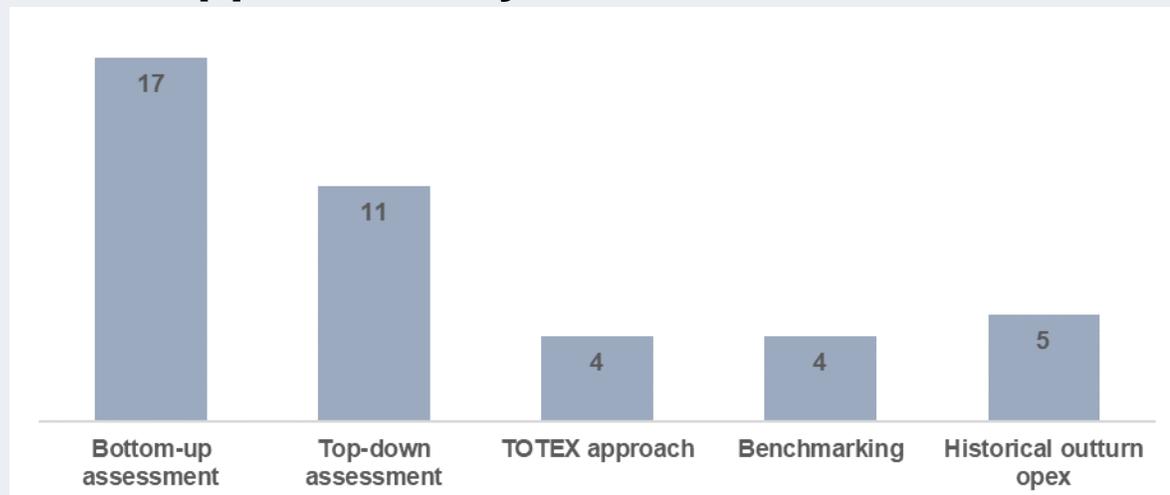
- ▶ In many cases, the review process is not set firmly by legislation
 - Some processes are *ad hoc* or highly variable
- ▶ Reported times may be based on NRAs' recent experience
- ▶ Cannot draw direct comparisons

Assessment of operating expenditure (OPEX)

Largely bottom-up or top-down approaches, but also a mix

- ▶ **Bottom-up assessments most common**
 - Used by 17 NRAs
- ▶ **Top-down assessments also prevalent**
 - Used by 11 NRAs
- ▶ **Eight** countries use two+ approaches
- ▶ Benchmarking relatively uncommon (only four NRAs)

OPEX approach tally



Varied approaches to OPEX

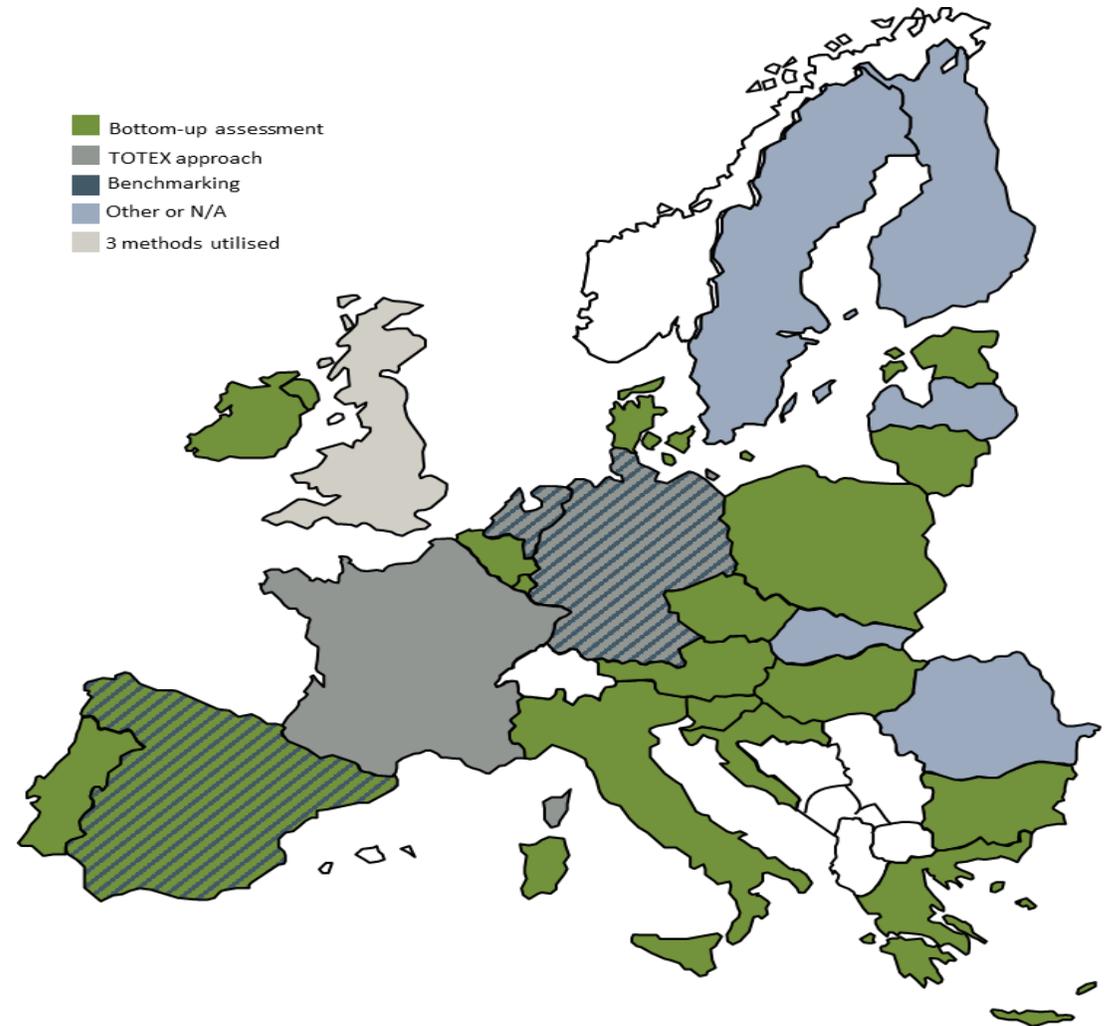


Assessment of capital expenditure

Bottom-up approach prevalent

- ▶ **Bottom-up assessments the main tool**
 - 19 NRAs
- ▶ **TOTEX countries** (Germany, Netherlands, Great Britain), and partially Spain, **use benchmarking**
- ▶ **Five 'other' cases**
 - **Ex post efficiency assessments** in Sweden and Finland
 - Capital expenditure assessed as part of TYNDP in Romania
 - May be **overlap with bottom-up** approach
 - **Cost-plus regime** means no *ex ante* capital expenditure assessment in Latvia
 - Slovakia **tariff comparison** approach

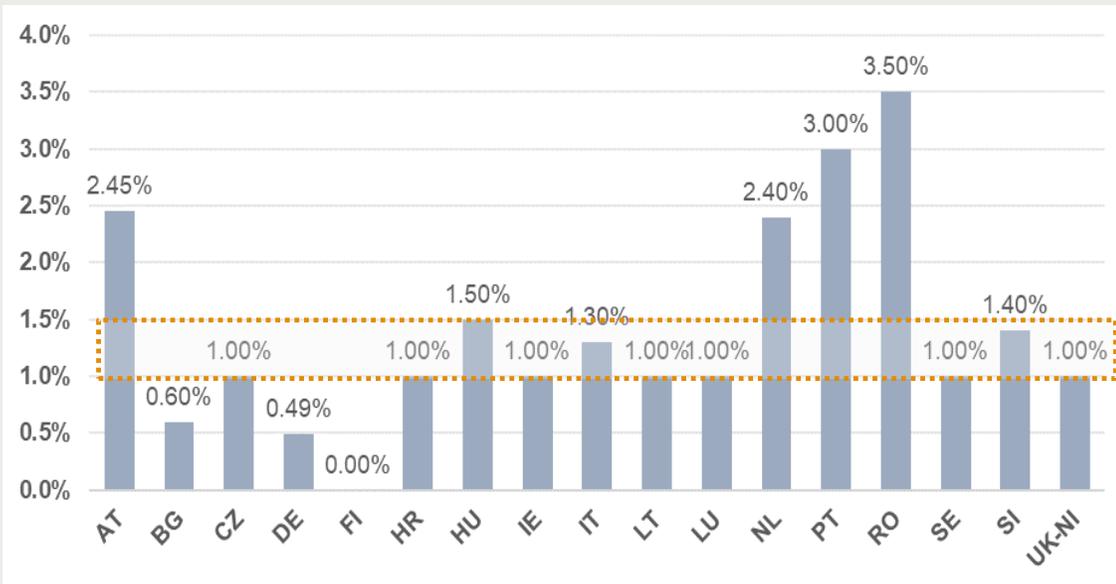
Lots of **green** (bottom-up assessments)



