# Cooperation between Construction and Energy sector to decrease the carbon emissions and primary energy use in Sweden Project manager: Ola Larsson

#### Questions

- Where are measures most cost efficient, in the buildings or in the energy supply system?
- Which measures are the most environmentally beneficial (decreased CO<sub>2</sub> emissions and primary energy use) and cost efficient?

# Work process

Statistics from Statistics Sweden

- 8 municipalities

Data divided into single-family houses, apartment blocks and

- building year (-1940,1940 1970, 1970 -)
- energy supply system
- energy end use

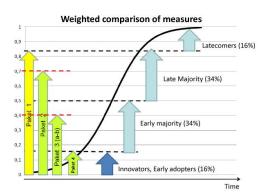
Measures in buildings.

Package 1 - low cost measures which are really cost efficient Package 2 – extra insulation of walls/roof/floors or high performance windows Package 3a – ventilation heat exchanger (apartments and offices) or convert energy supply system into district heating (single-family houses) Package 3b - heat pump to recover energy losses (apartments and offices) or convert energy supply system to ground source heat pump (single-family

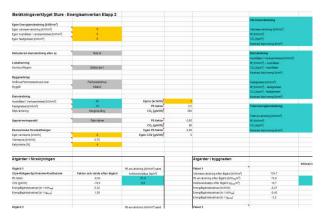
Package 4 – turn the building to passive house standard

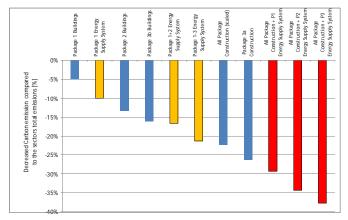
...and in the energy supply system

- Convert the fossil oil to bio oil
- Fluid gas condensation
- Combined heat and power
- Connecting district heating nets



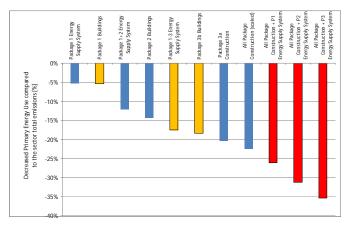
# Calculation in Excel based tool, Sture





## Result

- The potential to decrease the environmental impact is really significant in single-family houses, especially the ones with direct electric heating. The economical benefit will diffe across Sweden since the price of district heating per kWh differs between 0,45 SEK and 0,78 SEK;
- The potential for the district heating companies to convert their production into combined heat and power is huge. The economical benefit to convert into CHP depends on the price of the fuel. The tipping point where it's not profitable for the three fuels use for new CHP plants are; waste 0,52 SEK per kWh, Bio fuel 0,69 SEK per kWh and natural gas 1,13 SEK per kWh:
- The greatest potentials are in the three largest cities (Stockholm, Göteborg and Malmö) Measures in these three cities will have a major influence on the total emissions of carbon dioxide. But also in Uppsala (which has a lot of peat in their district heating system) and in Umeå (which is building more combined heat and power) will the measures in the supply system have a significant impact.



### Consultant:





Funded by:





