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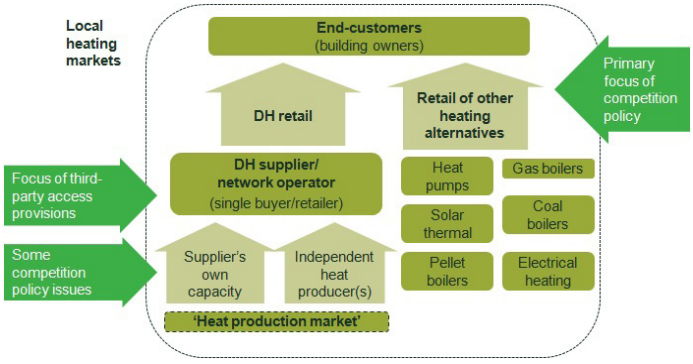
Regulated third-party access in heat markets: how to organise access conditions

In the May 2014 issue of *Agenda*, Harri-Pekka Korhonen, Head of Heat Policies and Regulation at Fortum Corporation, discussed EU policy, stakeholder expectations and the overall rationale for promoting competition in district heat (DH) markets. He now considers the appropriate definition and scope of heat market design, and how competitive conditions can be enhanced, and summarises key findings from recent Swedish and German surveys on third-party access (TPA) considerations in heat networks

When stakeholders discuss the development of heat markets, it is often the case that basic definitions are not well established from the start. The first question should be whether the discussion concerns the local heating markets or the local district heating system. Once the relevant scope has been defined, one can start to consider how to promote effective competition in the markets. As we understand it, 'local heating markets' are those where district heating competes with alternative space-heating solutions for end-customers—i.e. the owners of the buildings. The primary competition policy objective should be to ensure that effective competition between all available and preferred heating solutions is provided on equal terms. The second policy question should concern how competition in district heat production is organised, and whether competition is promoted—i.e. how TPA to supply heat to DH networks is organised.

Figure 1 illustrates the definition and scope of local heating markets. The degree of competition in parts of the market varies across countries and locations. Some countries have rules regarding the obligatory connection of new buildings to a DH network in order to promote efficient and renewable district heating. How does this align with the principle of fair competition, and how far does it guarantee cost efficiency from the end-customers' perspective? Does such obligatory connection create a rationale for outright price regulation of district heating?

Figure 1 Impacts of the FTT on the wider economy



Source: Fortum.

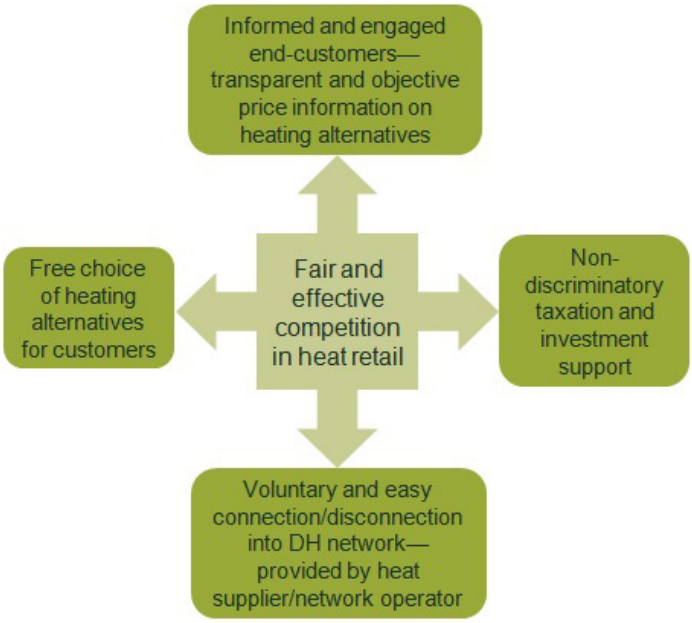
In countries such as Sweden, Finland and Germany, price-setting for DH is unregulated because it has been deemed that effective competition between DH and its main alternative(s) already imposes effective caps on heat prices, such that dominant heat suppliers are not able to set monopolistic prices. This indicates that effective competition in some parts of DH networks (e.g. new building areas) can benefit all end-customers when an equal price-setting obligation is applied across the whole heat network.

