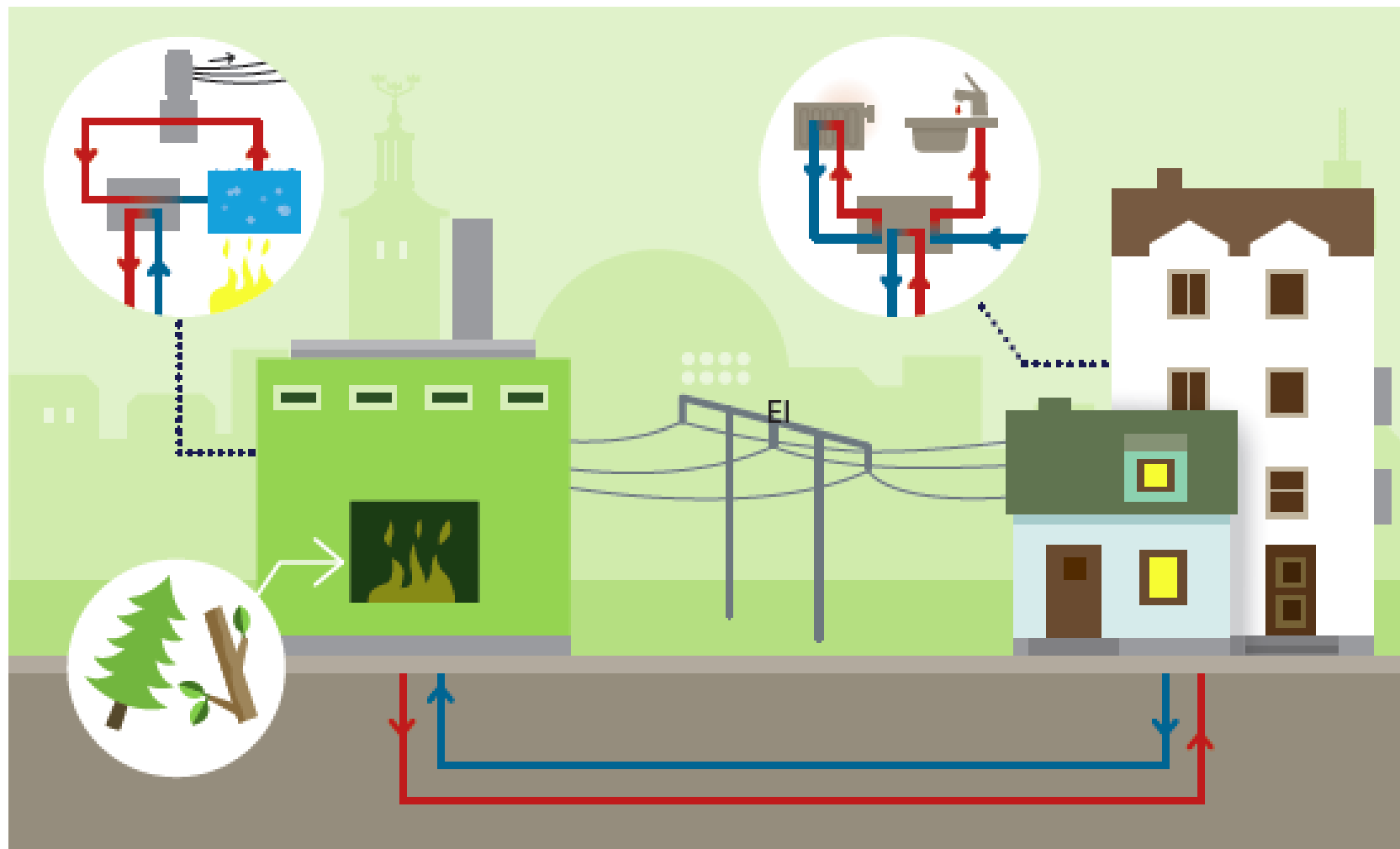
