

Ownership structures, financing, and regulation of district heating networks

IRENA DHC capacity building workshop for
Mongolia June 2022

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Outline



- Where District Heating? Basic national planning principle
- **How District Heating? Ownership, prices and finance**

Breaking the DH price topic up in two topics

Two tariff related topics:

- 1) **Tariff levels** - What costs are the DH company allowed to include in the tariffs – regulated through price regulation
- 2) **Tariff structure** - How is the consumer tariff structure designed to cover those costs

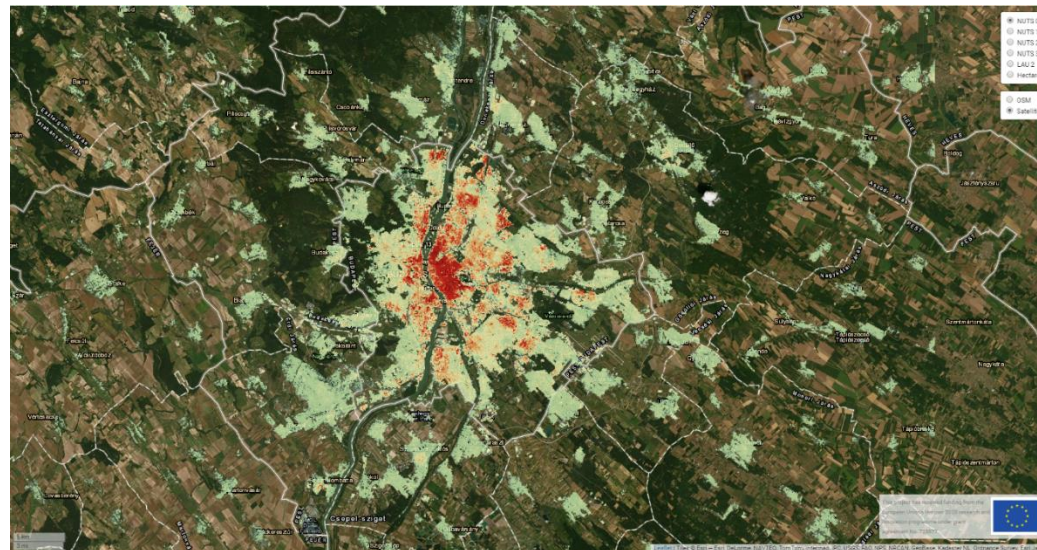
This presentation addresses topic 1 **Tariff levels**

The tariff structures is also an important topic – but a separate topic

- See fx Djørup et al «District Heating Tariffs, Economic Optimisation and Local Strategies during Radical Technological Change” DOI: <https://doi.org/10.3390/en13051172>

Where District Heating?

- National procedure for identifying **socioeconomic viable district heating areas**.
- For example, using the European framework for comprehensive assessment of heating and cooling
 - Supported by available tools and reports (Eg. Heat Roadmap Europe / Peta4, Hotmaps, Thermos, and others).
- On this basis, establish designated areas for district heating systems through zoning policies.



Creating the basis for district heating



A national regulatory frame for the heating sector.

- Plays an important role for creating the basis for a district heating economy.
- As an overall national frame, the role of the heat supply act is to outline the societal purpose of district heating systems.

Example - the Danish Heat Supply Act:

