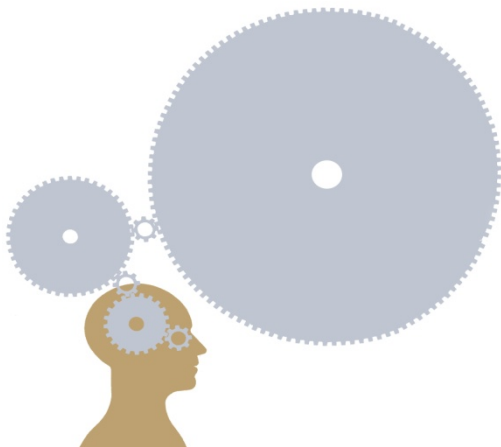


Regulatory best practices applied to district heating

Future of Heat Markets and DH Pricing in
Baltic Countries and Poland—workshop, Riga

Dr Leonardo Mautino
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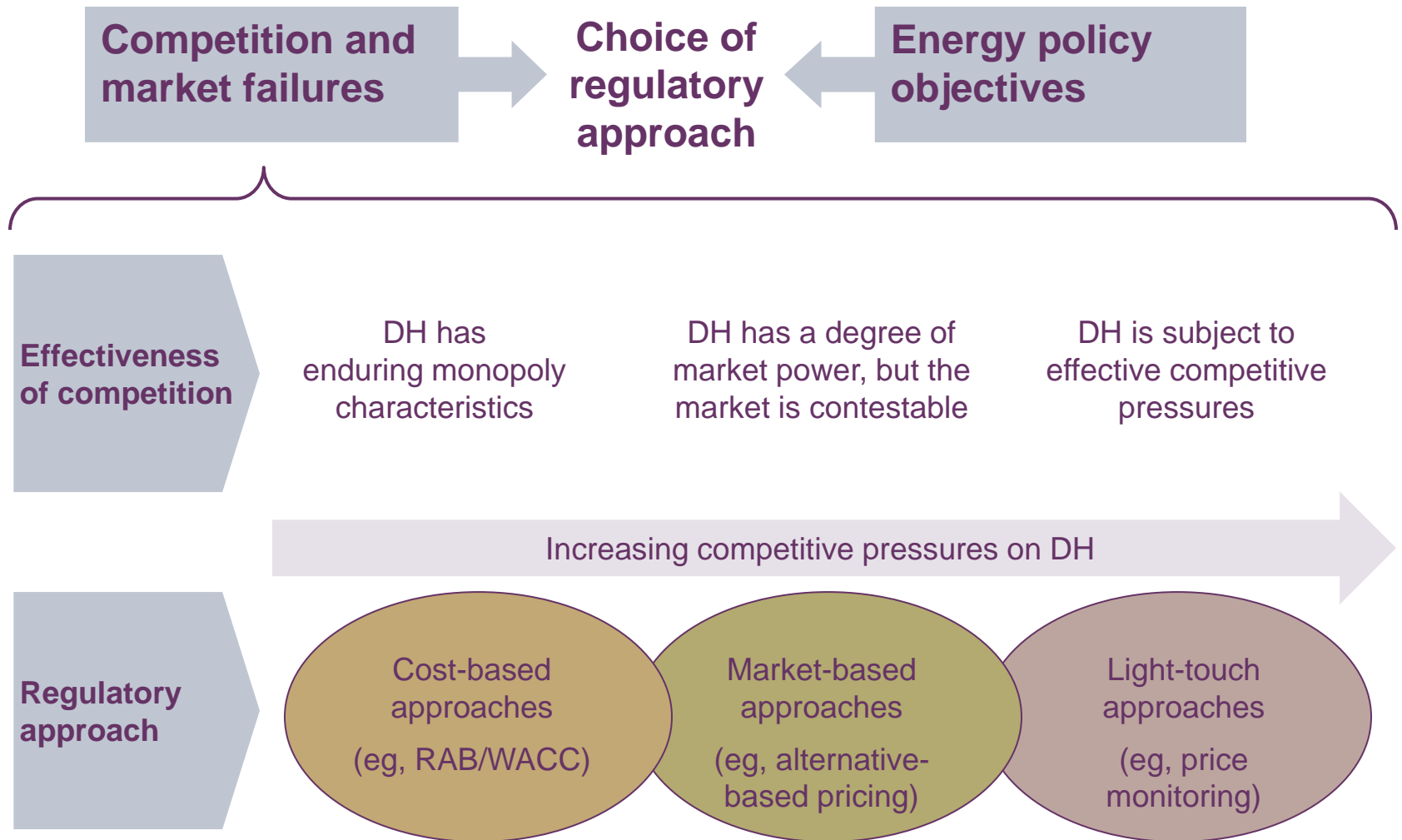
December 4th 2012



Overview

- context: models of regulation
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Choice of regulatory approach



Specific models of regulation

Market-based approaches

- aim to deliver economically efficient price signals
- more relevant where there is a prospect of competition
- imply cash-flow uncertainty and possible perception of over-recovery
- risk of asset-stranding

LRIC-based pricing

Reflects hypothetical competition with alternative/new technologies (eg, telecoms)

Alternative-based pricing

Reflects possible competition with different providers/ technologies (eg, DH)

Cost-based approaches

- aim to reduce investment risk and to guarantee cost recovery
- mostly relevant where the activity has enduring market power
- may imply limited upside of high-return scenarios

Cost-plus

Constrains profits, but provides few incentives for efficiency

Price (revenue) cap + 'add-ons'

Strong incentives for cost-cutting; provides incentives designed to reflect regulatory objectives (could be suitable for DH where there is limited competition from alternatives)

Current situation in Baltic States and Poland (I)

Current regulatory regimes

- low levels of regulatory engagement with stakeholders
- limited transparency and lack of justification of decisions
- lack of proportionality in investigations
- lack of high-powered incentive regimes (eg, uncertainty over CAPEX recovery in context of short control periods)
- customer non-payment

Obstacles to regulatory change

- fuel poverty and political salience of heat prices
- scope for political intervention in regulatory process
- low regulatory capability
- dominance of public and municipal ownership

Key steps for moving towards best practice

- transparency and clarity in regulatory decision-making
- investment and certainty of cost recovery
- potential and incentives for efficiency improvements
- potential to simplify cost assessments and regulatory burden

Current situation in Baltic States and Poland (II)

