The Italian Competition Authority and District Heating Sector

Fabio Massimo Esposito (*)
Energy and Basic Industry Directorate,
Italian Competition Authority

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(*) Opinions expressed in this presentation are strictly personal and cannot be attributed to the Italian Competition Authority
Growing interest for DH amidst unclear regulation and consumer complaints

- EU Directive 27/2012: efficient DHC systems are a building block of European energy efficiency policies
- Italy’s SEN: DHC and heating from renewable energy important to reach the 20-20-20 targets
- Biomass-fueled DH has a large development potential in Italian mountain areas
- No national regulation is in place, but prices, connection etc. are often regulated by DH service provision licenses granted by municipalities
- Consumers complain about the high price of DH service
- Mounting debate on the necessity to regulate DH
  - Should DH be subject to cost-of-service regulation, managed by a local or a national regulator?
    - DH is a local public service (“LPS” = service of general economic interest, SGEI) and the law mandates price must cover cost of service and a fair return on assets
    - DH distribution network is a natural monopoly
  - Consiglio di Stato: DH service in Tirano (SO) is a LPS and Tirano’s municipality had the duty to control DH prices
ICA’s market investigation

- At the end of 2011 ICA launches a market investigation and writes Rimini’s Major that mandating connection to DH networks is anticompetitive
  - industry overview
  - economic and legal barriers to heating systems competition
  - prices, costs and incentives
  - Whither regulation, if any is needed
- Investigation closed at the beginning of March 2014
- 2010-2011 data on costs, investments, pricing, incentives collected for a sample of networks representing about 60% of space heated by DH
- Extensive use of AIRU data on generation plants, network size, network losses
DH in Italy: one size does not fit all

Network heat generation costs vary widely.

Numerical prevalence of biomass networks, but medium and larger networks are based on natural gas and, in some cases, waste.

76.7% heat from fossil fuel (cogeneration 50.4%), 23.3% biomass, waste, geoth., etc.
DH in Italy: one size does not fit all /2

- **Distribution costs** have two drivers: the cost of the pipes and the heat supplied per km of the network (linear heat density)
  - Pipes costs: 1.5 – 3 times that of a gas pipe of the same diameter
  - Linear heat density higher than standard values for minimal profitability, except in mountain areas
    - Less efficient distribution in mountain areas due to geographical dispersion of customers and to higher network heat loss
    - DH profitability in mountain areas can depend heavily on incentives based on cost reimbursement or on revenue from sales of cogenerated electricity and green certificates
- **Network heat losses** are significant: 15% on average, ranging from less than 10% to more than 25%
  - Good performance w.r.t. other European countries: Denmark 18%, Sweden 16%, Finland 8%
- **Heat generation costs**
  - Thermal Boilers: 49-52 €/MWh, including average heat loss
  - Heat from burning waste is sold to DH suppliers at a price approximately equal to the cost of alternative fuel (natural gas), with or without taxes
  - Cogeneration plants: difficult to estimate, but wide variance due to use of different technologies
DH in Italy: local regulation in methanized areas

- Local regulation is significant but not uniform
  - Differentiation between areas served by natural gas transportation and distribution network (“methanized” areas) and other areas

- **In methanized areas DH service is provided by vertically integrated, municipality-controlled firms, usually under a LPS concession**
  - DH networks built and operated since late ’70s under a LPS concession by municipality-owned firms managing local public energy services (gas and/or electricity distribution)
  - LPS concession was a well known instrument to frame rights and duties of a service provider and therefore DH was held to be a LPS
    - **DH as LPS for historical and legal reasons only**
  - Concessions granted without any competitive procedure
    - give the *exclusive right within the municipality* to build and run the DH network and to sell heat to final consumers (to finance investment, maintenance and input costs)
    - impose *no discrimination obligations* to the DH supplier