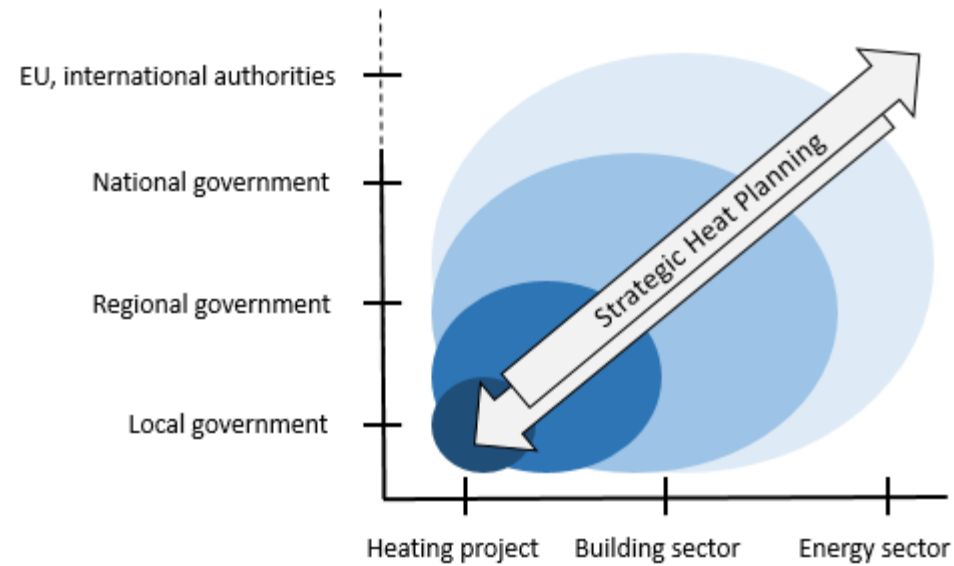
§ 1. The aim of the law is to promote the most socioeconomic, comprising environment friendly, use of energy for the heating of buildings and supply of hot water and within this framework to decrease the energy supply's dependence on fossil fuels.⁴

Translation: Djørup, S. The institutionalisation of zero transaction cost theory: a case study in Danish district heating regulation. *Evolutionary and Institutional Economics Review* (2020). <https://doi.org/10.1007/s40844-020-00164-3>

How district heating?

What are the regulatory challenges?

This presentation focuses on **Ownership & Price Regulation for a monopoly supply**



SOURCE: Figure from forthcoming guidebook by AAU/IRENA

The regulative challenge – Company perspective



From a **company perspective**, the regulation of district heating systems must address:

- High upfront capital costs necessitate a long-term investment perspective
- Associated risks
- Access to capital

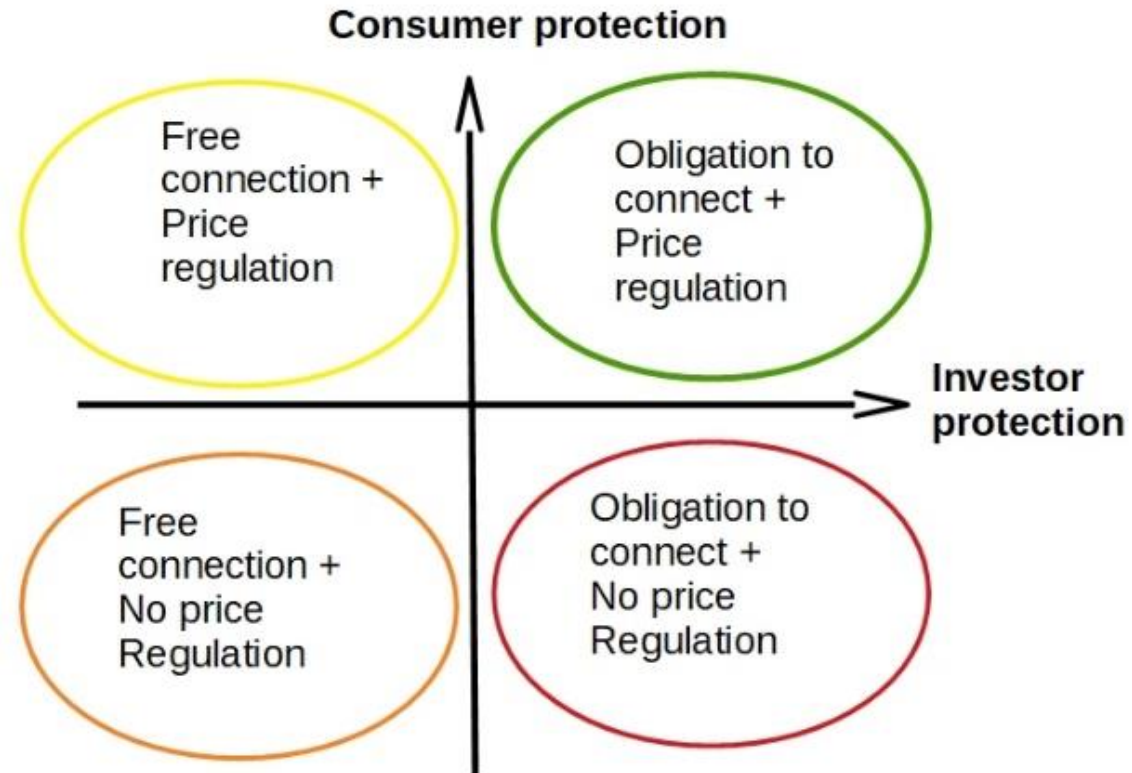
The regulative challenge – Society's perspective



