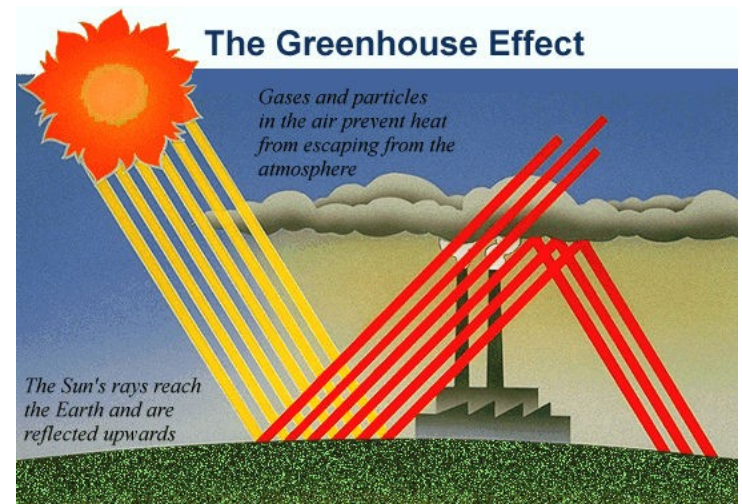


# HOW DO WE GET MOST CO2 REDUCTIONS FOR THE MONEY SPENT

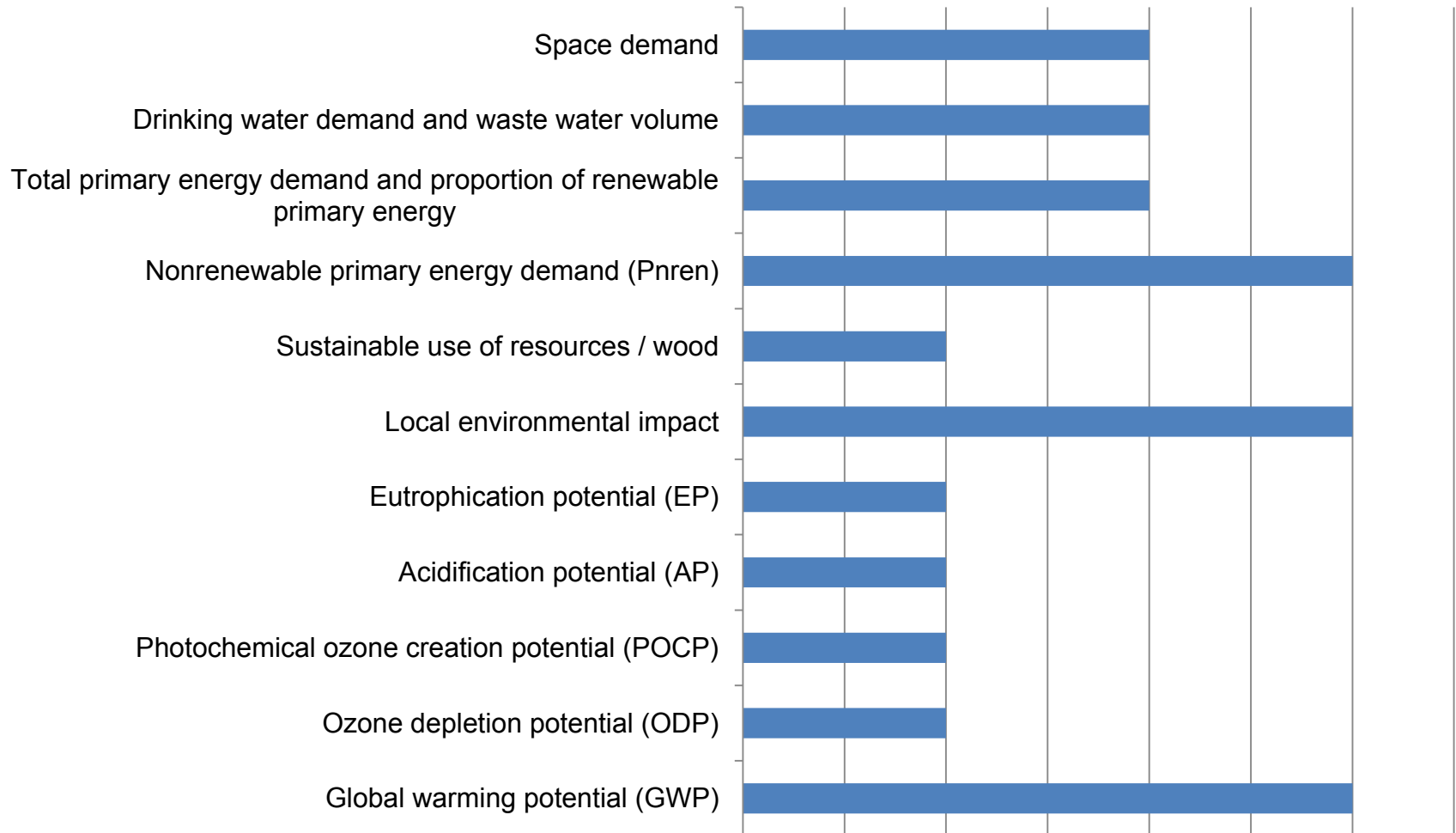
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Ole Balslev-Olesen,  
Cenergia Energy Consultants  
Herlev Hovedgade 195,  
2730 Herlev



