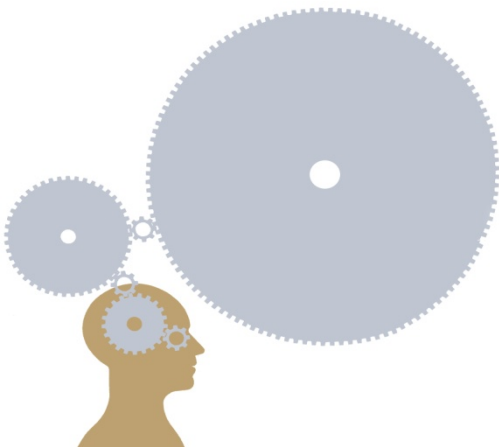


# Overview of heat market models

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

Dr Leonardo Mautino, Managing Consultant

December 4th 2012

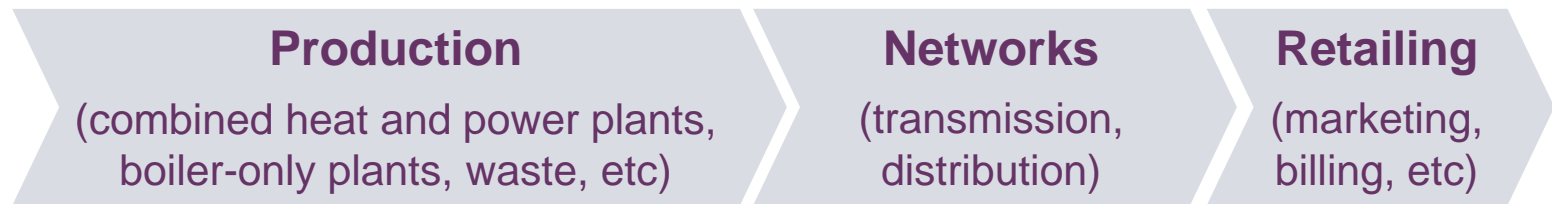


# Overview

- EU legislation and heat market characteristics
- theory of access regulation
- preconditions for the different regimes to work
- case studies
- appendix

## The idea behind access regulation

- the assumption unpinning traditional regulatory regimes is that district heating (DH) is a natural monopoly
- the assumption behind access regulation is that only the network part of the value chain is a natural monopoly



- let's not forget that there is a third possibility: that DH may compete with other heat sources (eg, heat pumps)

The idea of access regulation is to introduce competition in the parts of the value chain that are potentially contestable

# Legal framework

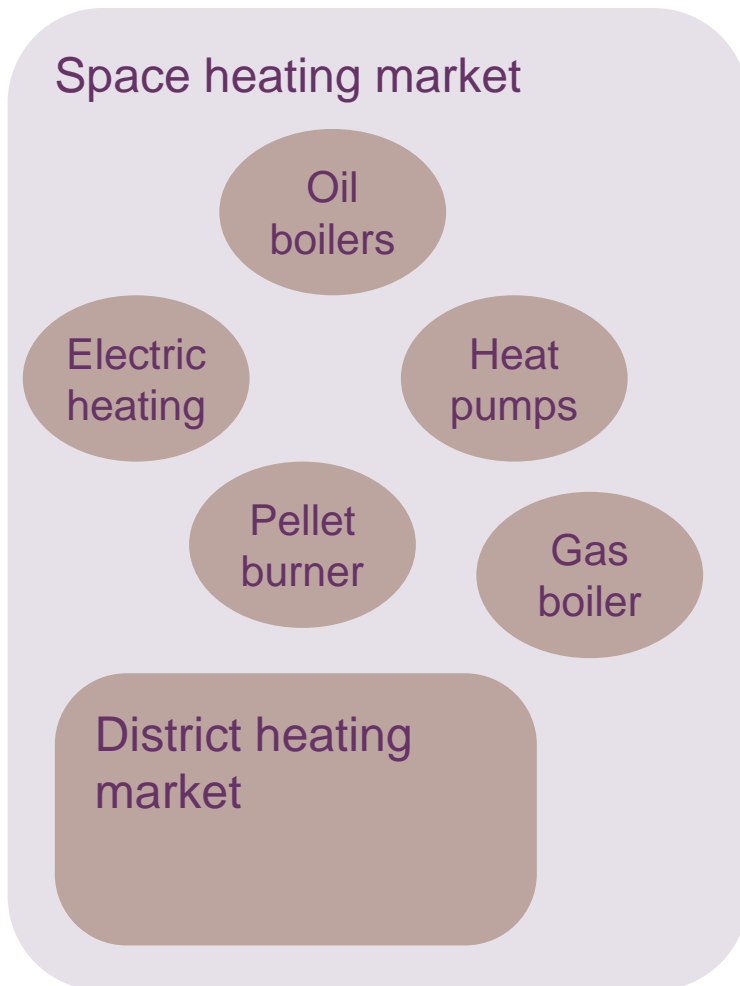
- EU energy legislation does not mandate access regulation for DH (indeed, it does not mandate DH regulation in general)
- however, heat producers could potentially claim access under EU competition law and the 'essential facilities' doctrine

