



## Barriers for flexibility between district heating and electricity

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# Barriers for flexibility between district heating and electricity

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**Flex4RES**

Flexible Nordic Energy Systems



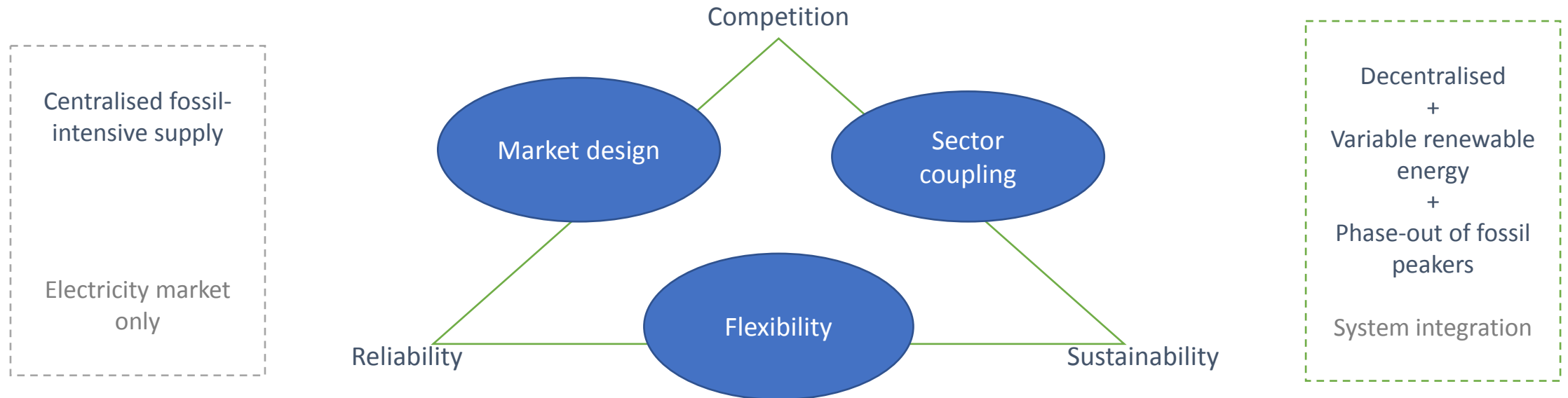
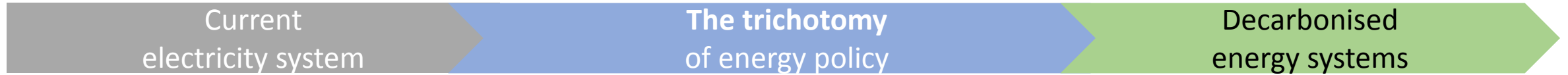
**Nordic Energy Research**  
**Nordic Council of Ministers**

# Wind of change

From centralised and fossil-intensive systems  
to decarbonised and integrated energy systems



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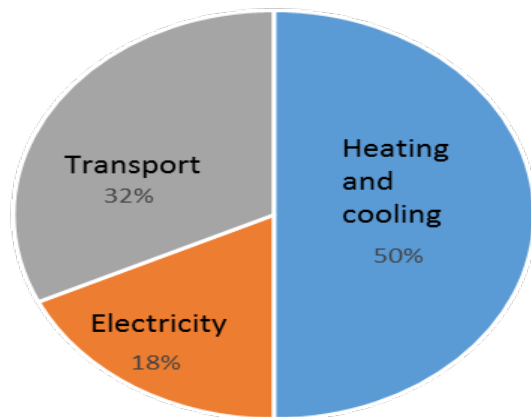


# Sector coupling

Electrification as source of flexibility

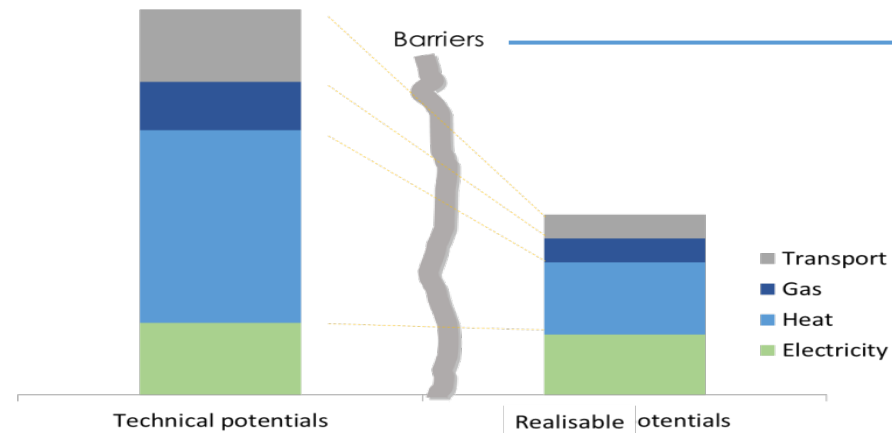


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Distribution of EU energy consumption  
(Source: EU Heating and Cooling strategy)