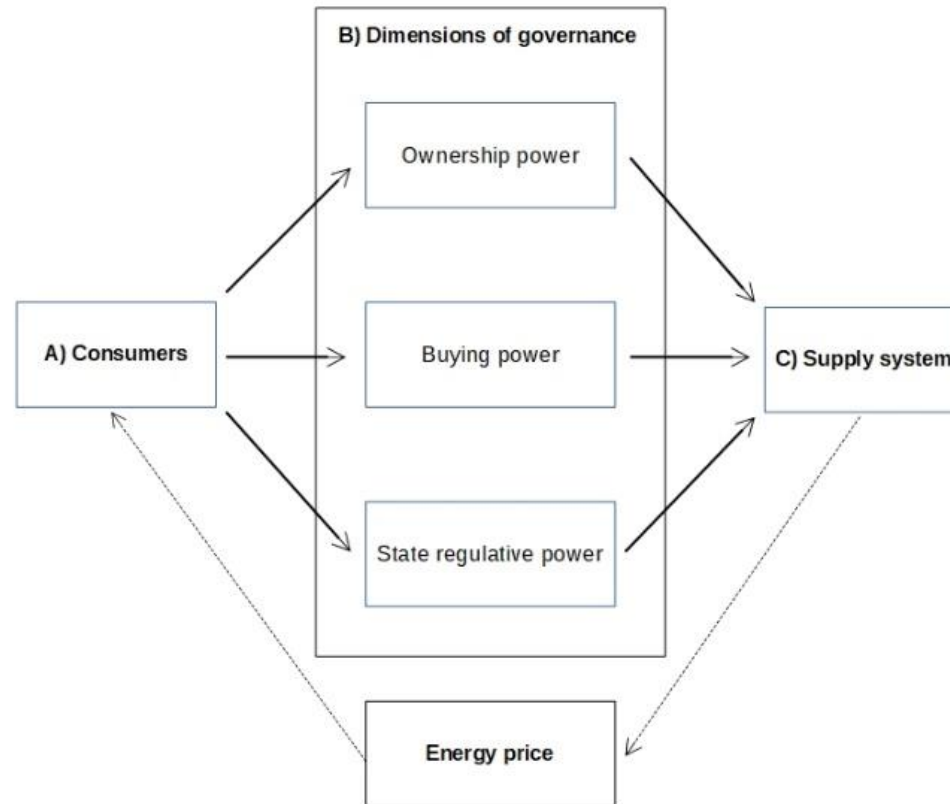
From a **societal perspective**, the regulation of district heating systems must be able to deliver:

- Consumer acceptance and protection
- The ability to support long term strategic energy planning

Consumer vs Investor protection



Three basic forms of regulative strategies



Hvelplund, F., Djørup, S., 2019. Consumer ownership , natural monopolies and transition to 100 % renewable energy systems. Energy 181, 440–449. <https://doi.org/10.1016/j.energy.2019.05.058>

The price-ownership matrix – framework for considering regulative strategies



OWNERSHIP REGULATION

	Consumer ownership	Public ownership	Private commercial ownership
PRICE REGULATION	True costs	Good experiences in DK	
	Price cap		
	No price regulation		

Price regulation – Price cap principle



PRICE CAP

Using state regulative power to determine a regulative price that seeks a compromise between investors demands for return and the society's need for price control of the monopoly

BENEFITS

Potentially attracts new investors as a return is allowed

CHALLENGES

It is difficult for regulator to monitor company costs – and thereby difficult to determine/regulate a 'fair price'

Price regulation – True cost principle



TRUE COST PRICING

Ensures that profits cannot be transferred out of the company – profit is either re-invested in the system or payed back to consumers

BENEFITS

Keeps prices low – thus promotes consumer acceptance.