## Characteristics used to define an essential facility

- there must be no other means of carrying out the production than by using the facility
- the refusal to grant access must prevent the emergence of a new product
- there must be no objective justification for the refusal to grant access
- the refusal to grant access must create a monopoly situation in the downstream market

Source: *IMS Health versus NDC Health*, Case C-418/01 (2004).

## Market definition (retail)



- DH may compete with other heat sources
- market power is likely, but it is not an all-or-nothing issue

# Enhancing competition in local heat markets

- is competition between heat sources effective?
  - is it attractive financially for customers to switch to alternatives?
  - is it possible practically for customers to switch to alternatives?

## Levelling the playing field: customer perspective

- access to alternatives (eg, gas networks)
- non-discriminatory zoning policies
- voluntary and easy connection and disconnection
- removal of unjustified price support or investment subsidies
- fair taxation treatment
- transparent and objective price information of alternatives: investment costs and energy prices

- access regulation may not be the only way to encourage efficiency and innovation
- if DH operators have incentives to be efficient, they should 'naturally' seek to take advantage of low-cost heat sources

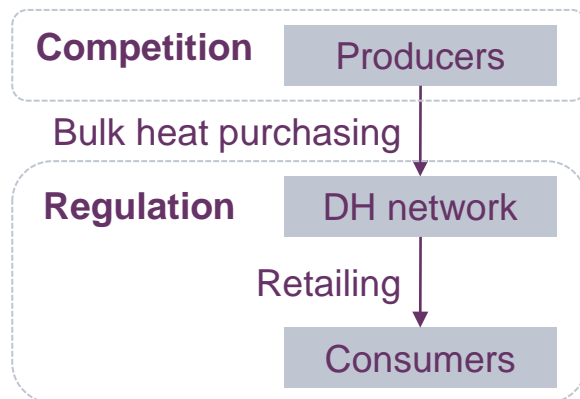
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# Principal models for heating markets

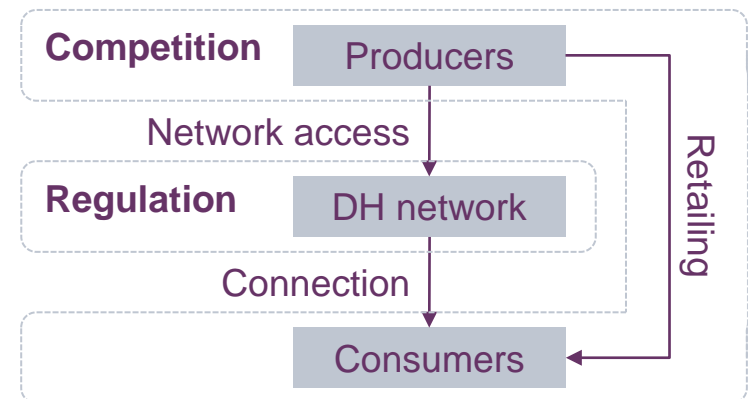
## The 'single-buyer' model

- heat producers sell heat to the DH company, which supplies it to end-consumers at regulated prices
- competition is introduced in generation but not retailing
- the network company has the relationship with end-consumers
- implemented in various forms in DH



