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Background

2.7 million residents

50% fossil fuel based

1.7 million tonnes of CO2 eq. annually

4 million barrels of oil equivalent annually

Problem statement

"To assess the carbon footprint of Small Modular Reactor for District Heating network in Helsinki"

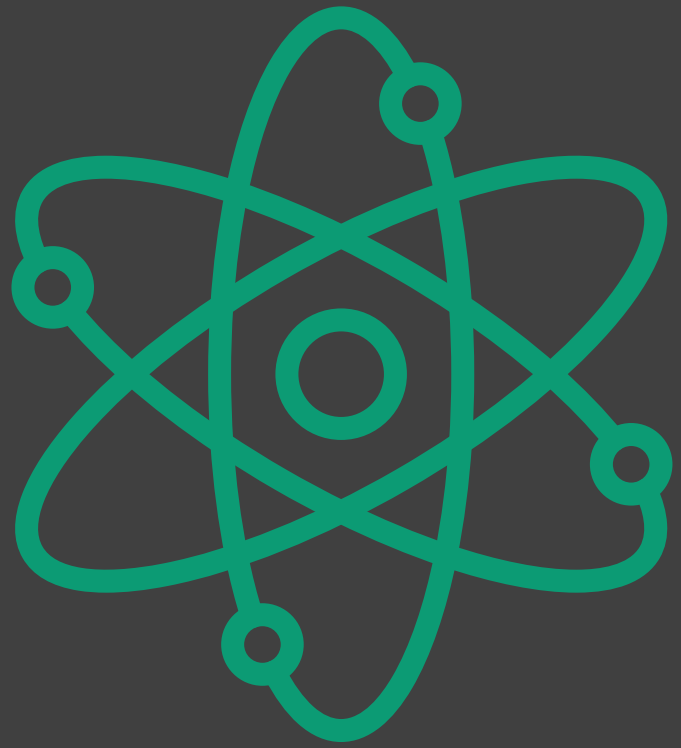
Small Modular Reactor

LDR-50

Low-temperature district heating and desalination Reactor

Output of 50 MW_{th}