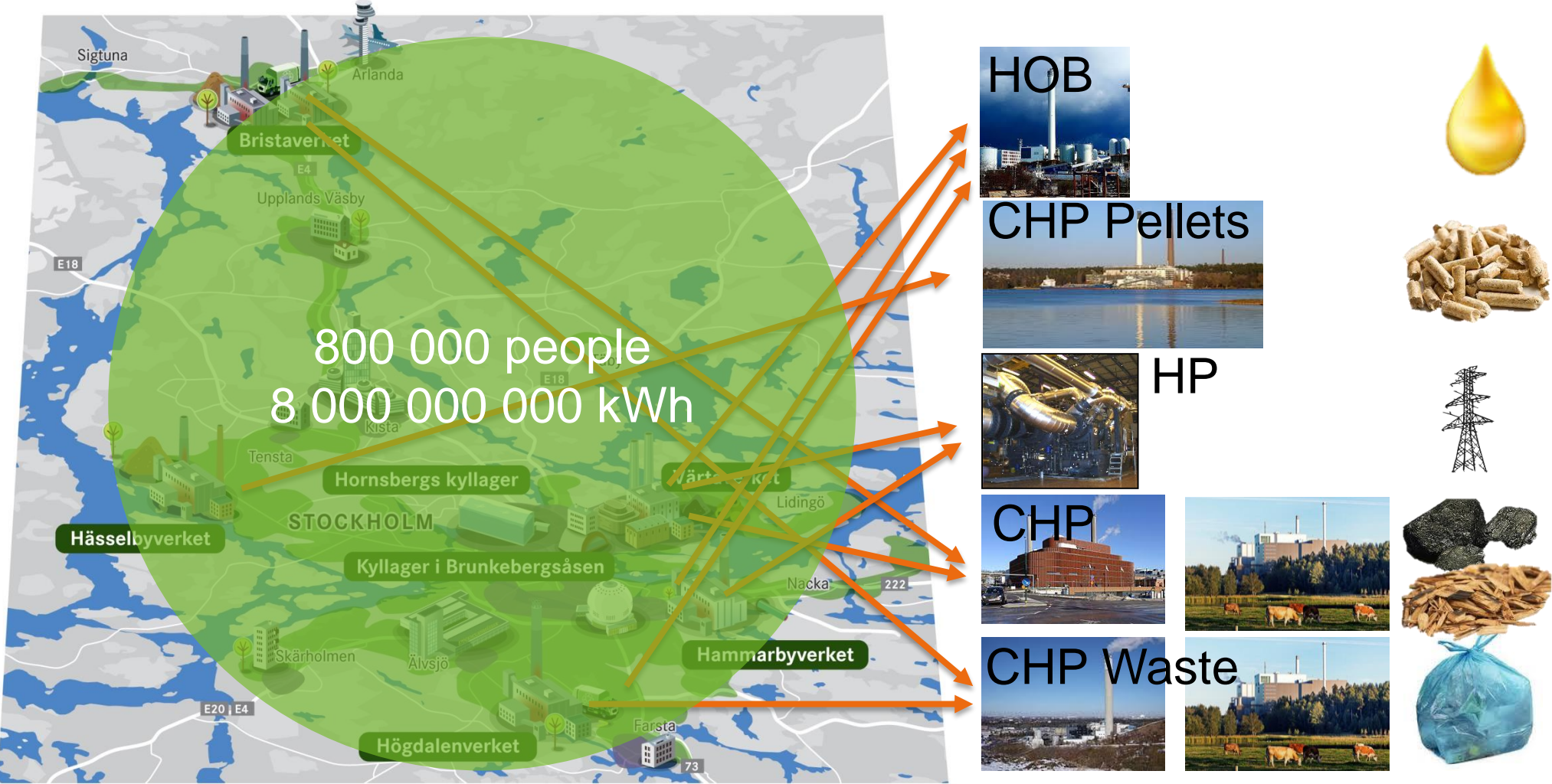