## The 'network access' model

- heat producers sell heat directly to end-consumers and pay access charges to the DH network
- competition is introduced in generation *and* retailing
- heat producers have the relationship with end-consumers
- no known **functional** example applied in DH





# Variants of the single-buyer model

## The long-term contracts model

- the DH company tenders out the long-term provision of capacity and bulk heat
- contracts specify payments for availability and energy
- similar to the Polish power market before 2005 (with long-term power purchasing agreements, PPAs)
- examples being set up in Baltic States

## The spot market model

- heat producers submit bids for the supply of heat in the next day or week
- the DH company accepts the cheapest bids meeting its demand forecast
- similar to existing market design for electricity and gas
- example in Copenhagen

In practice, there is some overlap between the two models:

- long-term contracts leave some scope for short-term optimisation
- spot markets incorporate medium-term payments for capacity

# Costs and benefits of access regulation

## Expected benefits

**Stronger efficiency incentives:** competitive processes select the most efficient producers and pass efficiency gains through to customers

**Lower regulatory burden:** the regulator needs to regulate only the networks and retail parts of the value chain

**Greater scope for innovation:** allowing third parties to get involved in the business creates more scope for new ideas and innovative approaches

## Potential costs

**Restructuring costs:** most access models require greater separation between production and distribution

**Transaction costs:** the separation of production and distribution creates legal and administrative costs and coordination issues

**Financing costs:** the introduction of competition increases the financial risk for producers, which in turn increases the cost of capital

# Transition issues

## The risk of stranded assets

- access regulation might lead to under-recovery of historical costs ('stranding') if:
  - the old plants of the incumbent are 'displaced' by the new plants of competitors; and
  - the regulator is unwilling to allow the incumbent to recover the cost of the old plants in the price control (or if this is not possible due to vertical separation)

## Dealing with stranding risks

- if the old plants are still owned by the network company, the regulator can allow the company to recover historical costs
- if the plants are separated from the network, it is necessary to set up a specific mechanism for cost recovery

# Key differences between DH and the gas and electricity markets

**Smaller scale:** most DH schemes are local in scope and there is a natural limit on the number of producers per scheme



The models involving direct competition between producers (the network access and the spot market models) will only be feasible in the largest schemes

**Greater coordination issues between network and plant:** the level of the return temperature of the water can affect the efficiency of CHP plants



The access arrangements need to replicate the incentives to coordinate investment and operation decisions

**Greater coordination issues between different plants:** presence of process industries (eg, paper mills, smelters) with little flexibility in their heat production pattern



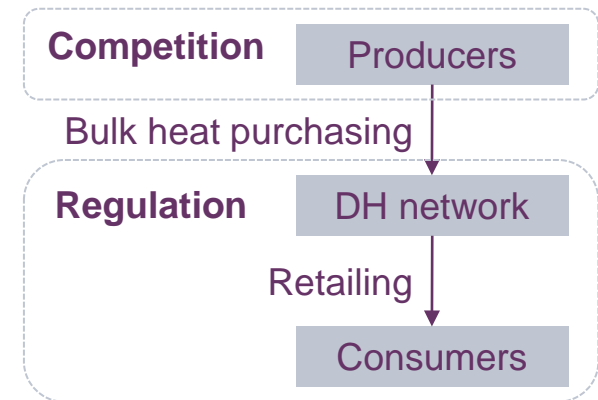
The access arrangements need to preserve the incentives for peak production and reliability

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# The single-buyer model

- competition in production only
- implemented in various forms in DH

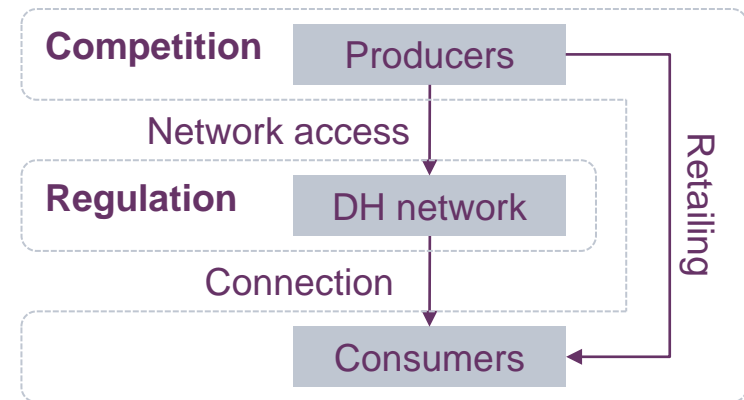


## What is required to make this system work?

- non-discriminatory treatment of alternative heat sources → effective separation of production and heat distribution
- DH network operator having sufficient incentives to seek lowest-cost heat sources
- regulatory oversight of tendering procedures ('long-term contracts' model)
- consistency with technical constraints
- consistency with local market conditions ('spot market' model)

