CONTINUOUS TRANSFORMATION OF HEATING AND COOLING VALUE SYSTEMS

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Heat energy

- Thermal processes consume half of total energy supplied in Europe
- A major part of the thermal energy is used in buildings, heating and cooling
- In most countries, fossil fuel is the source of heat energy – severe lock-in

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Transition and challenges

Europe* must transform from gas, oil and coal, to fossil-fuel free

- Electricity-driven heating (heat pumps)
- District heating (DH)

Challenges DH:

PRESERVE existing systems, future proofing, service life extension	SE, DE, (UK)
CONVERT to fossil-fuel free energy sources	DE, UK
EXPAND existing systems	DE, UK
ESTABLISH new systems	DE, UK
OPTIMISE sector coupling, just-enough	DE, UK, SE

The transformation is a matter of capital investments but may also require a change of Value System – how actors are organised to create value to customers

*Entire Sweden heating sector is near 100% fossil fuel free (coal, gas, oil). 60% DH, heat pumps/ el, biomass. 2% oil/ gas. Same in electricity supply. Germany has 18% DH. The total heat & electricity sector is heavily dependent on oil, gas, coal

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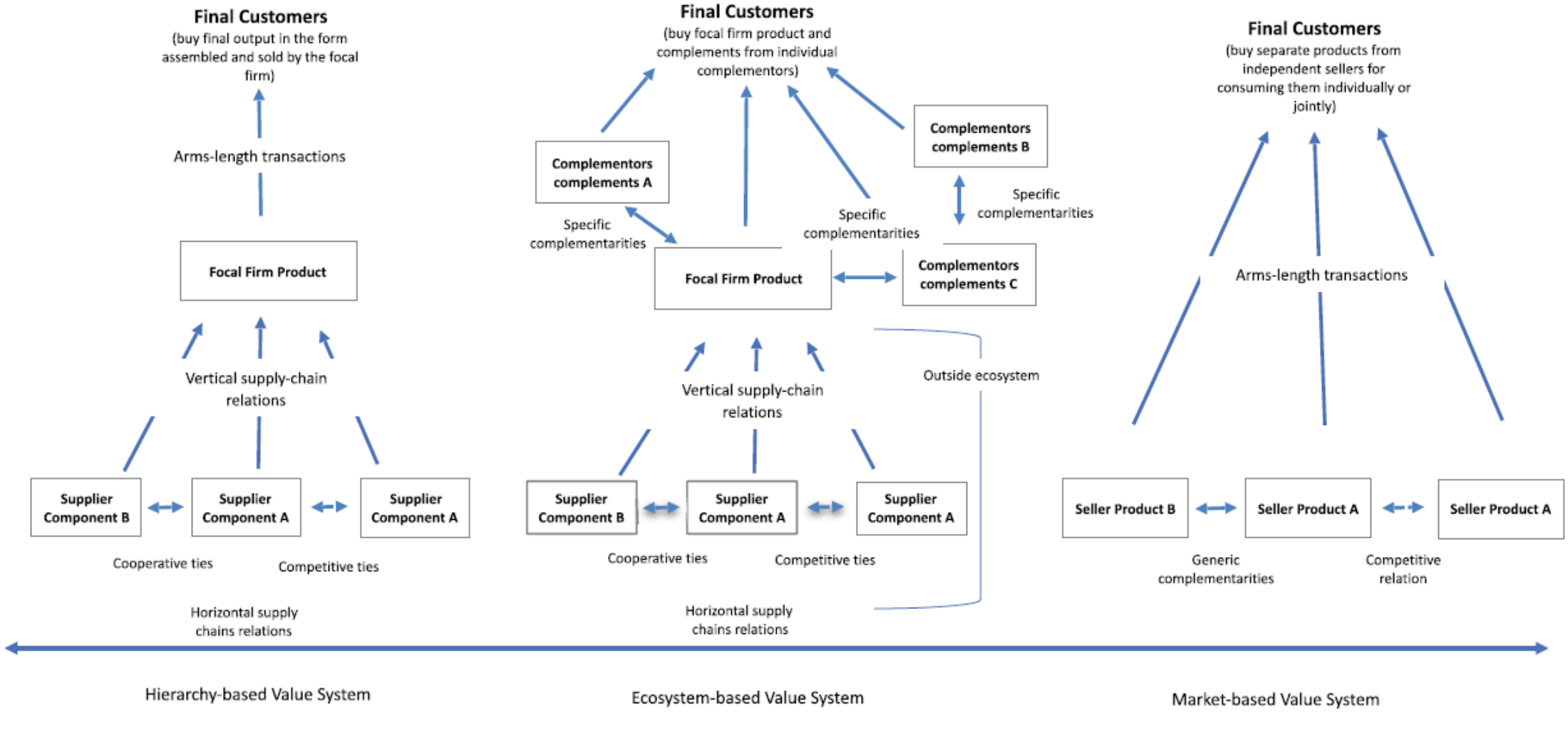
Value system