Ensures capital for maintaining and improving grid.

CHALLENGES

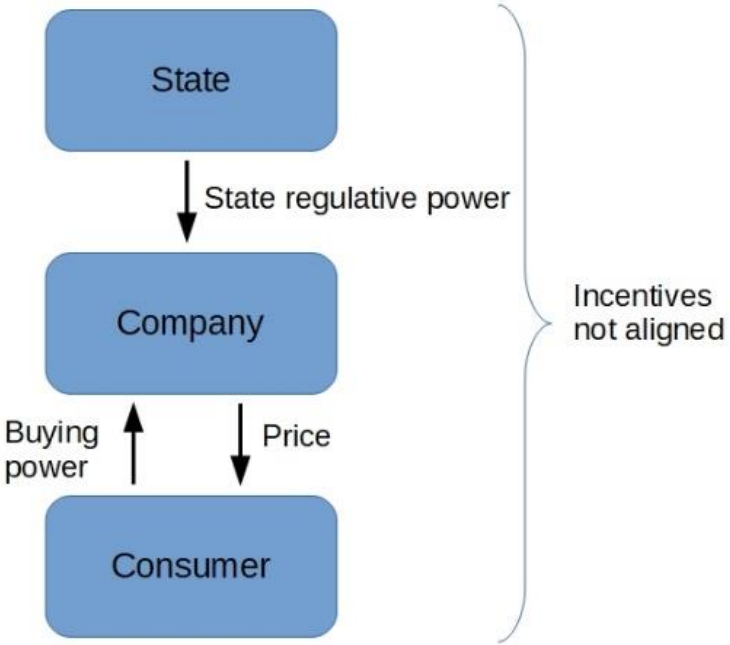
Can be difficult to regulate if the interests of the regulated are not sufficiently aligned with intention of the regulator.

Difficult and costly for regulator to monitor true costs

OWNERSHIP

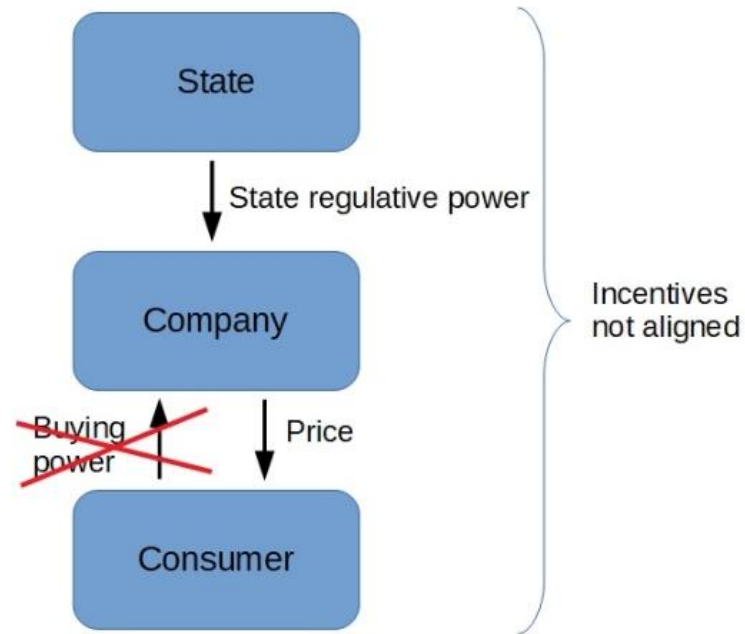
Due to these challenges the ownership structure is an important part of the regulation