# The network access model

- competition in wholesale and retail
- reference model in gas and electricity
- no known functional example in DH

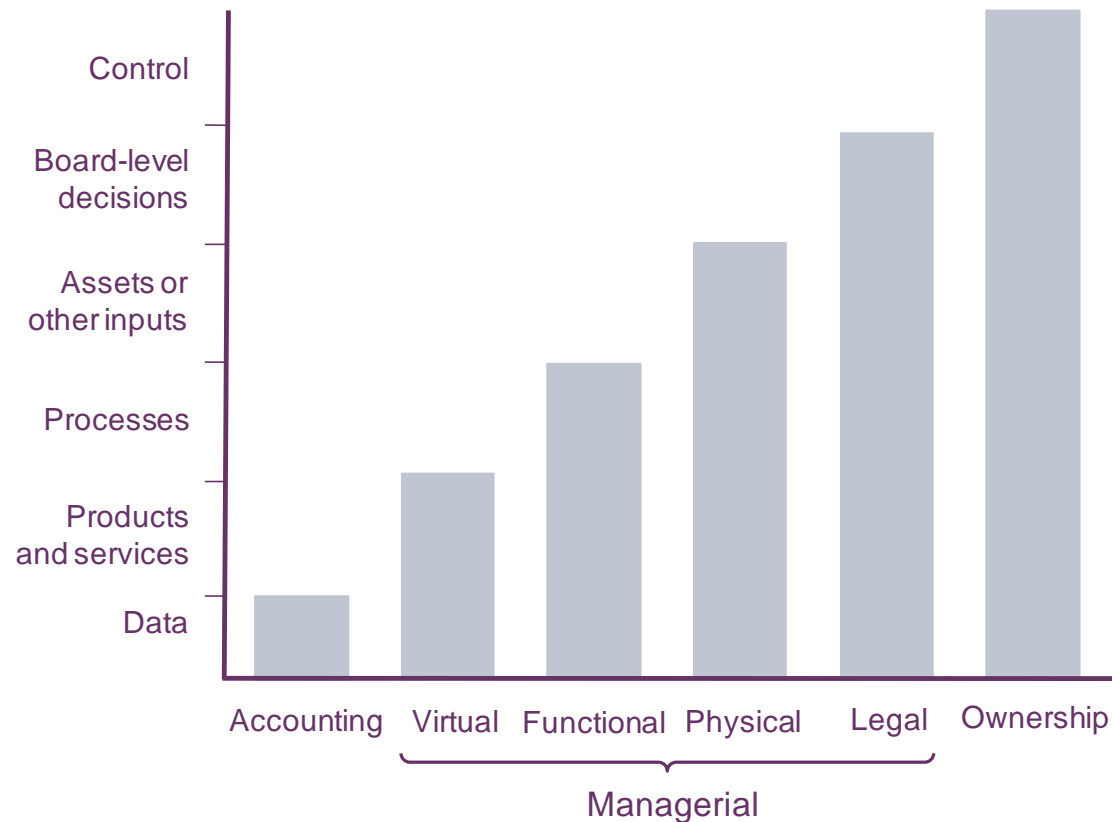


## What is required to make this system work?

- effective separation between network and production/retailing
- regulatory regime for non-discriminatory network access
- procedures and IT systems to manage customer switching
- public service obligations for dealing with vulnerable customers
- market-monitoring process

# Vertical separation (I)

## Degrees of separation



- vertical separation of production and distribution could take many forms
- different degrees of separation would have different implications in terms of requirements