Below, we discuss how to enhance competition in heat retail to end-customers, and then how to enhance competition and access provision in the 'heat production market'.

How can competition in heat retail to end-customers be enhanced?

A DH system typically has a share of 50–90% of local space heating markets in an urban area. The main idea behind heat retail competition is to allow customers to choose between various space heating and cooling alternatives that are technically and economically feasible. This approach allows new technologies—i.e. solar heating or heat pumps—to be developed and installed.

Figure 2 Effective competitive conditions in heat retail in a local heating market



Source: Fortum.

Heating solutions should be chosen in accordance with energy policy objectives. This might mean, for example, that coal or oil boilers are not targeted as preferred heating solutions for new buildings. Such steering can also be done through CO2 taxation of fuels, or through primary energy parameters for energy efficiency labelling of buildings. Some of the key mechanisms that should be further developed to enhance competition between space heating alternatives are as follows.

- **Free choice of heating alternatives for end-customers.** This should be the primary principle, which should be closely aligned to competition policy objectives.

- **Transparent and lifetime-based price information on heating alternatives.** DH prices should be transparent, to enable comparison between alternatives, and they should be provided by a third party. Such price comparisons should include energy (variable), capacity (fixed), taxes, environmental costs, and capital (investment and interest) costs over time. In some countries, DH prices should be set below the price(s) of next-best alternatives. Currently, and in some non-regulated heat markets, DH operators set competitive prices.[1]

- **Non-discriminatory taxation and investment support.** Heating alternative(s) should be taxed equally for small and large consumers, for example through carbon-related fuel taxation or VAT.[2] Investment or price subsidies for housing associations and households should also be distributed equally.

- **Voluntary and easy DH connection and disconnection.** Existing and new customers should be allowed to choose their heating method without forced zoning policies or connection rules. The customer connection procedure should be economical, transparent and negotiable, and should reflect equal and fair customer treatment. Although it may be limited for technical or economic reasons, the disconnection possibility should also be allowed.

Under the single-buyer model of competitive DH supply described in the next section, the DH network operator has an exclusive interest and right to sell DH to connected end-customers and potential new customers. In principle, this should ensure transparent and equal pricing principles among similar customer segments.

Under the DH network access model, there would be a limited number of competing DH retailers that can sell DH to end-customers at different prices. The equal treatment of similar end-customers is more difficult to ensure in such a market model. When there are several network operators in connected heat networks, interaction rules need to be established—such as a heat network code that ensures the equal treatment of end-customers, and non-discriminatory treatment of the different market participants (such as heat network operator(s) and producers).

Some DH companies already offer different pricing alternatives for end-customers—for example, by varying the proportions of energy and capacity fees, or by offering a fixed tariff for a certain period. In addition to various price alternatives, there should always be a common price list available for all customers. While retaining DH price regulation as a statutory duty, the price application and approval process could be simplified by setting price caps below which the price-setting would be more competition-based and driven by the company, and less reliant on regulatory oversight.

How to set priorities for heat supply to district heat networks?