# Environmental Quality

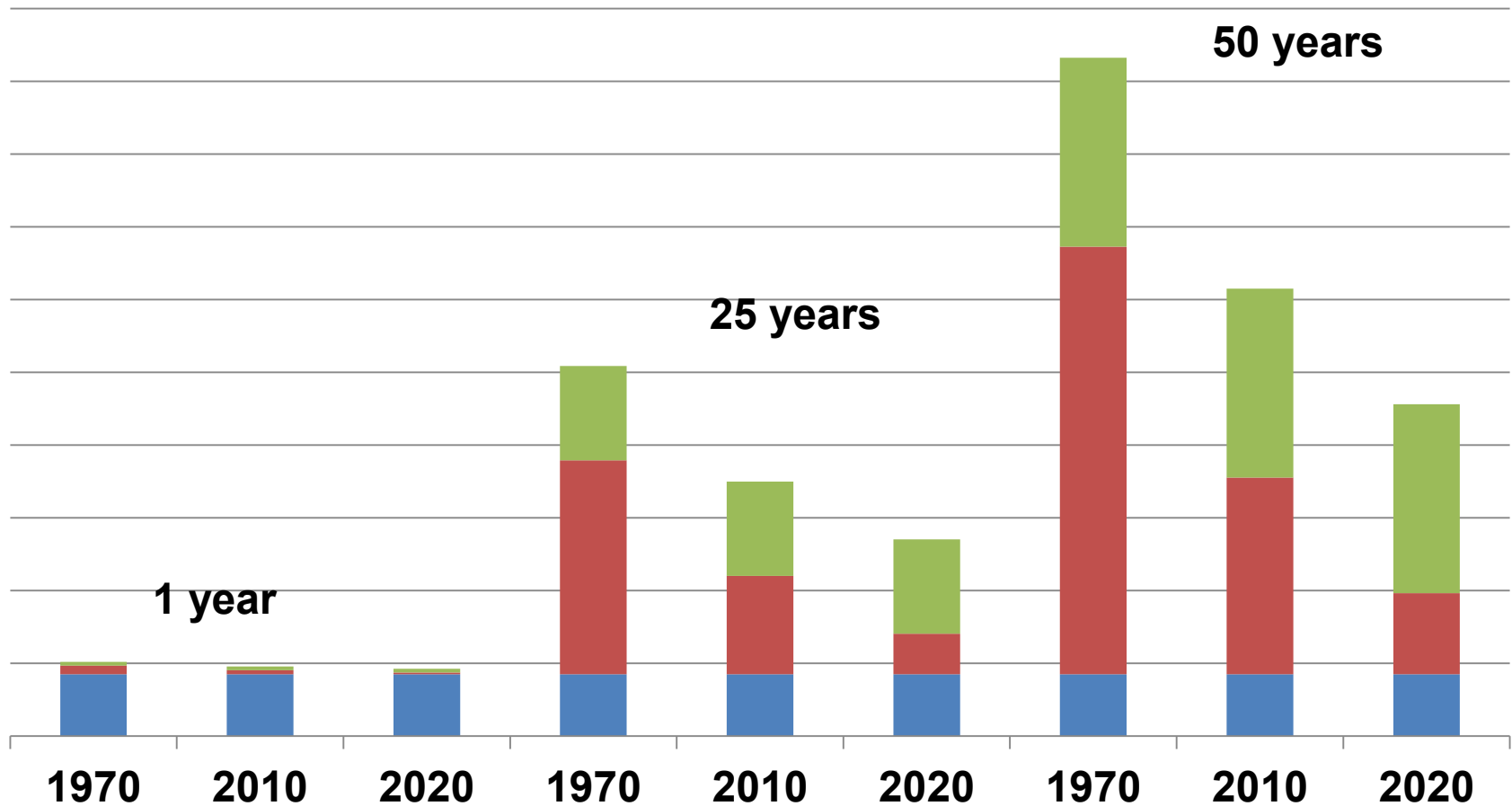
## DGNB Certification System



# Global Warming Potential, CO<sub>2</sub>

Single Family House, 160 m<sup>2</sup>, DH

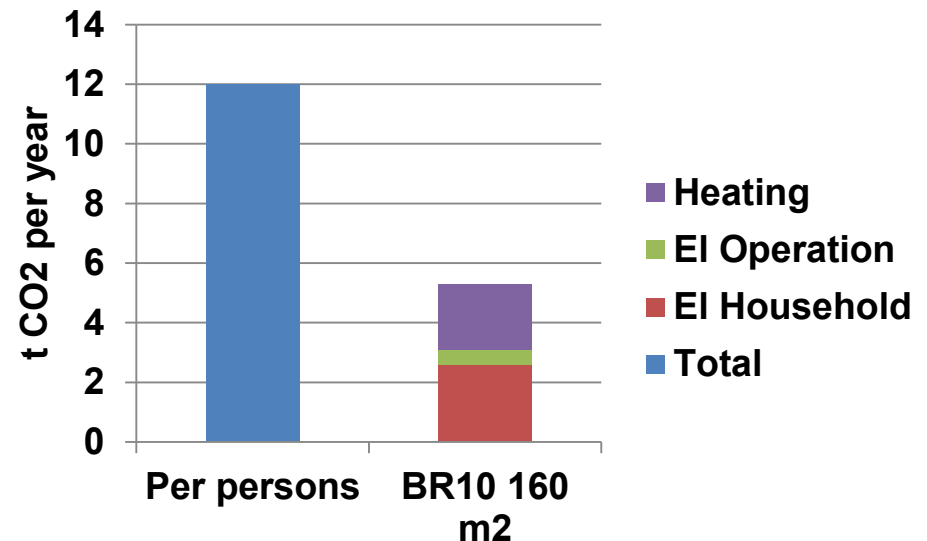
■ Material ■ Operation ■ Household



# Global Warming Potential

## Building sector

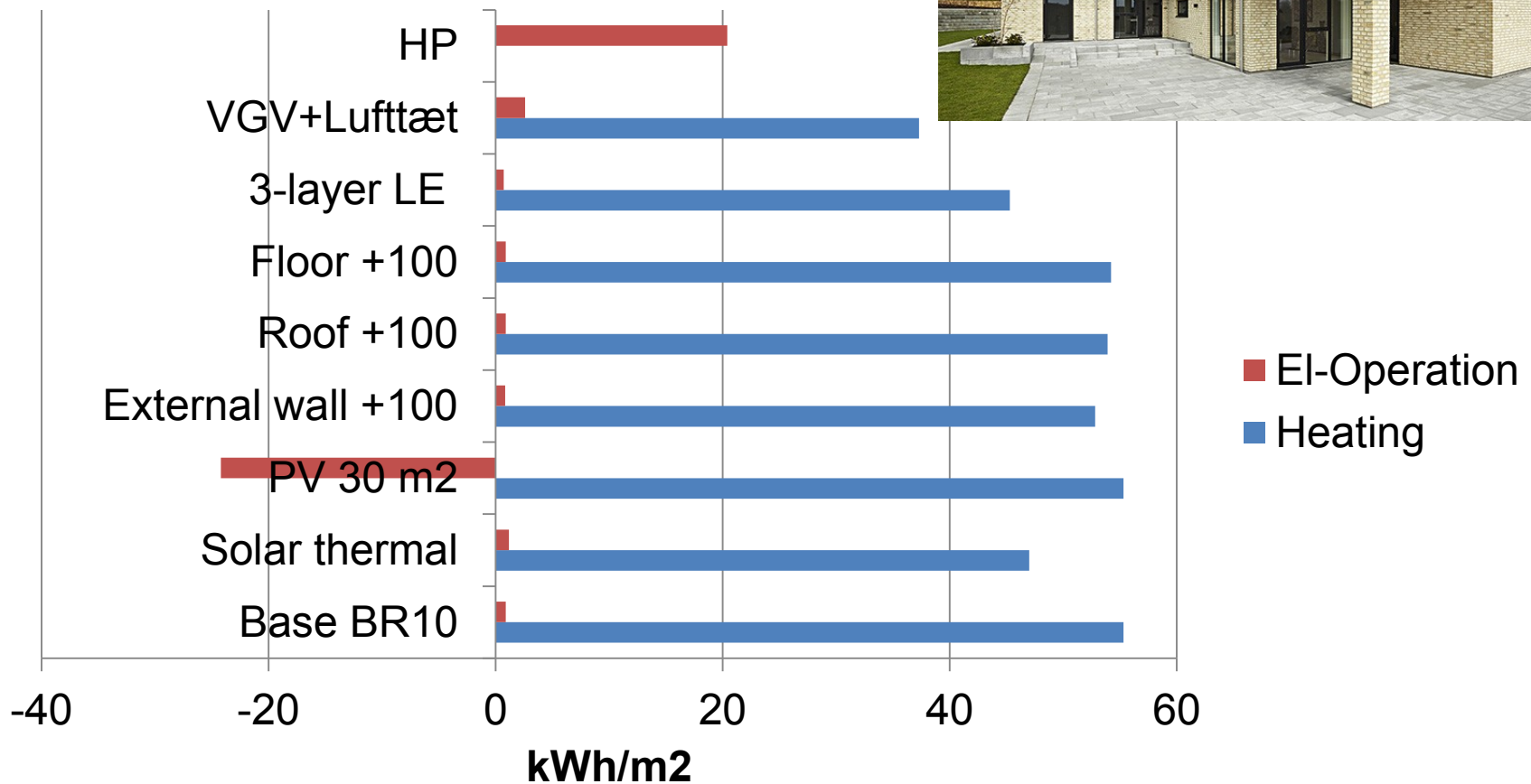
- Heating demand (SH+DHW)
- Electricity demand (Operation and Household)
- Production of material
- Maintenance
- End of Life



# CO2 emission from different heating sources

- Natural gas: 0,205 kg CO2 pr. kWh
- Full oil: 0,265 kg CO2 pr. kWh
- District heating: 0,137 kg CO2 pr. kWh
- Electricity: 0,567 kg CO2 pr. kWh

# Yearly Energy Demand, BR10



# CO<sub>2</sub> reduction per investment

## Solar Heating System

### Year energy savings

District heating:

$$(55.3 \text{ kWh/m}^2 - 47.0 \text{ kWh/m}^2) * 160 \text{ m}^2 = 1328 \text{ kWh}$$

Electricity:

$$= -44.8 \text{ kWh}$$

### Yearly CO<sub>2</sub> savings

$$\text{District heating: } 1328 \text{ kWh} * 0.134 \text{ kg CO}_2/\text{kWh} = 178.0 \text{ kg CO}_2$$

$$\text{Electricity: } -44.8 \text{ kWh} * 0.567 \text{ kg CO}_2/\text{kWh} = -25.4 \text{ kg CO}_2$$