# Vertical separation (II)

## How to decide on the degree of separation

### Potential distortions

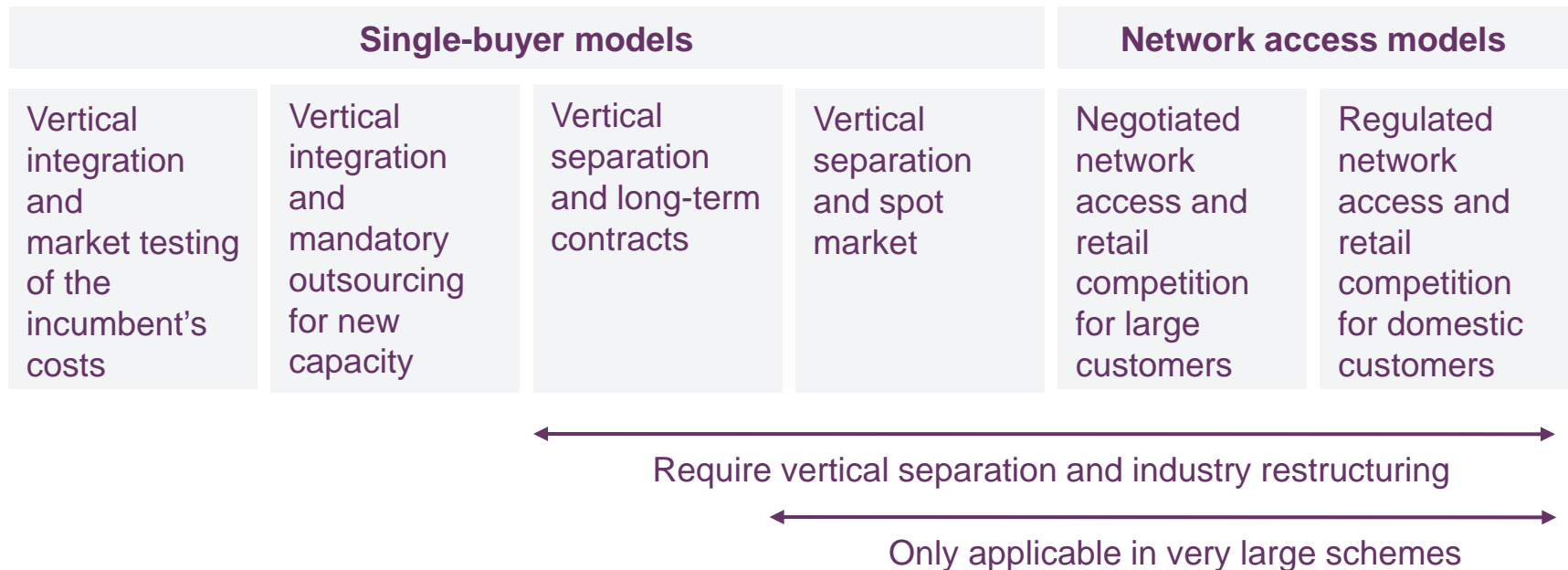
<b>Cross-subsidisation</b>	The production/retailing unit of the incumbent recovers some of its costs through network access charges
<b>Informational advantage</b>	The production/retailing unit of the incumbent uses commercially sensitive information collected by networks
<b>Common branding</b>	The retailing unit of the incumbent benefits from marketing/branding effort of networks
<b>Access to essential facilities (charging structure)</b>	Networks structure access terms and conditions so as to make access more difficult for new entrants
<b>Access to essential facilities (investment)</b>	Networks curtail investment that could facilitate new entry

**Greater degree of vertical separation needed**



# Spectrum of options

Increasing scope of competition in DH production

## Moving along the spectrum:

- the scope of competition (and the potential benefits) expands
- the cost of introducing competition increases

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## Third-party access outlook in selected countries

Country	Model	Requirement to accept offers priced below own cost and/or alternative costs?	Regulatory requirement to tender out new volumes?	Requirement to accept offers approved by regulatory?
Estonia	Single buyer	✓	✓	✓
Latvia	Single buyer	✓	?	
Lithuania	Single buyer	✓		
Poland	Network access (*)	✓		

Note: (\*) Not currently functional.

Source: Oxera and Fortum.