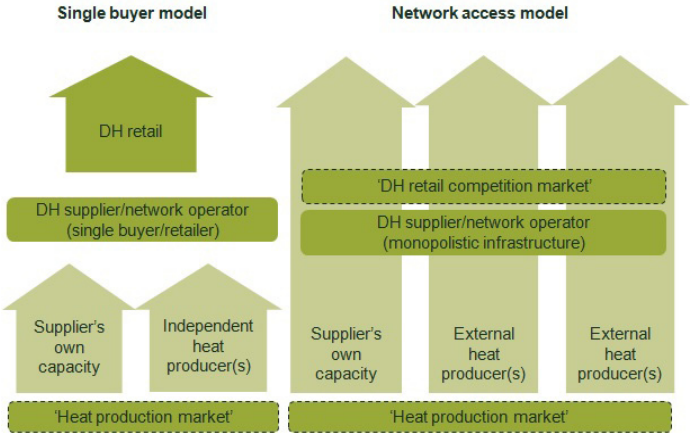
Arranging TPA in heat networks must begin with the current heat market design, which has the following two models.

- In the **single-buyer model**, the heat supplier/network operator offers heat to similar end-customers on equal terms and prices, although the ownership of different parts of heat networks varies. This can be achieved if the overall responsibility for heat retail to end-customers is directed into one body—e.g. the main heat network. Under this model, the vertically integrated network operator needs to provide access to third-party producers and its own production source on equivalent

terms. This model is the most common design of DH systems across Europe, and is usually stipulated in the respective country legislation.[3]

- In the **network access model**, producers have access to heat networks provided that the producers are supplying heat to their own end-customers via open heat networks. This model is possible under current energy law in Poland, but it is otherwise practically never implemented due to its complexity.[4]

Figure 3 Basic variants of DH system designs

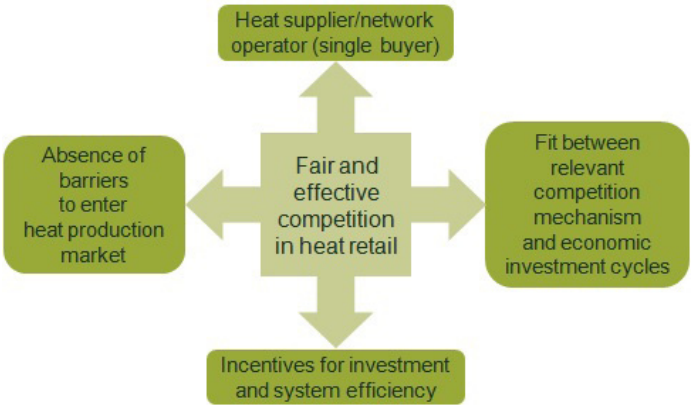


Source: Fortum.

The competitive conditions are established according to the characteristics of the basic market design. The remainder of this article focuses on the single-buyer model. This is due to there being no well-functioning examples of the network access model at present, mainly because the model significantly increases the complexities and relationships between DH system participants.

The key conditions required to encourage competition in heat production are shown in Figure 4.

Figure 4 Effective competitive conditions in the heat production sub-market



Source: Fortum.

It is possible to establish competition between heat producers, in practice as well as in theory. The types of TPA are detailed below, according to the openness of the regime that we have encountered in different countries.

Negotiated (voluntary) network access

The DH network operator and supplier determine, on a voluntary basis, how to set up the heat despatch order to the DH network. They then choose, based on short- or long-term contracts, between available heat sources from their own and external sources. The model works because the DH network operator has an economic incentive to look for lowest-cost heat sources, since the economic benefit from lower heat production costs can be shared between the end-customers and the DH network operator/supplier. This model is currently applied in Germany, Sweden and Finland, for example.

'Open district heating' is a new initiative to increase customer engagement and loyalty. The main idea is to minimise the costs of heat supply to the DH network and related production capacity, and to introduce a daily heat production market price for which anyone can choose to produce and supply heat to the open DH network. Heat capacity will have a similar type of price-setting mechanism, when operators or customers will receive compensation for available capacity or negative capacity utilisation during peak periods. Smart building technology and demand management can also be implemented as part of the system, and there will be a smart district energy system that maximises profitability through optimal energy supply and capacity utilisation.

Open district heating may call for the restructuring of DH systems due to increased requirements for openness, transparency and non-discriminatory treatment of all market participants. This will enhance the crucial role of the DH system operator and may bring expectations for a higher degree of unbundling inside the DH system than there is today.