# District heating – how it works!

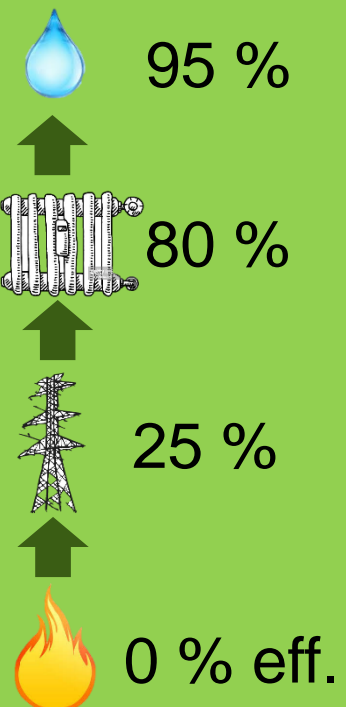


# Stockholm district heating

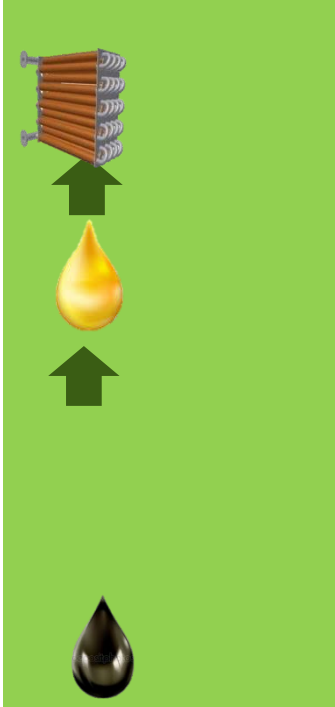
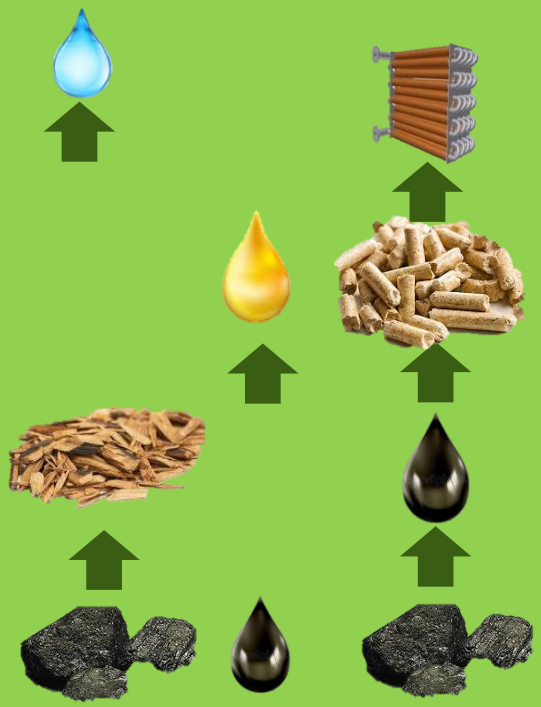