$$\text{Total saving} = 152.6 \text{ kg CO}_2$$

### Investment

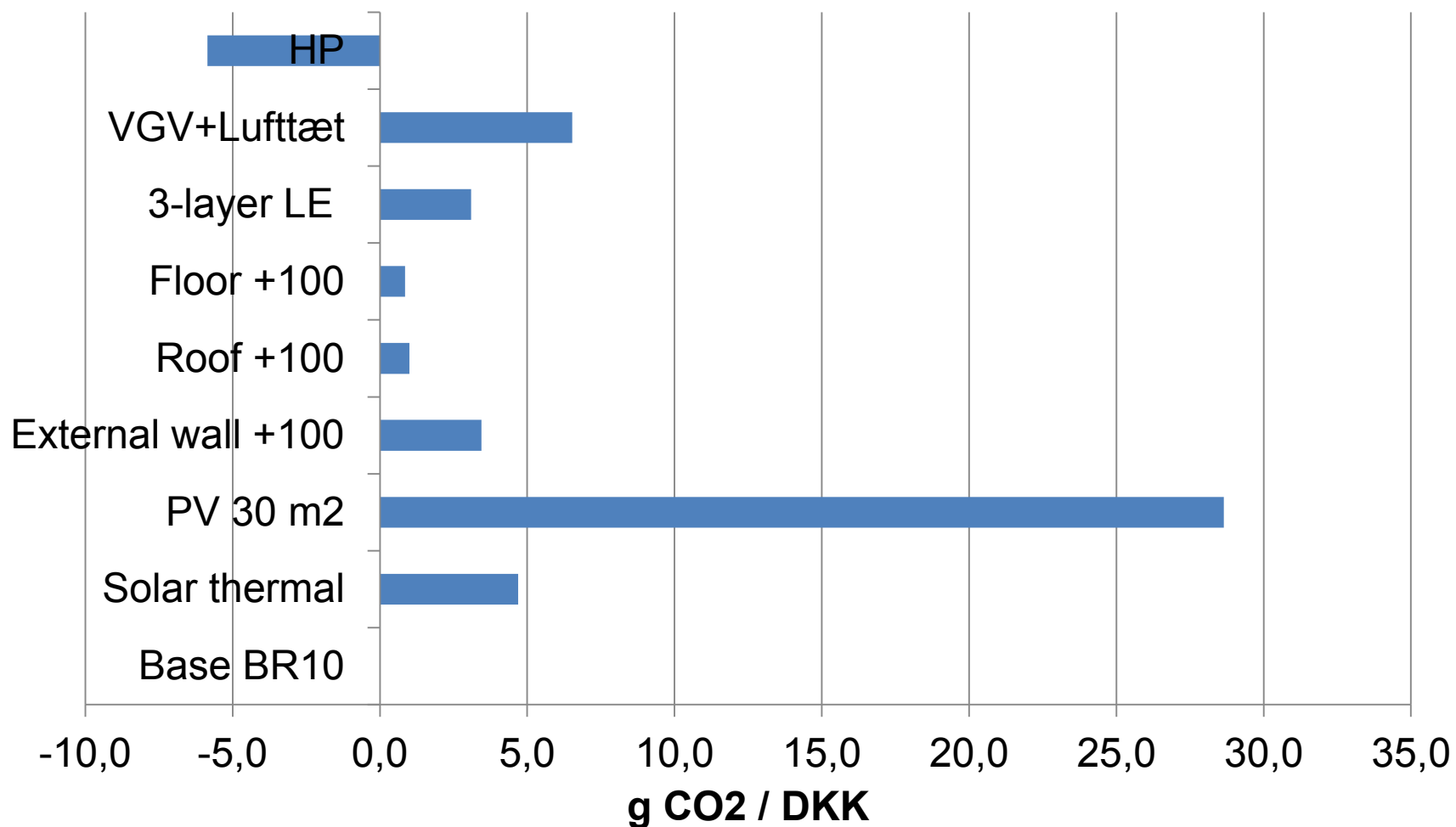
$$\text{Investment (4 m}^2 \text{ solar heating system)} = 32,500 \text{ DKK}$$

### CO<sub>2</sub> reduction per investment:

$$152.6 \text{ kg CO}_2 / 34.500 \text{ DKK} = 4.42 \text{ g CO}_2 / \text{DKK}$$