OPEX efficiency factors

Common, but with varied approaches and levels

OPEX efficiency factors

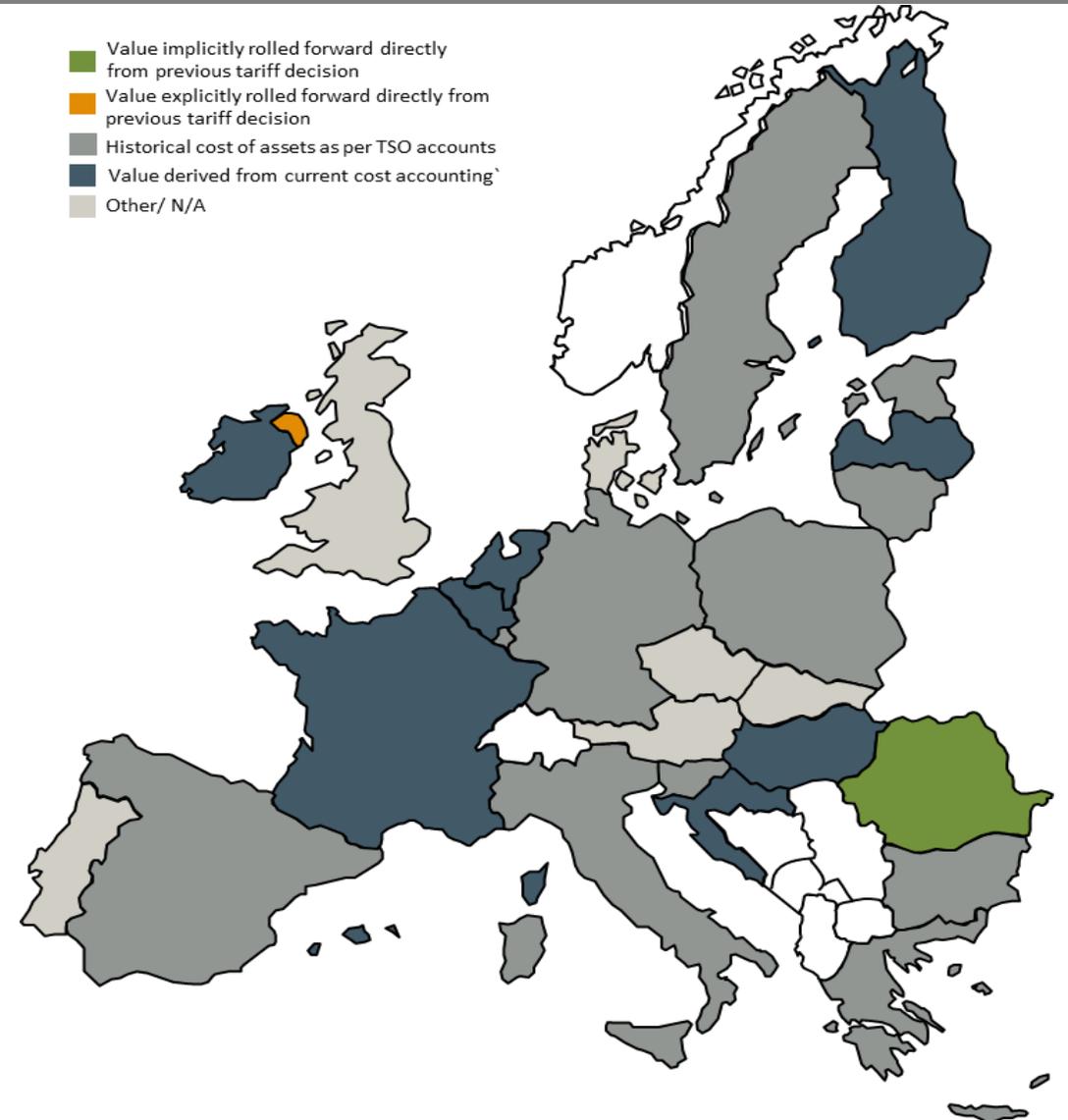


- ▶ Tend to be in the **1.0%-1.5%** range

- ▶ **Majority** of NRAs (19 of 27) use OPEX efficiency factors
- ▶ Some efficiency factors hard to compare
 - Most are 'relative' efficiencies
 - The improvement needed to close the gap between the TSO's current efficiency and the 'efficiency frontier'
 - Netherlands applies 'static' (catch-up) efficiency and dynamic efficiency (frontier shift)
 - France applies efficiency *above inflation*
- ▶ **Efficiency factors not common for capital expenditure**
 - Limited to NRAs applying TOTEX approach

Setting the opening asset value

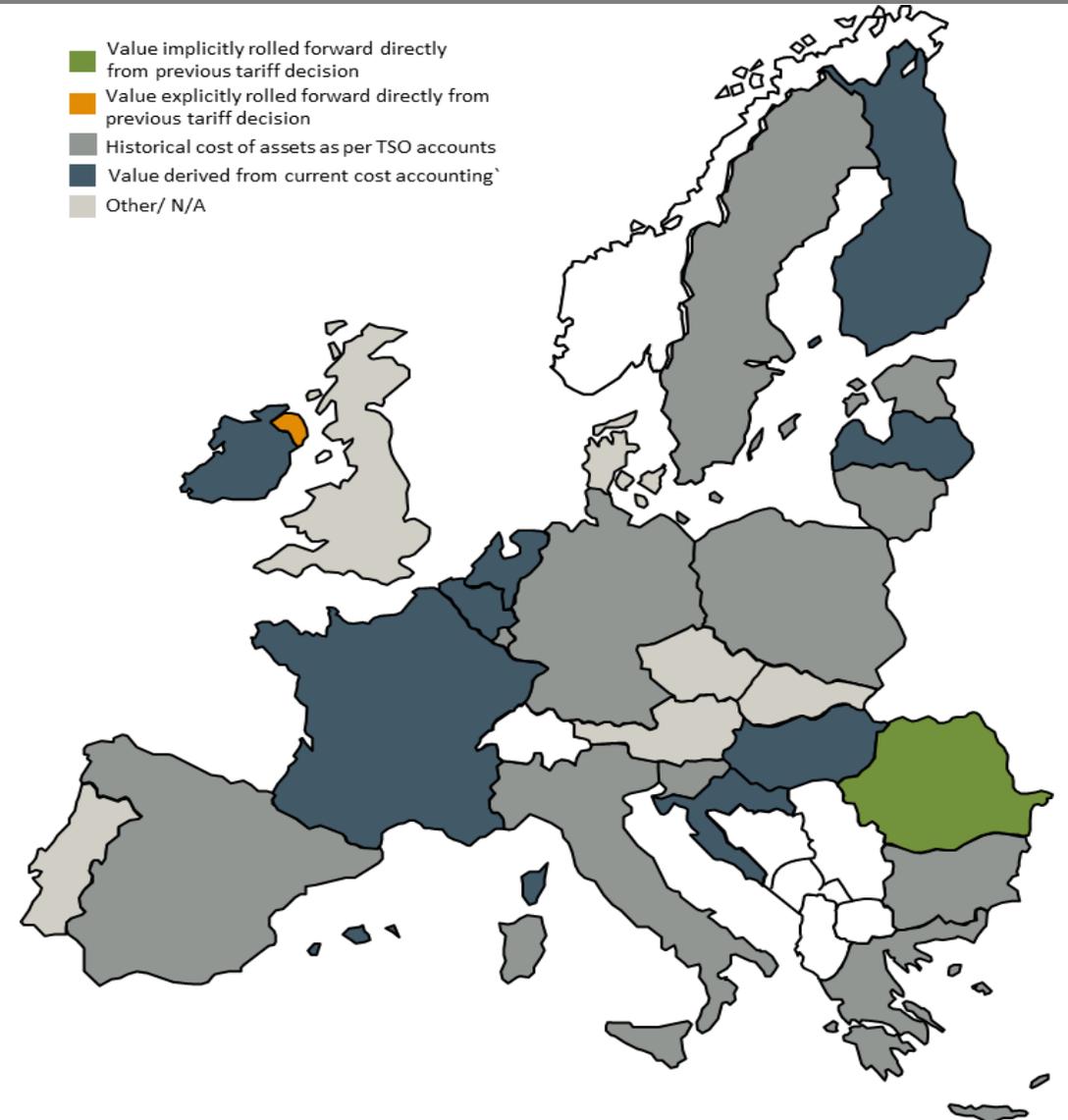
- ▶ **Historical or current cost accounting most common**
 - Was employed by 11 and eight NRAs, respectively
- ▶ Varied current cost accounting approaches
 - Belgium, Hungary and Latvia used **replacement cost**
 - Finland refers to a '**net present value**' approach
 - France's set by the '**Houri commission**'
 - Ireland and Netherlands applied **historical cost indexation**
- ▶ Two **rolled the value forward** implicitly (Romania) or explicitly (Northern Ireland) from a previous tariff/revenue decision



Setting the opening asset value

► Five 'other' approaches:

- *Austria*: **split** between debt-financed component valued at historical cost and equity component that uses replacement value
- *Czech Republic*: RAB set at level to **ensure prevailing profitability**
- *Denmark*: treated as an **equity value equivalent to the net assets at the time**, preserved in real terms through inflation indexation
- *Portugal*: established and revalued at rates **set by the Government**
- *Great Britain*: **independent valuation** at the time of British Gas' privatisation

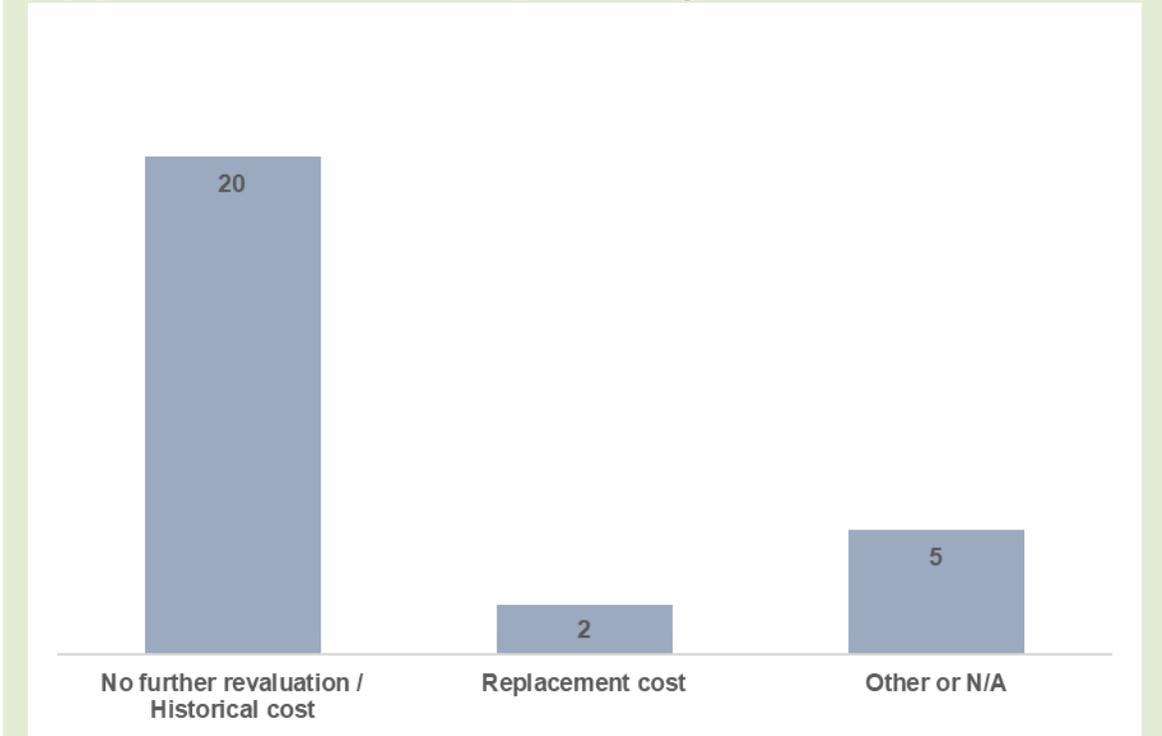


Revaluations of RAB

Generally rare

- ▶ **20 of 27 NRAs conduct no further revaluation of the RAB**
 - Some index to inflation to keep consistent with a real WACC
 - Austria indexes the equity portion of its RAB (which is in real terms)
- ▶ Hungary and Latvia periodically revalue **based on replacement cost**
- ▶ Denmark and Slovakia have unique revenue setting regimes
- ▶ Finland uses “average unit prices and average age information”
- ▶ Germany distinguishes between pre- and post-2006 assets
 - Valued and depreciated differently

Approach to RAB updating?