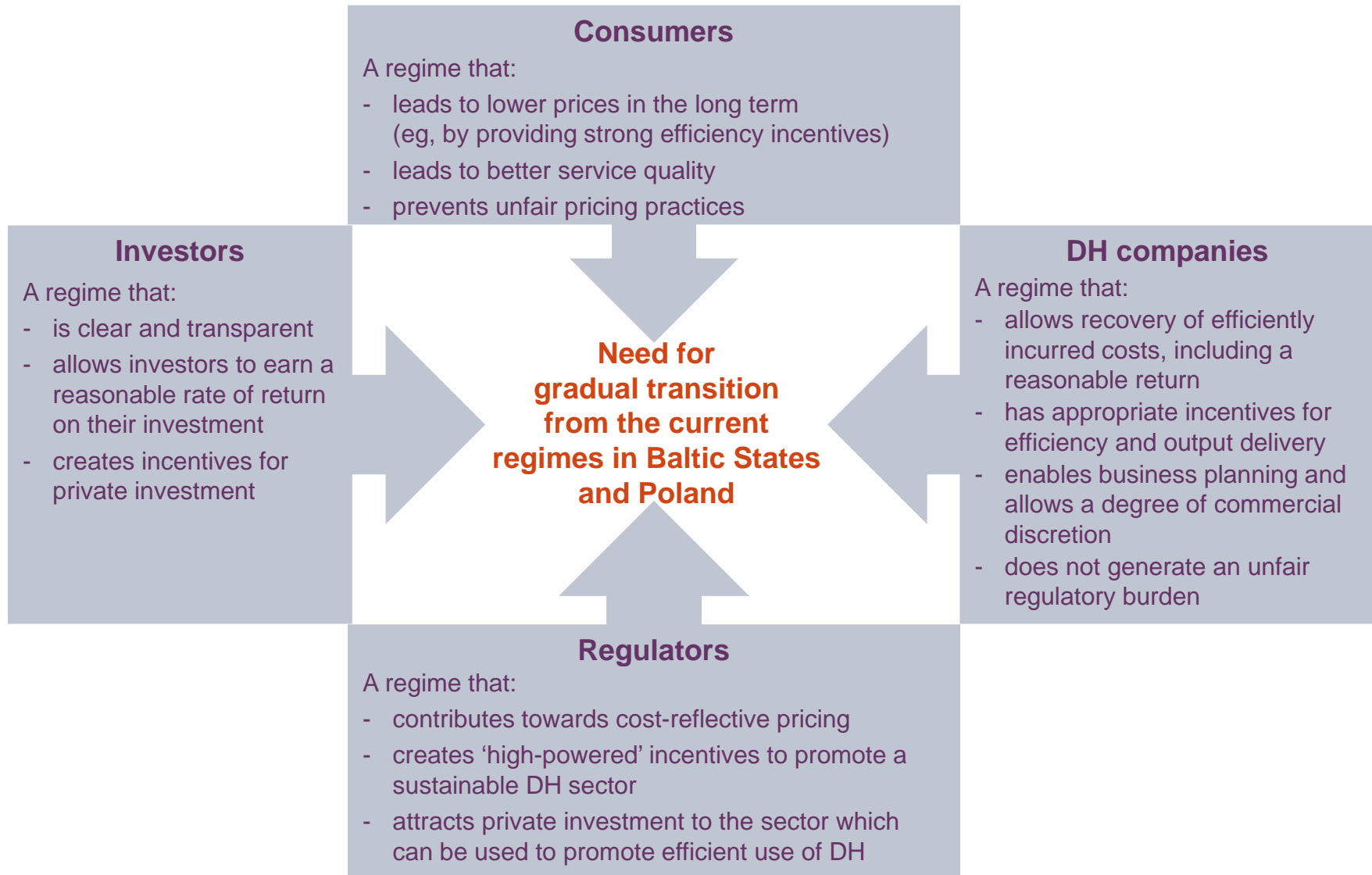
Other external pressures for change

- a need to develop stepwise approaches towards heat market liberalisation, along with EU and national energy strategies and policies
- ensuring long-term affordability of energy (including heat)
- incentivising heat production from local, more stable renewable fuels (biomass, waste) away from costly fossil fuels (gas)
- a need to make energy policy more independent from social policy

Key issues that need addressing

- duration of price controls and degree of regulatory burden
- mechanisms to ensure long-term cost recovery—in particular, allowing an appropriate rate of return on debt and equity
- using appropriate benchmarking tools to incentivise cost efficiency
- developing mechanisms to transition from current regulatory frameworks to best-practice regulatory regimes and more cost-reflective tariffs

Regulatory guiding principles to ensure well-functioning DH markets



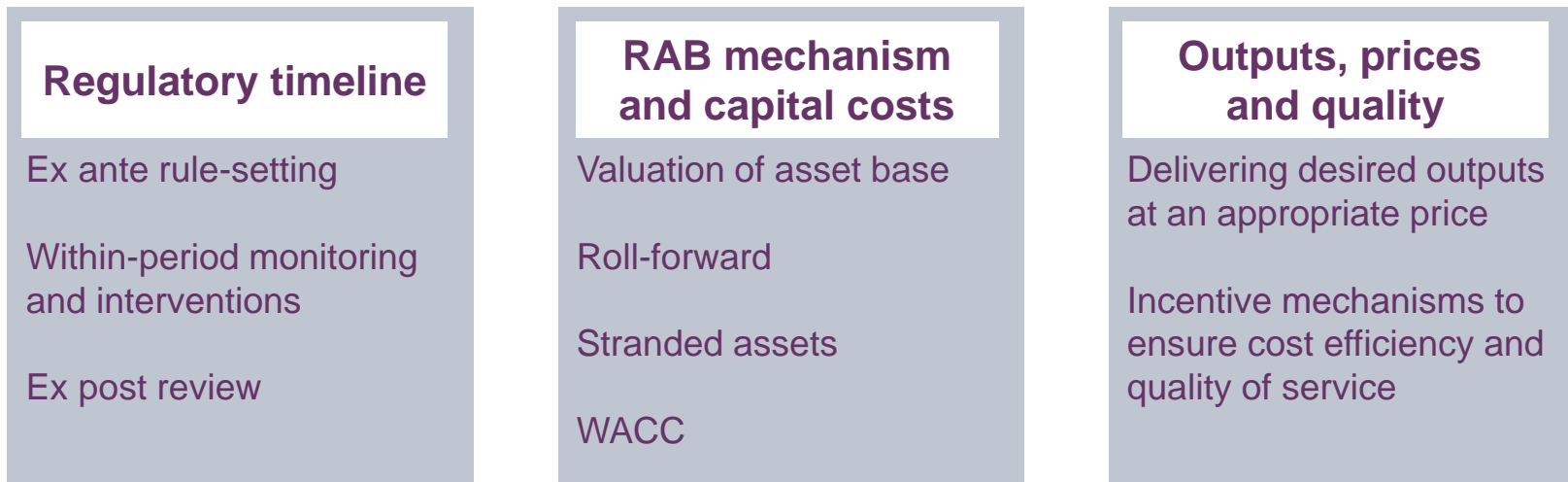
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Towards best-practice price regulation

Ex post review supported by ex ante rules

The three basic components are as follows:

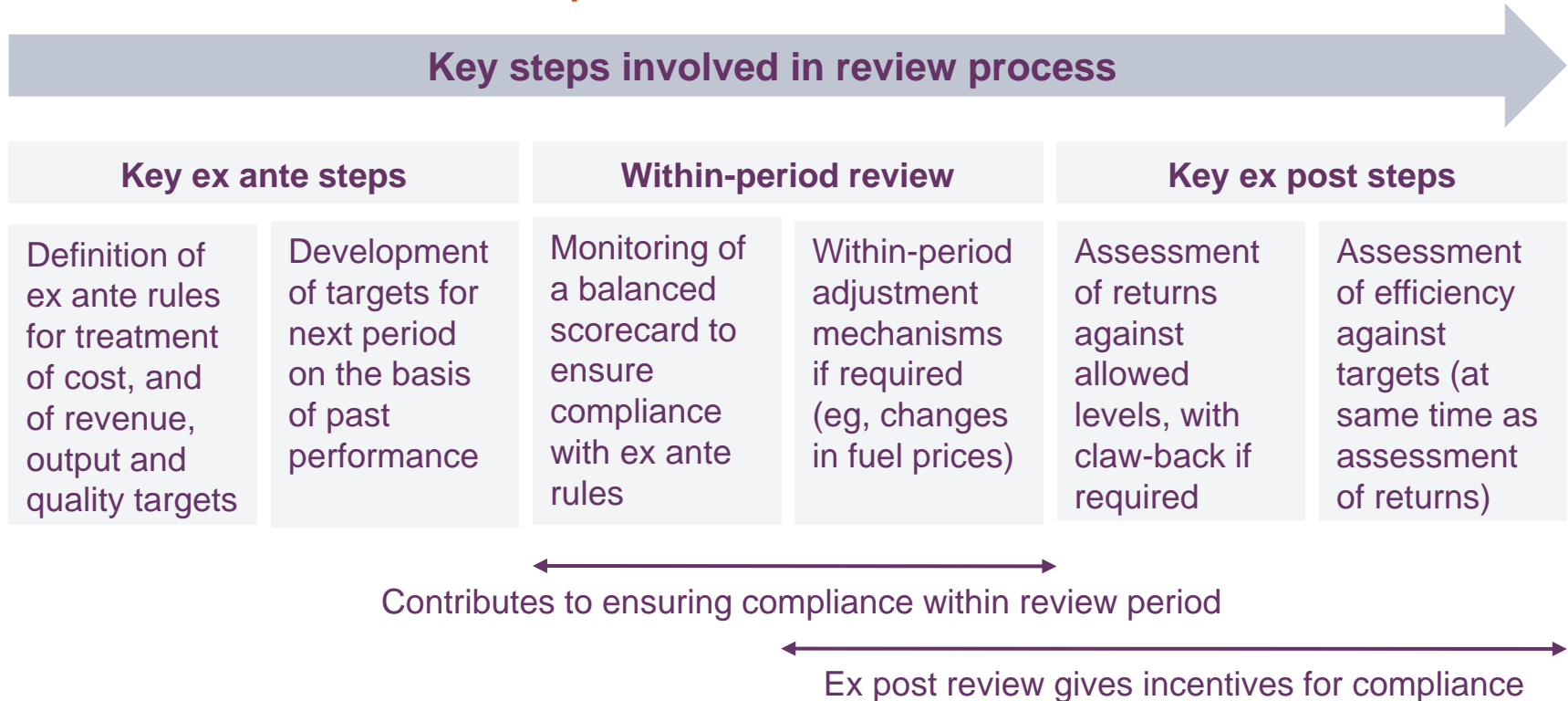


It is recognised that as not all of these changes may be implementable at once, there may be a need to identify priority areas of change

The approach would be consistent with the regulatory guiding principles, while ensuring that customers are protected by paying a fair price for heat

Ex post review supported by ex ante rules

Towards clearer, simpler rules



An ex post regime supported by ex ante rules

- the primary job of a regulator is to define rules for allowable cost and for quality, and then to monitor, reward or penalise companies for their compliance with these rules and targets

Issue-specific benefits

The expected advantages of the proposed system

Area of impact	Expected impact
Protection for customers	<ul style="list-style-type: none"> - ex ante methodologies embed customer protection, while ex post mechanisms provide powerful incentives for compliance; incentives and mechanisms for cost efficiency mean that customers benefit over the long term - within-period review ensures that customers are not exposed for up to five years - more transparent approach to regulation allows for improved understanding of implications of investments for fuel poverty - provides justification of any price changes that have an impact on affordability
Attraction to investors	<ul style="list-style-type: none"> - offers a stable, transparent regulatory process that gives firms discretion to set prices in line with agreed methodologies - RAB/WACC principles well understood by investors
Flexibility for companies and regulators	<ul style="list-style-type: none"> - companies have discretion to set their own prices subject to defined methodologies - regulators do not have to specify or evaluate ex ante the nature and scope of investment programmes; these are decided by the company and reviewed subsequently
Limited incremental regulatory burden	<ul style="list-style-type: none"> - no ex ante review and therefore limited incremental impact on regulatory resources - companies responsible for calculating the parameters of the price cap, and demonstrating their consistency with methodologies and related rules and obligations
Consistency with precedent	<ul style="list-style-type: none"> - RAB/WACC model widely used in infrastructure sector - other ex post regimes show that principles can work

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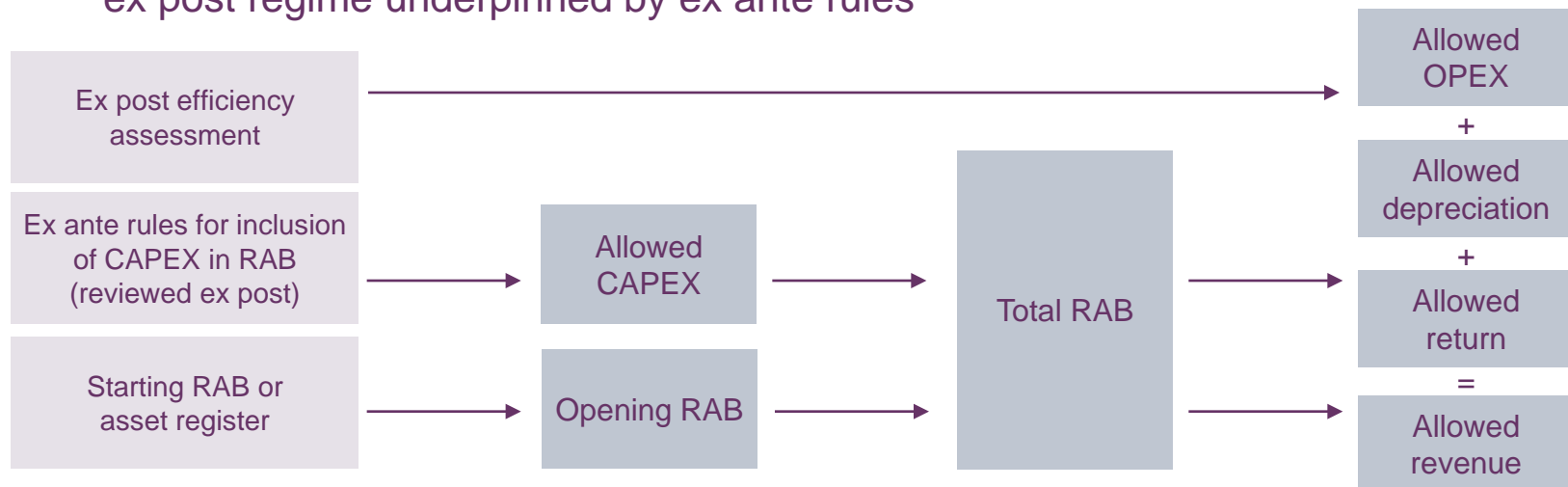
Key aspects of best-practice regulation