- **DH heat price is somehow regulated in LPS concessions**
  - Sometimes, indifference between DH price and the cost of heating with natural gas is mandated (e.g., Milan)
  - Sometimes, the initial DH price is set in the concession and it is stipulated that its rate of change will be equal to the rate of change of regulated natural gas price to households (e.g., Alba)
  - In other cases, concession does not set specific criteria (e.g. Turin)
DH in Italy: local regulation in methanized areas

- No cost-of-service regulation, but a sort of price-cap regulation, based on natural gas price
  - Heat generation in NG-fueled boilers and cogeneration plants; WTE plants came later
  - Natural gas is the best available alternative heating system
    - DH and natural gas in competition to substitute old diesel-fueled boilers in condos
  - Simpler to manage; bypasses information asymmetries
    - Generation cost index: heat was (co-)generated by natural gas boilers
    - Cost index of the efficient alternative heating system
    - It exploits gas price regulation, linking DH heat price changes to (regulated) natural gas price changes
  - It avoids discriminations between voters connected to different networks (natural gas or DH)

- DH supplier integrated in the gas sector would not oppose it, as it reduces cannibalization on gas distribution
  - In most cases, the same group operated DH service and distribution and sale of natural gas
    - Turin is one of the main (partial) exceptions

- Even in absence of specific concession provisions, self-regulation equates DH price changes to changes of regulated natural gas price to households (e.g., Turin, AIRU’s formula)
  - This is the effect of competition between DH and natural gas heating
DH in Italy: local regulation in non-methanized areas

- In non-methanized mountain areas, DH service provision is not explicitly based on LPS license and there is no explicit price regulation
  - DH service provided by either privately controlled (even cooperatives) or local government-controlled firms or mixed
  - There is an authorization to use the soil to put in place network pipes
  - Sometimes there is an agreement (“convenzione”) with interested municipalities granting them some control power on DH price change (e.g., Tirano, privately-controlled firm)
  - In Alto Adige does not seem to exist any regulation of service price, even when DH service is provided by firms not controlled by local government

- In non-methanized mountain areas, realization of DH networks seems to be subject to a lighter regulatory regime and private iniiziative seems more common than in methanized areas
- Large prevalence of small biomass-fueled generation plants
- *Can a national regulation handle these two models? Can a national regulation foster the development of privately-owned DH networks competing with other heating systems keeping price controls at a minimum level?*
Competing heating systems

Stock of heating appliances - Centralized Heating

DH = number of intermediate heat exchangers (substations)

Source: REF-E
Heating systems competition in mountain areas

Estimated total heating cost –
15 kW heating power, 15,000 kWh/y for 20 years – October 2013

Source: Alto-Adige Consumers Association
DH vertical organizations

- DH consumers buy heat (transported by hot water) and a heat exchanger, instead of fuel and boiler
- Existing structures do not allow competition at the retail level, as technical question regarding uniform heat quality and compensations among producers are not been solved yet  
  \[\text{No full TPA currently possible}\]
- Heat is bought from the distributor, who acts as a “single buyer” for its network
  - M1-M3 models all have a single buyer of the heat produced; M4 has a single buyer for each distribution network
- Heat production can be competitive - depending on network size and how the network evolved
Competition in (centralized) heating systems

- The system is composed by durables (boiler, exchanger, pipes) and a consumable (fuel or heated water)
- Switching to another system requires changing the durable good
  - Pipes internal to the building/apartment and heat radiators are usually compatible with all systems, as water is used to transport heat
  - Usually a given boiler works with one fuel only
- In systems different from DH, heat consumers buy fuel and boiler and produce themselves the heat
  - There is competition in retail sale of boilers and fuel
  - Sometimes consumers buy also access to the fuel distribution network (Natural Gas, sometimes LPG)
- DH: vertically integrated system competing against systems made by components assembled by the final consumers
  - DH integrated provider can internalize system externalities, and therefore can be more aggressive than rival systems
- Can competition against other systems substitute for retail and wholesale competition within the same heating system?
ICA’s approach /1

- **Main question**: public interest + monopolistic supply of DH service do imply that DH must be regulated? If so:
  - must it be regulated according to general rules for LPS?
  - Is competition only “for” the market?