# Sustainability pathways!

Fossil free waste



Bio Energy Carbon Capture and Storage

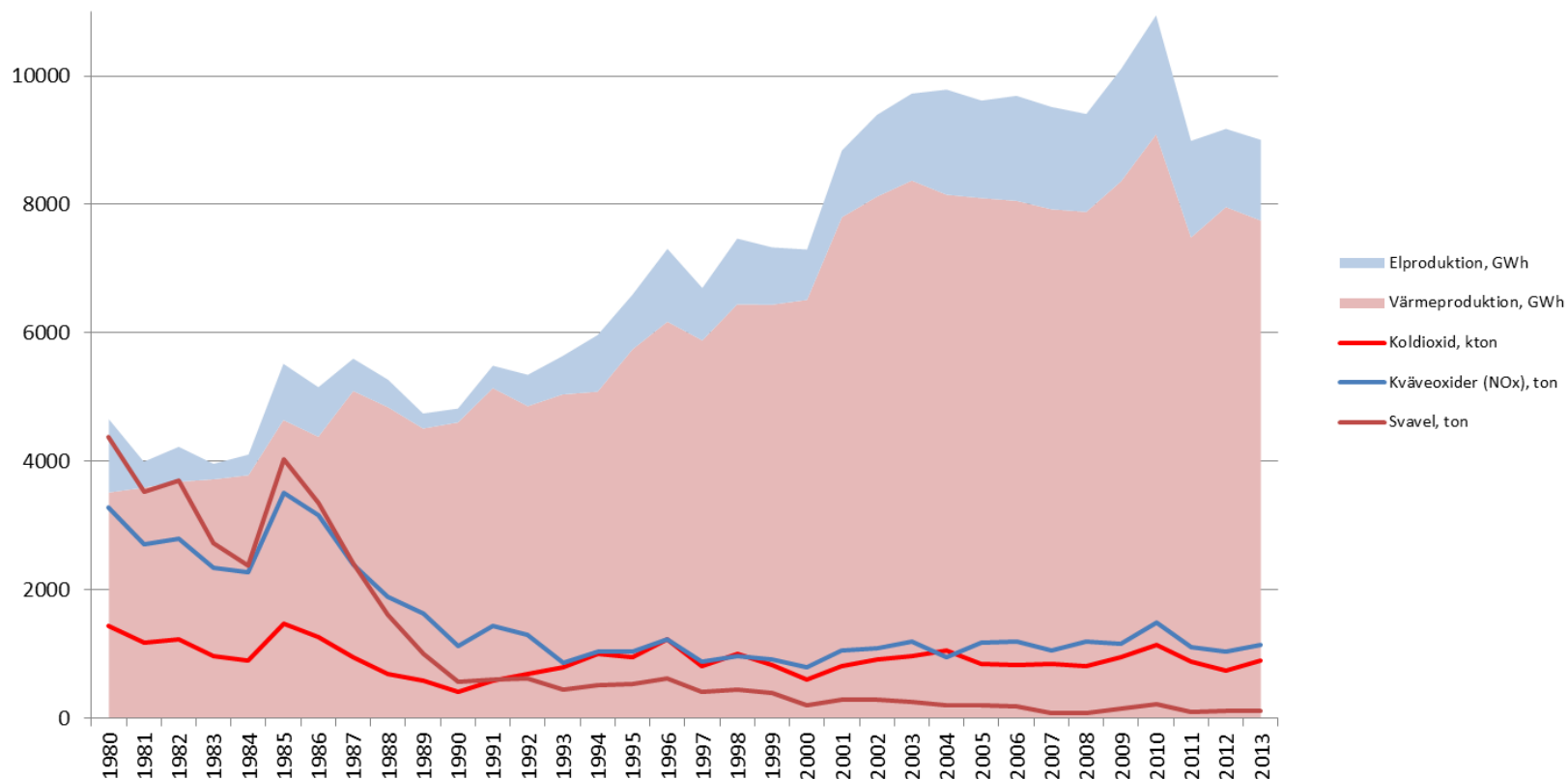