Rolling new investments into RAB

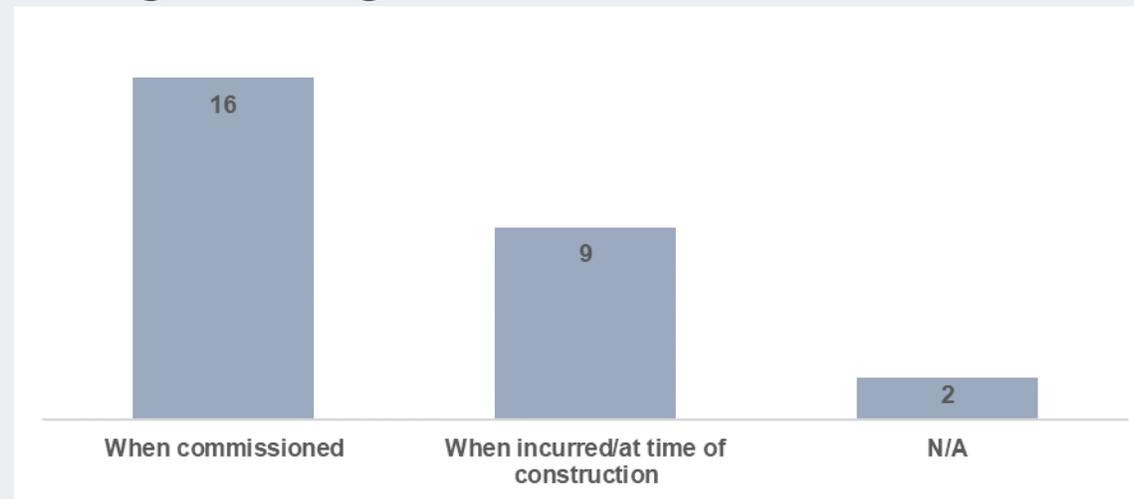
Varied treatment

- ▶ Common for investments to be both rolled in when commissioned or when incurred
 - 16 when commissioned
 - Nine when incurred
 - Irrelevant to the regimes in Denmark and Slovakia

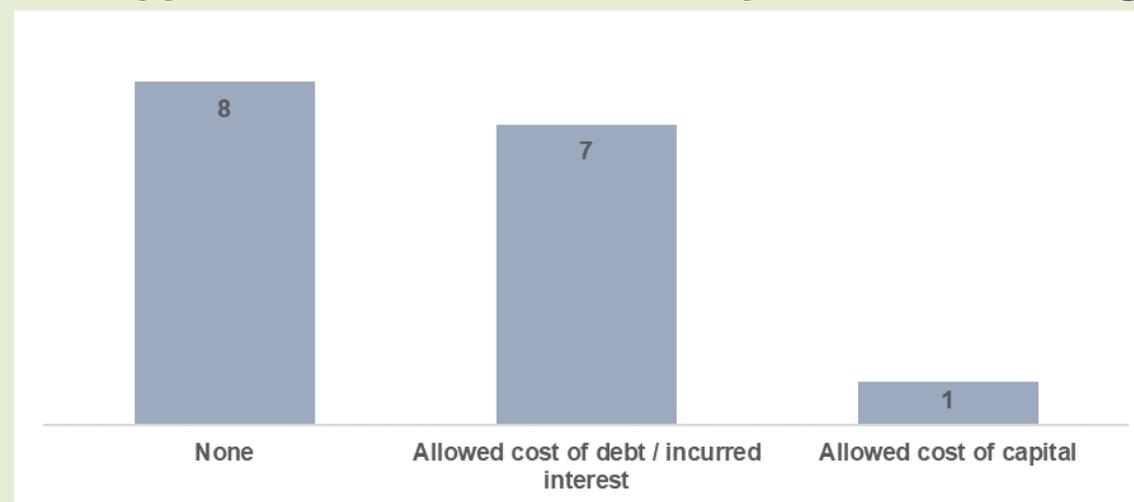
▶ Of those that recognise assets once commissioned...

- Eight do not recognise financing costs
- Seven apply an allowed cost of debt
 - Usually capitalised into the book value
- Netherlands alone in applying WACC

Timing of rolling into RAB



Rate applied when assets rolled in upon commissioning



Ex post reviews of capital expenditure

Fairly even split whether reviewed ex post

NRAs undertaking <i>ex post</i> reviews	NRAs that do not undertake <i>ex post</i> reviews
1. Bulgaria	1. Austria
2. Denmark	2. Belgium
3. Finland	3. Czech Republic
4. France	4. Germany
5. Croatia	5. Estonia
6. Ireland	6. Greece
7. Italy	7. Spain
8. Luxembourg	8. Hungary
9. Poland	9. Lithuania
10. Portugal	10. Latvia
11. Great Britain	11. Netherlands
12. Northern Ireland	12. Romania
	13. Sweden
	14. Slovenia
	15. Slovakia

- ▶ General rationale for *not* conducting *ex post* reviews
 - **capital expenditure generally approved through network development plans**
 - **no need for reassessment**
- ▶ *Ex post* reviews tend to be *ad hoc*
 - Focus on 'large' investments or when costs substantially deviate from estimates or budgets
 - *Note*: has not been undertaken in practice in Italy

Choices in composition of RAB

▶ **Consistent inclusion of**

- Pipelines
- Gas receiving stations
- Compressor stations
- Control stations
- Metering stations
- Meter and regulation stations

▶ **Less consistency** with respect to inclusion of

- Linepack
- Customer connection assets
- Working capital

Item	Included	Not included
Linepack	9 NRAs	18 NRAs
Customer connection assets	13 NRAs	14 NRAs
Working capital	7 NRAs	19 NRAs

- ▶ For countries that include linepack and/or working capital, all have **different methods for determining the allowance**

Depreciation methodology (consensus)

Asset lives (wide variation)

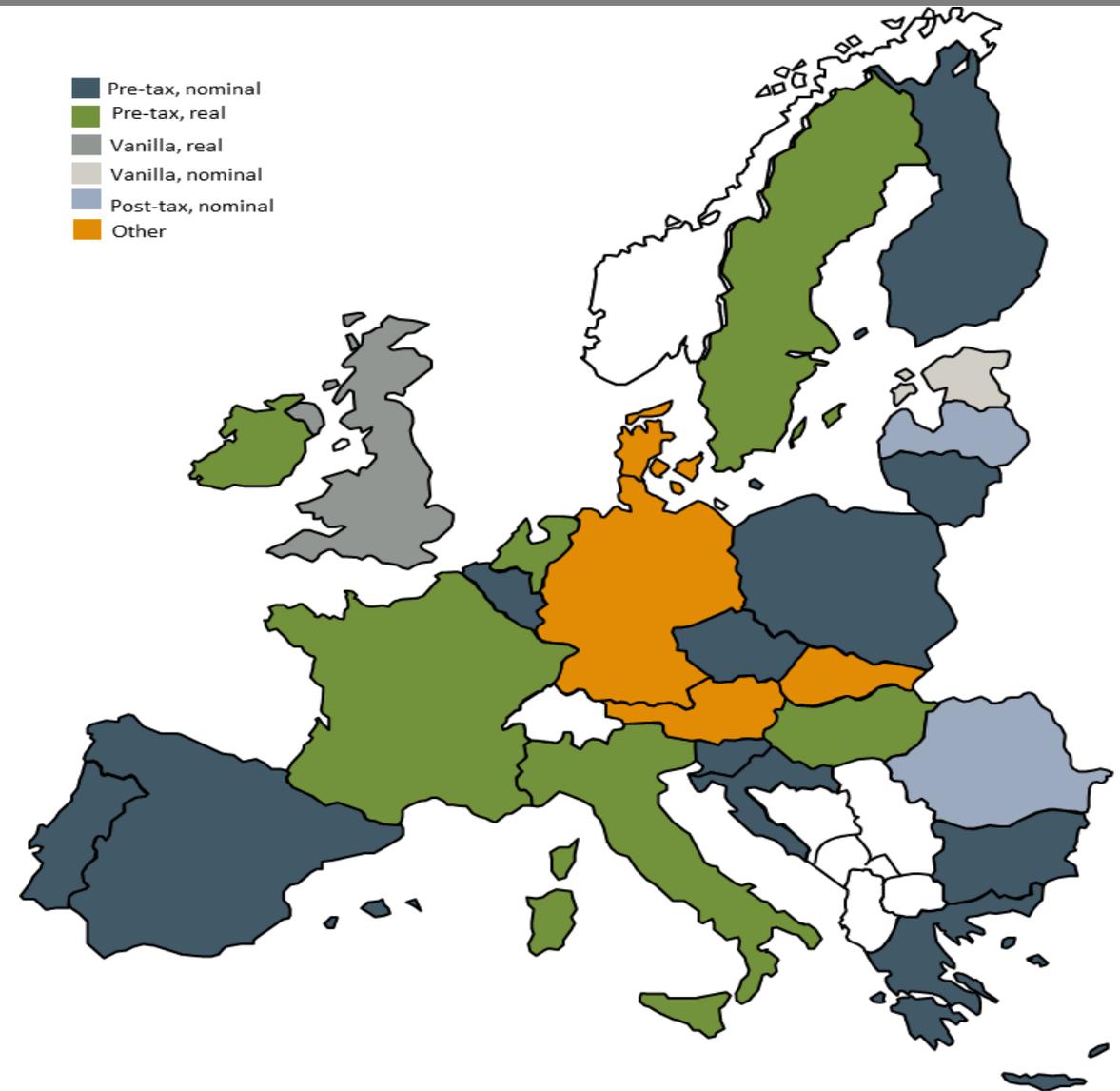
- ▶ Broad consensus in depreciation methodology - **straight-line methodology**
 - Belgium and Great Britain are the exceptions
 - Use declining balance (or accelerating) depreciation for “*limited number*” of installations
- ▶ **High variation in defined asset lives**
 - ***Pipelines***: 30-90 year range (generally 40-50 years)
 - ***Compressors***: 12-65 year range (generally 20-30 years)
 - ***Controller and metering stations***: 9-45 years (generally 20-30 years, but *much* variation)
 - ***SCADA and telecom***: 4-30 years (generally 5-10 years)

