The Swedish experience with local energy planning: implementing the energy hierarchy in Gothenburg

Lars Holmquist

Göteborg Energi

Nov 30 2021

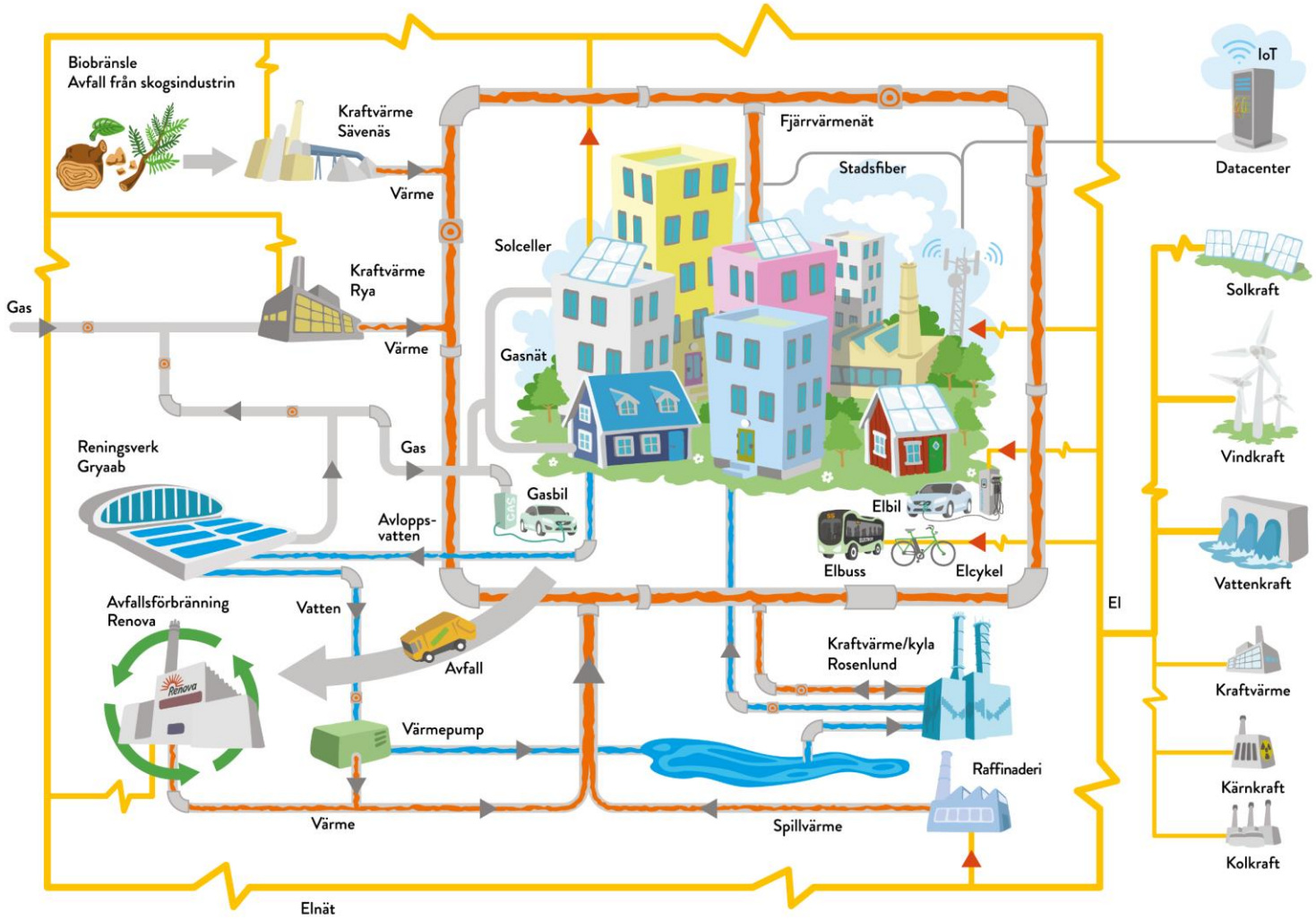
Gothenburg – A typical European city

- Half a million people
- Close to the water
- Industrial more than administrative
- Quite unique, not least how the city is kept warm:
  - Practically no individual boilers
  - District heating supplies ca 80% of all homes, and most businesses
  - 80 % recovered heat in district heating