- **The answer, according to ICA, depends on the extent of actual market failures:**
  - LPS supply must be regulated only if the market is not able to provide the service in an affordable way and/or with the required quality standards
    - Even so, regulation should be limited to those provisions the market is not able to provide by itself at the desired level
    - See Commission Communication on the Reform of the EU State Aid rules on services of general economic interest (2011)
  - Is there a market failure?
    - Competitive process – i.e., competition in the market - is able to limit the exercise of market power by the DH service supplier?
    - Which is the actual performance of DH suppliers? Analysis of a suppliers sample

- **European experience does not suggest DH must be regulated**
  - Finland, Sweden, Germany: DH is not price regulated
  - Denmark: cost-of-service regulation, but prices do not seem lower than in unregulated countries
ICA’s approach /2

- “Is DH a LPS or not” dilemma is by-passed
  - Heating systems competition suggests DH is not an essential service satisfying a basic need
    - this undermines its “objective” definition as a LPS
  - Dilemma is turned into an economic question about the necessity of (economic) regulation, keeping into account heating systems competition

- Key question is whether ex-post monopoly power exploitation can be prevented by market forces working before connection to DH
  - If not, and exploitation occurs systematically, then (national, cost-of-service) regulation is needed
  - If yes, ICA may act as a “regulator of last instance”, intervening on residual instances of market failure to punish (excessive) monopoly power exploitation
    - Art. 3, lett. (a), Italian Competition Law: “directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions” is an abuse of dominant position; it encompasses charging excessive prices

- Analysis is directed to verify whether exploitation occurs in a systematic way
  - Benchmarking of DH prices, profit margins and rate of returns w.r.t. competing products (other heating systems)
  - Profitability (= rate of return on invested capital) preferred measure as acknowledges different cost structures and “normal return rate”
ICA’s approach /3

- **Heat distribution** is a natural monopoly, as natural gas distribution
  - the driver of distribution costs is network’s thermal density
  - Adding another parallel networks would halve thermal density, leading to an increase of distribution costs per unit of heat in each network

- **As long as DH systems are vertically integrated, DH performance does not depend on natural monopoly in distribution, but on ex-ante systems competition**
  - Natural monopoly gets relevant only as wholesale heat competition develops

- **The emphasis on ex-ante competition does not mean that the only relevant market is the market for heating systems**
  - ICA’s investigation does not define relevant markets
  - However, relevant markets definition hinges on consumers’ ability to engage in life-cycle computations (as in aftermarkets)
    - If most consumers do it regularly, the only relevant market is the “system” market – i.e. ex-ante competition
    - if this is not the case – as customers complaints suggest -, ex-post monopoly is a relevant market too
Environmental advantages and competition

- ICA recognizes that DH can be energy efficient and “cleaner”
  - Energy efficiency due to cogeneration and larger, optimized boilers, must be balanced with heat losses (15% on average, often higher in mountain areas)
  - Harmful emissions are concentrated in one point and better controlled
  - DH can help to use local energy resources (biomass, waste, geothermal heat, solar radiation) and to promote a better management of land and forests

- Environmental and energy efficiency goals must be reached by minimizing competition distortions

- No discrimination in favor of DH should be allowed
  - It is anticompetitive any regulation mandating connection to DH or making too costly the adoption of a heating system alternative to DH

- Incentives/subsidies granted to DH should be graduated on the basis of actual energy and environmental value
  - Incentives to renewables-based DH should be greater than that to fossil-fueled DH
  - Cogeneration from fossil fuels cannot be equated to production from renewables (as done, on the contrary, by several Regions)

- Should environmental or energy efficiency policies mandate connection to DH networks, cost-of-service regulation might be the only way to shield consumers from the exercise of market power by DH supplier
Ex-post monopoly and ex-ante competition