Basis for setting the weighted average cost of capital (WACC)

Variety of approaches

► Observations

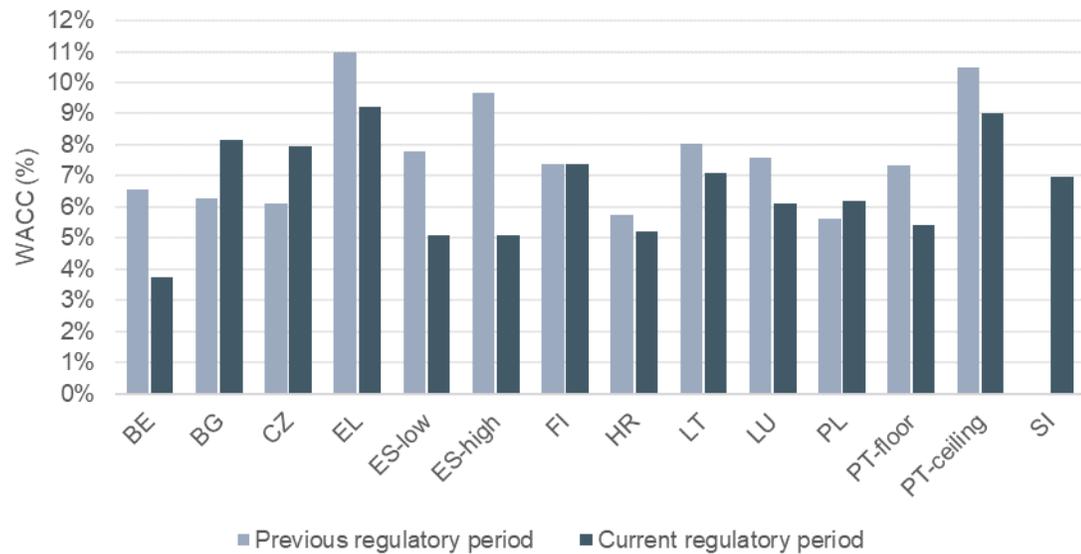
- **Pre-tax nominal WACC most common** (12 NRAs)
- Vanilla WACC used by three NRAs, post-tax nominal used by two NRAs
- **Nominal regimes more prevalent than real regimes** (15 vs eight NRAs)
- **Pre-tax regimes more prevalent than post-tax regimes** (18 vs five NRAs)
- **Four ‘other’ approaches**
 - Austria sets pre-tax real cost of equity, pre-tax nominal cost of debt
 - Germany recognises actual debt costs subject to their “reasonableness” against “customary” interest costs. Equity treatment differs between pre- and post-2006 assets
 - Cost of equity broadly equals inflation in Denmark. Receive beneficial interest rates on government issued bonds for debt
 - No explicit allowed rate of return in Slovakia



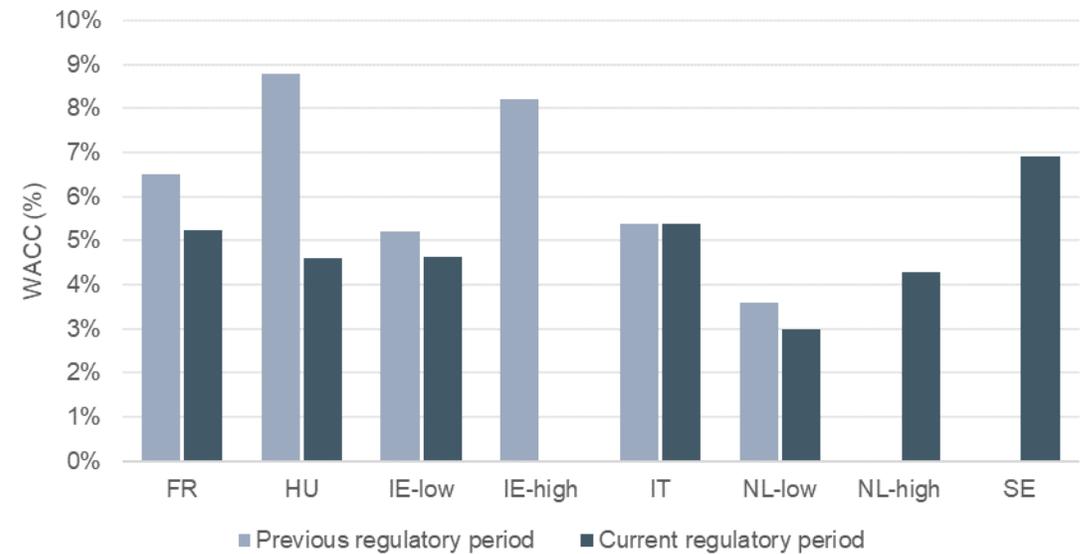
WACC values

Previous and current regulatory periods: considerable variability

Comparison of pre-tax nominal WACCs



Comparison of pre-tax real WACCs



- ▶ Among WACCs that are directly comparable between previous and current regulatory periods ... **12 of 18 WACCs have declined**

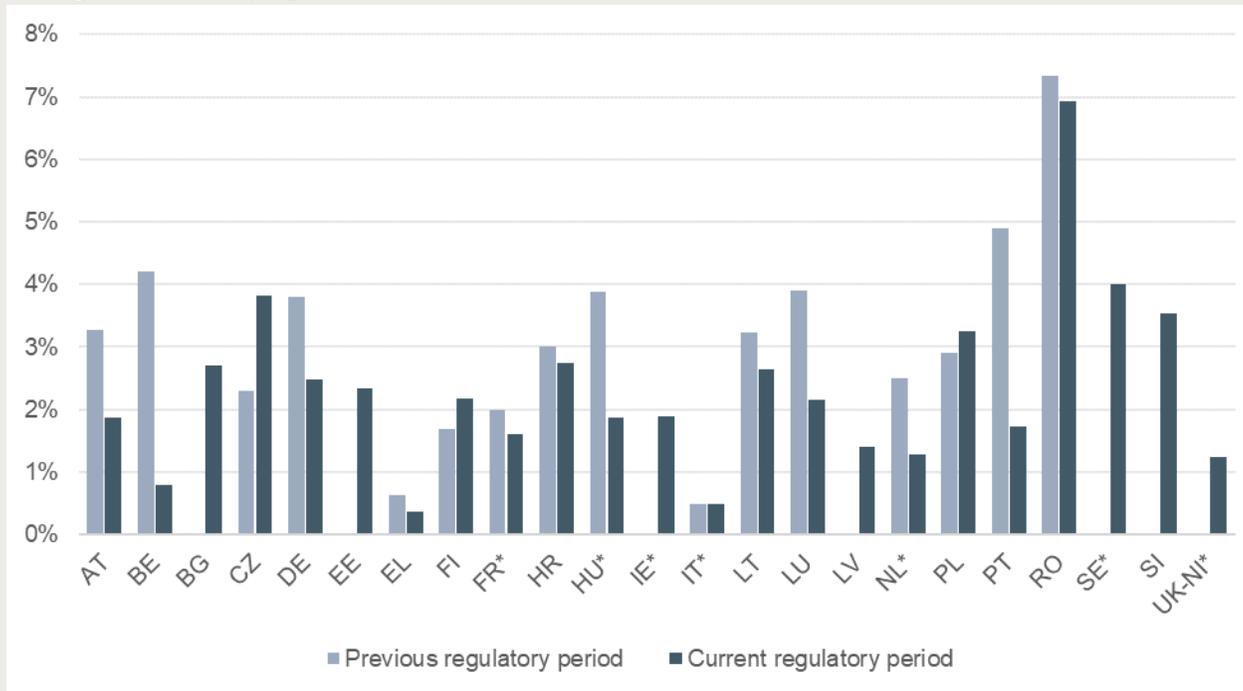
▶ WACC premiums

- Allowed in Austria, Belgium, Finland, France, Italy, Latvia, Romania, Sweden
- “Foreseen” in Greece, but not yet applied in practice

Cost of equity: risk-free rate

High variance in RFRs the main explanation for WACC variances

Risk-free rates for previous and current regulatory periods



► Note:

- Asterisks mark *real* rates
- Some RFRs include country risk premiums (CRP)