Negotiated (mandatory) network access

In this model, although the conditions for access to the network may be stipulated in the legislation, they are ultimately negotiated between the network owner and the company requesting access. This model may be suitable for the DH networks because it allows local conditions for each network to be taken into account, as well as (to some extent) the system optimisation of each network. However, there can be relatively large transaction costs in involving an impartial third party to resolve the more detailed rules and disputes between the parties.

The following are examples of mandatory negotiated access.

- **Mandatory rules for establishing regular competition (tendering)** between all or selected

alternative and new heat sources—such as the monthly auctioning between independent heat producers in Lithuania.[5]

- Specific **mandatory rules for network access for preferred heat sources—**such as the mandatory heat off-take rules for renewable sources in Poland, or the mandatory tendering for new capacity in Estonia.

Fully regulated network access

This is where the legislator or regulator has determined the ex ante access provisions. If these preconditions are met by the acquiring heat source, the network owner is obliged to provide access to the network. In this model, it is usually important, or necessary, to unbundle the DH networks and production. The extent of unbundling, which can range from accounting to full ownership unbundling, should be proportionate to the significance of the market failures.

There are also some legal hurdles in enforcing mandatory unbundling of integrated assets, which may be a barrier in applying this model on a larger scale. In this model, end-customers would also have the freedom to choose their heat supply.

A fully regulated network access model would raise a number of critical issues, as follows.

- The general requirement for relatively **unlimited access to DH networks would raise the question about how to offer equal location terms for all producers, and whether such access should still be provided if total demand is not expected to increase.** Another question would be whether it is optimal to have multiple small-scale heat producers that want to access the heat networks when one bigger plant can produce the larger amount of required heat more economically.

- **The principle of equal treatment for end-customers could be difficult to fulfil.** The total DH system costs would be likely to rise due to increasing complexity and network investment. In a full competition model, an independent heat producer should aim to sell its heat either to large customers based on long-term contracts, or to less price-sensitive customers. In either case, there is still a need for a party that is responsible for selling and delivering heat at a common price list—as in electricity retail markets.
- As far as we know, **there is no larger-scale practical precedence** for this kind of model in the DH sector. However, in Poland there are specific mandatory rules (open network access) for those heat producers that sell heat directly to end-customers according to the amount the end-customer is using. This model has been applied in a only few cases, because in any case heat prices are regulated ex ante and are not set by real competition.

Table 1 Overview of DH system designs in selected countries

	DH system design(s)	Main access principle	Price-setting of production
Sweden	Single buyer	Voluntary	Non-regulated
Finland	Single buyer	Voluntary	Non-regulated
Estonia	Single buyer	Mandatory tendering for new capacity	Regulated, price caps
Latvia	Single buyer	Mandatory access if price below threshold and technical conditions can be met	Regulated
Lithuania	Single buyer	Mandatory access if price below threshold and technical conditions can be met	Regulated, price caps
Poland	Combination of single buyer and network access	Mandatory if economic and technical conditions can be met	Regulated, price caps

Source: Fortum.

Table 1 presents the main characteristics of prevailing designs in selected countries—either a result of historical developments, and/or supported by strict legal stipulations in energy or heat-specific legislation. The mandatory network access is not fully implemented in any of these countries, although some efforts have been made. As noted above, in Poland, the energy law allows access to a heat producer with a network when it has its own end-customers and is able to retail heat to them directly.

The box below summarises the experience of TPA in Sweden and Germany.

How has the application of TPA been explored in DH networks?

In 2011, the Swedish Energy Agency (Energimyndigheten) published a report investigating the possibility of establishing a full TPA mechanism in district heat systems.[1] It concluded the following.

- TPA in local DH systems would not protect customers and would not promote resource-efficient DH systems. It was difficult to assess the potential consequences (cost–benefit analysis) of the proposed DH network access model (full TPA).