## From technical to realisable potentials



## Framework conditions

- Market design
- Direct regulation
- Fiscal policies
- Support schemes
- Grid regulation

Large flexibility potentials in electrification of the energy sectors

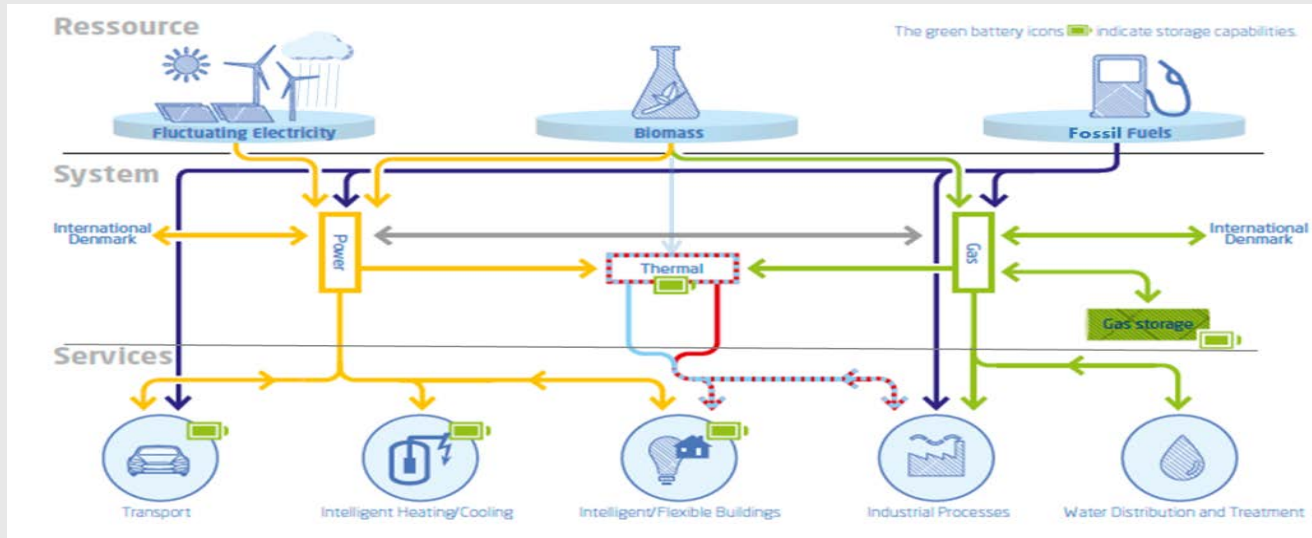


Hindered by regulatory barriers



Remove barriers

# Challenges in a larger perspective



Energy system integration



Infrastructure

Biomass Supply

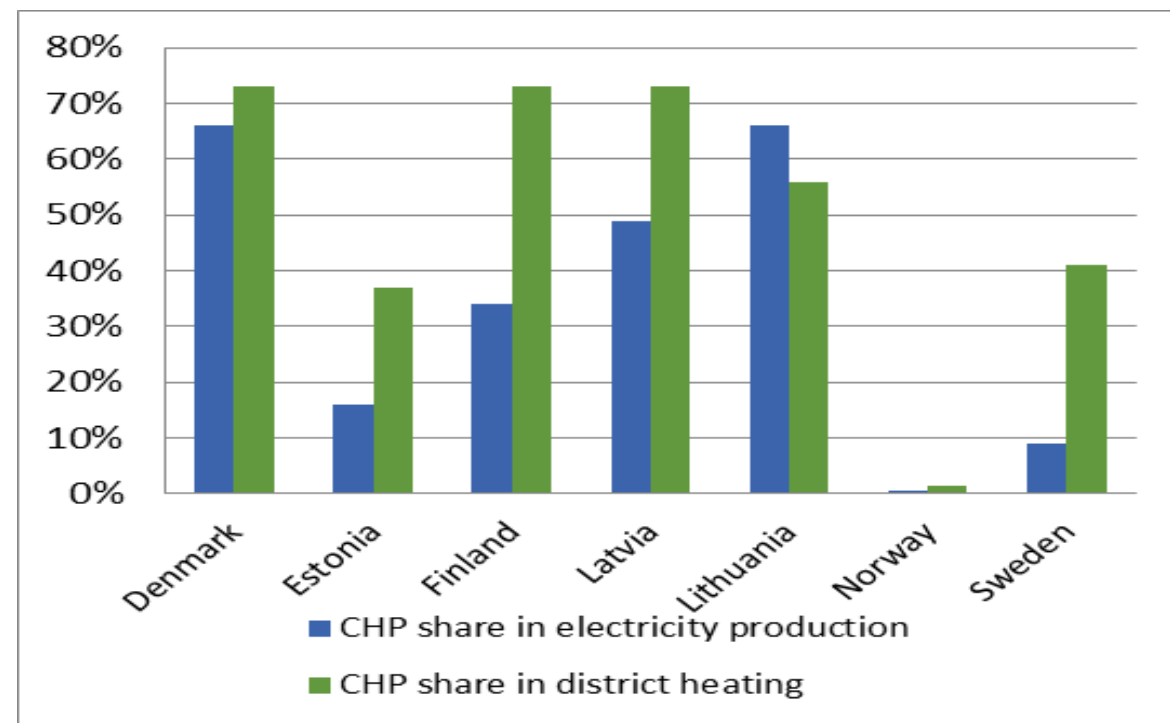
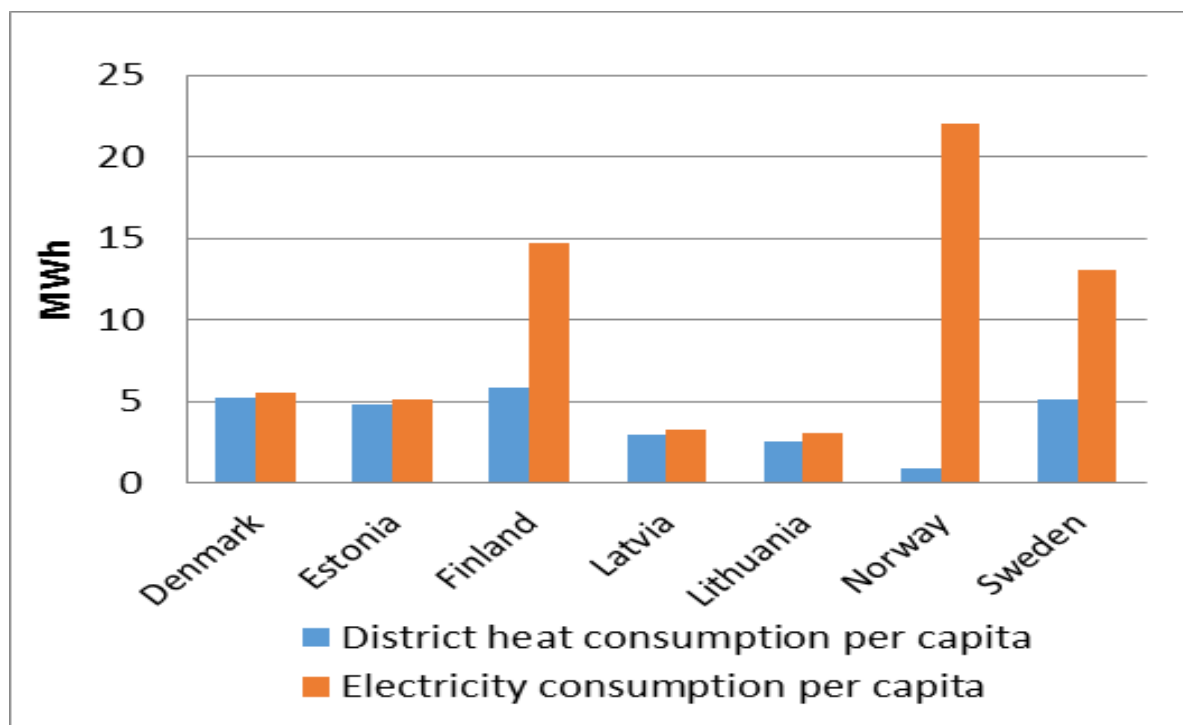


# Outline of the talk today

- District heating-electricity interface