Jacobides, et al, 2018

Market-based value system

- Batch deliveries of fuel
- High customer involvement

Hierarchy-based value system

- Infrastructure and monopolies*
- Traditional energy utilities
- Low customer involvement
- Lock-in

Reinvestment of district heating pipe network

Natural gas pipe lines

Electric power grid

*In conrast to many countries, the heating sector in Sweden is deregulated, in respect to pricing, choice, ownership

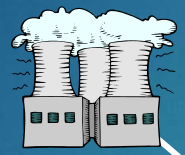
Ecosystem-based value system

- Traditional operators and complementors in new platforms – energy communities
- Shift from back-end (production) to front-end (customers)
- Combining DH, heat pumps, geothermal sources and storage
- Sector coupling with electric system (CHP, heat pumps)
- Supply of heating and cooling

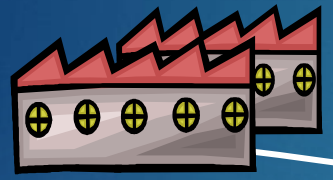
Example:

- Collaboration in new construction or replacement, water, sewage, rain water, electricity, district heating, optic fibre
- Collaboration in building technology, reduce peak energy demand, temperature demand, demand flexibilty
- Collaboration in reusing surplus and waste heat energy

Ecosystem district heating



Geothermal energy



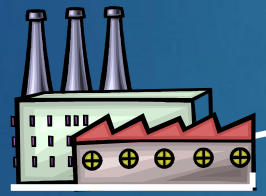
Industrial Waste Heat

Data Centers
Waste Water
Refrigeration

The Heat market

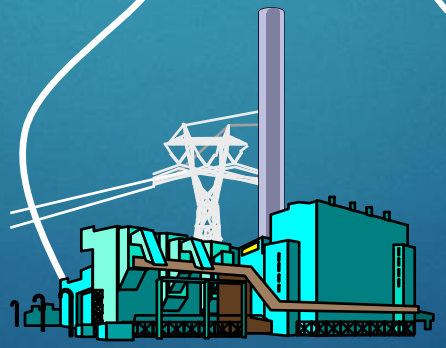
Front-end solution

Power-to-Heat Services – heat pumps
Cooling-to-Heat Services – heat pumps
Solar heating
Heat storages
Customised heat supply
Ventilation heat recovery – geothermal
Automation, control, demand-side optimizing

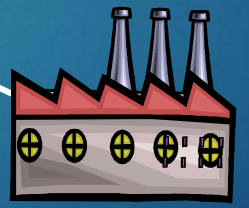


Energy from Waste

Secondary low temp system, recovering local heat . High temp inter-city connections



Combined Heat and Power CHP



Bio Fuels
peak supply

Source: Sweden Environmental Ministry, modified

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SUSTAINABLE HEATING & COOLING BY SWEDEN

Promoting knowledge-sharing and business dialogues between Sweden, France and the UK

- **Sustainable heating & Cooling by Sweden – SHC by Sweden**
  - The programme is owned and financed by the Swedish Energy Agency and implemented by Business Sweden
  - The programme has approximately 50 Swedish member companies
  - Focus markets: UK and France
- **Objectives:**
  - Promote collaboration and facilitate knowledge-sharing between Sweden, the UK and France to accelerate the development and implementation of sustainable heating and cooling solutions around Europe and across the world.
- **Key activities**
  - Joint promotion: drive knowledge-sharing between our countries through different activities, such as seminars, conferences, webinars, purchasing collaborations, policy forums, delegations, trade fairs
  - Opportunity mapping: identify and prioritize opportunities with potential value for Swedish companies
  - Stakeholder engagement: build valuable networks and form collaborations with key actors
  - Communication: dissemination of relevant news, updates, Swedish competencies, SE-UK-FR collaborations and upcoming events through Website, Newsletter, and LinkedIn

Over 50 Swedish companies are members of Sustainable Heating & Cooling by Sweden, representing a broad range of unique solutions and expertise

Thank you!

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