Traditional regulation in a market economy



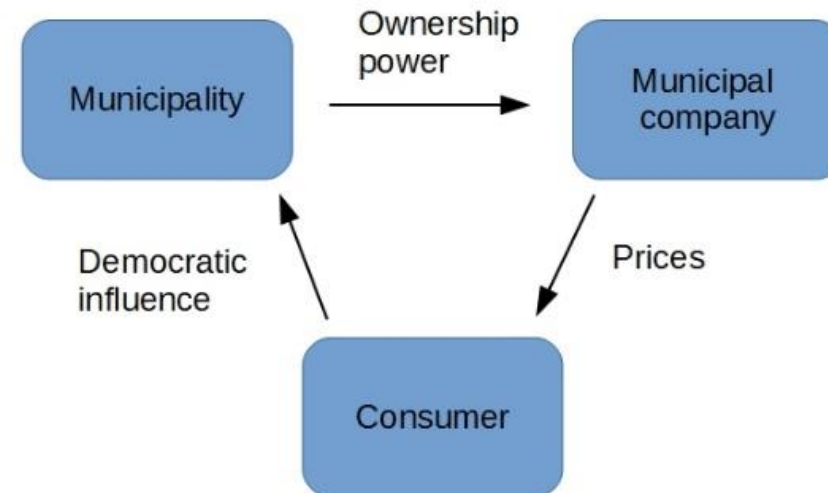
See Djørup et al (2021). Consumer Ownership of Natural Monopolies and its Relevance for the Green Transition: The Case of District Heating. In: Danish Utility Regulator's Anthology Project Series on Better Regulation in the Energy Sector VOL. 1.

Traditional regulation in a market economy – The monopoly challenge

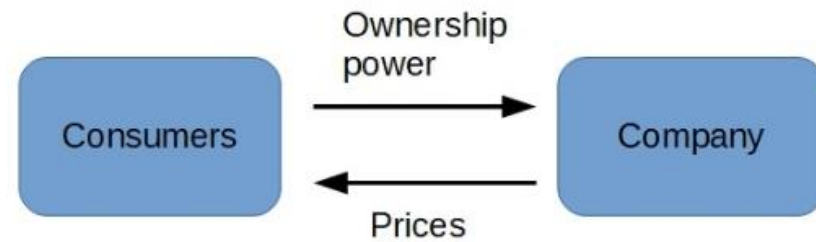


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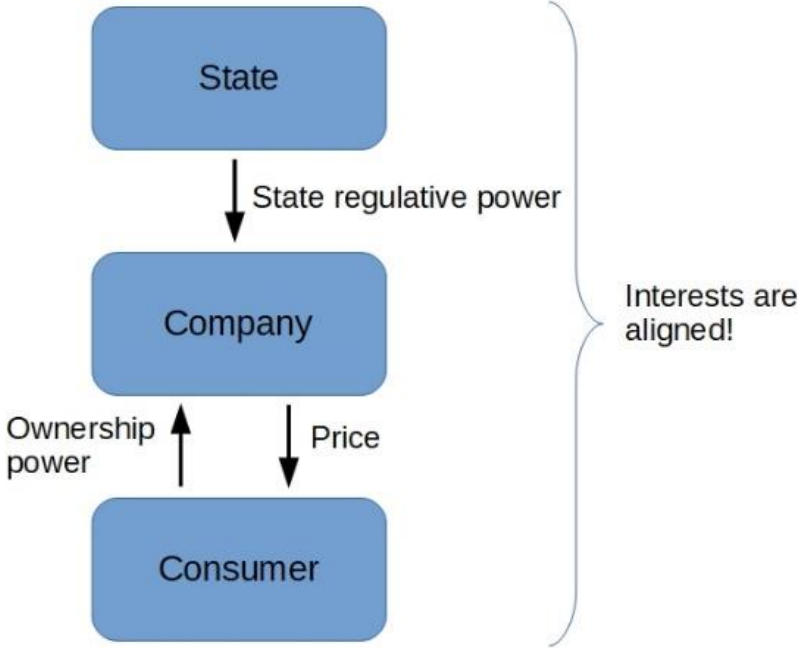
Example of ownership construction: Local public ownership