1. Price control based on RAB/WACC principles
2. Sharing of efficiency gains between customers and companies, and cost benchmarking
3. RAB valuation
4. Principles for including assets in the RAB (including treatment of working capital)
5. Cost of capital
6. Customer protection
7. Transitional arrangements

Price controls based on RAB/WACC principles

Introduction to RAB mechanism

- RAB/WACC models are designed to allow regulated firms to recover some measure of their costs
- these costs are typically presented as ‘building blocks’ consisting of:
 - **operating expenditure (OPEX)**—here, incentives come from an ex post review
 - **depreciation on the RAB** (the return of capital)—the rules for valuing the RAB and adding assets to the RAB are set out ex ante. Any additions are reviewed ex post to ensure compliance with these rules
 - **return on the un-depreciated RAB** (the return on capital, calculated as the WACC times the outstanding RAB)—the rules for calculating the return (WACC) are set out ex ante
- the version of the RAB mechanism proposed reflects, and is supportive of, an ex post regime underpinned by ex ante rules



Price controls based on RAB/WACC principles

Duration

Moving to a longer price control period

- allows companies time to secure **cost efficiencies** and retain the associated benefits before sharing them with customers
 - this allows companies a degree of discretion to find innovative means of reducing cost that may not emerge under more frequent, ex ante reviews
- reduces the **regulatory burden** relative to the existing practice, by increasing the time between price reviews

The proposed duration of the price control is five years

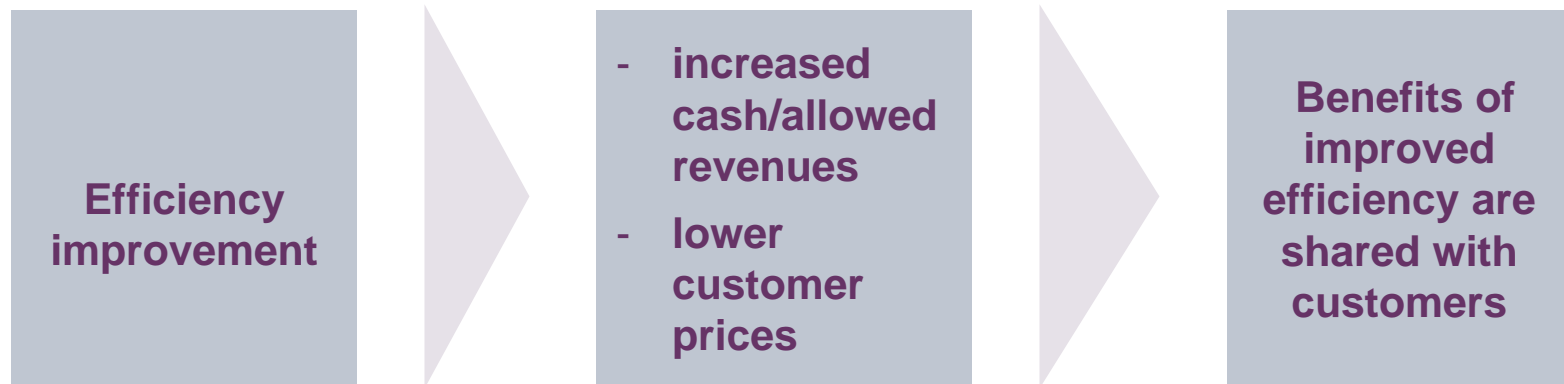
- a five-year regulatory period is in line with the period established in many countries and industries, and seems suitable for regulation of DH in Estonia, Latvia, Lithuania and Poland

The approach allows for **within-period reviews** to account for any material change in circumstances. As such, regulators do not have to wait up to five years to act in response to specific concerns

Sharing of efficiency gains between customers and companies

Incentives to encourage efficiency drive value for customers

→ central to the approach



- efficiency incentives have been successful in driving out costs to users from regulated industries in a number of sectors and countries
- both customers and private investors are likely to place a high value on appropriately designed regulatory mechanisms to support efficiency
- important role for **benchmarking**
- the **rationale** for benchmarking is to replicate competitive market incentives to reduce cost by reflecting company-specific and industry-wide efforts to cut cost in different ways and thereby increase profit

Efficiency benchmarking in an ex post regime

The incentives

Carrots: encouraging good performance

- firms can retain the benefits from efficiency gains arising from reduced operating cost until the next ex post assessment or even longer, depending on how 'excessive' returns are defined and treated (this could weaken incentives)
- frontier companies (ie, the most efficient ones) should be provided with additional rewards

Sticks: penalising poor performance

- the ex post efficiency benchmarking implies that firms that earned excessive returns relative to the estimated efficient cost base (either because returns were excessive or actual costs were significantly higher than the efficient cost base) will have tariffs adjusted in subsequent years
- if thresholds exist and are breached, or companies are identified as inefficient, the regulator can opt for a more intrusive investigation, with the potential introduction of ex ante regulation or adjustments to tariffs in subsequent years

Benchmarking DH/CHP operators

Aspect	Recommendation
<p>Level of comparison depends on data availability and consistency: can be regional, national, or international</p>	<p>Model at the aggregate level using national-level data. Group- and firm-level analysis to be pursued, with the former accounting for the shared fixed costs of firms within a group</p> <p>At a later stage, possible to extend to an international level</p> <p>Continue to develop standard definitions and methodology for data collection, and adjust for regional factors and atypical costs to normalise costs</p>
<p>Possible to compare companies based on their size of operation, fuel used, etc</p>	<p>Benchmark companies in groups of similar technological characteristics (eg, fuel technology used)</p> <p>Directly account for company-specific operational factors in the model (eg, economies of scale, customer density/market penetration, customer composition, etc)</p>
<p>Costs to be included in benchmarking analysis</p>	<p>Include as many costs as possible</p> <p>Benchmark fuel costs, costs of electricity generation, and other OPEX, and jointly including CAPEX at the TOTEX level</p>
<p>Depending on data availability, other aspects could be modelled</p>	<p>Explore use of multiple inputs, multiple outputs and exogenous factors, depending on the data</p>
<p>Treatment of input prices</p>	<p>Benchmark at the national level by grouping companies of similar technology (eg, fuel type)</p>

