

# The impact of Climate policy on the District Heating System in a Nordic City

Karl Vilén  
Chalmers University of Technology

Powered by



## Background:

- Swedish national climate goals – no net emissions in 2045
- Climate goals of Gothenburg – no fossil emissions in 2030
- Cities continues to expand – does this affect how the climate goals can be fulfilled on a local level?

Powered by

Karl Vilén  
Chalmers University of Technology



## Aim:

- How does different climate policies affect the district heating supply side? – Focus on the emissions on the local city level
- Does the climate policies have any effect on how new housing of different types are connected to the district heating system on the local level?

Powered by

Karl Vilén  
Chalmers University of Technology



# Method:

- Using a system cost optimizing model (TIMES)
- Introduce climate policies scenarios to the model
- Gothenburg is used as modelling case
  - Has several kinds of supply side technologies (CHPs, heat pumps, excess heat, waste incineration, HOBs)

Powered by

Karl Vilén  
Chalmers University of Technology



# Climate policy scenarios:

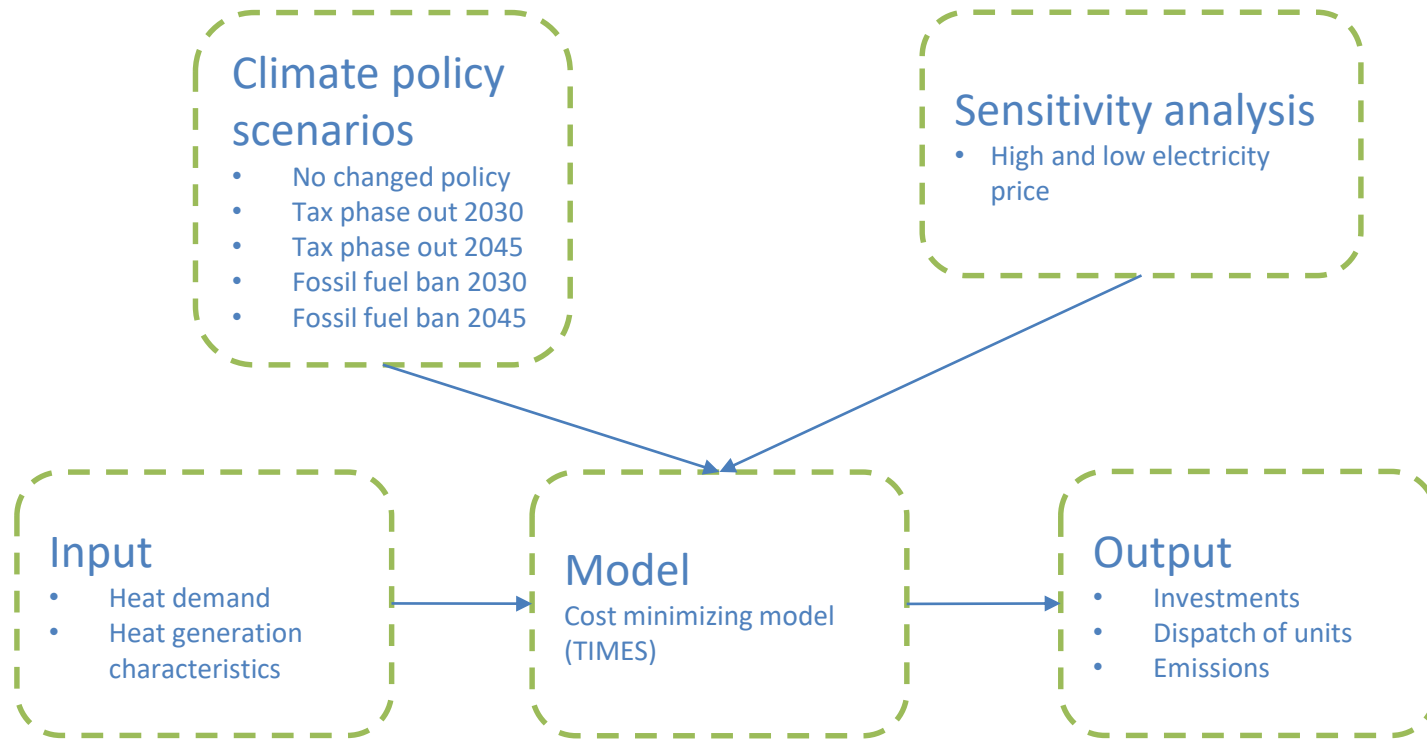
- Increase of CO2 tax
- Introduction of a fossil fuel ban at a specific year
- Both policies are aimed at phasing out fossil fuel use in 2030 or in 2045