Example of ownership construction: Consumer ownership

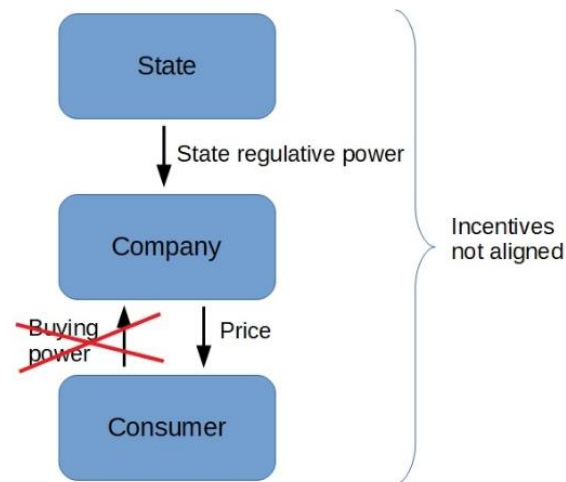


The strength of consumer ownership

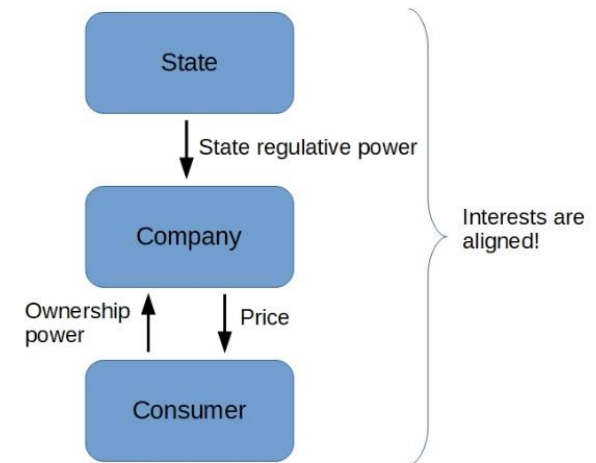


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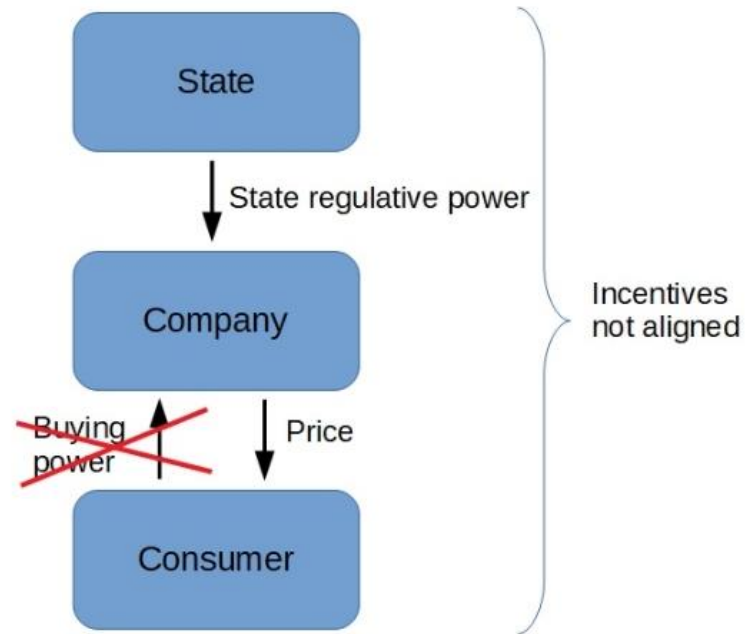
A) THE PROBLEM OF MONOPOLIES...



B) HOW OWNERSHIP REGULATION SOLVES IT



Traditional regulation in a market economy – The monopoly challenge



See Djørup et al (2021). Consumer Ownership of Natural Monopolies and its Relevance for the Green Transition: The Case of District Heating. In: Danish Utility Regulator's Anthology Project Series on Better Regulation in the Energy Sector VOL. 1.