Inefficiency management

District heating
1500 MW

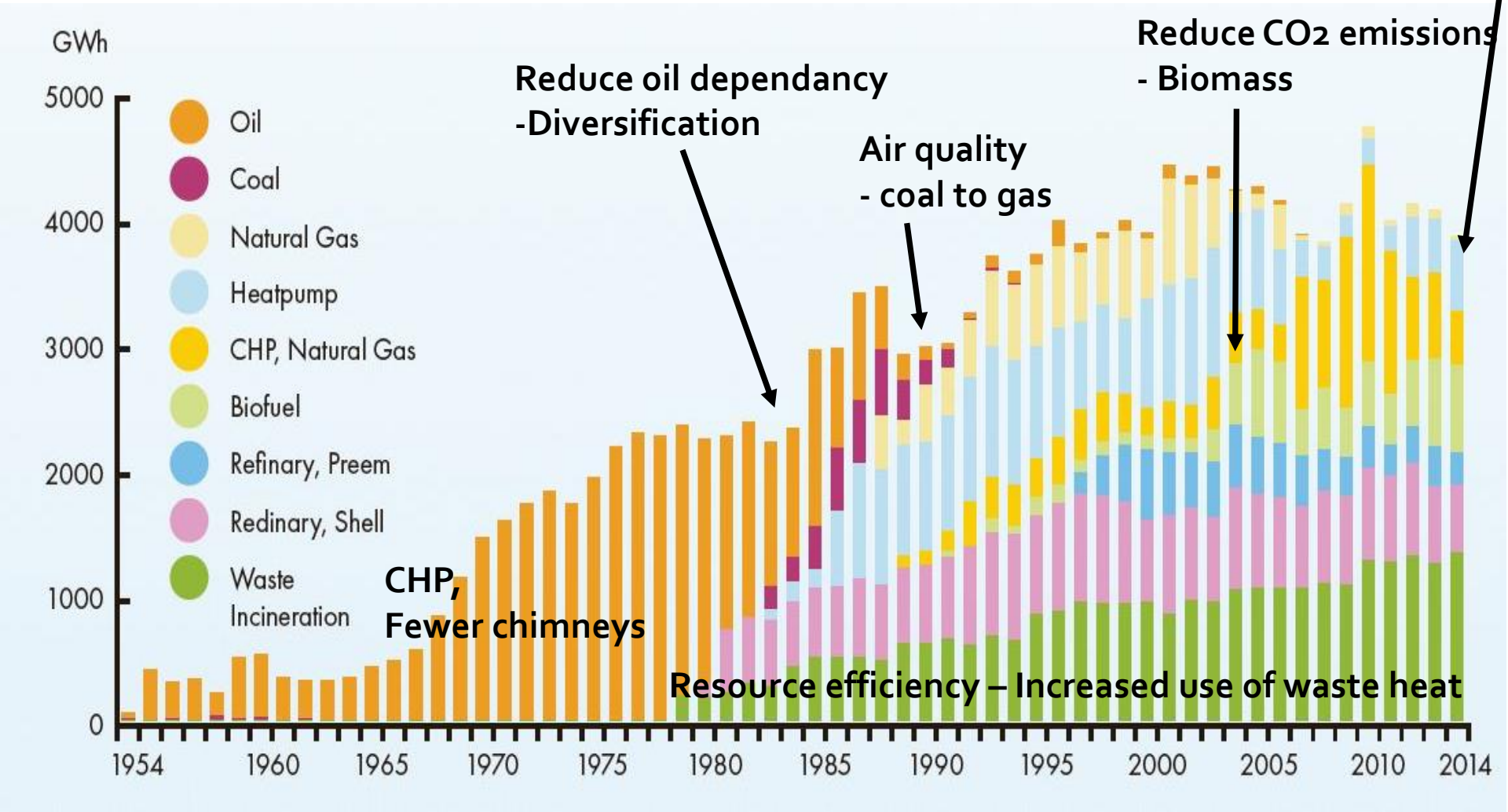
Gas
1 100 MW



Electricity
850 MW

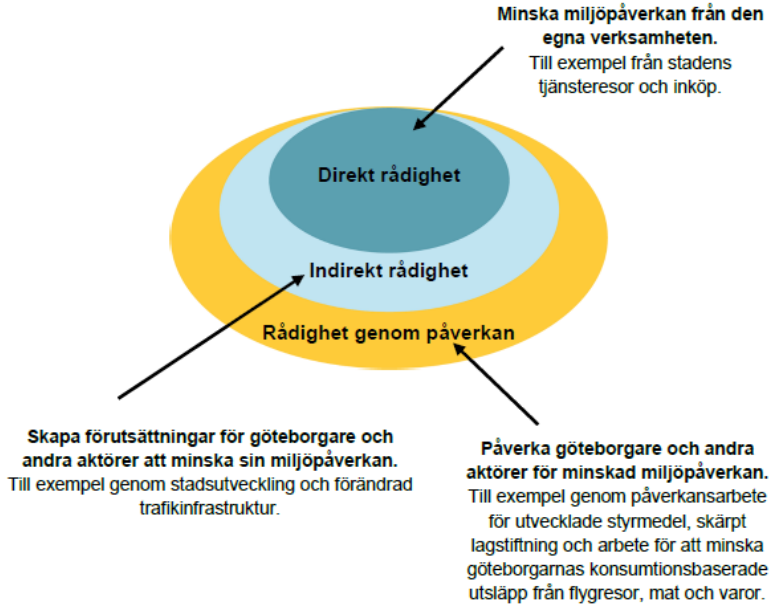
District cooling
100 MW

District heating is flexible and can address many challenges