# Case studies (I)

## Latvia and Estonia

### Latvia

#### DH companies required to:

- accept offers from independent producers if the offers are below companies' own production costs
- competitively tender for additional volumes of bulk heat

### Estonia

#### DH companies required to:

- accept offers from the independent producers, subject to:
  - approval by the regulator
  - offers being selected via competitive tendering carried out by the regulator

# Case studies (II)

## Lithuania

- DH companies are required to accept offers from independent producers if they are more competitive than their own costs
- the price cap is based on the DH company's:
  - *variable* costs of production if there is sufficient capacity to cover demand
  - *variable and capital* costs if there is insufficient capacity to cover demand
- independent producers using renewable fuels can benefit from a mark-up on capital costs for a duration of five years ('fixed costs')
- independent producers can also request an exemption from the cap if they can demonstrate that they are not in a dominant position

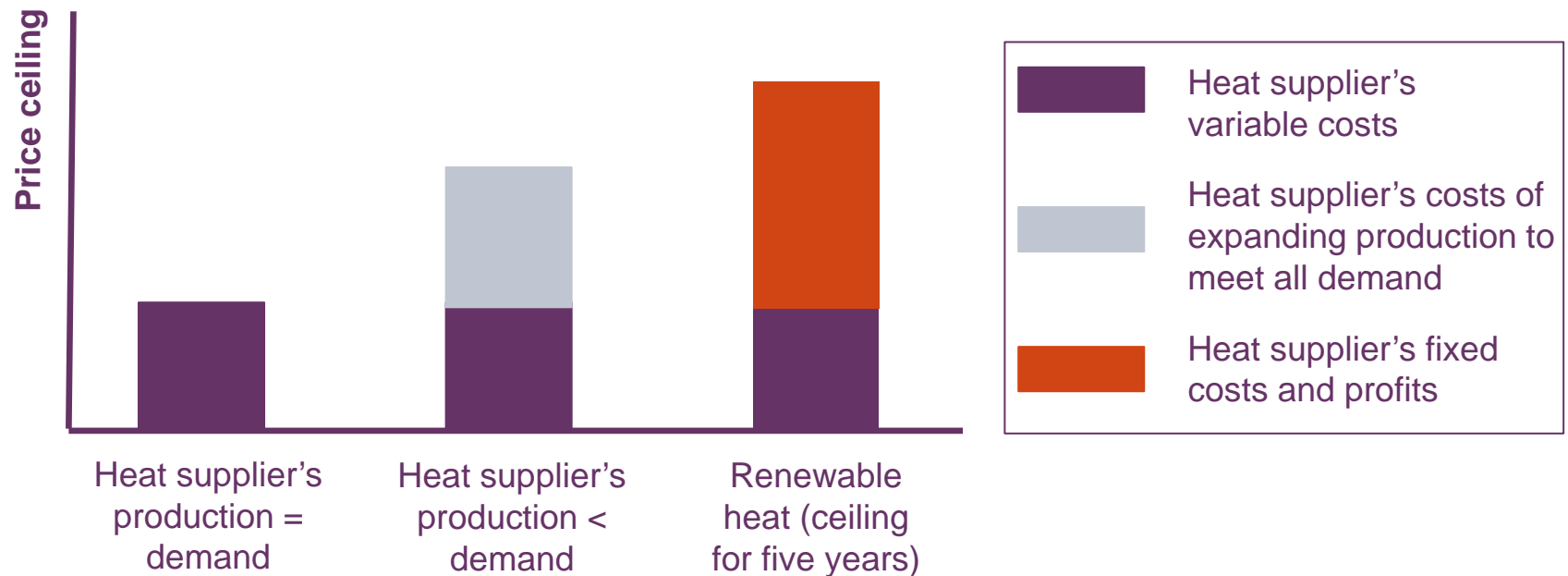
The key idea is to 'market-test' the companies' own production costs against the offers of new entrants

# Case studies (III)

## Lithuania—illustration

Many details to be bedded down in regulatory practice

- time differentiation of costs (baseload/peakload)
- definition of variable costs