- Before the customer connects to the network, DH competes with others heating suppliers to serve that customer
  - This *ex-ante competition* has been recognized also by other Competition Authorities (e.g. the German one in DH investigation closed in 2013)
- Customers are subject to the monopoly power of DH supplier only after they connected to the network, because of lack of retail competition
- Actual exploitation depends on the *ability* to exploit market power and on the *incentive* to do it
- DH supplier’s *ability* to exploit its monopoly power depends on the height of switching costs
  - *Switching costs create lock-in effects*
  - the lower the switching costs, the lower the ability of DH supplier to exert monopoly power
  - Switching costs are significant: 8-21 €/MWh/year towards natural gas, 20-30 €/MWh/year towards diesel in areas not reached by natural gas distribution
  - Switching does exist (Alba, Imola, ecc.), although switching rates are very low
DH supplier has an *incentive* to increase heat price after the customer connected, to exploit its ex-post monopoly power.

This incentive exists as long as DH supplier can discriminate between old and new customers.

If DH supplier committed to charge the same heat price to old and new customers, then its incentive to exploit ex-post monopoly power would be (significantly) reduced.

- now there is only one heat price to use as an instrument to attract new customers and to exploit ex-post monopoly power.
- *the wider the potential market of customers that could switch to DH, the lower the incentive to set the heat price in order to exploit ex-post monopoly power on connected, locked-in customers.*

This effect can be reduced by DH supplier by manipulating the price of the durable.

- competition for new customers can drive the price of the durable (connection, exchanger) to cost (and even below).
- this allows a higher heat price that extracts more rent from old customers.
- a significant flow of new customers entering the market may prevent such an increase.
As the DH network gets saturated – or the flow of new customers reduces –, the incentive to exploit the “connected customer base” increases and would eventually exceed the incentive to keep heat price “low” to attract customers.

A commitment to a given rule of change of heat prices would eliminate the incentive to increase prices as the network gets saturated.

Heat price change can be linked to the change of a cost index – heat generation costs for DH, cost of the most competitive alternative:

- DH supplier should not be able to manipulate the index
- Index should be easily verifiable by the customer

Where DH is a “new entrant” heating system, it will exploit switching costs to price the heat under the “umbrella” of the incumbent heating system:

- Natural gas heating has provided a natural umbrella in many municipalities
- Diesel oil heating umbrella in mountain areas has been “lowered” by competition among alternative heating systems
If DH supplier commits to not discriminate between old and new customers, ex-ante competition among heating systems prevents full exploitation of ex-post monopoly power on locked-in customers. This is a well-known result from switching costs literature. Exploitation will be limited by a commitment to a rule of change of heat prices even when the network gets saturated. Commitment may arise from:  
- **Competition**: if a list price equal for old and new customers is the rule in competing heating systems, DH supplier very likely will not price discriminate between old and new customers.  
- Natural gas, LPG, diesel oil does not discriminate this way.  
- Discrimination based on expected consumption levels (two-part tariffs) is possible and widely practiced.  
- Competition with heating systems whose fuel cost changes are regulated.  
- **Regulation**
Empirical findings: Heat prices (€/MWh)

Heat price, net of VAT and discounts to consumers

*Italian heat price affected by high share of NG in fuel mix and higher NG prices*
Empirical findings: pricing

- Pricing reflects competition among heating systems
  - Durables (connection, heat exchanger) heavily discounted
  - Heat price based on the price of incumbent heating system (natural gas, diesel oil)

- In most cases, pricing presents features that limit the exercise of ex-post market power
  - Absence of discrimination between old and new customers
  - In methanized areas, the rate of change of heat price is anchored (or equal) to the rate of change of regulated gas price for small customers
    - This index is both an index of the cost of the alternative heating system and an index of heat generation costs
    - The higher the share of natural gas in heat generation, the more limited is market power
    - Potentially higher margins for suppliers of heat generated from waste or renewables when NG is the benchmark
  - Heat price in the sample is often above the cost of natural gas heating
  - In this case, most of the difference is accounted for by avoided management costs and is heavily affected by assumed NG boiler efficiency
    - Switching costs are exploited to exert some market power
    - Lack of transparency / benchmark values arbitrarily set
  - NG/DH competition weakened to avoid cannibalization of sales within the same group selling both gas and DH
Price equivalence formula