Energy planning in Sweden

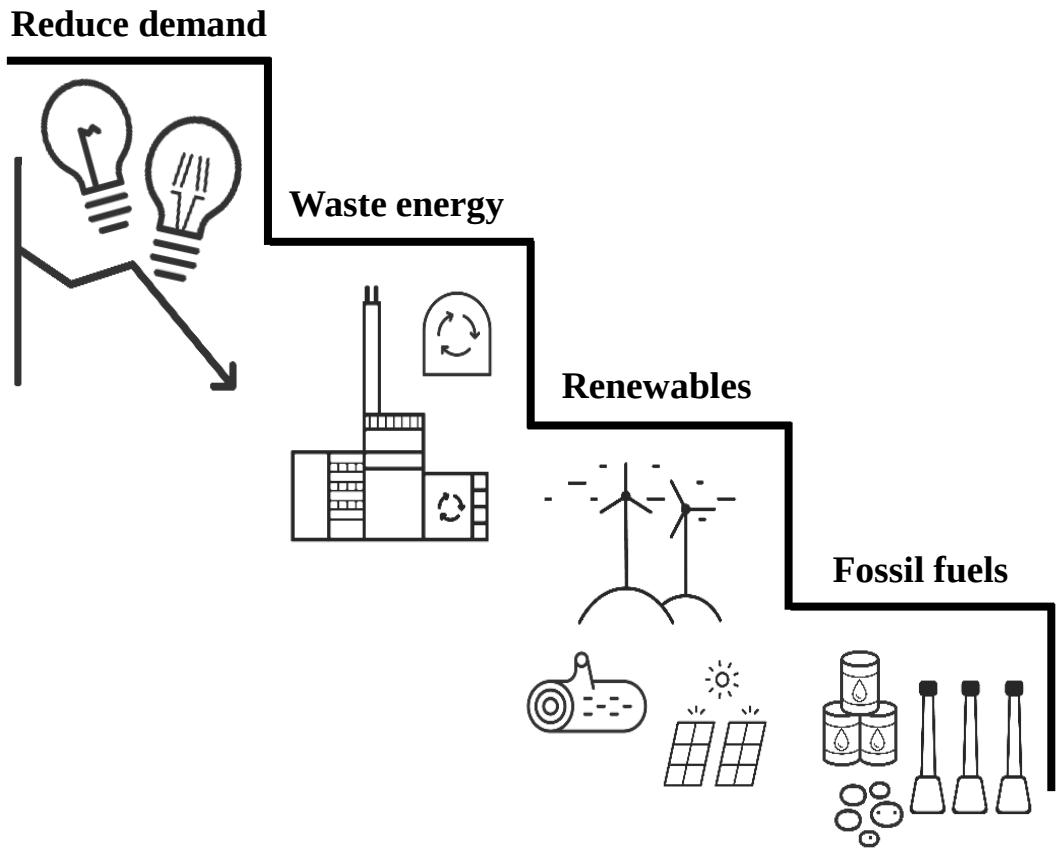
- Mandated by law
- Historically focus has been on Security of Supply, but has shifted towards environmental challenges
- No harmonizing of plans
- General challenge: Just what can a city actually do?