RAB valuation (I)

Replacement cost (RC) as a regulatory target

Efficient market outcome

- DH networks are different from traditional utilities as there is some competition with alternative sources of heat (at least at the installation stage)
- using RC would promote efficient use of alternative sources of heat in the long term

Inter-generational equity

- using RC ensures that each generation of customers pays for the actual value of the asset used to supply the service

Ensuring that companies are financeable

- using RC produces a depreciation profile that matches more closely actual expenditure on asset renewal, reducing the mismatch between cash outflows and cash inflows

Facilitating benchmarking

- using RC ensures that companies adopt similar cost capitalisation and depreciation policies, making asset values more comparable across the industry

RAB valuation (II)

- main challenge in moving to the RC approach

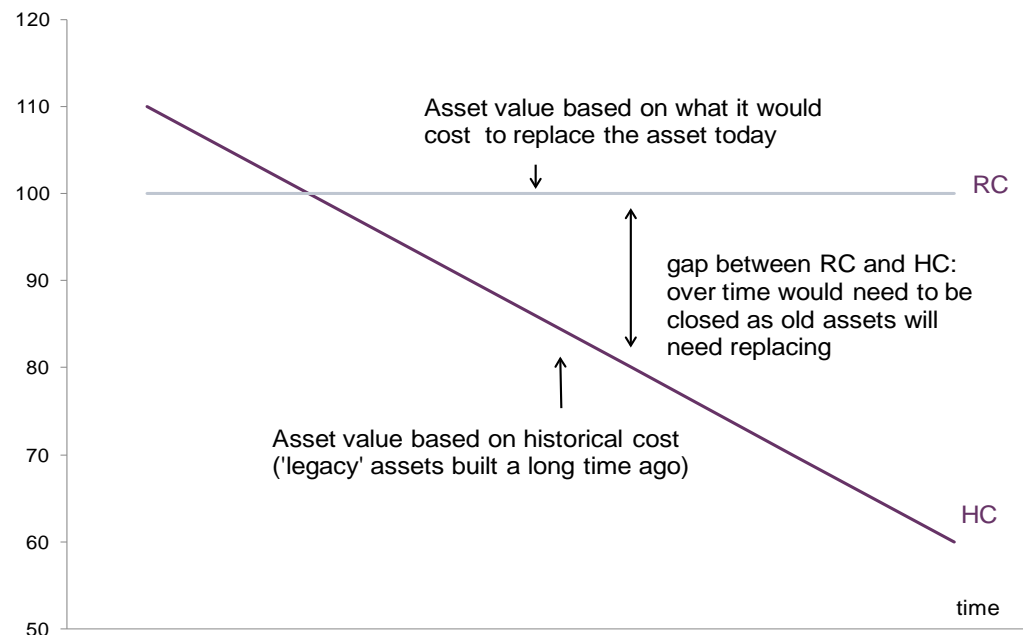
if the gap between RC and HC is large, a move to RC might imply a large increase in tariffs, which might be inconsistent with affordability objectives

- for newer assets the gap will not necessarily be large, but it may be so for older assets

How could the change to RC be managed?

One option, as a transitional arrangement, could be to use a 'hybrid' between RC and HC

- depreciation is based on asset values calculated using RC, while returns are based on asset values calculated using HC
 - **example:** assume HC = 60, RC = 100, cost of capital = 10%, average asset live = 20 years, and straight-line depreciation; then allowed return = 6 (10% of 60) and allowed depreciation = 5 (100/20)
- could strike a balance between efficiency and fairness arguments: customers are charged for the current opportunity cost of assets, while investors recover only their actual investment without windfall gains
- this type of approach is used in the water sector in England and Wales
- main practical complication would be the need to estimate both RC and HC



Principles for including assets in the RAB

Which types of assets are allowed in the RAB?

- only 'used and useful' tangible assets
- rules for passing the 'used and useful' test are set ex ante
- an appropriate allowance for working capital

When are the new assets added to the RAB?

- added either when the funds are expensed or when the new asset becomes operational
- in the latter case, the financing costs of construction work in progress are added to the final cost of the asset

At what cost are the new assets added to the RAB?

- added at forecast acquisition cost
 - ex ante rules specify how the opening RAB in the next regulatory period is to be adjusted to reflect differences between the actual and the forecast expenditure that was used to set prices at the beginning of the period
- the regulator reviews the cost ex post
 - ex ante rules define how the regulator will carry out the review

Principles for including assets in the RAB

Treatment of working capital

What is working capital?

Accounting

- the difference between current assets and current liabilities
- current assets include inventories, cash required for operations, marketable securities, accounts receivable, other receivables
- current liabilities include accounts payable, other payables

Regulation

- primarily relates to receivables less payables; also includes inventories where applicable
- excludes cash and interest-bearing securities (financial working capital)
- capital that is required to cover the **time lag** between an expense being incurred and revenue being received

Why should working capital be included in the RAB?

- working capital is needed for business operations, and therefore satisfies the **'used and useful'** principle
- the defining characteristic of working capital is the short-term timeframe over which it is locked into the RAB. As with other capital, it generates an **opportunity cost that should be remunerated at the cost of capital**
- in addition, regulatory precedent is consistent with compensation for working capital
 - for example, the Italian energy regulator, the water regulator in England and Wales, and North American energy regulators have made adjustments for working capital

Cost of capital: what is it and why is it used?

- the cost of capital is the cost to a company of raising finance (debt and **equity**) to support investment programmes
- it represents the *opportunity cost* to investors of putting money into one type of asset as opposed to their alternatives
- on average, in a competitive market, returns paid by firms to investors trend towards the cost of capital
 - regulators estimate the cost of capital to determine allowed returns
 - the cost of capital is the percentage that is multiplied by the RAB to determine the allowed return component of allowed revenue
 - setting a cost of capital below the true opportunity cost of funds can lead to an **underinvestment** problem

Companies that outperform the regulator's assumptions on costs can earn more than the cost of capital, and vice versa

- allowing companies to earn extra returns if they are more efficient than the industry on average is key to incentivising investment and further efficiency

Cost of capital

High-level best-practice principles in estimating the WACC

- a company's cost of capital cannot be measured directly; it can only be estimated
- important to balance theoretical accuracy with the practicality required for developing regulatory regimes in the four countries, taking into account the limited availability of country- and industry-specific data
- best practice for estimating the WACC involves thorough analysis, taking all relevant evidence into consideration
- methodological proposals and parameter estimates should be subject to a formal consultation, with opportunities for contributions from all stakeholders
- the estimated WACC should reflect the risk of those DH activities that are subject to regulation. Proposals provided in the appendix reflect the cost of capital of DH network activities:
 - if returns on generation activities (eg, CHP) were subject to regulated returns, the parameters for the equity beta, debt premium and gearing in the comparator analyses would need to be adjusted