ODP: 0  
ODP: 0,055  
HP

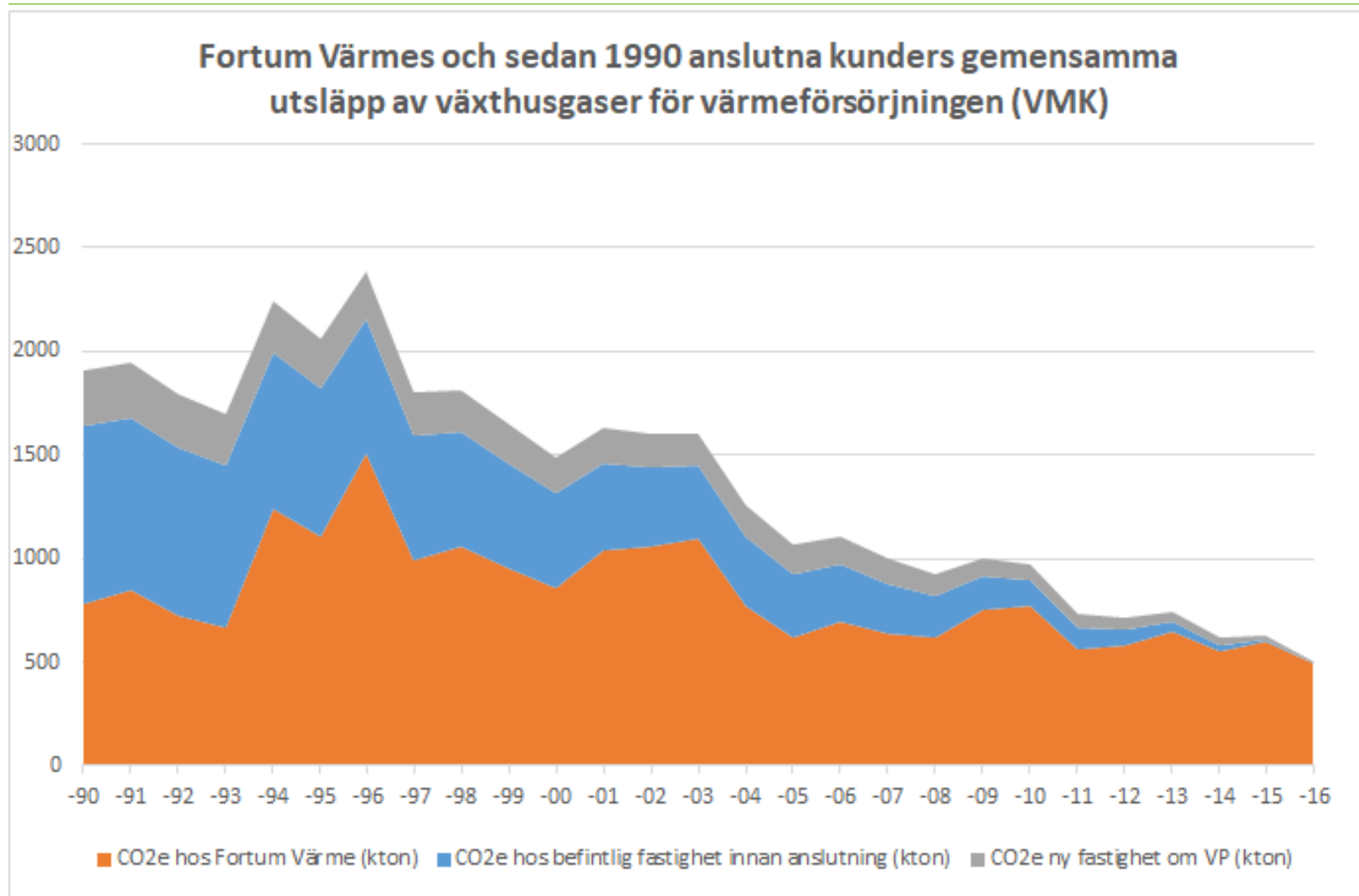
# Environmental impact

## Produktion