- Barriers for flexibility
- Discussion



## District Heating in the Baltics/Nordics



Source: Euroheat, 2015

District heating is widely used in most Baltic/Nordic countries and thus represents a flexibility source of considerable magnitude which is only partly exploited today by the power market

# Which technologies can provide flexibility?



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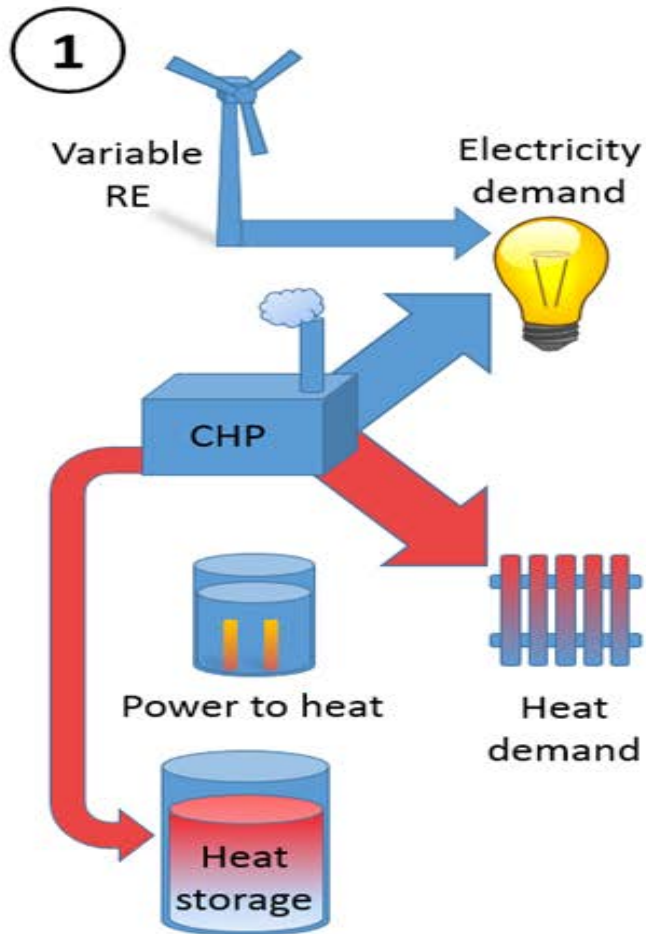
Today flexibility is mainly provided by CHP combined with heat storages (water tanks)