- Heat price equivalent to NG heating price

\[ P_H = k_1 \cdot k_2 \cdot (\frac{P_{NG}}{(PCI \cdot \eta)}) \cdot \text{conv} \cdot t \]

Where

- \( k_1 \) is a coefficient equating natural gas heating and DH management costs
- \( k_2 \) discounts or bonus services coeff.
- \( P_{NG} \) = natural gas reference price for small consumers, defined by AEEGSI (energy regulator); includes national and local taxes
- \( PCI \) = lower calorific power of NG
- \( \eta \) = average seasonal heat efficiency of a natural gas boiler
- \( \text{conv} \) = converts \( P_{NG} \) from MJ to kWh
- \( t \) = adjustment coefficient taking into account different VAT

- Relative performance of DH depends crucially on heat efficiency and \( k_1 \) coefficients
Empirical findings: pricing /2

- In most cases, pricing presents features that limit the exercise of ex-post market power
  - *In non methanized areas*, and in particular in biomass fueled networks, the rate of change of heat price is not restricted
    - Sometimes, there a commitment to minimum savings w.r.t. diesel oil
    - DH prices are below the price of heating by diesel oil (although not as much as claimed)
      - Switching costs are not fully exploited, thanks to
        - competition between heating systems in a market sensitive to price and to energy efficiency, as well as more likely to engage in life-cycle computations
        - Self-restrain by local government-controlled suppliers
  - *Competition between heating systems does work!"
Empirical findings: margins and returns

- **Profit margin (EBIT/operating revenues)** < 20% for most of sample networks (80%)
  - Netting out revenues for incentives on cogenereted electricity and heat, profit margin reduces to less than 10% in 75% of sample networks
  - Profit margin on heat sales only is < 20% for more than 80% of sample networks
    - No significant difference between cogenereted and non-cogenereted heat

- **Returns on fixed capital** < 8% in most cases
  - 8% is the WACC guaranteed to natural gas distributors by AEEGSI for 2008-12
  - Returns below this level cannot for sure be labeled “excessive”, while above 8% further analysis is needed

- **For cogeneration plants, estimates were based on the c.d. benefit distribution method**, that distributes cogeneration benefits both to heat and electricity
  - Conservative assumption, not favourable to heat production
    - It implies heat is an output of a joint production process, not just waste from electricity production
Average revenue (net of VAT and discounts) and return on fixed capital (\emph{gross} of incentives on electricity and cogenerated heat)

- Networks to the right of vertical axis showed an average revenue above sample average
- Networks above the horizontal axis showed a return on fixed capital $> 8\%$ (WACC Gas Distribution 2011)
  - 28\% of sample networks exceeds this benchmark (gross of incentives), but only in half of them there might be a competition problem
Average revenue (net of VAT and discounts) and return on fixed capital (net of incentives on electricity and cogenerated heat)

- Netting out incentives reduces dramatically returns to DH provision
  - Likely problematic networks reduces to just one, while the other former “problematic” networks becomes “inefficient”
- Profitability hinges on incentives on cogenerarted electricity
Does DH need further regulation?