av fjärrvärme och el

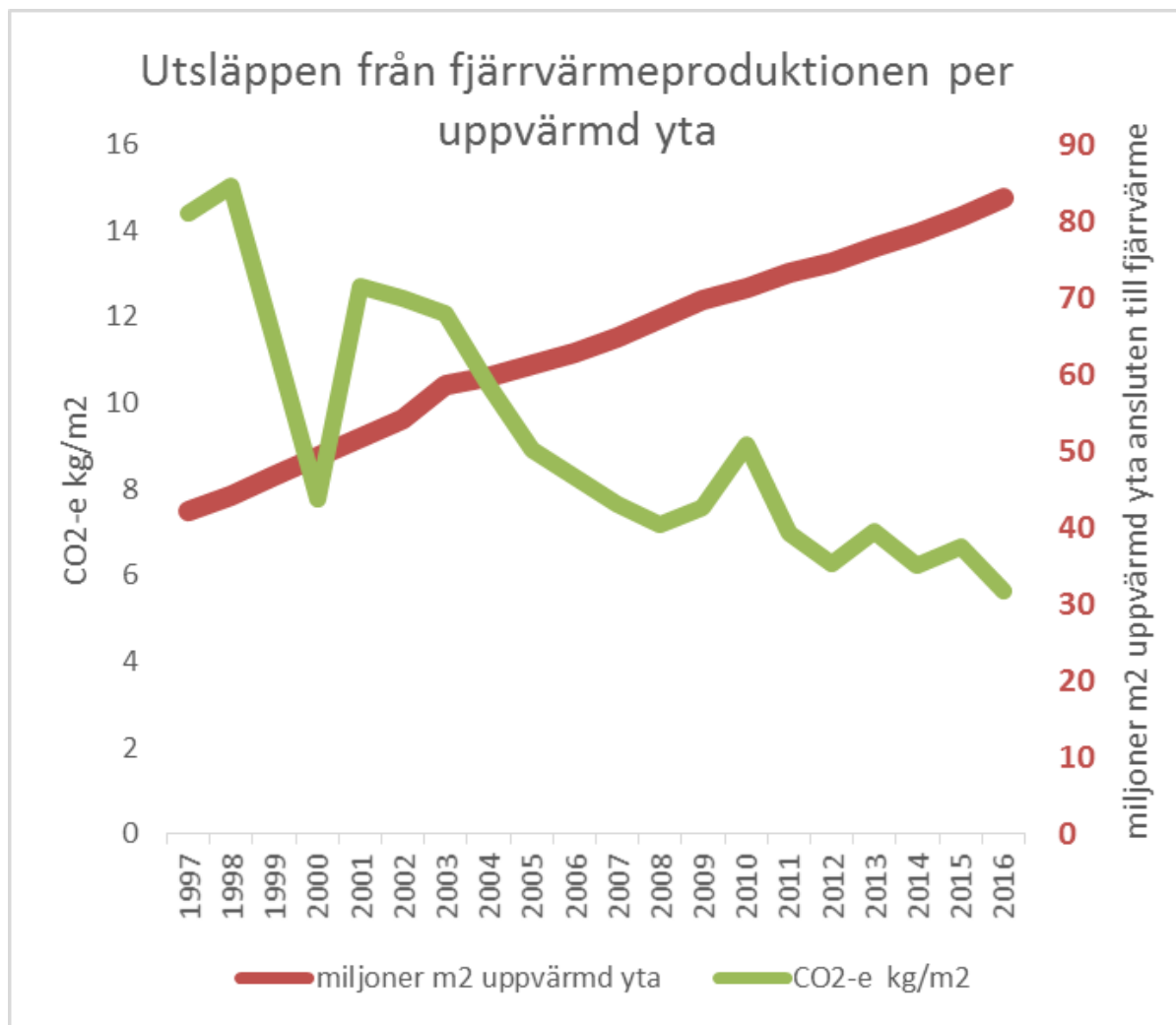
Fortum Värme Stockholm (City, Söder och Nordvästra)