## Case studies (IV)

### Poland

- network access model incorporated into the Draft Energy Law
- targeted competition between heat producers
- DH/CHP producers would be able to sell heat directly to end-customers via a third-party network
- mandatory heat off-take for RES source and other heat producers whose heat price is lower than the variable price of the existing producers
- long- and short-term heat supply contracts



## Concluding thoughts (I)

- **be prepared to apply different approaches to different DH schemes**
  - DH is by nature a local product and the characteristics of local markets affect the feasibility of certain models
  - the market designs applied in the gas and electricity markets are not applicable in all circumstances
- **an analysis of the preconditions for the different models to work is essential in order to define the most suitable approach**
- **do not assume that access regulation will allow the regulator to withdraw completely from the production segment**
  - competitive dynamics in energy markets are complex and require constant (and sophisticated) monitoring
  - regulatory oversight of tendering procedures requires good procurement skills and good technical knowledge of the sector

## Concluding thoughts (II)

- **do not assume that legal access requirements will be sufficient for competition to be develop**
  - significant industry restructuring might be needed
- **think about the interactions between access regulation and the other areas of energy policy**
  - the scope for innovation is limited if public authorities prescribe investment choices to attain energy policy goals
  - extensive public service obligations might be needed if there is a large section of vulnerable customers
- **think about the alternatives to access regulation to encourage efficiency and innovation**
  - competition between heat sources and light-touch regulation
  - a balanced price control regime with appropriate incentives

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# Appendix: 'long-term contracts' model

## Typical contractual structure

### Capacity fees

- meant to recover capital costs and fixed OPEX
- typically indexed on consumer price index

### Energy fees

- meant to recover variable OPEX
- typically indexed on fuel prices or Producer Price Index
- 'take-or-pay' clauses

### Performance-related fees

- rewards or penalties for availability
- mechanism for scheduling maintenance and dealing with outages

### Duration 15–20 years

## Appendix: ensuring non-discrimination in tenders

- a risk of discrimination arises when companies are involved at both the network and the production levels
- there are two solutions for dealing with this risk:

### **Mandate greater separation of network and production activities**

- establish management separation and 'Chinese walls'

*or*

- separate ownership  
(more on this later)

### **Intensify regulatory oversight of tendering procedure**

- the DH company runs the tender, but the regulator reviews the specifications and the award criteria

*or*

- the regulator runs the tender

## Appendix: issues with regulatory oversight of tendering procedures

The regulator might:

- not have the technical and procurement expertise required
- require detailed specification of the award criteria to ensure transparency
  - although this discourages the emergence of innovative approaches (which is one of the objectives of introducing competition)
- also limit the scope for bilateral negotiation between the DH company and the bidders
  - although this could discourage the emergence of a cooperative approach between the DH company and producers (which is one factor behind the most successful cases of long-term contracting)

An alternative to mandatory tendering is to require the DH company to 'market-test' its own forecasts of its production costs

## Appendix: how to evaluate the effectiveness of competition between heat sources?

- is it attractive *financially* for customers to switch to alternatives?
  - cost of DH relative to cost of alternatives
  - switching costs
- is it possible *practically* for customers to switch to alternatives?
  - legal requirements and urban planning policies ('zoning')
  - technical feasibility (eg, gas networks)
- what is the evidence that competition is effective?
  - market shares
  - customer switching
  - profitability (if market not currently regulated)

# Appendix: what determines the degree of heat production outsourcing?

<b>Sweden/ Finland</b>	Existence of process industry in many locations and incentives for DH operators to use these sources—voluntary access based on long- or mid-term heat supply contracts. However, DH operators need to take care of necessary reserve capacity
<b>Poland</b>	Production and distribution were separated at privatisation (with production being privatised and distribution being kept under municipal ownership in most cases)
<b>Denmark</b>	Mandatory ownership unbundling where customer cooperatives take care of DH networks and supply, and CHP production is outsourced
<b>Baltic States</b>	Low degree of unbundling, although availability of industrial waste heat sources is limited

- **there is no obvious link between heat production outsourcing and mandated third party access**
- a range of factors (many of them historical) have influenced the degree of heat production outsourcing, including
  - mandatory ownership unbundling as part of state energy and privatisation policy
  - availability of process industry waste heat sources
  - sector targets for integrated DH systems
- if DH operators have incentives to be efficient, they should 'naturally' seek to take advantage of low-cost heat sources, and outsource generation when it is more efficient