- Water tanks are widely installed and used in Denmark, Finland and Sweden

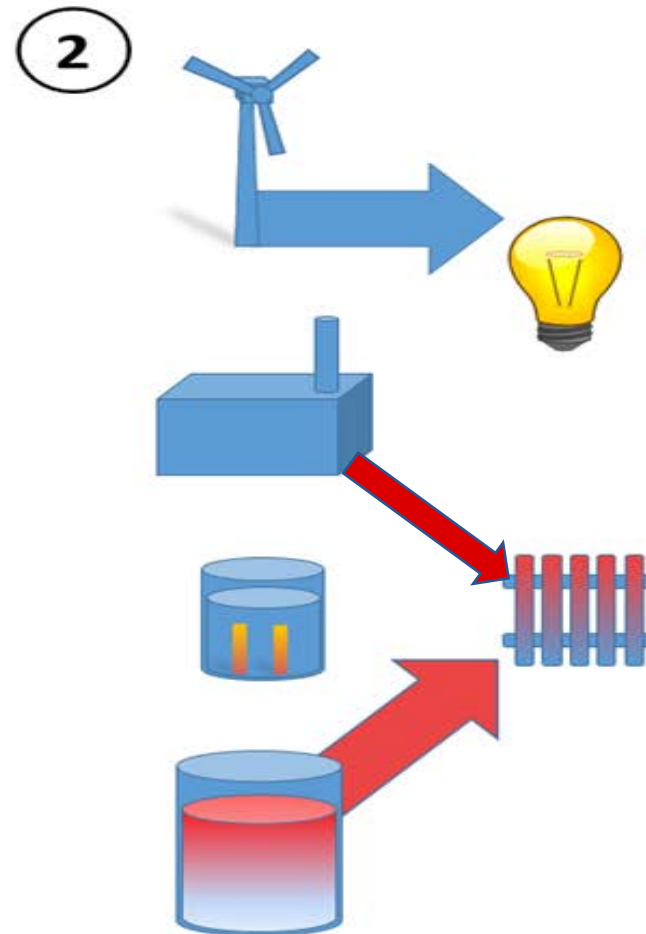
Electric boilers and large heat pumps

- Several barriers, e.g. existing taxation
- Consequently: very limited use in the Baltic/Nordic countries

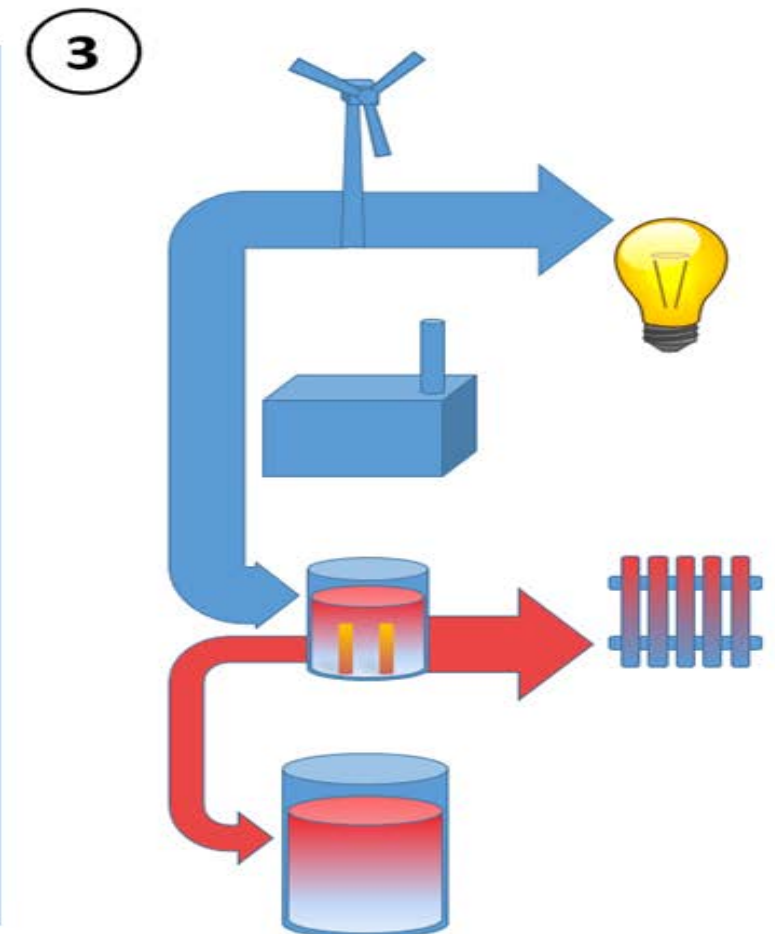
# District heating-electricity interface



Power demand exceeds the VRE supply



VRE supply sufficient for demand  
No need for additional flexibility



VRE power supply exceeds the demand

## Different market frameworks

The Baltic/Nordic power market is an integrated competitive market

DH is supplied by local monopolies regulated by national rules and authorities

- Not originally designed to provide integration with the power market
- National rules sometimes work against DH providing flexibility services to the power market
- Local security-of-supply objectives may be preferred e.g. going from foreign natural gas to national biomass



# Barriers to flexibility

## Market development, e.g.

- Large central power plants run fewer and fewer hours due to low electricity prices
- No incentives to investment in flexible capacity

## Regulatory set up, e.g.

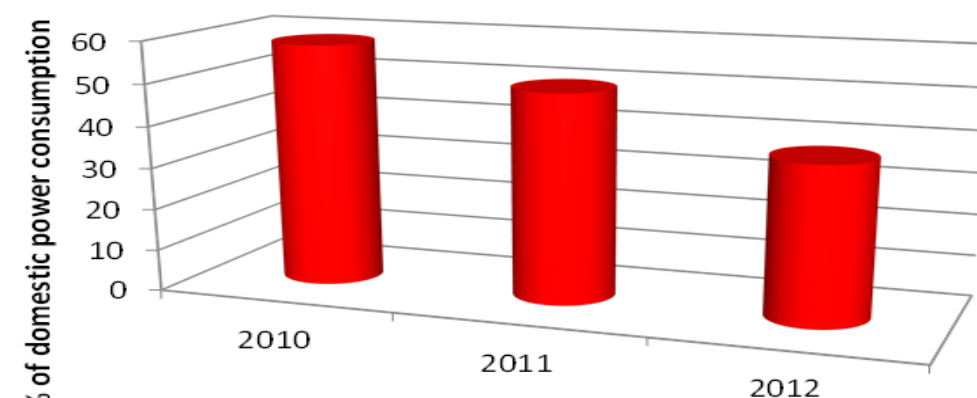
- grid tariffs and taxes on electricity use
- local DH utilities prefer to substitute gas-fired CHP by biomass heat-only boilers due to tax exemptions for biomass