Customer protection

Principles and recommendations

Clear and transparent regulatory framework

- ensuring customer protection is one of the regulator's statutory duties
- develop ex ante a system of rewards/penalties based on customer satisfaction metrics
 - adjust revenues for the next regulatory period at the ex post review or at the within-period review (subject to clearly defined ex ante conditions)
- define what an unacceptably large price increase would be in each country
 - develop rules for transition to the new regulatory regime and revenue re-profiling tools that the company can use in setting prices

Customer engagement

- ensure that the regulatory process is transparent, with customers able to comment on the proposed framework through a customer representative group

Most effective tool for protecting customers → a clear regulatory framework that limits the scope for discretion by both regulator and companies, and within which compliance with ex ante rules can be monitored effectively

Transitional arrangements

Balancing affordability and investment needs

- transition to higher prices, if justified, should take account of both **affordability concerns** and the **impact on investment**, quality and service provision by DH companies
 - rapid and significant increases in prices will pose difficulties for users but long transition periods may make it difficult for DH companies to finance investment
- **possible tools available** to a regulator (reflecting precedent) to mitigate the impact of price increases to address affordability concerns include the following:
 - modifying **depreciation** profiles
 - this will not affect the net present value of cash flows, only their timing, such that the company recovers more at future dates than today and the impact is spread over time. Note that this may cause financing concerns as there could be negative impacts on cash flow
 - **deferral** of CAPEX, and **delay of entry** of CAPEX into RAB
 - **capitalisation** into RAB of what is considered OPEX
 - **profiling** of returns over time, so that they are higher towards the end of the control period

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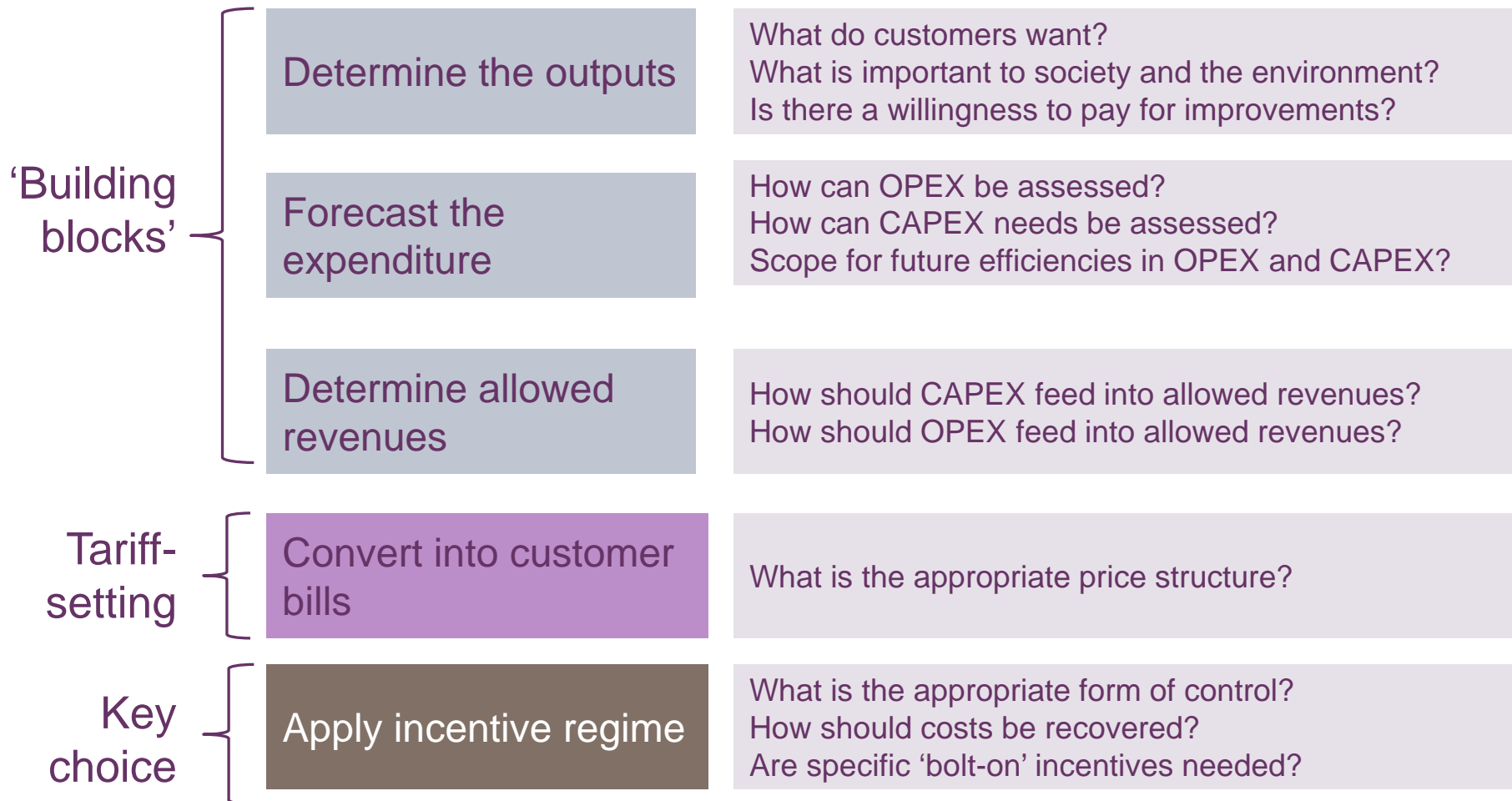
Implementation: main conclusions

- the principles of RAB/WACC-based regulation have the potential to deliver value to consumers, and to provide a supportive environment for investment
 - customers protected by ensuring cost-reflective prices and incentivising cost reductions without jeopardising service quality, which is critical given political emphasis on affordability
 - ensures that the company recovers all efficiently incurred costs and earns an appropriate return (ie, commensurate with the level of risk taken) on invested capital
- employed in a number of countries across a wide range of sectors
 - lessons from regulatory precedent can help to address specific issues that may arise in different countries and in developing proposals that deliver value for consumers
- ex post regimes may be expected to reduce regulatory burden and allow the company greater flexibility to set prices
- it is recognised that there is a need to address any practical issues that may be encountered in the implementation of these proposals, and to account and adjust for these issues as appropriate