- DH prices would probably become higher and less competitive due to the introduction of full TPA, with prices rising by 10–20% in a fully implemented network access model, although there might be advantages in production. Furthermore, no evidence was found that the sustainability of DH systems would improve.

- The use of waste heat sources can be promoted more effectively in other ways.
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- Profitability of investments would reduce, and the incentives and willingness to take long-term investment decisions would worsen. There would therefore be a higher risk to security of supply. It is also likely that, due to high capital intensity, there would be little, if any, competition that would benefit customers.

- To function well in practice, TPA in DH would need to address significant challenges, which will be difficult to resolve.

In Germany, the German Competition Authority (Bundeskartellamt, BKA) published a DH sector inquiry in August 2012, concluding the following on TPA:[2]

- the BKA does not encourage the promotion of more TPA of external heat producers as a way to increase competition;

- under competition law, DH suppliers generally have a right to use the network of an incumbent to supply heat to their own customers;

- the BKA does not consider it advisable to unbundle and regulate DH networks. Mandatory unbundling would impose higher administrative costs possibly with consequent synergy losses;

- technical conditions have to be met in order to connect a new DH producer in the network. Also, the DH network operator is not obliged either to increase the volume capacity of the system or to suffer from a reduction in the efficiency of the system because of TPA;

- increased competition between heating solutions would be desirable. This could be ensured through greater transparency in DH pricing, and a more level playing field between alternatives;

- the BKA shares the conclusion of the Swedish experts that mandatory unbundling and regulation would lead to higher system costs with no sizeable benefits.

Source: [1] Energimyndigheten (2011), 'Yttrande angående fjärrvärme i konkurrens (SOU 2011:44)', 29 August. [2] Bundeskartellamt (2012), 'Sektoruntersuchung Fernwärme: Abschlussbericht gemäß § 32e GWB – August 2012'. AFGW (2012), 'Stellungnahme – Zum Abschlussbericht der Sektoruntersuchung "Fernwärme" des Bundeskartellamts', October.

What issues should be resolved when imposing regulated network access?

In principle, the costs of introducing access regulation under a regulated or mandatory negotiated access model should be lower than the expected benefits. The benefits, such as stronger efficiency incentives that can be passed over to customers, a lower regulatory burden, and greater scope of technical innovation in heat production, should exceed the higher restructuring (separation), transaction and financing costs that are likely to occur.

Legislators and regulators should ensure **transparent and non-discriminatory tendering processes and access provision.** This becomes critical when companies are involved in both networks and production. Solutions can include greater unbundling and regulatory oversight of tendering procedure. Owner(s) of site locations that are most feasible would have a natural competitive advantage. Network charging should reflect, and encourage new entrants to internalise, location decisions in the network (connection costs, network reinforcement costs, and impacts on network losses and pumping costs).

The treatment of risks for stranded assets for existing heat producers, when they are replaced by new heat sources, should be solved so as to provide sufficient possibilities for adaptation. Transition periods will be needed to handle short-term cost increases due to accelerated or one-off depreciation periods of stranded assets.

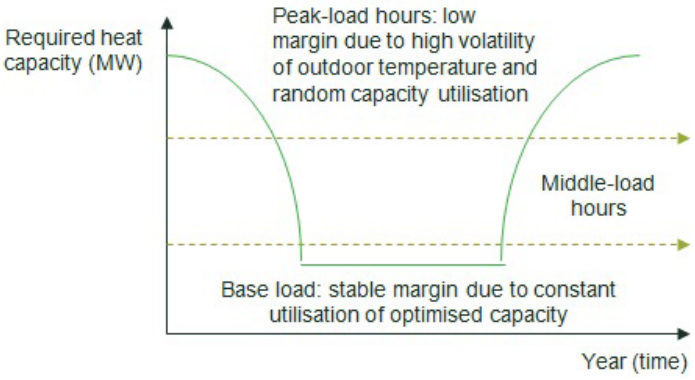
Another question is whether the single-buyer model could be applied effectively when the existing participants are already competing against each other—for example, when it is operationally and economically possible for several DH networks to be connected, although they have a variety of owners and operators. From an end-customer's point of view, it may be sensible to implement a single-buyer model among diversified network owners. This would mean assigning an exclusive role to a single DH network operator (the main operator), or applying a set of common rules to all operators and providing equal treatment to end-customers.