## Baltics:

### Limited use of

- market prices for CHP
- thermal storages/water tanks

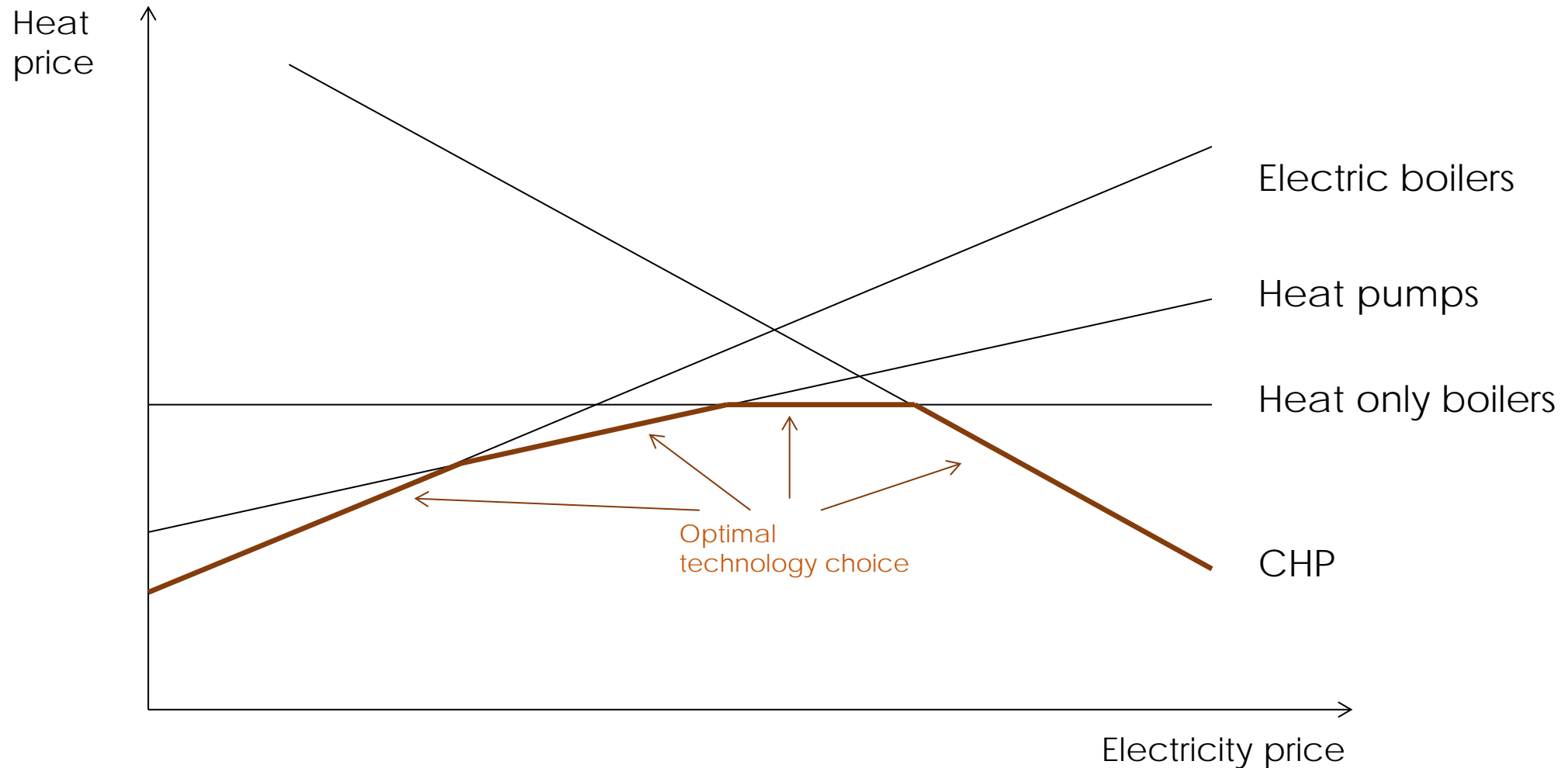
**Central power plants' share of domestic power consumption**



# Choice of heat supply at different electricity prices net costs



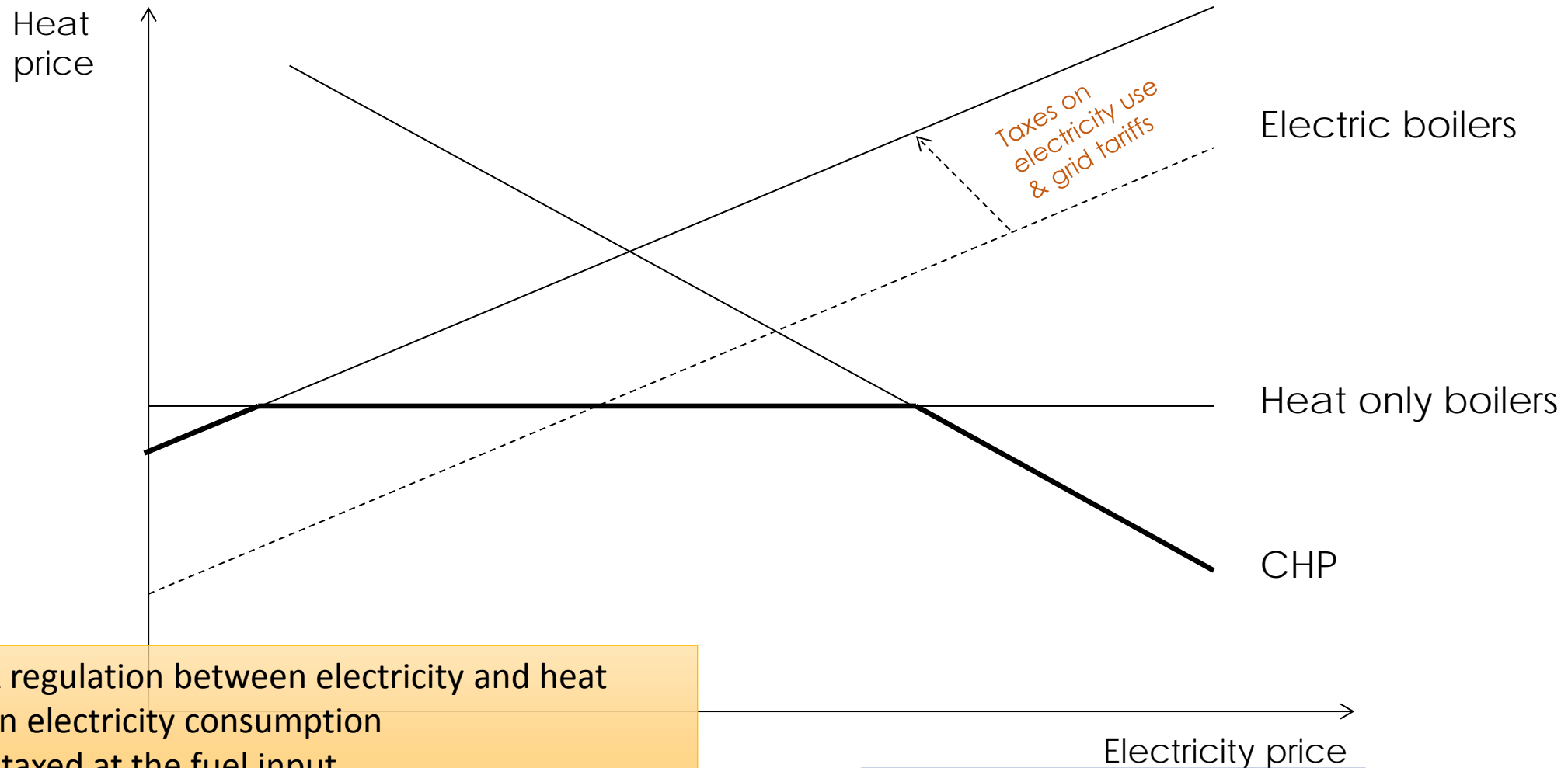
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# Choice of heat supply - at different electricity prices