Powered by

Karl Vilén  
Chalmers University of Technology



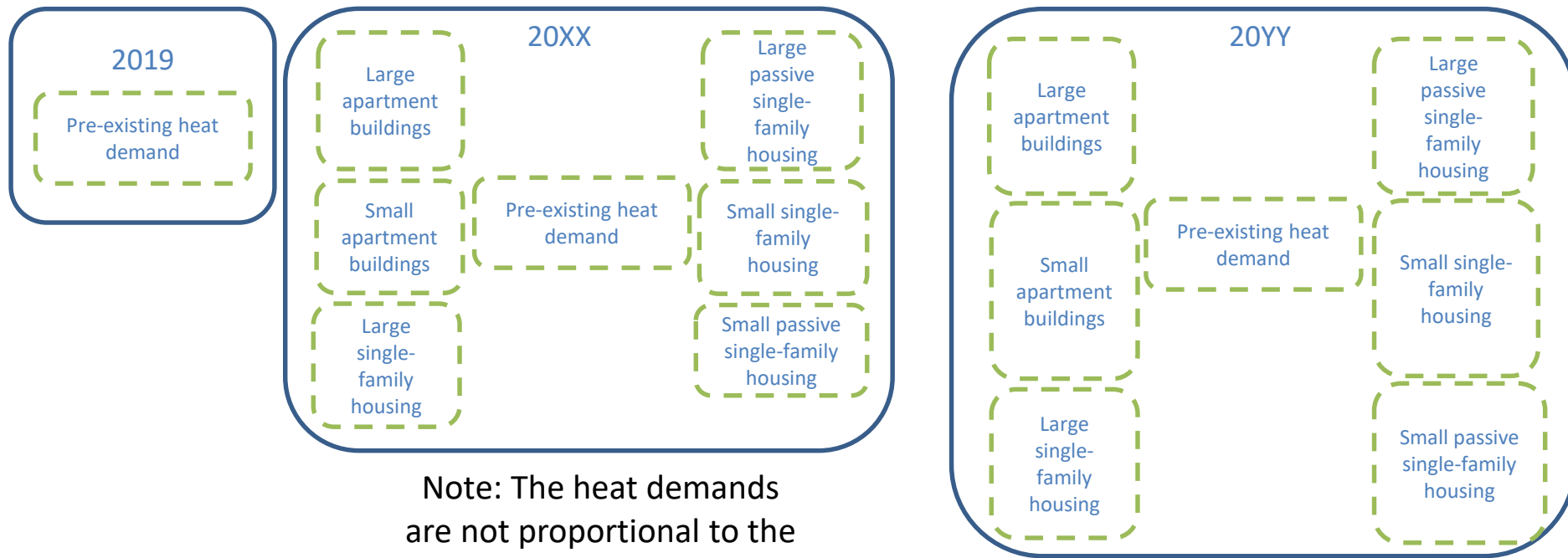
# Model overview



Powered by

Karl Vilén  
Chalmers University of Technology

# Heat demand in the model

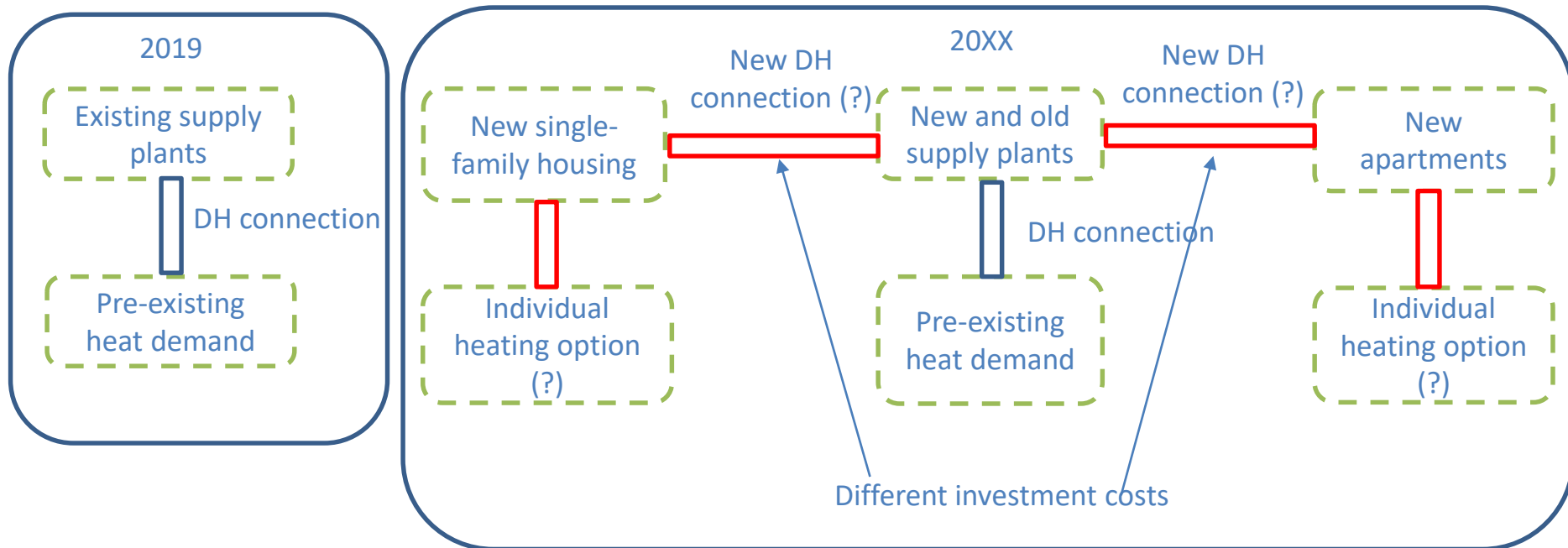


Note: The heat demands  
are not proportional to the  
size of the boxes

Powered by

Karl Vilén  
Chalmers University of Technology