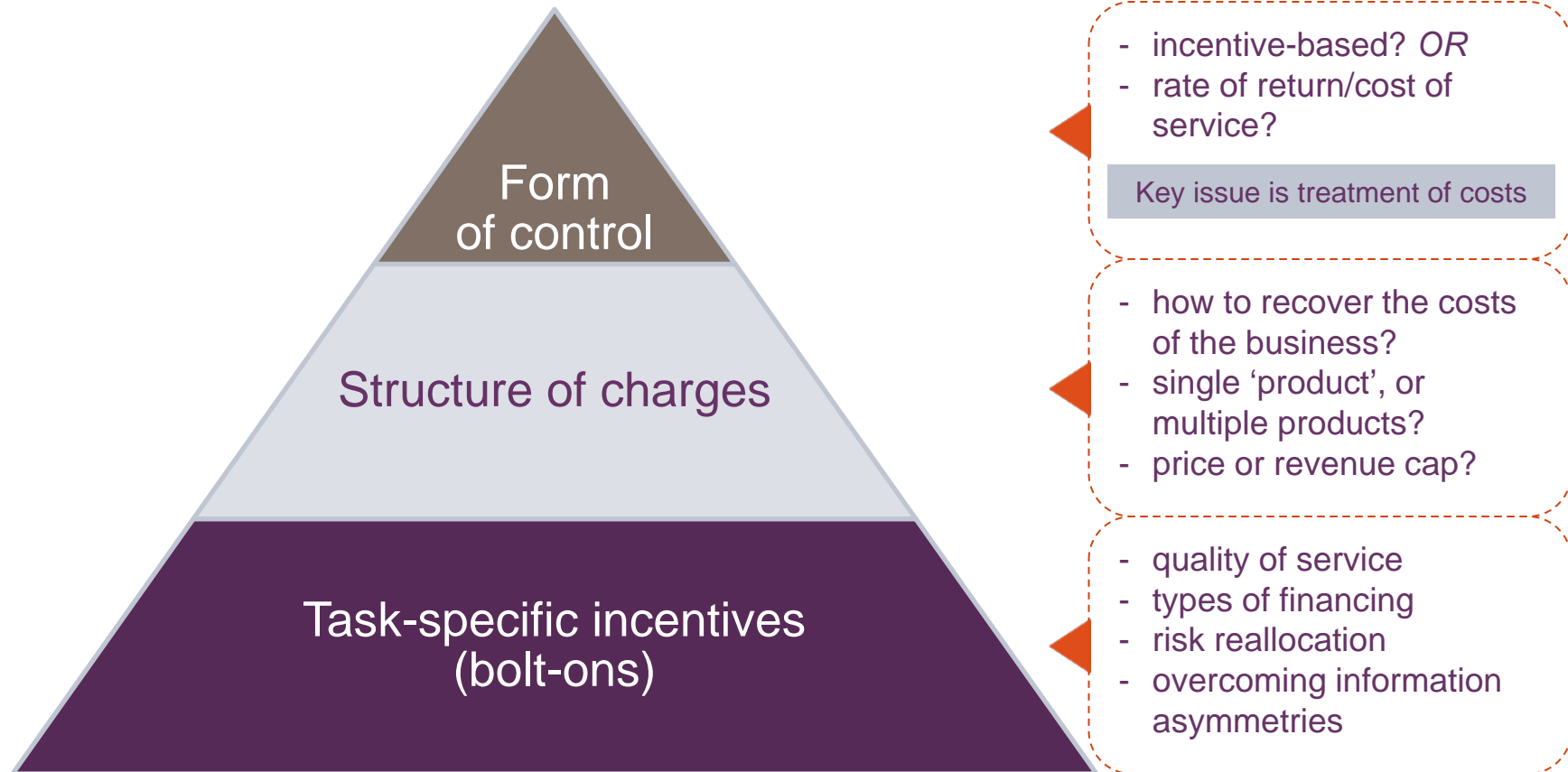
It should be possible to develop supportive regulatory regimes that account for the specific characteristics of individual countries based on the proposed framework

Appendix

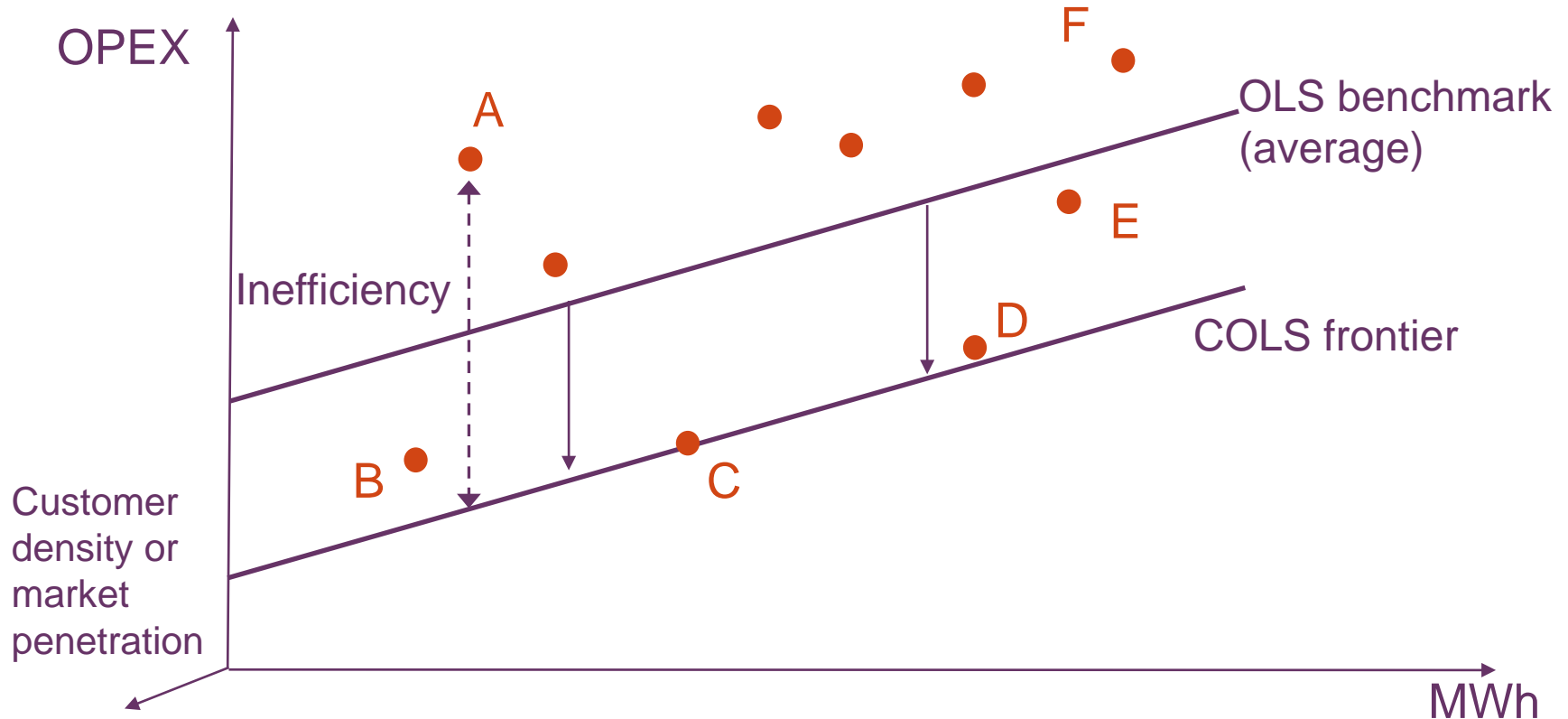
Appendix: price control building blocks



Appendix: applying the incentive regime



Appendix: example of econometric methods for benchmarking



Econometric approaches make comparisons more like-for-like by taking into account factors that differ between companies (eg, customer density could be a third dimension). The above two dimensional representations on the OPEX–MWh plane take into account economies of scale (ie, larger companies have lower unit costs)