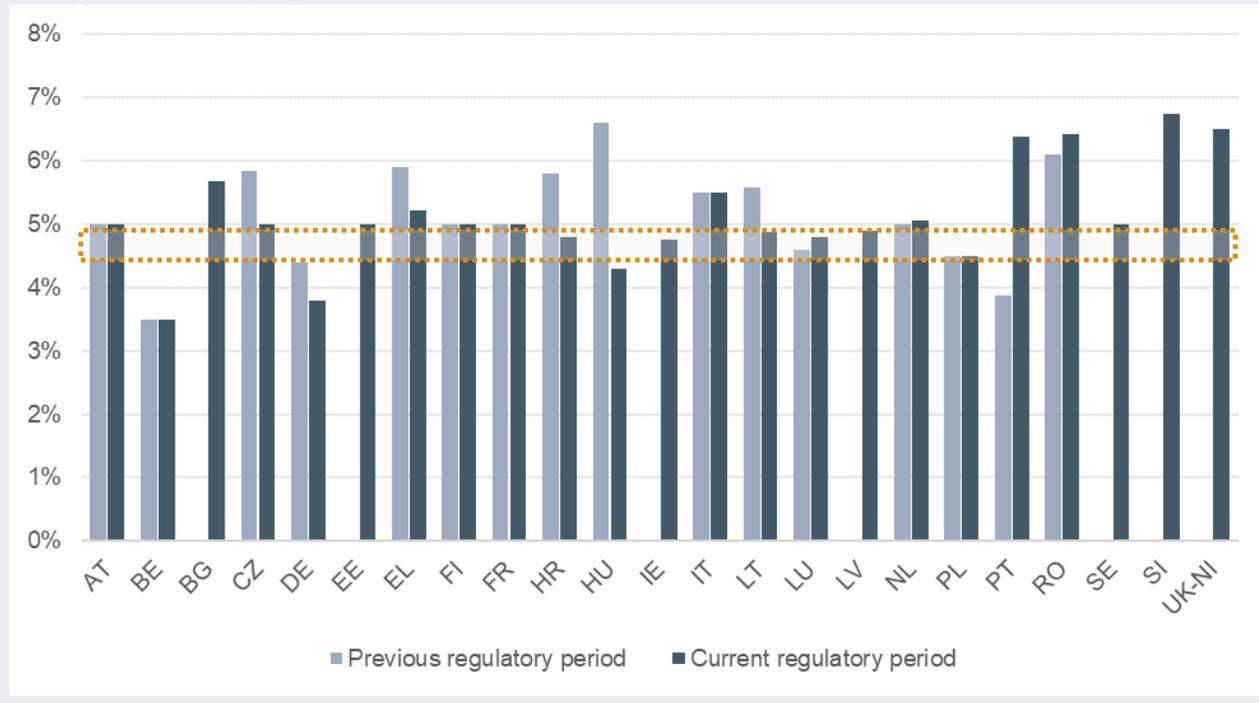
► Differences due to

- Different reference or regulatory periods
- Most countries reference their **own government bond yields**
- Several countries set yields according to high-grade Eurozone bonds
 - AA- or AAA-rated countries or a weighting
 - Estonia, Greece, and Slovenia use **German bonds alone**
- Hungary references US rates + CRP

Cost of equity: market risk premium

Relatively consistent across countries

Market-risk premiums for previous and current regulatory periods

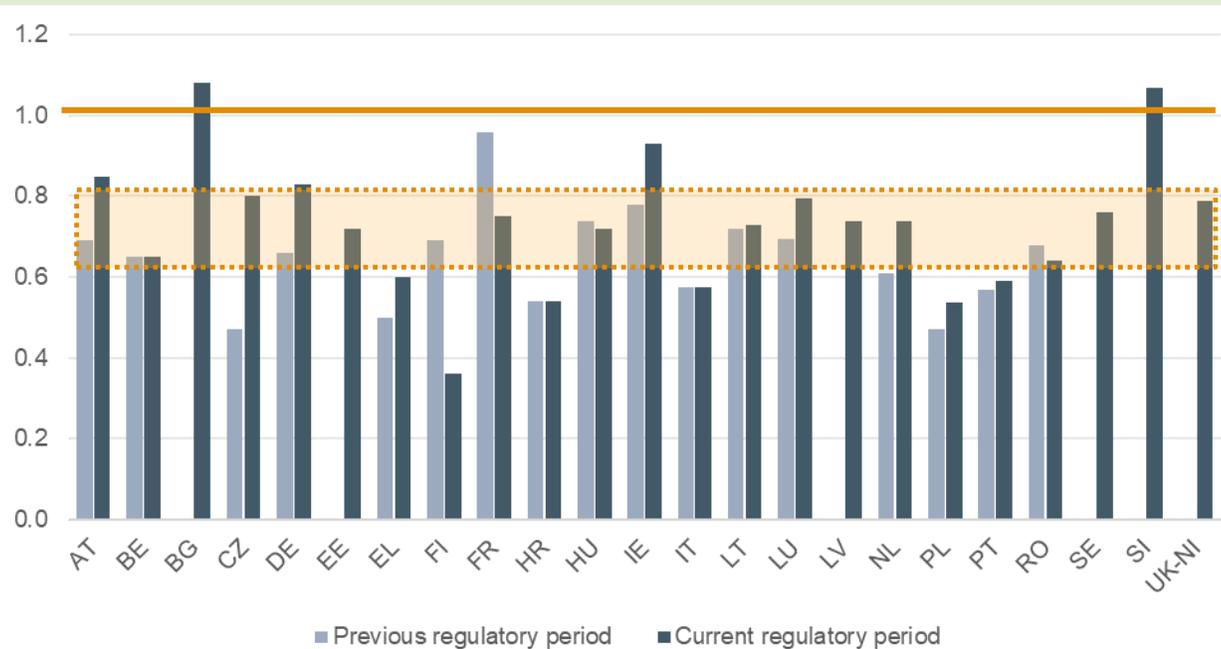


- ▶ Majority of MRPs are within the range of **4.5%-5.0%**
 - 13 countries within 4.5% and 5.05%
 - Three countries below 4.5%
 - Three countries between 5% and 6%
 - Four countries above 6%
- ▶ Broad consistency can be attributed to NRAs using **very long-term data** to estimate premium
 - Removes effect of short-term fluctuations

Cost of equity: equity betas

Some variance

Equity betas for previous and current regulatory periods



- ▶ Reminder: the higher the beta, the higher the cost of equity/WACC applied
 - Equity beta multiplied by MRP and added to RFR
- ▶ **Vast majority of NRAs have an equity beta below ‘one’**
 - Exceptions are Bulgaria and Slovenia
 - Bulgaria states it relies on precedent elsewhere
 - Slovenia calculates beta based on group of EU companies
- ▶ **Most equity betas between 0.6 and 0.8**
 - Three between 0.8 and 1.0
 - Five below 0.6

Cost of debt

Mostly *ex ante* plus a debt premium

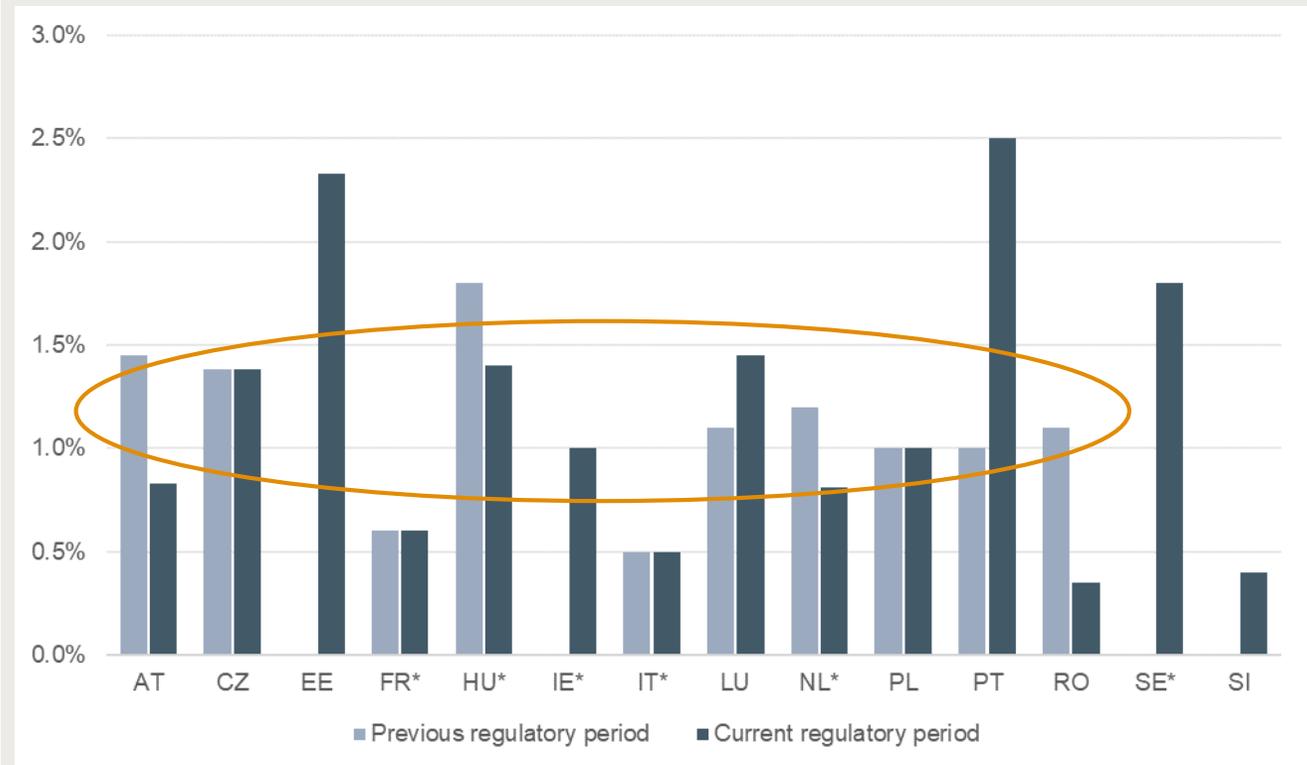
▶ **Most NRAs (23) set cost of debt on an *ex ante* basis**

- Belgium and Denmark set the cost of debt *ex post*
- Spain applies a financing rate covering the cost of debt *and* equity
- Great Britain applies trailing index of corporate bonds *ex ante*

▶ **Among NRAs setting the cost of debt *ex ante***

- 16 use RFR + debt premium
- Eight set debt costs based on observed yields

Debt premia applied by country (where relevant)