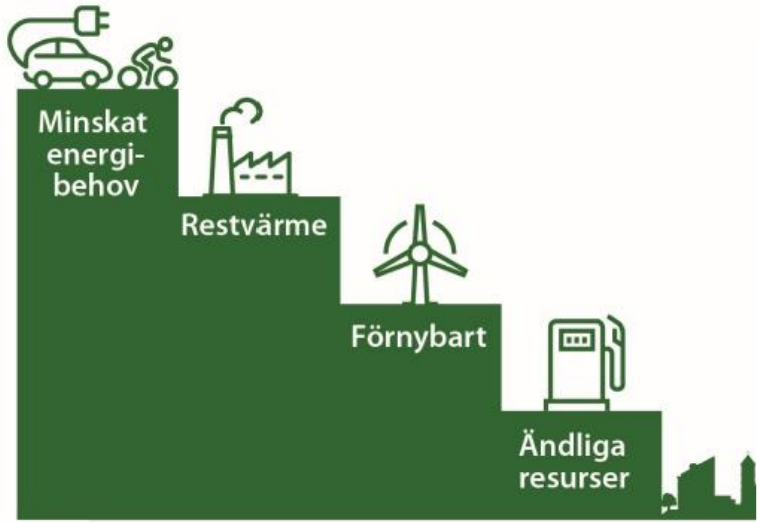
Energy planning in Gothenburg

- Mainly a concretization of the Environment and Climate Programme 2021-2030
  - No fossil fuels in heat & power production by 2025
  - 30 % primary energy savings per capita 2010-30
  - 90 % reduction of CO_2 from transport 2010-30
- 49 actions in 9 categories
- Most actions have short time spans
- Follow up and update every two years
- Description of the energy system
- Guiding principles

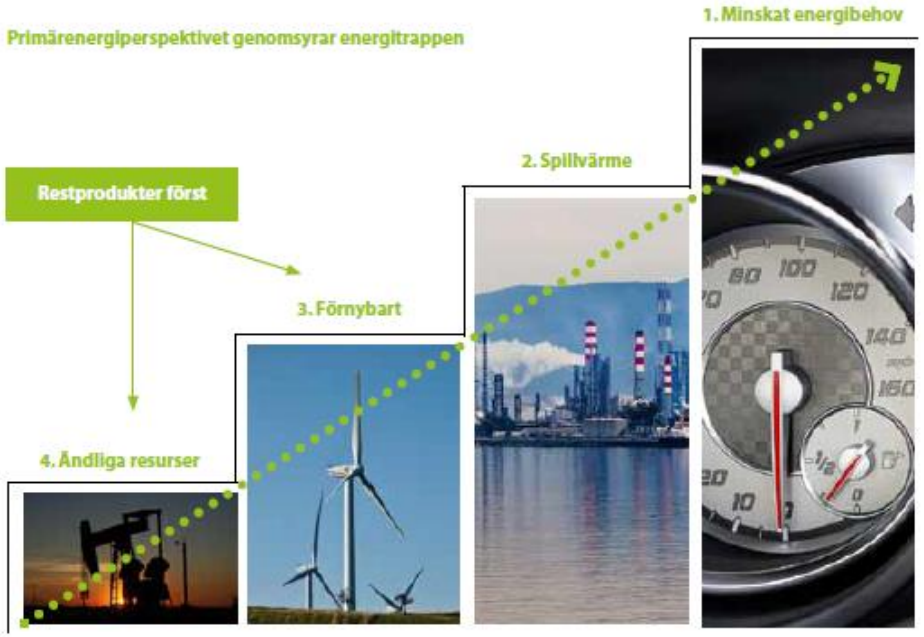
The energy hierarchy – Energy efficiency first principle on a systemic level



Still early days



Figur 2. *Energitrappan beskriver det förhållningssätt som är vägledande förvaltningar och bolag i deras verksamheter. Primärenergiperspektivet g energitrappan, vilket bland annat innebär att restprodukter skall priorite råvara.*



Energitrappan beskriver det förhållningssätt som bör vara vägledande för kommunens förvaltningar och bolag i deras verksamheter. Steg 1 prioriteras före de efterföljande stegen.

Some constructive questions generated by the Energy ladder

- How much can be saved in the production phase, by energy efficiency measures in buildings?
- How much more waste heat can we utilize if we change the temperature levels in the district heating system?
- Which heating system is the better: district heating or electricity?
- How can pricing strategies be used to reduce peak demand?
- What's the optimum level of renovation?
- What's the best way to use on-site production?