An industry frontier (rather than an average cost function) can be established by parallel-shifting the OLS regression line until it envelops all firms (the COLS frontier suggests that only C is efficient)

Appendix: cost of capital

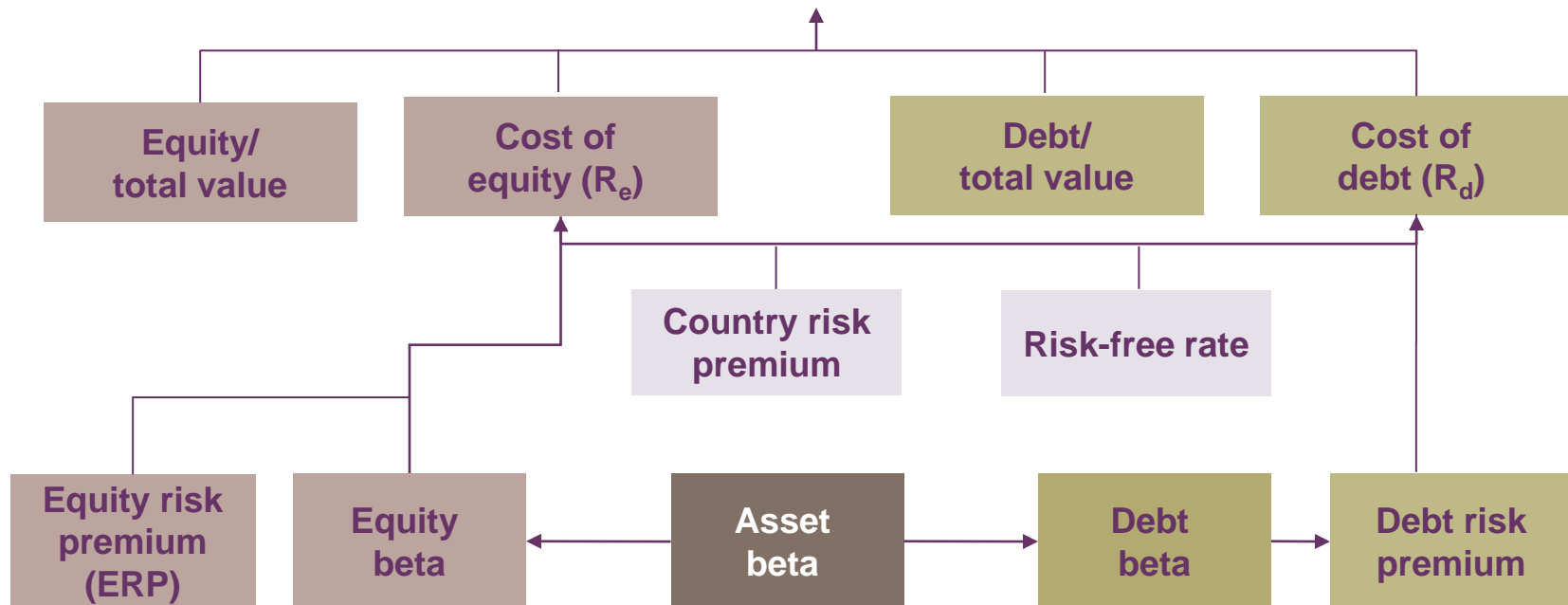
Weighted average cost of capital

- the cost of capital for a firm is typically estimated as the weighted average of the costs of different types of financing sources
 - costs of equity (R_e) and debt (R_d)
 - weighted by the proportion of equity and debt in the total value of the business—eg, the cost of debt is weighted by gearing (g), where:
 - g is typically defined as net debt/RAB
 - and **net debt** is the amount of long- and short-term debt, minus cash or other cash-like assets
- European regulators typically estimate the WACC using the capital asset pricing model (CAPM)

Appendix: cost of capital

Estimating the cost of capital: CAPM and WACC

Weighted average cost of capital under CAPM



The WACC is the weighted average of *required* rates of return to different *types* of financing sources, weighted by the *market* value of those financing sources. For two types of capital (debt and equity) where gearing (g) = $D/(D+E)$:

$$\text{WACC} = R_e \times (1 - g) + R_d \times g$$

Proposals for cost of capital

Summary of DH WACC parameters

Parameter	Key evidence used	Base methodology
Risk-free rate	Index-linked French and UK government bonds of 10-year maturity; nominal yields on German bonds	Construct a range based on current market rates
Sovereign risk premium	Poland: current rates on 10-year sovereign bond yield less the risk-free rate Latvia, Lithuania, Estonia: sovereign CDS spreads of maturity consistent with the risk-free rate (10 years) less the sovereign CDS of the country whose bond is used to calculate the risk-free rate	Add to the post-tax cost of equity. In cases where debt premium comparators are domiciled in countries with minimal sovereign risk, an equivalent adjustment should be made to the debt premium
Equity risk premium	DMS long-run ERP in Europe (UK, Germany, Europe overall); implied equity market volatility	Apply the DMS ERP directly; ERP should be based primarily on arithmetic average
Beta	Asset beta estimates for comparable companies; raw betas and Blume-adjusted betas ; using data over various frequencies and time periods	Construct a range consistent with the raw and adjusted beta estimates
Debt premium	Current debt spreads of comparable companies ; cross-checked with historical averages and corporate bond indices	Construct a range based on comparators; with an adjustment for sovereign risk if comparators are domiciled in different countries
Gearing	Based on market values of debt and equity . Consistent with gearing levels of companies with credit rating comparable to target credit rating of DH networks; and with regulatory precedent	Construct a range consistent with the observed evidence
Inflation	Independent forecasts , such as those provided by central banks	Inflate the real risk-free rate by the inflation forecast using the Fisher formula: $(1+r) \cdot (1+\pi) = (1+i)$

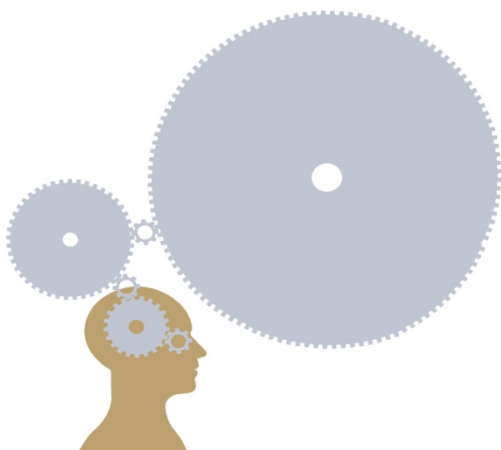
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