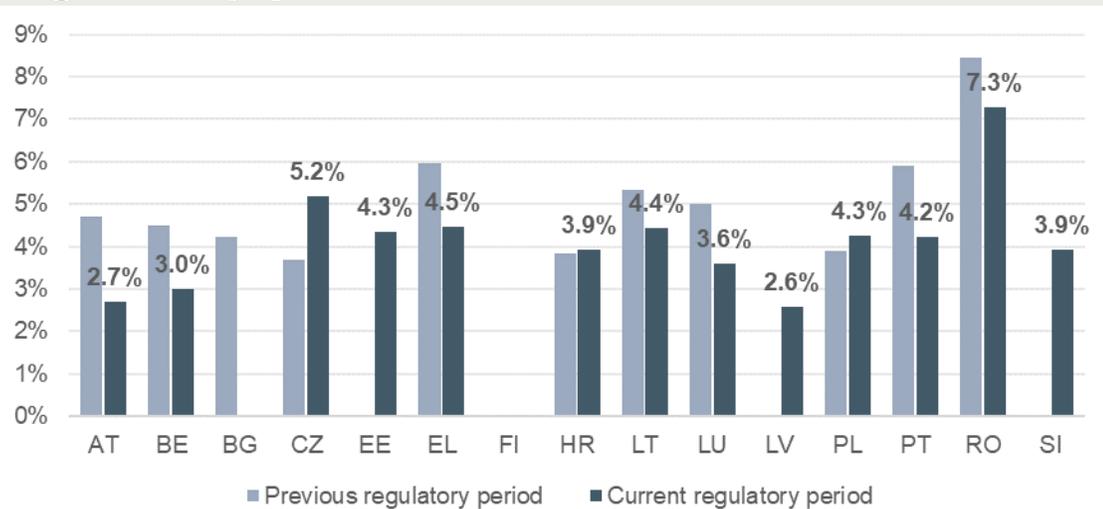


▶ **Most debt premia between 1.0%-1.5%**

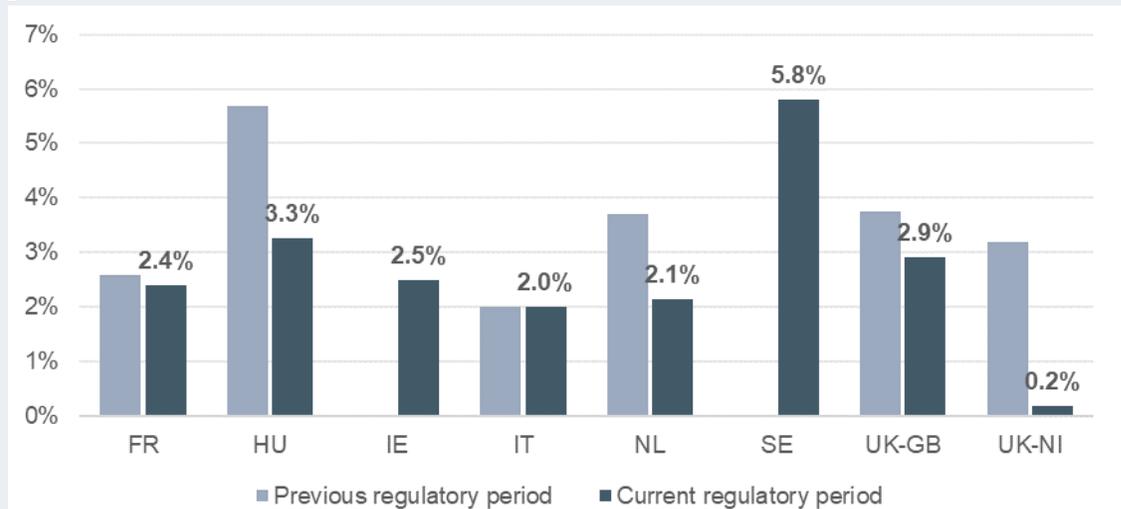
Cost of debt

Allowed or target cost of debt

(Nominal) cost of debt for last two regulatory periods



(Real) cost of debt for last two regulatory periods



▶ Among nominal rate regimes, most fall within 3.0%-4.5%

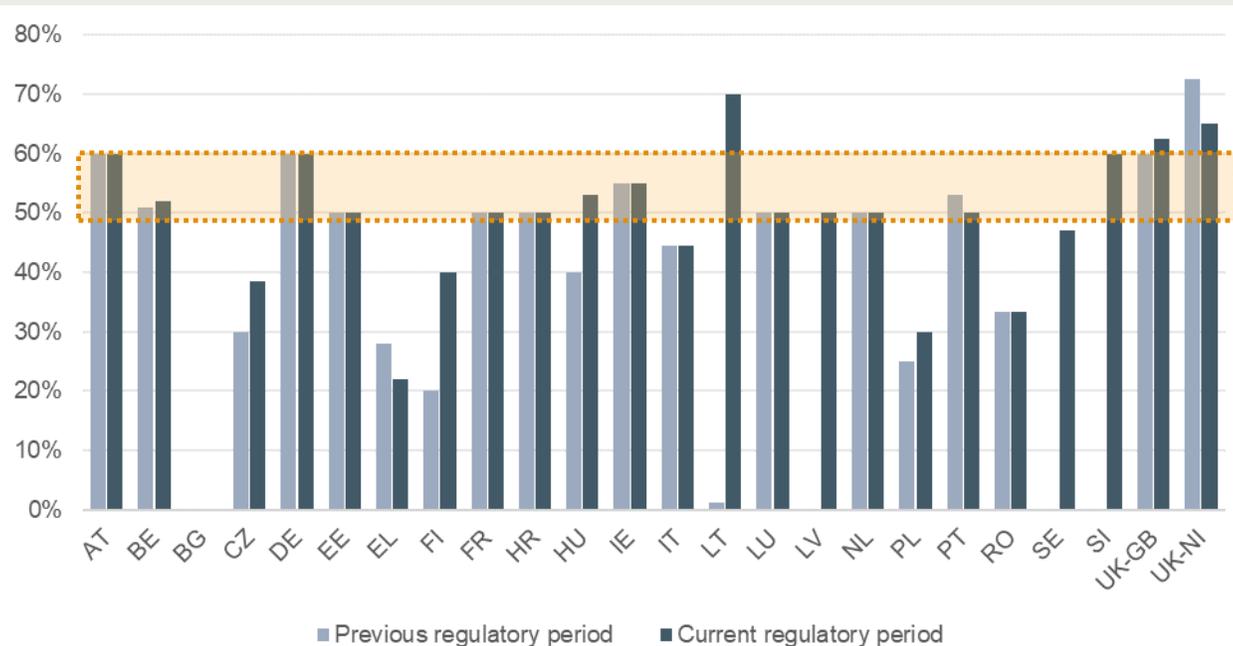
▶ Allowed debt costs have *mostly* fallen between the previous and current regulatory periods

▶ Among real rate regimes, generally within 2.0%-3.0%

Gearing

Vast majority (22) of NRAs apply notional rather than actual

Gearing level for previous and current regulatory periods



- ▶ Most NRAs (13) fall within the **50%-60% range**
- ▶ Three NRAs respectively use gearing levels in the following ranges
 - **61%-70%:** Lithuania, Great Britain and Northern Ireland
 - **40%-50%:** Finland, Italy and Sweden
 - **Less than 40%:** Bulgaria, Czech Republic and Greece

Over- or under-recoveries of revenue

Many different approaches

- ▶ Adjusting revenues/tariffs within or between periods?
 - Eight NRAs adjust between regulatory periods
 - Seven NRAs adjust within regulatory periods
 - Seven NRAs do both
 - We interpret this as annual adjustments where shortfalls or over-recoveries in the final year are carried over to the next period

- ▶ **Variance in approach to revenue recovery**
 - Time over which recoveries are **spread**
 - Some cases of longer timeframes for larger revenue adjustments
 - **Applying penalties** to incentivise better forecasting
 - Adjustments for **all revenue variations** or only beyond **thresholds**
 - **Symmetrical**
 - Equal treatment of over- and under-recoveries?
 - Rate used for **time value of money**
 - CPI (most common)
 - Short-term borrowing rate
 - WACC
 - Allowed cost of debt

Over/underspend adjustment mechanisms

Limited use

- ▶ Incentive regimes may foresee need for *ex post* adjustments to account for outturn costs and activities
- ▶ Idea: set **constant incentives** for TSOs to pursue efficiencies and share cost saving benefits

▶ Some cases for **OPEX**

- Six NRAs use **efficiency sharing mechanism**
 - Generally 50%
- Romania uses a five-year **rolling mechanism**
- Hungary applies **profit sharing**, irrespective of the cause of the over-recovery
 - 'Asymmetrical earnings sharing'

▶ Only **three cases** applying to **capital expenditure**

- Spain: assets rolled into RAB based on **average of actual costs and 'reference' costs**
- Luxembourg: **30/70 sharing** between TSO and network users
- Great Britain: 44.36% efficiency sharing **applied to TOTEX**

Performance metrics and/or rewards/penalties

Limited use

▶ Austria

- TSOs measured on five (weighted) **performance metrics**
 - Customer satisfaction (25%)
 - Unplanned unavailability time (25%)
 - Transparency obligations and data quality (10%)
 - Environment (15%)
 - Agency cooperation (10%)
- Reward-only, up to 5% of OPEX

▶ Finland

- Rewards when '**energy not supplied**' is in the top quartile of reference years
 - Penalties applied if in the bottom quartile
- Up to +/-2% of 'reasonable return' in a year

▶ France

- **Quality of supply regime** covering 16 different metrics and schemes
- Rewards/penalties if **large investment projects** (>€20m) are implemented significantly below/above budget
- Have an **R&D funding scheme**

▶ Great Britain

- Various schemes covering financial, statutory, and reputational incentives

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Part III: Evaluation of EU methodological practices

How to assess the various approaches?

Little *practical* assessment, even less *empirical* evidence

- ▶ Inherently **difficult to disentangle the factors potentially impacting outcomes**
 - Historical circumstances
 - Geography and sector characteristics
 - Macroeconomic framework and business cycle
 - Growth in demand
 - Differential standards
 - Social and economic objectives
 - National legal constraints
- ▶ Exploring empirical outcomes might be warranted but beyond the scope of this study
 - Focus is therefore on **qualitatively assessing** the comparative approaches



Even so, how should the (qualitative) assessment be undertaken?



- ▶ **By reference to the underlying objectives** of regulating gas TSOs

What regulatory objectives might be relevant?