# Environmental impact



# Environmental impact



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We need negative  
emissions!

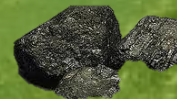
# Production of biochar and heat



- 70 g CO<sub>2</sub>/kWh



10 g CO<sub>2</sub>/kWh



385 g CO<sub>2</sub>/kWh



125 g CO<sub>2</sub>/kWh



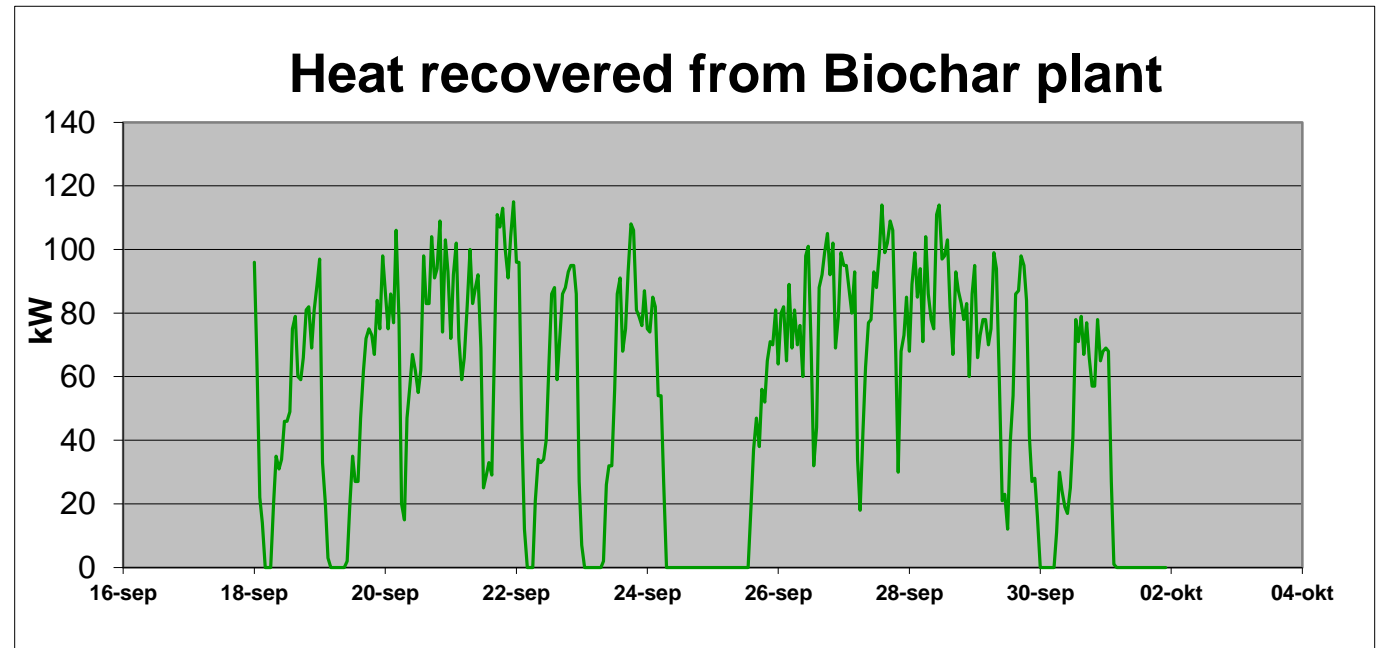
# Investements, Income and Performance

- Investements

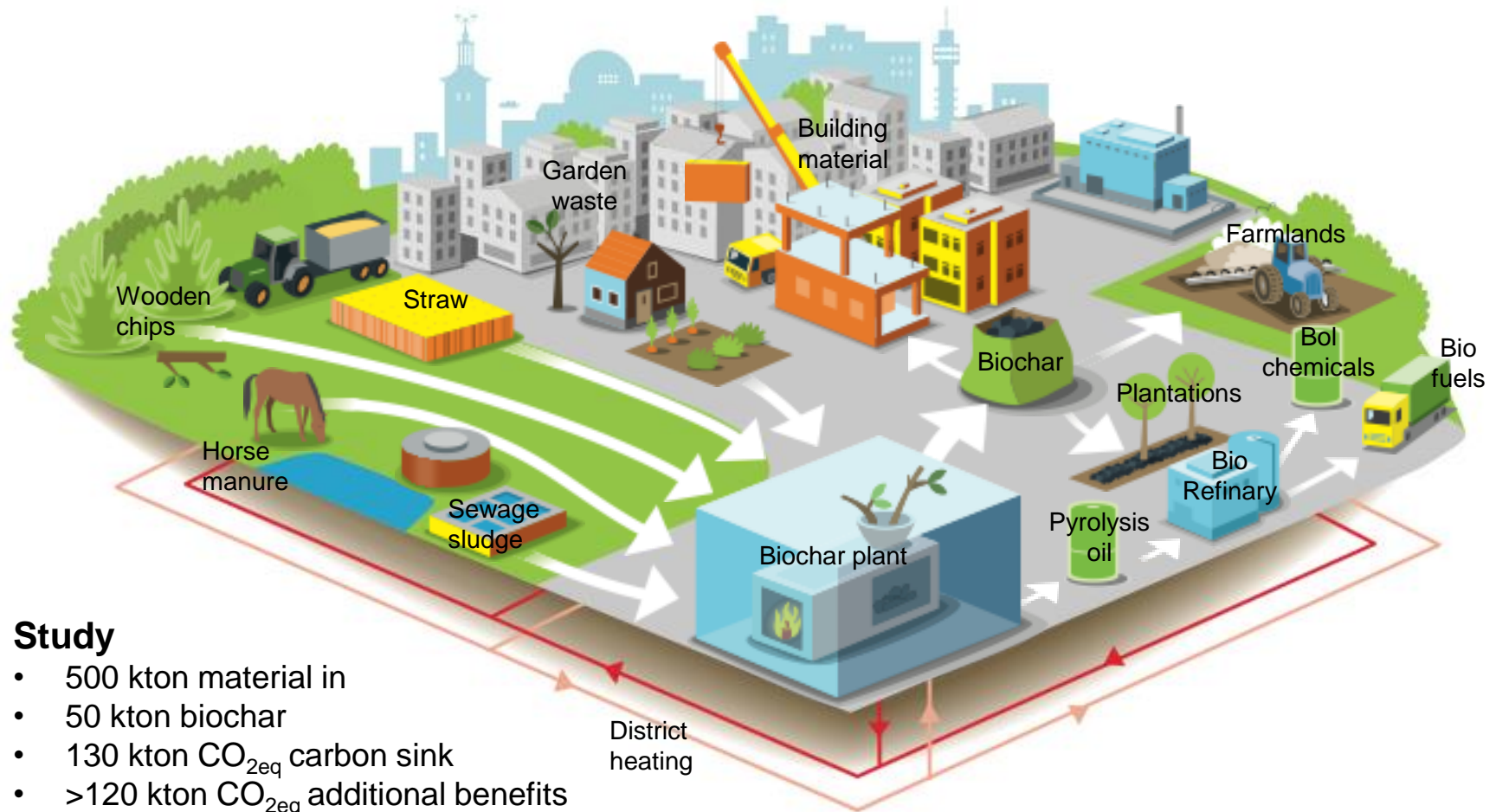
- Connection pipes 500 - 1000 €/meter
- Measuring station/heat exchanger 15 000 – 20 000 €