The ownership factor matters – Experience from Denmark

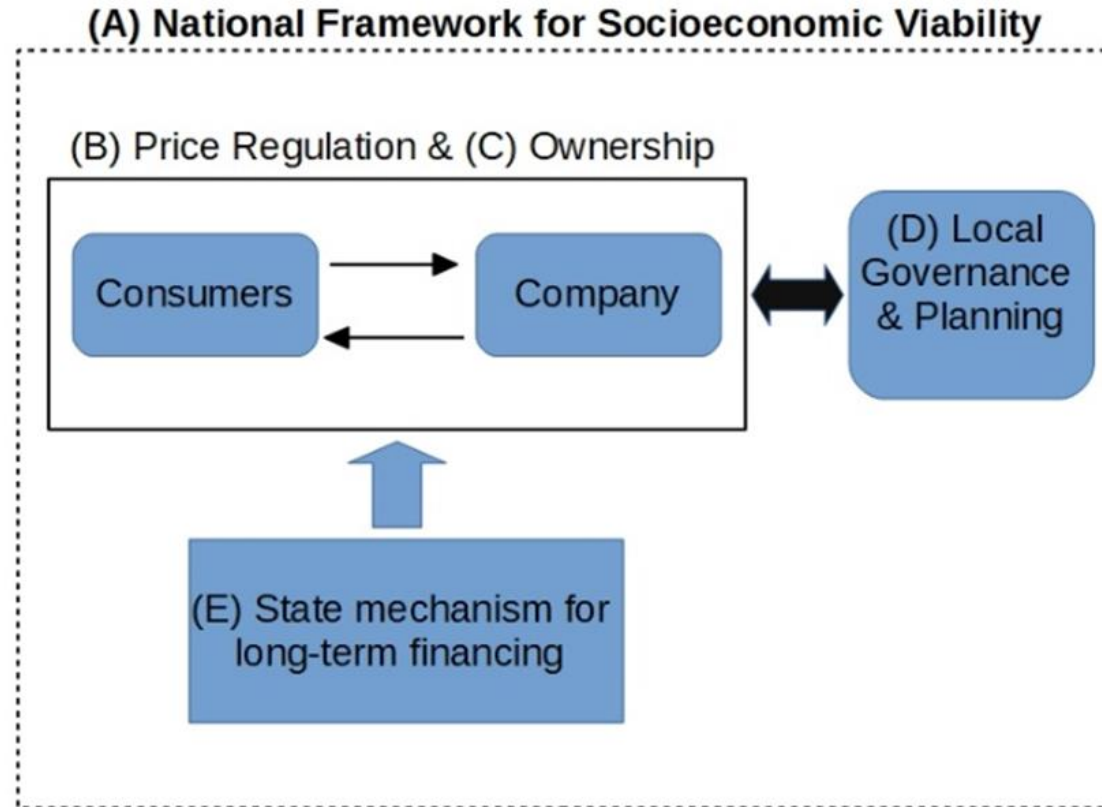


**Table 1: DH consumer prices for DH companies owned or previously owned by the transnational energy company E.ON
(Danish Kroner per year)**

Name of DH company	DH price: 15 Dec. 2013	DH price: 18 Dec. 2012	Change in DH price	Change in ownership
Hjortekær	37,090	37,096	-6	No. Privately owned
Annebergparken	31,793	31,803	-10	No. Privately owned
Ørslev-Terslev Kraftvarmeforsyning	31,041	31,005	36	No. Privately owned
Slagslunde Kraftvarmeværk	25,614	30,205	-4.591	Yes. Consumer group buys DH supply
Præstø Fjernvarme	23,573	21,329	2.244	No. Privately owned
Lendemarke Varmeforsyning	18,971	13,151	5.820	No. Privately owned
Skævinge Fjernvarmeforsyning	17,178	27,901	-10.724	Yes. Municipality buys DH supply.
Frederikssund Kraftvarme	17,653	17,653	0	No. Privately owned
Gørløse Fjernvarme	16,338	35,125	-18.788	Yes. Municipality buys DH supply.

Consumer prices are listed for a typical house (130 m², 18.1 MWh heat consumption). 1 Euro ~ 7.5 Danish Kroner.

Enabling framework for district heating



Summing up



- District heating projects should be based on socioeconomic assessments
- Regulatory measures should address;
 - Consumer acceptance and protection (low returns on investments)
 - Access to capital & risk management
 - Company & ownership structures that enable long term planning

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