EU legal framework provides a guide, but is not readily adaptable

Directive / Regulation / Tariff Network Code

- ▶ Market integration
- ▶ Security of supply
- ▶ Interconnected gas networks
- ▶ Consumer choice
- ▶ Cross-border trade
- ▶ Competitive and market prices
- ▶ Sustainability
- ▶ Enhanced gas market competition
- ▶ Investment in infrastructure
- ▶ Non-discrimination and transparency

'Typical' regulatory objectives

- ▶ Cost reflective prices
- ▶ Financial viability of the regulated firm(s)
- ▶ Cost minimisation
- ▶ Quality improvement
- ▶ Efficient investment
- ▶ Predictable, simple and transparent regulatory regime
- ▶ Minimisation of regulatory costs (for the regulator and the regulated)

Assessment criteria

We categorise the objectives into a more encompassing grouping

Economic efficiency

Productive, allocative and dynamic

Also encompasses, for example

- Market integration
- Security of supply
- Interconnected networks

Risk allocation

Allocation of regulatory outcome deviations

- Volume risk
- Cost risk

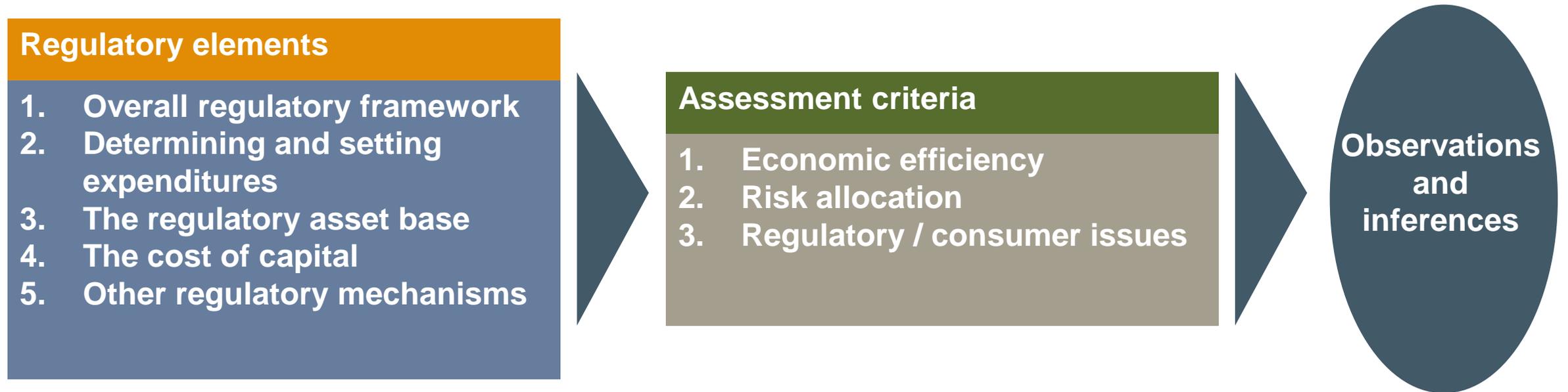
Other regulatory and consumer issues

- Transparency
- Simplicity
- Predictability
- Reduced regulatory costs and gaming

What about financial viability and promotion of competition and efficient pricing?

Methodology assessment framework

Five focus areas – three criteria - observations



1. Overall regulatory framework or revenue control mechanism

Incentive-based regimes should be most consistent with *efficiency*

▶ Productive efficiency

- **Revenue and price caps** should provide strong **incentives for operating cost reductions**
 - Higher cost reduction means higher profits
 - **Muted incentives under cost-plus**, as cost reductions are passed through to network users
- Revenue cap should have **lower cost of capital** compared to price cap (but higher than cost-plus or RoR) – not observed in practice, why?

▶ Dynamic efficiency

- Revenue cap – delayed investments
- Price cap – disincentive if throughput is lowered
- Cost-plus / RoR – potential for ‘gold plating’
- **If expanded service coverage or demand is important, maybe cost-plus and price cap are more appropriate**

▶ Allocative efficiency (tariff design)

- Revenue caps generally associated with ‘passive’ pricing strategies
- Price caps (and to lesser degree hybrids) more consistent with efficient tariff design, but limited evidence in practice
- Tariff design now regulated directly by the Gas Network Tariff Code

▶ Allocative efficiency (demand management)

- Price cap – incentive to maximise throughput
- Revenue cap – more conducive to implementing demand management
- Cost-plus – no incentives either way

1. Overall regulatory framework or revenue control mechanism

Revenue caps are more compatible with efficient *risk allocation*

▶ Volume risk

- Revenue cap - revenues are fixed so higher or lower tariffs are borne by network users
- Price cap – TSO revenues fluctuate, so revenue risk resides with the TSO
- Cost-plus / RoR – borne by network users but only to the extent that costs vary with demand
- Given prevalence of fixed costs in gas transmission, **risk exposure is best placed with users**
 - TSO has limited ability to manage risk
 - Risk is diversified by spreading it across a wider group
 - Should result in lower cost of capital

▶ Cost risk

- Revenue / price caps – risk of cost differences are borne by TSO
- Cost-plus / RoR – risk is passed to network users
- ▶ **Fundamental trade-off between efficiency (under incentive arrangements), on the one hand, and certain cost recovery on the other (with cost-plus/RoR frameworks)**
- ▶ Which is preferable?
 - **It depends** (on objectives and circumstances)
 - Eg, availability of robust cost information

1. Overall regulatory framework or revenue control mechanism

All regimes are susceptible to *regulatory gaming*

- ▶ Under **revenue and price caps**, profitability is determined by the **difference between forecasted/allowed expenditure versus actual expenditure**
- ▶ There is therefore an **incentive to raise the cost forecast/allowance** as part of the revenue setting process
 - Eg, include capital expenditures, but then defer projects until the next period
- ▶ **Fundamental dilemma for incentive-based regimes – how to preserve the incentives for cost minimisation without encouraging (excessive) gaming?**

- ▶ **Price caps** have the added problem of creating an **incentive to game the demand forecast**
 - A regulated firm has an incentive to bias down its demand forecasts, and then to act to maximise demand (and its profits)
- ▶ **Cost-plus regimes** suffer from the ‘Averch-Johnson effect’
 - **Incentive to overinvest to increase the capital base** on which regulated firms are guaranteed a return
 - Little incentive to pursue efficiencies

1. Overall regulatory framework or revenue control mechanism

Summary assessment – not unambiguous, depends on weighting

Criteria	Revenue cap	Price cap	Hybrid	Cost-plus / RoR
Productive efficiency	✓✓	✓✓	✓	✗
Dynamic efficiency	✓	✓	✓	✓
Allocative efficiency	✓	✓	✗	✗
Volume risk allocation	✓✓	✗	Uncertain	✓
Cost risk allocation	✓✓	✓✓	✓	✗
Regulatory gaming	✓	✗	Uncertain	✓

- ✗ Little consistency with the criterion
- ✓ Some consistency with the criterion
- ✓✓ Potentially strong compatibility with the criterion

1. Overall regulatory framework or revenue control mechanism

Main takeaways

- ▶ **Revenue and price caps provide stronger incentives** than cost-plus/RoR to minimise costs
- ▶ **Revenue and price caps place the risk of any cost deviations on the TSO**, which is consistent with efficient risk allocation
- ▶ **The impacts on dynamic and allocative efficiency are ambiguous**, with the different control mechanisms providing mixed incentives (of a different type each)
- ▶ **Revenue caps score well in relation to volume risk**
- ▶ **Incentive-based regimes** (particularly price caps) are **subject to regulatory gaming**, but cost-plus/RoR are not immune to this
- ▶ **Most NRAs seemingly place more weight on efficiency incentives and removing volume risk from the TSOs**, which favours revenue caps
- ▶ However, **a significant number continue to use cost-plus arrangements for capital expenditures**
- ▶ We think this might largely derive from the gaming issues and a concern that TSOs do not have an incentive to artificially inflate (and therefore profit from) cost forecasts
- ▶ **Obtaining accurate cost forecasts is therefore critical** (and a challenge)

2. Determining and setting expenditures

Key aim is to set revenues commensurate with efficient costs

- ▶ This is at the centre of NRAs' tasks and of the challenges they face
- ▶ The difficulty arises because of the **information asymmetries** between the TSOs and the regulators
 - NRAs have **imperfect information** about the TSOs' actual costs, demand and service quality
 - **TSO has more information** about these attributes than the regulator or other interested parties
- ▶ But, **regulators are required to make judgements** about these matters so that they can **set revenues broadly equal to efficient costs and/or to define the magnitude of (and the time for closing) any efficiency gaps**

1. *Do NRAs need to devote more effort (and resources) to TSO cost assessment and, if so, is there merit in moving to more 'sophisticated' forms of assessment such as cost benchmarking and/or TOTEX approaches?*
2. *If more detailed cost assessment is justified, how could these other approaches be adopted and applied?*

2. Determining and setting expenditures

There is a trade-off between efficiency incentives and complexity

Criteria	Bottom-up	Top-down	Benchmarking	TOTEX
Efficiency	<p>✗</p> <p>Limited efficiency incentives, given focus on individual costs</p>	<p>✓</p> <p>Holistic approach should deliver stronger efficiency incentives</p>	<p>✓</p> <p>Strong efficiency incentives given revenue-cost decoupling</p>	<p>✓ ✓</p> <p>In principle, most consistent with efficiency as it also removes incentive to favour one type of expenditure to increase profits</p>
Regulatory cost / complexity	<p>✓ ✓</p> <p>Least costly approach as only firm-specific costs are assessed (albeit generally requires detailed examination of individual cost items/categories)</p>	<p>✓</p> <p>Requires access to a dataset of (partial) efficiency or productivity measures of comparator companies</p>	<p>✗</p> <p>Extensive and complex data and modelling requirements</p>	<p>✗</p> <p>Extensive and complex data and modelling requirements plus major change to regulatory regime and approach</p>

- ✗ Little consistency with the criterion
- ✓ Some consistency with the criterion
- ✓ ✓ Potentially strong compatibility with the criterion

2. Determining and setting expenditures

Is the added regulatory burden justified?

Depends on level of inefficiency

TSOs are monopolies and are therefore shielded from competition

In many cases, state ownership means no threat of hostile takeover

TSOs cannot be allowed to become insolvent

There are large divergences between the most and least efficient businesses

- ▶ Suggests more detailed scrutiny of TSO costs might be warranted
- ▶ **Note:** “Historical outturn OPEX” approach used by some NRAs for setting OPEX allowances does not necessarily address the issue of productive inefficiency
 - Eliminates rents (allocative efficiency), but not necessarily technical inefficiencies
 - But, has **several important advantages including its relative simplicity and the strong incentives it provides for cost reduction over time** (dynamic efficiency)

2. Determining and setting expenditures

How could more 'advanced' assessment methods be employed?