The regulator would need to set up **a mechanism** with the DH network operator **for ensuring adequacy of production capacity** and determining how the risks, costs and appropriate compensation would be shared between heat producers. Another issue would be how to mitigate the risks of cross-subsidisation, and how to deal with the direct or indirect impacts from public support, in order not to harm competitive conditions between producers.

Finally, the need for, and role of, regulation of heat production prices should be reconsidered when sufficient competitive mechanisms are in place, in order to remove overlaps and reduce the regulatory burden. The role of authorities would be limited to monitoring competition, preventing market abuse, and correcting failures or problems.

Heat demand, and thus the requirement for heat production, is driven by outdoor temperature and is therefore seasonal. Figure 5 illustrates the seasonal variability of the typical heat load and the typical cost of heat production over a year. In summer, heat load is driven mainly by the use of domestic hot water.

Figure 5 Typical heat production capacities and volumes over a calendar year



Source: Fortum.

What types of competitive mechanism should be introduced to make the whole system more efficient and better optimised? The most obvious problems in introducing regular competitive mechanisms are how to avoid overlapping capacities during summer time, and how to compensate for any stranded assets and costs for operators that cannot supply heat.

We suggest that the main approach should always be to replicate the behaviour of a commercial heat supplier/network operator that has an economic incentive to look for the lowest-cost heat sources. This is not the case in countries where production prices are primarily cost-based and set by the regulator, rather than set by the DH network operator on the basis of competitive alternatives. In any case, the heat supplier/network operator should take main responsibility for the long-term competitiveness of district heating. In other words, we suggest that any regulated network access should be based on fully commercial principles according to the benefits it brings to end-customers and the DH system as a whole. The main question should be whether mandatory competition is worthwhile.

Table 2 provides a regulatory checklist for planning and implementing the rules for regulated network access in heat networks so as to replicate having a fully commercial heat supplier/network operator as the main responsible body. The list is indicative, and the local situation and conditions should always be taken into account. The local heat supplier/network operator has an important role in determining more detailed provisions.

Table 2 Tentative checklist of critical issues to resolve when establishing regulated network access

	DH supplier/ network operator	Heat producer(s)	Regulator/competition authority
Equality principle (access parity)	The different heat sources should be treated in a non-discriminatory manner		
Base-load capacity preferences	Resource-efficient (primary energy) heat sources (e.g. CHP and industrial waste) should be promoted as the preferred base-load capacities. Typically, CHP (based on fuels with low and stable prices) is the most resource-efficient and competitive way to organise base-load capacity		
Peak capacity requirements	The DH supplier/network operator should be ultimately responsible for having, or outsourcing, peak capacity reserve. Appropriate reserve capacity requirements should be set		
Determination of which share of the heat production market is subject to competition	What proportion of current heat production can be subject to competition should be assessed on a case-by-case basis. The important question is to understand the competitive advantages that new entrants could bring compared with similar investments properly incentivised and implemented by the incumbent		
Competition mechanism	Selection between hourly/monthly/seasonal/yearly and long-term tendering		
Criteria for mandatory tendering	Tendering manager		Tendering prerequisites
Tendering process for new or replaceable capacity	Offering for heat supply/ production (capacity and/or energy)	Tenderer(s)	Setting transparent and non-discriminatory rules. Scope of regulator's decisions needed
Unbundling requirements	Appropriate degree of unbundling of vertically integrated operations		
Access price determination	Publication of price cap	Price offerings	Ex post review/approval/ benchmarking
Treatment of stranded costs			Ex ante rules for recouping allowance for stranded costs
Security of supply—spare capacity	Agreement negotiations		Rules

Source: Fortum.