# Fulfilling the heat demand



Powered by

Karl Vilén  
Chalmers University of Technology



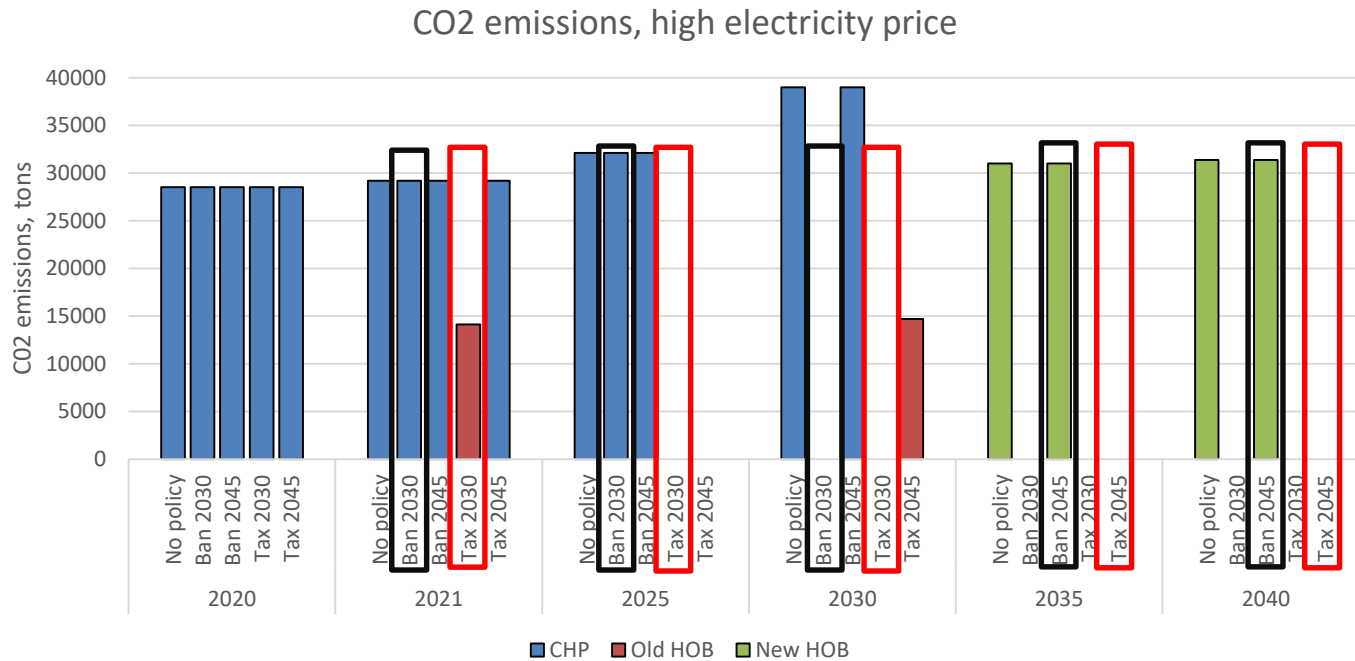
# Results

Powered by

Karl Vilén  
Chalmers University of Technology



# District heating supply side emissions

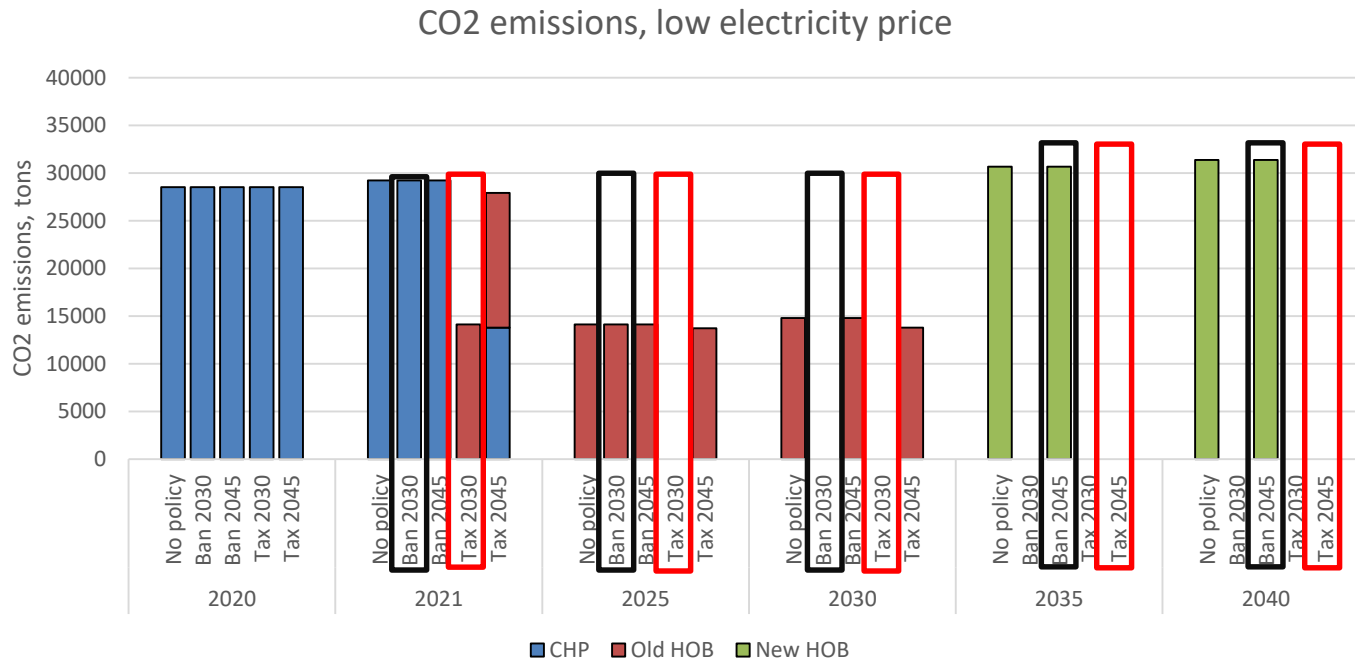


Powered by

Karl Vilén  
 Chalmers University of Technology