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Patchwork regulation between electricity and heat

- Taxes on electricity consumption
- Heat is taxed at the fuel input
- Biomass exempted for taxes



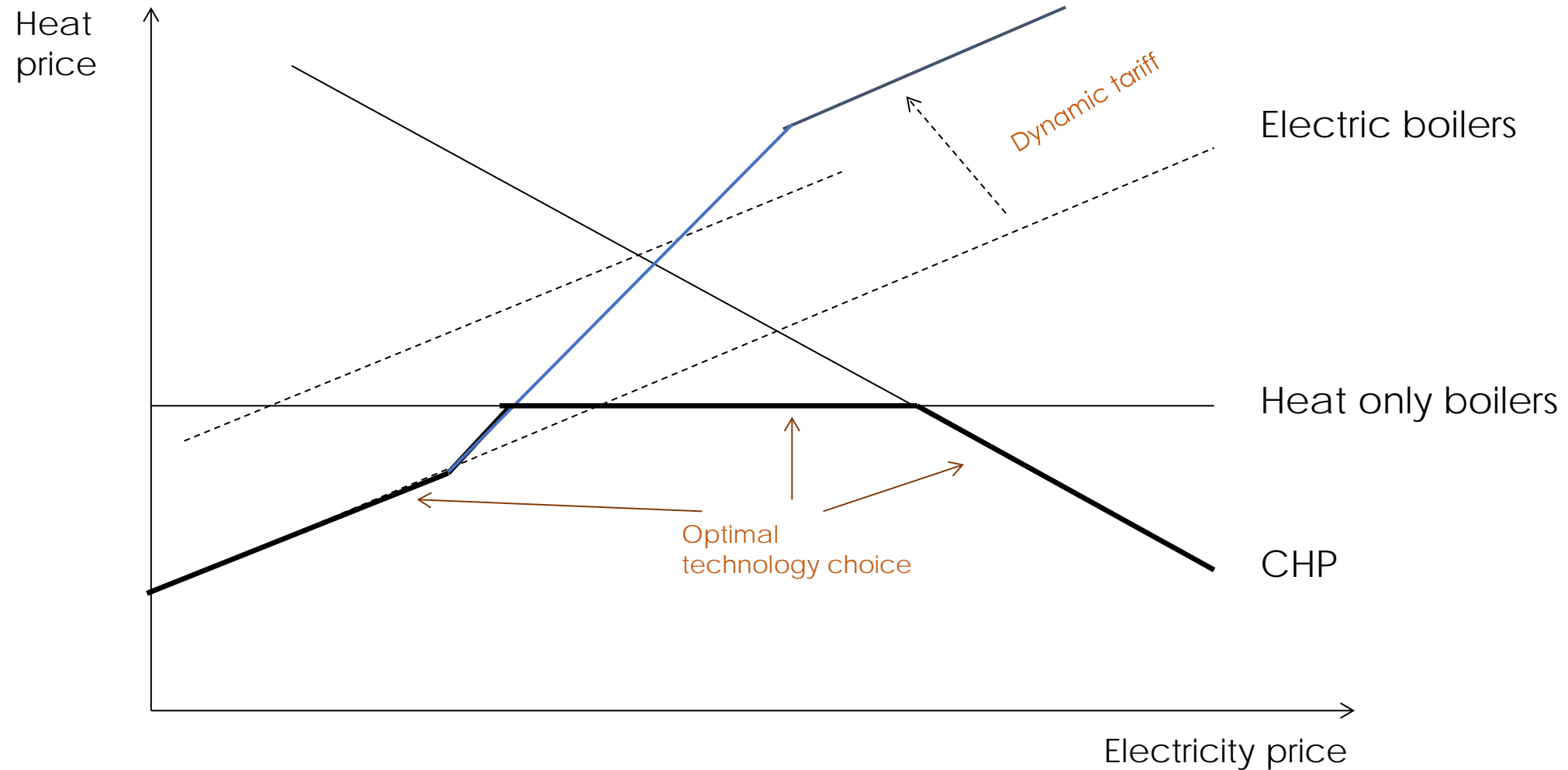
More heat only boilers.  
Decoupling of electricity and heat  
markets