When considering new competition mechanisms, the main issue is whether short-term price formation (tendering between competing capacities) will give lower long-run price levels than normal capacity optimisation, which would have been determined by a commercial heat supplier/network operator.

How to determine the network access prices?

The current cost of heat production is a weighted average of the costs of different heat sources throughout the season. The base-load production capacity is further optimised (by size in thermal megawatts, and depending on the price levels of fuel alternatives) to the maximum number of operational hours, with the option of operating at minimum capacity under reduced load during the summer, and depending on the regional availability of various fuels (waste fuels, biomass, biogas, coal, natural gas, peat). The average base-load production cost is typically substantially lower than the average cost of peak production capacity, which can be idle for most of the year and always has a higher cost than the average cost of base-load capacity.

The investment cost of connecting a new source, and the costs of measurement, should mainly be borne by the new entrant in order to avoid increasing network costs for existing end-customers. This responsibility also indicates to the new entrant the importance of conducting a comprehensive cost–benefit analysis for its heat supply.

The main pricing principle should be that the total production costs of a new entrant (including a justified return) should be competitive with the variable costs of the production it replaces. However, implementing this principle is not always straightforward.

- First, when the new capacities do not exactly match existing capacities, a capacity mismatch (and thus pricing mismatch) will occur. If this is not resolved, the sub-optimisation risks will increase.

- Second, the partial replacement of existing capacities will affect their cost structure (unit cost), which will need to cover availability and fuel efficiency risks. Therefore, the access price cap becomes variable, not fixed. This might not be a problem if clear rules are in place for recouping stranded or partially idle assets.

A further challenge in setting access charges is ensuring that they provide sufficient incentives for market entry and incentivise efficient capital expenditure, while retaining economic long-term investment life cycles and asset optimisation. They might prove beneficial for prospective investors, but less so for end-customers when the new prices remain just below access price caps. When new capacities are allowed to access heat networks by simply offering marginally lower total prices than the total costs of current producers, such access price caps are likely to bring strong competition and replacement risks between existing and new producers.[6] This would also increase the total cost of the DH system and reduce the competitiveness of DH against alternatives.

The main prerequisite for any non-discriminatory access provision is that the DH network operator publishes regulatory price caps that new entrants have to beat in order to gain access to supply heat to the network.

How to attract new heat production investors?

The critical question is then whether such access conditions would actually attract new investors—if not, competition will not be introduced. We suggest that the following aspects be considered in setting the access conditions for attracting professional, long-term investors.

- **Positive prospects for long-term business** include demand expectations and an ability to meet customer expectations for new services—this includes cooling, but also understanding the risks of more competitive new technologies that may emerge and increase the risks of the existing providers being replaced. The access price determination should, in principle, match long-term financing terms, or additional guarantees may be required.

- In some cases, **new incentive mechanisms** (e.g. RES support mechanisms) may have an important role in attracting new investments in local heat production markets. Such incentives should be highly predictable and stable. The predictability of the **heat price determination mechanism** is also vitally important. Sufficient returns should be allowed that acknowledge the relevant risks. There should be a manageable degree of regulatory intervention risk (i.e. not both competition *and* heavy-handed price regulation).

- A professional heat producer needs to have an **excellent ability and commitment** to manage plant construction, sell heat and electricity, source fuels at competitive prices, and operate and maintain the plant in order to secure high availability. Negotiation skills, financial flexibility and long-term commitment to stay in business would also be expected.