# District heating supply side emissions



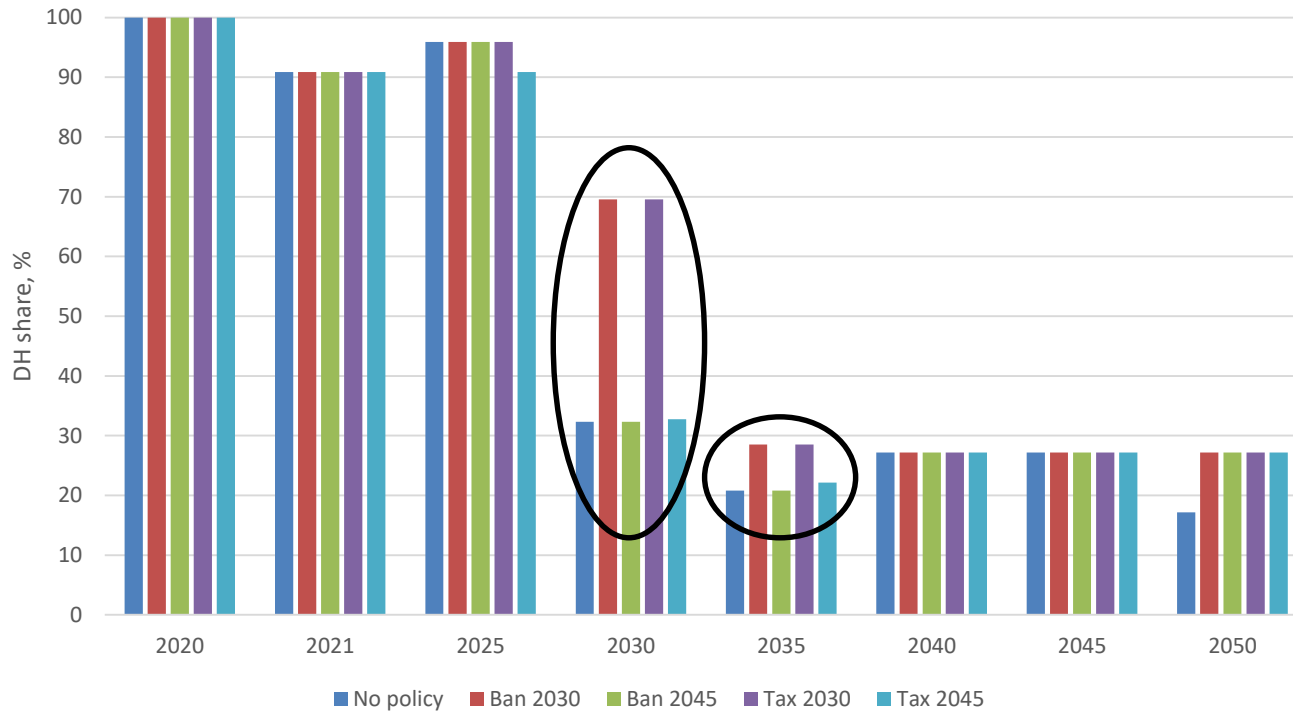
Powered by

Karl Vilén  
 Chalmers University of Technology



# Share of heat demand supplied by DH – large single family housing

High electricity price



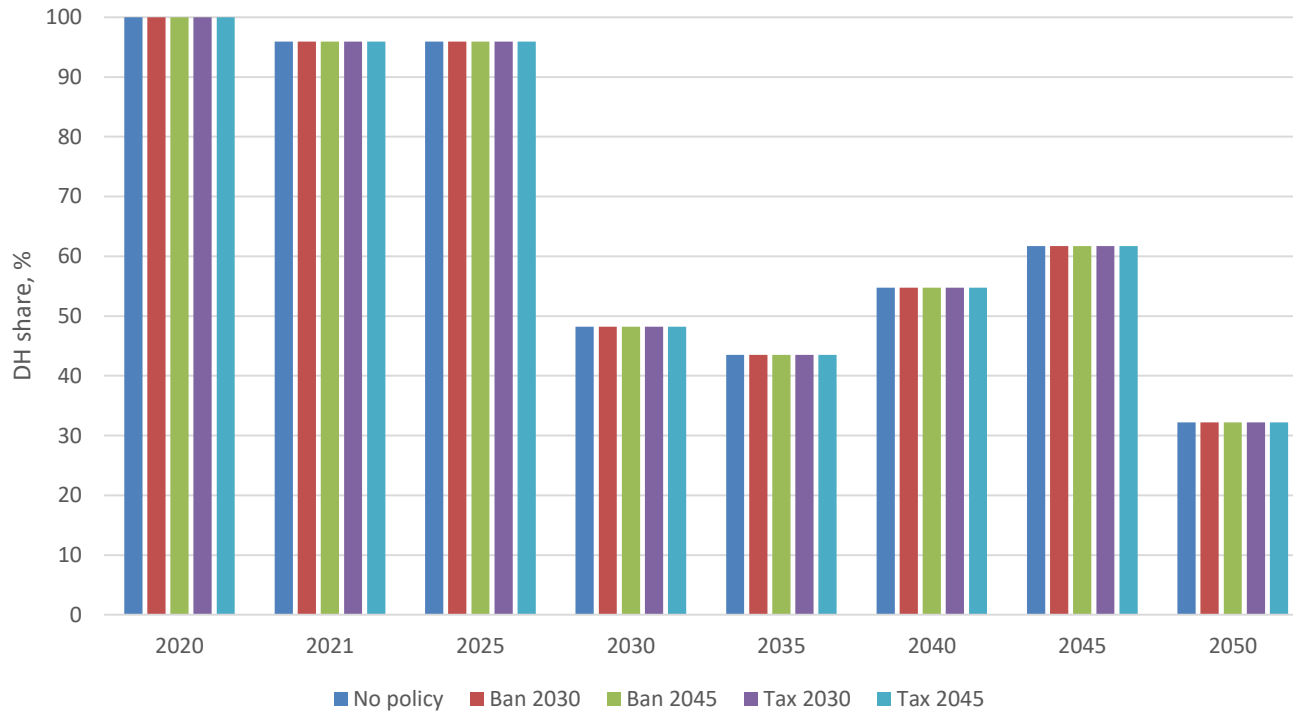
Powered by

Karl Vilén  
 Chalmers University of Technology



# Share of heat demand supplied by DH – large single family housing

Low electricity price



Powered by

Karl Vilén  
 Chalmers University of Technology



## Demand supplied by DH – other housing types

- Climate policies had no effect on the heating option for any of the other housing types
- Apartment buildings uses only district heating
- Other single-family housing uses individual heating options

Powered by

Karl Vilén  
Chalmers University of Technology



# Conclusions

- Fossil fuels are used until forbidden by a ban, but an increasing CO2 tax phases out fossil fuels before target year
- Climate policies have minor, if any, impact on how much of the new housing that are supplied by the DH system

Powered by

Karl Vilén  
Chalmers University of Technology