- Income

- 15 °C → 0 €/MWh
- 10 °C → 15 €/MWh
- 0 °C → 35 €/MWh
- -5 °C → 55 €/MWh
- -10 °C → 95 €/MWh



# Waste is turned into biochar and biooil

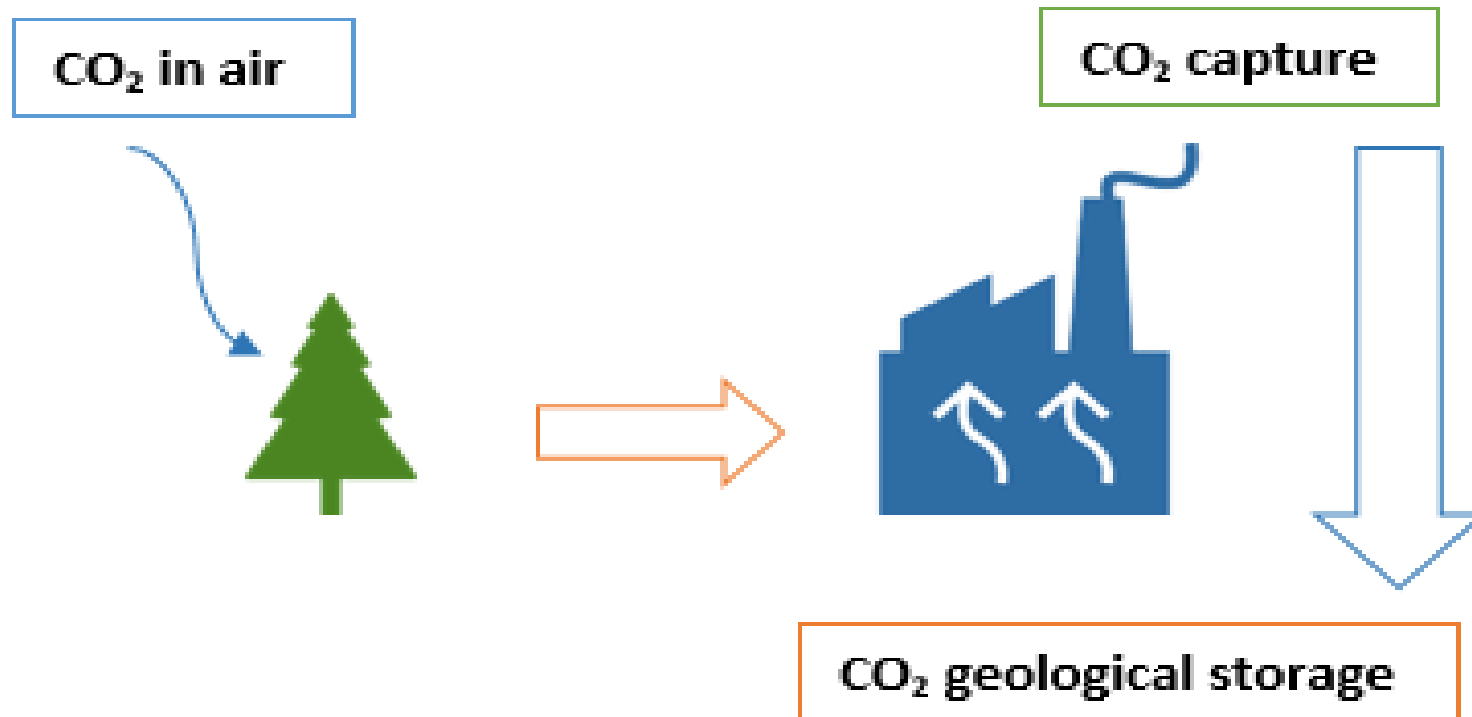


## Study

- 500 kton material in
- 50 kton biochar
- 130 kton CO<sub>2eq</sub> carbon sink
- >120 kton CO<sub>2eq</sub> additional benefits

# BECCS-Bio Energy Carbon Capture and Storage

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# Thank You!