- DH networks sample showed
  - Heat price below diesel oil heating, variable difference with NG heating
  - Significant margins, but *rate-of-return on fixed capital in most cases does not exceed regulated rate-of-return on gas distribution*

- *Prima facie*, no systematic excessive exploitation of monopoly power enjoyed post-connection by the network supplier emerged
  - Competition among heating systems and local regulation in most instances limited the exercise of ex-post market power
  - there might be exceptional situations where such an excessive exploitation occurs. ICA would ponder intervention in such instances
    - Abuse of dominant position (excessive prices)

- **DH has to be subjected to LPS regulation?**
  - This would imply shifting to cost-of-service regulation, which is much more informationally demanding and complex than price-cap regulation
    - no reason to believe that cost-of-service regulation by municipalities could bring large reduction of DH prices, while preserving economic viability of DH provision

- **Would national regulation be an improvement?**
  - If ICA’s computations are correct, cost-of-service regulation by AEEGSI might not bring about price reductions
  - Why regulating situations where competition among heating systems works?
Improving competition in DH provision

- A national framework law would be useful to
  - Define a unitary framework, with basic DH provider obligations
    - No discrimination between old and new customers, commitment to a price change rule, service continuity, service quality
  - Improve competition among heating systems
    - Transparency and ex-ante availability and confrontability of heat prices, supply and connection conditions
    - Comparisons of heating systems based non-arbitrary parameters (heat efficiency)
    - Transparency on average revenues from heat supply
    - DH networks benchmarking
    - Elimination of building and energy efficiency norms distorting heating systems competition

- Geographical scope of exclusivity rights should be limited to the one necessary to ensure economic sustainability of DH network
  - Sustainability of local natural monopoly would not necessarily prevent another supplier from developing a sustainable DH network in a different area of municipal territory
    - Eventually, the networks could compete for marginal consumers
    - Presence of neighboring networks is a premise of development of wholesale competition
  - Municipality-decided network extensions should be assigned through public tender, unless there exists excess generation capacity

- New DH concessions should be assigned by public tender

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Advicing on Energy Efficiency Law

- Draft version of Energy Efficiency Law gave AEEGSI the power to regulate DH, in particular in non-methanized areas
  - But in non-methanized areas competition seems to work better!!
- ICA advised Government and Parliament to change the law, consistently with DH Investigation results
  - Suggestions only partially accepted
- On connection charges, Government followed ICA’s advice and asked AEEGSI to set only general criteria to determine them
  - Being connection charges a competitive weapon in heating system competition, ICA feared regulation could “freeze” competition
- On price transparency, Government did not follow the advice to impose transparency on all DH suppliers to promote consumer empowerment
  - Transparency limited to new networks, to make cost-benefit analysis
- On network access charges, ICA advice was not followed
  - Government asked AEEGSI to set such tariffs, while ICA claimed it was premature and potentially dangerous
- On price regulation, government followed ICA’s advice, giving AEEGSI the power to regulate prices only where connection to DH is mandated by local regulation
  - ICA preferred solution was regulation wherever DH has no alternative
Sailing towards perilous seas…

- **There is potentially a wide role for ICA in DH**
  - *Advicing government for a framework law*
  - Status of old DH concession assignments made without competition
    - Past investment protection issues in case of new public tender
    - Unbundling of distribution network not a solution as long as generation stays monopolistic
  - *Improving transparency towards consumers* by applying Consumer Protection Law
  - *Punishment of abusive exploitative conduct by DH monopolists*
    - Charging prices so high to lead to a very high return on capital invested
    - Attempting to change pricing rules who limited the exercise of market power

- **The “regulatory” nature of exploitative abuses makes Competition Authorities reluctant to engage in this kind of intervention**
  - Establishing a price is exploitative implies setting a threshold below which a price or a rate of return is “right” – a threshold which is not competitively defined
    - Setting this threshold is necessary for the effectiveness of “cease and desist” orders following a finding of exploitative abuse
  - Commitments very hard to evaluate

- **However, in many cases DH lends itself to this kind of intervention…**
  - Monopoly backed by exclusive rights
  - No sectoral regulator
  - Several European competition authorities engaged in such interventions in DH

- **…and pilot interventions may effectively induce self-restraint of ex-post market power exploitation**
  - They make clear a “regulatory threat” exists, as some Swedish experience suggest
Thank you for your patient attention.