1. **Diagnostic tool** to help assess the reasonableness of bottom-up proposals
2. **Set expenditure allowances**, eg, by combining (partial productivity measures) with some top-down assessment of particular cost categories
3. **Set the efficiency factor**, based on total factor productivity growth, to set operating cost or revenue growth
4. Provide information to network users and others (through **regulatory reporting**)
5. **Set revenues based purely on the cost benchmarking results** (as is common under TOTEX approaches)

- ▶ Benchmarking may play a more deterministic role in setting revenue allowances...over time
- ▶ Expect that **for most NRAs the more appropriate use of benchmarking would be for one (or more) of the first three listed purposes**
- ▶ Even so, **considerable effort needed in determining the information to collect, and standardising data collection and benchmarking processes**
 - **Best defined at an EU-wide level**
 - Information could be published

3. The regulatory asset base

We do not favour revaluations...

Objective is to underpin confidence that the opening value of, and the basis for updating, the RAB are stable – provides foundation for future investment and low cost of capital

▶ No rationale for departing from the adopted starting asset values

- Creates **regulatory risk** and potentially **undermines** future investment
- TSOs might request a **higher cost of capital** to compensate for the added risk and uncertainty
- Because the costs are sunk, there is **no clear economic rationale** for any change (to counterbalance the added regulatory risk)
- Only be appropriate to depart from existing values **if there is a perception of inequity** that is strong enough to render the RAB unsustainable without a correction

▶ Prefer that the entire RAB *not* be periodically revalued at replacement cost

- Introduces greater **regulatory risk** and therefore **higher WACC** needed to compensate
- Adds to the **complexity and cost** of the regulatory regime and can be subjective
- **Unclear how upgrades would be treated** under a replacement cost approach, potentially threatening future investment
- In most cases, would be a **major change** from the existing regime
 - Only two NRAs employ this approach currently

3. The regulatory asset base

...but greater scrutiny of investment costs is needed

Current situation

- ▶ Most NRAs apply a form of incentive regulation to OPEX
- ▶ Capital expenditure
 - Is not subject to incentives, and/or
 - Is treated as cost-plus with almost automatic updating of the RAB
- ▶ Differential treatment creates a '**capex bias**'
- ▶ Might be good regulatory practice to allow regulators the flexibility of undertaking **ex post reviews of TSO capital spending**, particularly where this materially exceeds previously forecast levels

- ▶ Key feature of such an approach would be that NRAs only allow capital expenditure that they deem **prudent and efficient**
- ▶ But, need to be mindful of potential **drawbacks**
 - Practical difficulties in demonstrating that spending was inefficient
 - The risk of mistakenly identifying an efficient investment as inefficient
 - Greater level of intrusion and micromanagement
- ▶ Therefore, such reviews **should be used sparingly** and as a complement to other *ex ante* incentive arrangements

4. The weighted average cost of capital

Efficiency requires that the cost of capital is set ‘accurately’

- ▶ **If the cost of capital is set too low**, tariffs for network users would be lower (in the short term) but
 - Difficult for TSOs to recover their efficient costs
 - Deters investment
 - Results in deteriorating infrastructure and/or quality of service
- ▶ **If the cost of capital is set too high**
 - Creates incentives to over-invest
 - Results in higher tariffs
- ▶ Both would be **inconsistent with** productive and allocative **efficiency**

- ▶ There are **practical difficulties** to setting the ‘right’ cost of capital
 - CoE can only be partially observed through *realised* returns on comparable assets
 - Even this cannot be measured reliably
 - And, if it can, it may not in any case reflect *expected* future returns
 - CoD is observable, but varies depending on company-specific characteristics, hence, unlikely that a prescribed methodology will be applicable or desirable in all cases
- ▶ **No unambiguous way of choosing between alternative estimation methods**

4. The weighted average cost of capital

EU-wide high-level principles for setting the cost of capital?

- ▶ Regulators must **exercise judgement** about the analytical techniques and evidence that should be employed
- ▶ But, there might be merit in developing some **overarching principles and guidelines** for setting the WACC **at the EU-level**, while allowing sufficient flexibility to individual NRAs
 - These would set out the approach to calculating the cost of capital

- 
- ▶ **Cost of capital objective**
 - ▶ **WACC basis (pre or post tax, real or nominal, vanilla)**
 - ▶ **Methodology and estimation methods**
 - ▶ **Deterministic estimation vs regulatory flexibility**
 - ▶ **Transparency and accountability**

5. Other regulatory mechanisms

Need to align incentives and incorporate quality metrics

Efficiency incentives

- ▶ The **incentive mechanisms** that are in place are generally **limited to OPEX**
- ▶ Savings and losses kept/incurred for the duration of the regulatory period
 - Incentives are **not constant through time**
- ▶ Where they are time-neutral **they do not address the issue of capex bias**
- ▶ There is therefore a case for **equalising the incentive rates** for OPEX and capital expenditure
 - Adopt **TOTEX** approaches
 - Introduce comparable **incentive mechanisms for capital expenditure** to complement existing OPEX efficiency schemes

Quality standards

- ▶ A risk that in an effort to reduce costs (especially under incentive-based regimes), TSOs do so at the expense of quality
- ▶ **More widespread use and development of incentives to maintain or improve service quality levels** (as well as to reduce costs)

Some final observations

- ▶ Consideration could be given to **expanding the revenue cap to cover the entire revenue allowance** (and not just OPEX)
 - Needs to be accompanied by other mechanisms to ensure efficient costs and incentives are set
- ▶ **Greater regulatory effort is required to challenge the cost assumptions of the TSOs** and to provide more ‘stretching’ efficiency targets
 - Possibly employ cost **benchmarking**
 - Consider establishing an **EU-wide procedure for collecting standardised information** from TSOs and **publishing data** on comparative network performance
- ▶ There are **no strong efficiency grounds** for revisiting opening asset values or periodically revaluing and updating the RAB
 - Minimises regulatory risk and complexity
 - Lowers cost of capital and promotes investment
- ▶ Need **greater scrutiny of new investments** and/or **incentives to minimise costs** and remove potential biases for undertaking capital expenditure
 - TOTEX approaches
 - *Ex post* reviews of capital expenditure
 - Incentive mechanisms
 - Neutral in the choice of both timing and expenditure type

Some final observations

- ▶ For the **cost of capital**, we believe it **neither necessary nor desirable to establish prescriptive rules** and a common EU approach
 - High-level guidance at the EU level?
 - Greater sharing of thinking and analysis between NRAs
 - Periodic reviews of the underlying principles to reflect current best or common practice
- ▶ **Quality** of the transmission network service **needs to be given greater prominence** in NRA regulatory frameworks
 - Relevant metrics and **value to network users**
 - Eg, system reliability, damage incidents, gas leaks and unaccounted for gas, emergency responses, asset management practices, pipeline corrosion and community liaison

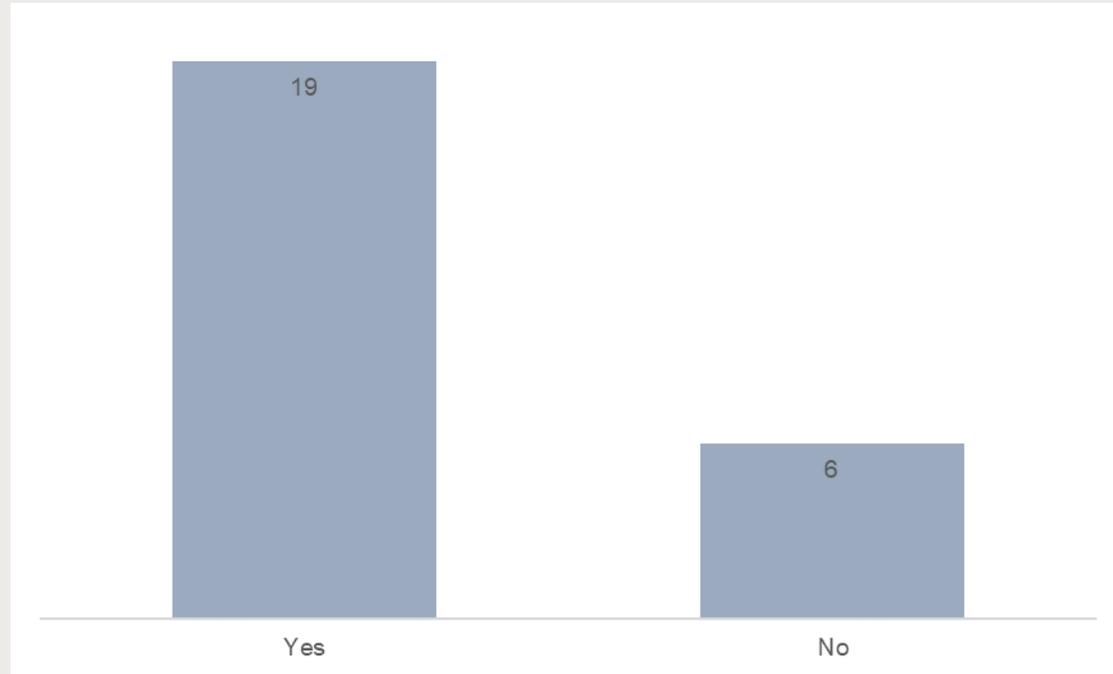


Annex slides

OPEX pass-through

Most NRAs allow pass-through of some OPEX

Are OPEX costs passed-through?



- ▶ Most NRAs do treat some OPEX components as pass-through
- ▶ Among those NRAs employing pass-through mechanisms, there is considerable variability in the cost categories to which these apply
- ▶ Most common and almost universal costs recognised as pass-through are
 - Fuel gas
 - Government taxes and duties
- ▶ Other pass-throughs
 - Council rates
 - Licence fees and regulatory costs
 - Non-wage payroll costs
 - Bad debts

Cost of equity

Methodological details

▶ Total market returns (TMR) or market risk premium (MRP) emphasis?

- Assume TMR broadly constant and MRP inversely correlated with RFR (“**TMR emphasis**”), *or*
- Assume MRP largely constant and TMR is positively correlated with RFR – MRP directly estimated (“**MRP emphasis**”)

▶ MRP emphasis more conventional among NRAs

▶ Arithmetic or geometric averages?

- Most NRAs rely on arithmetic averages
- Ireland, Italy and Portugal use geometric averages
- Belgium, Germany and the Netherlands apply the average of the arithmetic and geometric averages