- Finally, in order to make a **positive investment decision**, certain aspects need to be manageable, including the size of the required investment cost and expected recouping period; the ability to cover the minimum equity requirement; and a match between a long-term revenue plan and long-term financing and re-financing risks. Higher uncertainty regarding these factors will substantially increase equity return expectations and the cost of debt financing.

Conclusions

The prospect for competition in the heating sector is fundamentally different from that in the electricity and gas sectors. The key issue is determining what can effectively be achieved, in terms of benefits to end-customers, through enhancing competition in heat retail markets and through regulated and more competitive TPA to supply heat into DH networks. Are there any risks of market failures that necessitate increased competition?

We conclude that the EU's energy policy, and any more detailed steering from the EU, should focus on creating and sustaining competition in heat retail to end-customers between space heating alternatives. In the Nordic countries, the DH network operator has a strong economic incentive to always look for the lowest-cost heat sources and replace prevailing more expensive sources, as it has a long-run pressure and interest to develop the competitiveness of DH against alternative space-heating solutions. It may be that the competition in new parts of the DH network will actually bring benefits to other connected customers via an equal and transparent price-setting practice. In Finland, where this is already the case, relative DH prices are some of the lowest in Europe.[7]

As generally acknowledged, TPA in heat networks makes sense only if it leads to lower (i.e. more competitive and affordable) DH prices, better ecological performance (resource efficiency), and higher security of supply for end-customers. Particular benefits may come from stronger efficiency incentives that are passed on to customers, a lower regulatory burden, and a greater scope for technical innovation in heat production. These benefits should exceed the higher restructuring (separation), transaction and financing costs that are likely to occur. However, enforced TPA can easily lead to increased system costs and higher instability, and more requirements for transparency and unbundling—and thus to higher prices and losses of synergy and efficiency potential.
When access rules are being developed, we suggest that legislators and regulators run a full and detailed assessment of achievable pros and cons, to assess the trade-offs between benefits and increasing system costs, and to avoid (incorrectly) assuming that competition will automatically lead to substantial reductions in the total price of heat to end-customers. Instead, they could focus on how to allow and encourage DH suppliers/network operators to implement economic decisions for lower-cost heat production.

There is also the question of whether such TPA schemes would attract new entrants to heat production markets, or whether they would remain a way of managing the links between existing producers that happen to have overcapacity in heat production. New entrants would require positive prospects for a long-term business environment, attractive incentive mechanisms for cost efficiency, prerequisites for positive investment decisions financed on a commercial basis, and relevant competencies and commitment. The prospects for attracting interested, competing investors appear to be relatively limited, as long as the current capital intensity in DH production remains.

Finally, we strongly believe that the local DH network operator/supplier is best-positioned to optimise heat production capacity, and that it should be allowed sufficient flexibility to determine how to run this from a local perspective—assuming that it has the incentive to look for the lowest-cost heat sources, and assuming non-discriminatory treatment of all the parties that want access.

Harri-Pekka Korhonen

The views are those of the author and do not necessarily represent those of Fortum.

[1] In Norway, DH prices are capped by the prices of the next-best alternative under the Energy Law. In Sweden and Finland, DH companies are increasingly setting their prices in competition with alternatives.

[2] In some countries, such as Lithuania, lower VAT rates have been applied to some forms of heating for affordability reasons.

[3] For example, in Estonia and Lithuania.

[4] The model partially occurs in some large cities in Poland where producers compete with heat network operators for heat retail customers.

[5] In this case, non-regulated competition is maintained by stipulating that an independent heat producer is not allowed to produce more than one-third of total heating capacity, and that the impact on end-customer prices may not be significant.

[6] In Poland, a new capacity can access heat networks if its price is lower than the total costs of the prevailing heat source that it would replace. This approach will create strong competition between sources because the competing price levels are close to one another. The approach is likely to be a barrier for new investments due to substantially increased competition and replacement risks.

[7] In Finland, the average DH prices that are adjusted with purchasing power parity are among the lowest in Europe.