# Choice of heat supply

## With dynamic tariffs



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# Summing up

- Trend towards more *market integration* and need for more *flexibility*
- Large potentials in district heating
- Need for a holistic system approach in order to identify and assess *regulatory and technical pathways* towards coherent energy systems

REthink market designs and regulation

- Make RE market ready & Markets RE ready
- Coherent changes in market designs, regulatory framework condition, and coupling of markets
- Dynamic tariffs and taxes?

Thank you for your interest



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Questions?



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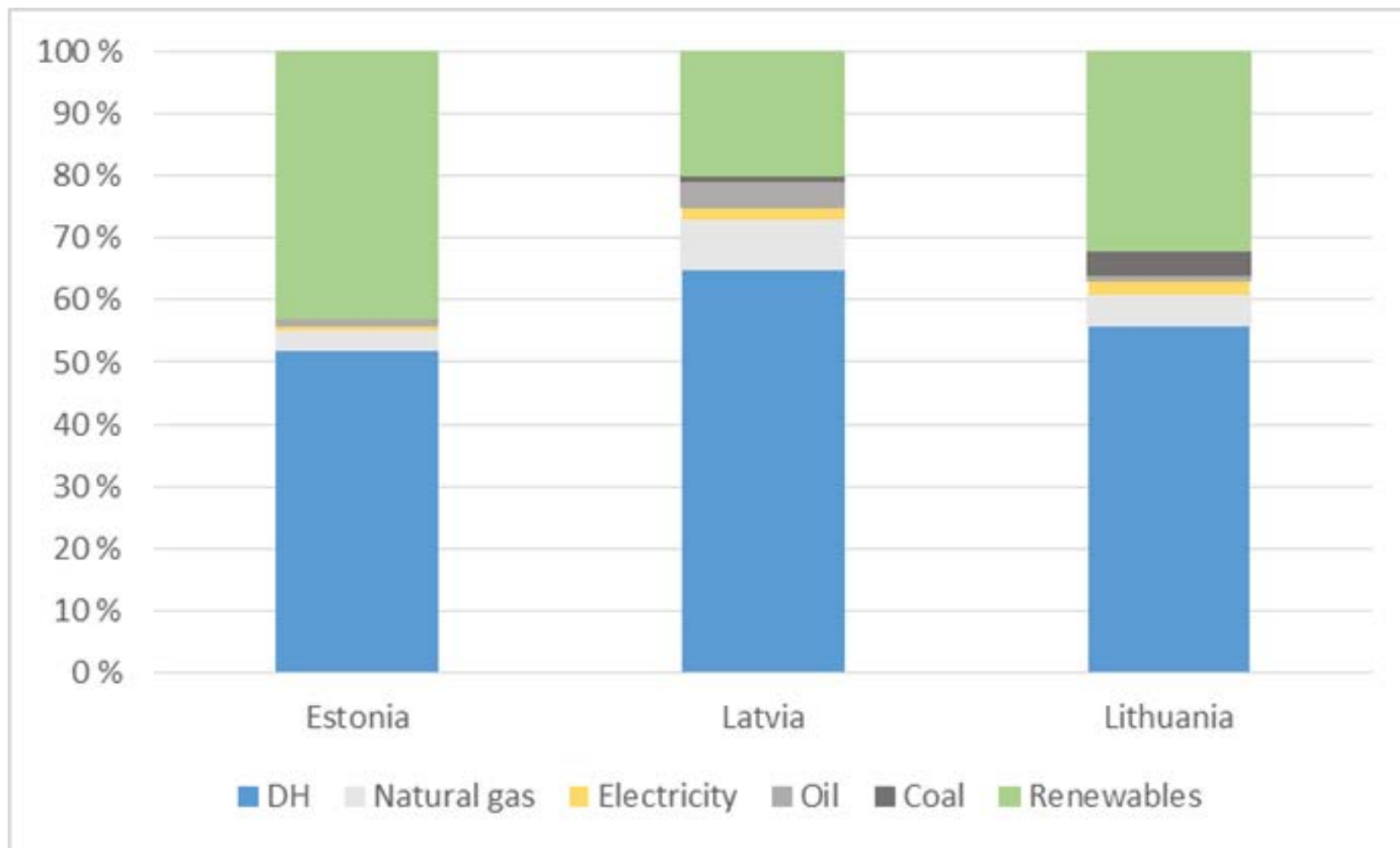


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# Share of energy consumption for heating in the Baltic countries



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Source: Euroheat & Power, 2015