# Appendix: vertical separation

## Typical requirements for managerial separation

Key areas of functional separation	Examples of necessary measures
<b>Managerial separation</b>	<ul style="list-style-type: none"> <li>– Board structure: separate reporting path for distribution and supply</li> <li>– financial control: distribution business has separate financial control</li> </ul>
<b>Physical separation</b>	<ul style="list-style-type: none"> <li>– individual buildings contain staff from one business only</li> <li>– access doors to distribution areas are locked (subject to health and safety regulations)</li> </ul>
<b>Information separation</b>	<ul style="list-style-type: none"> <li>– separate intranet systems for distribution and supply</li> <li>– requirement for confidentiality in relation to the distribution of information</li> </ul>
<b>Call centres</b>	<ul style="list-style-type: none"> <li>– call centres on separate sites</li> <li>– restricted overflow arrangements (preferably outsourced)</li> </ul>
<b>Branding</b>	<ul style="list-style-type: none"> <li>– clearly identifiable separate brands: style, logo, colour and font</li> <li>– new stationery in use and new uniforms issued and being worn</li> </ul>

Source: Ofgem (2000), 'Separation of PES Businesses—Progress Report', November.

# Appendix: summary of third-party access regimes

Country	Comment
<b>Latvia</b>	DH companies are required to: <ul style="list-style-type: none"> <li>(i) accept offers to provide bulk heat from independent producers where such offers are priced below the company's own production costs (if commercial negotiations fail, courts can decide whether this criterion is fulfilled)</li> <li>(ii) use competitive tendering for procuring additional volumes of bulk heat.</li> </ul>
<b>Lithuania</b>	All independent heat producers are regulated, although they can negotiate exemptions. A price cap is determined based on: <ul style="list-style-type: none"> <li>(i) the DH company's variable costs if it can produce its entire heat requirements; or, if it cannot produce its entire heat requirements,</li> <li>(ii) its variable costs and the costs of expanding production; or</li> <li>(iii) its variable and fixed costs of production (including profit) for up to five years if the independent heat producer produces heat from a renewable source</li> </ul> <p>When buying heat from independent heat producers, the DH company pays the lower of the price offered and the price cap defined above</p>
<b>Estonia</b>	DH companies are required to accept offers to provide bulk heat from independent producers subject to such offers: <ul style="list-style-type: none"> <li>(i) having been approved by the regulator; or</li> <li>(ii) having been selected through a competitive tendering process initiated by the regulator</li> </ul>
<b>Poland</b>	Network access model incorporated into the Draft Energy Law <p>Targeted competition between heat producers</p> <p>DH/CHP producers would be able to sell heat directly to end-customers via a third-party network</p> <p>Mandatory heat off-take for RES source and other heat producers whose heat price is lower than the variable price of the existing producers</p>
<b>Russia</b>	DH companies are required to connect new efficient sources, although the exact nature and scope of the obligations vary between districts
<b>Denmark</b>	DH companies are required to purchase heat efficiently, as specified in heat plans and approved project documents
<b>Finland</b>	The Ministry of Trade and Industry considered third-party access in 2005/06, but decided not to implement it because no reduction in prices was expected
<b>Norway and Sweden</b>	DH companies enter into voluntary agreements with independent heat producers (including industrial producers with waste heat). In Norway, DH companies often own and operate heat-recovery equipment where they obtain waste heat from industry

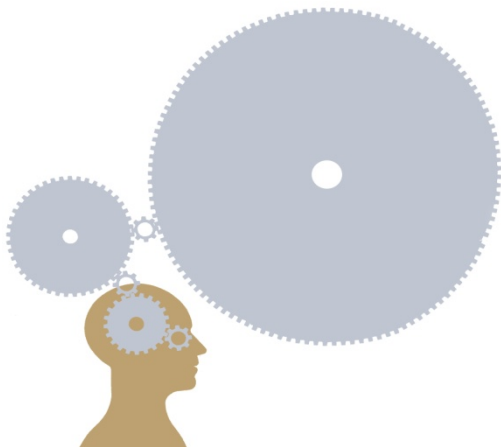
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