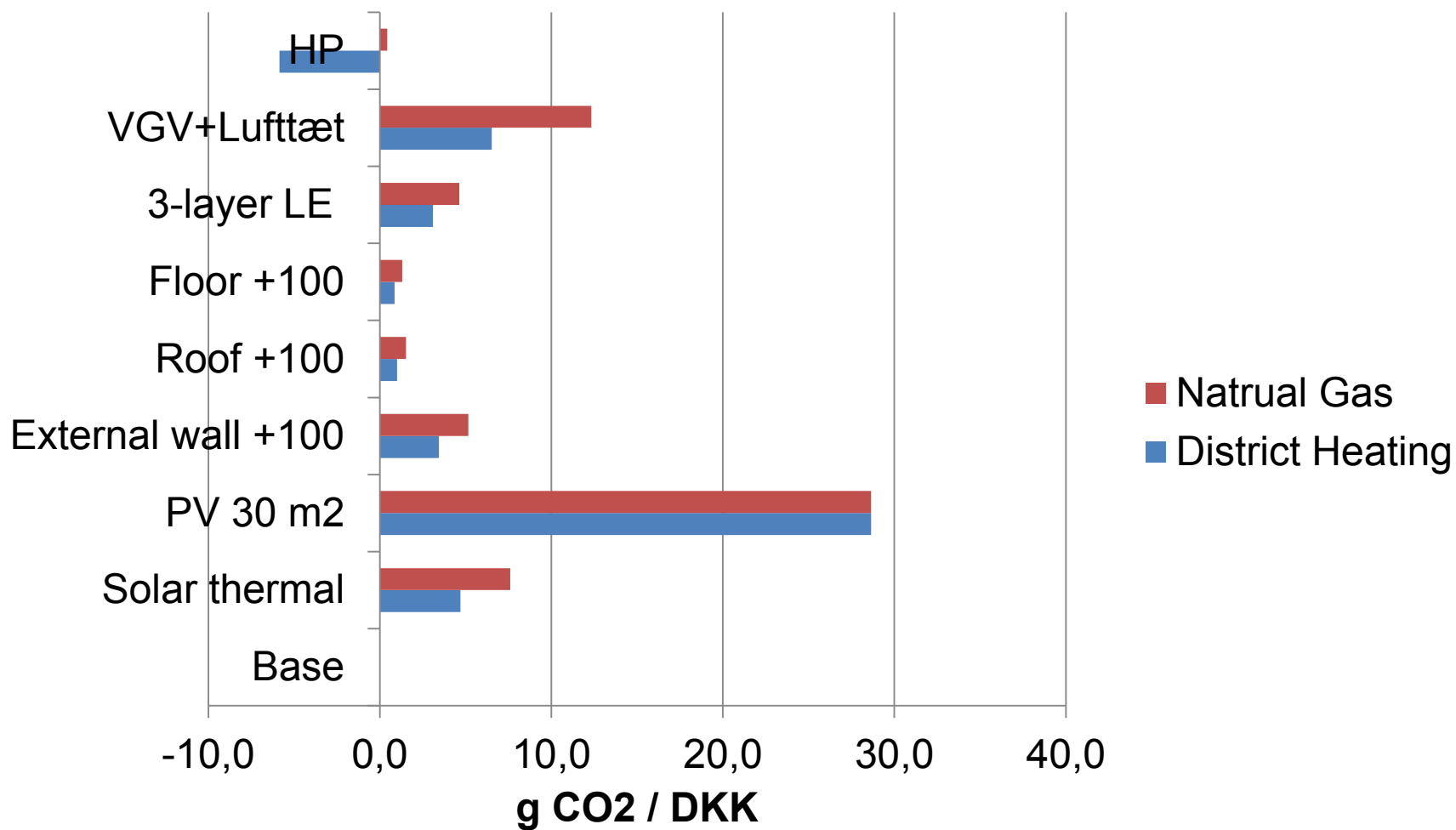
# Reduction in CO2 per investment

District heating, DR10

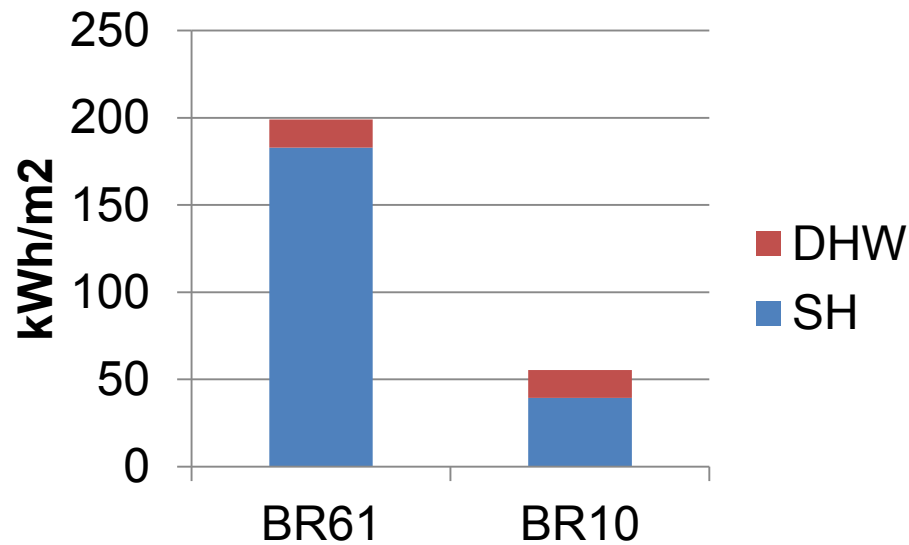




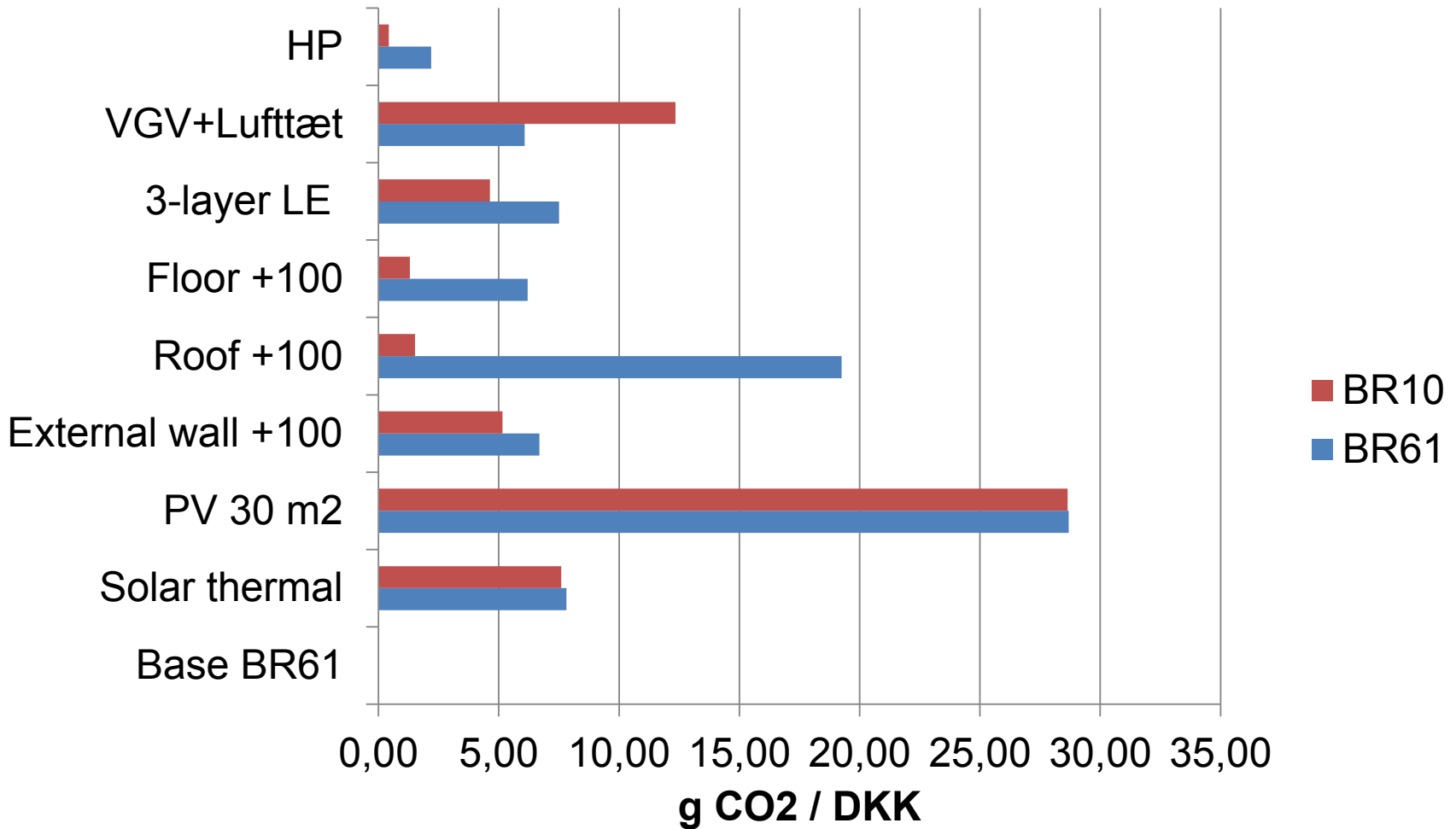
# CO2 reduction per investment



# New Building / Renovation

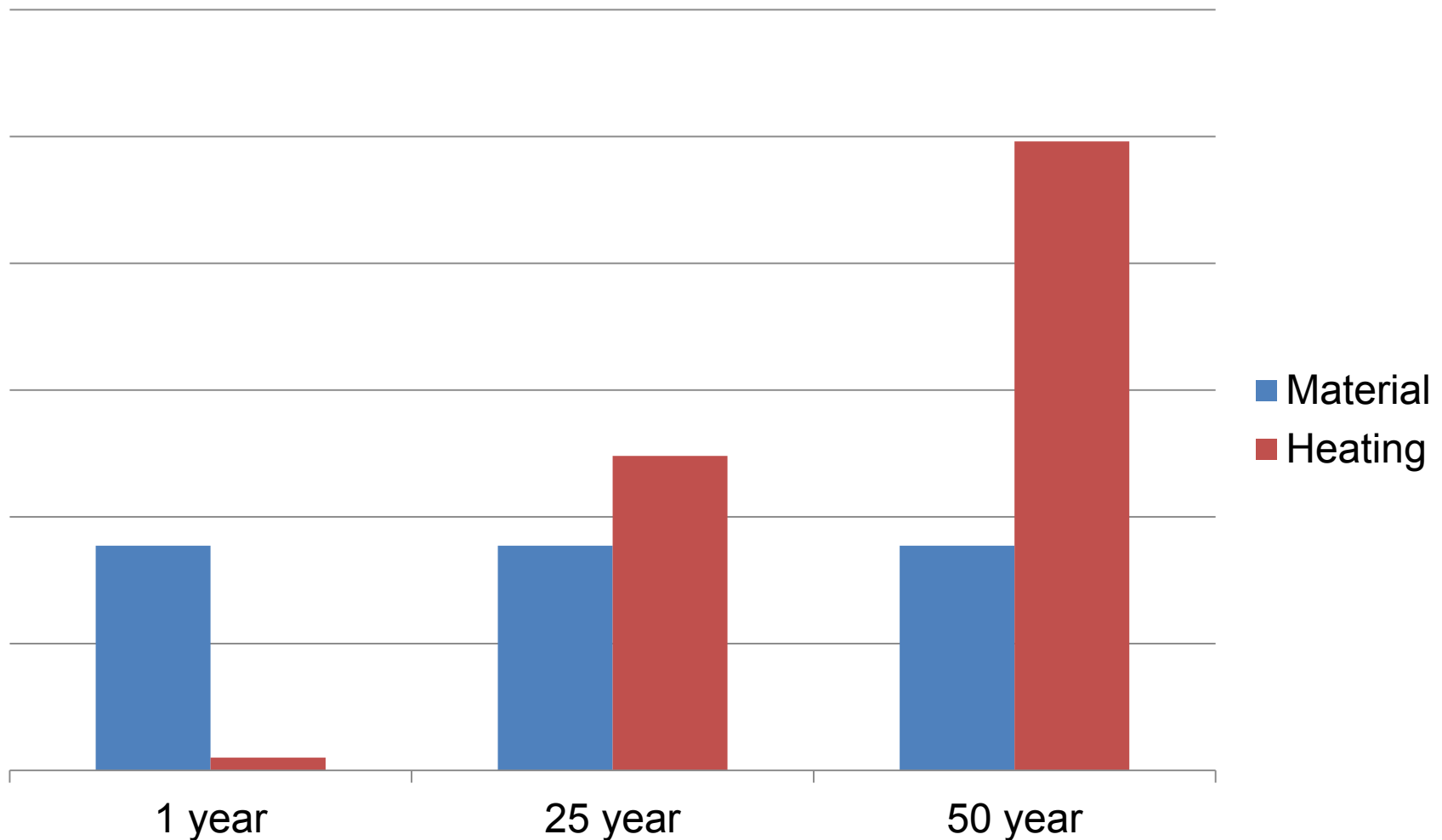


# New Building / Renovation



# CO2 emission

## Extra 100 mm roof insulation – BR10 / DH



# Conclusions

How do we get most CO<sub>2</sub>-reduction for the money spent?

- Focus on operation in existing buildings.
- Focus on operation and materials in new low energy buildings.
- Focus on electricity in household.
- Different approach depending on available energy supply system available.

# THANKS

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Ole Balslev-Olesen

Cenergia Energy Consultants

obo@cenergia.dk