Temperature between 65-120°C at < 10 bar



Simple and compact design

Conventional technology
Requires lower land use

Modular

Fast fabrication and Installation

Project map

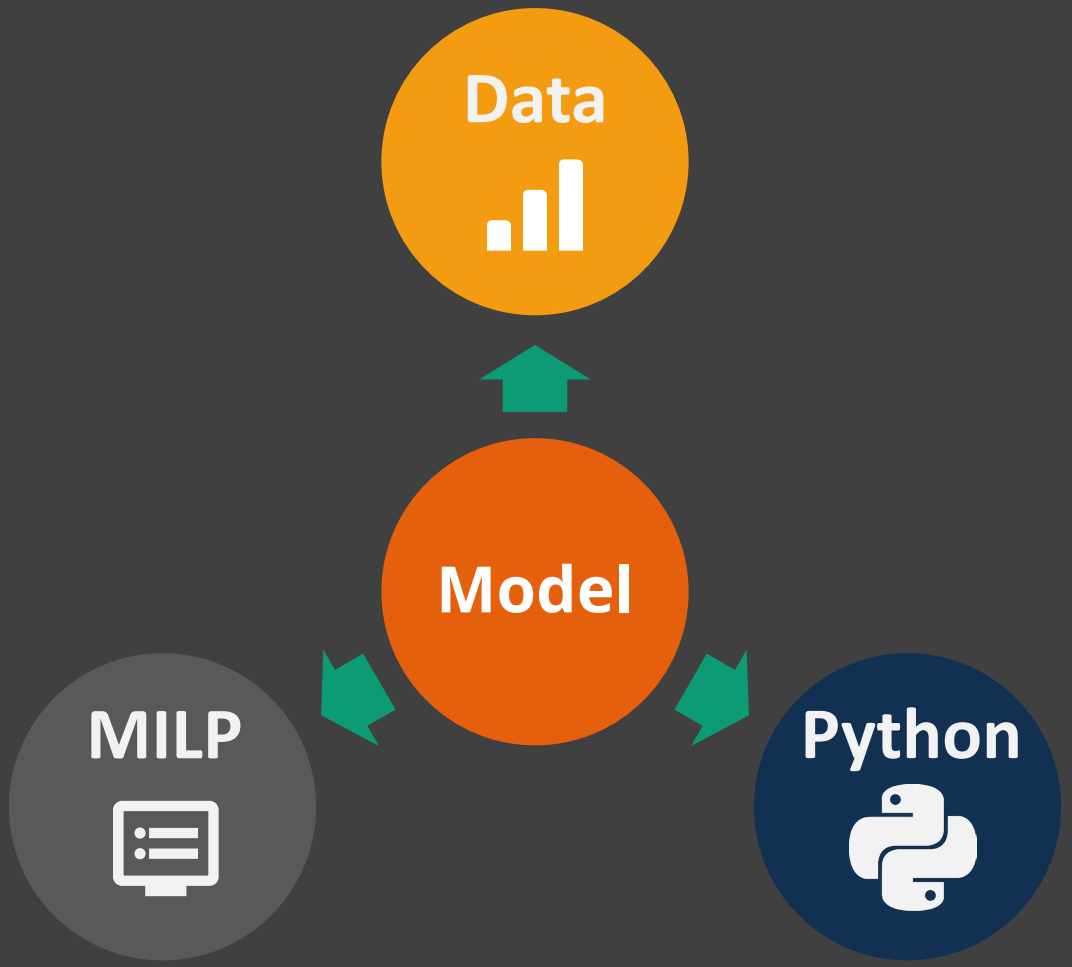
2. CO_2 emissions from SMR

4. Way forward

1. SMR impact on district heating system

3. Key takeaways

Modelling of DH system



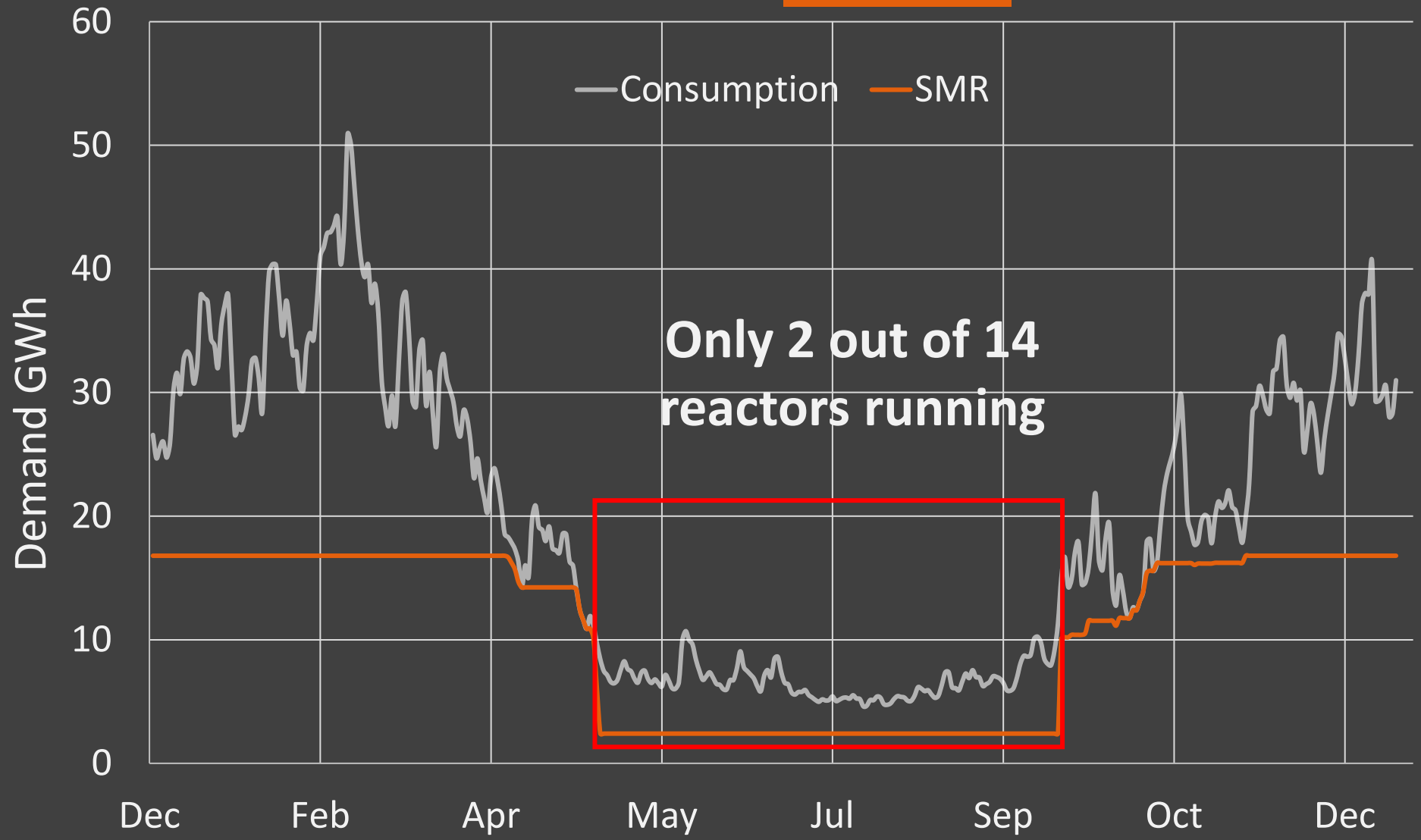
SMR impact on DH system

Min. 250MW

6000 Full load hours

Seasonal variation

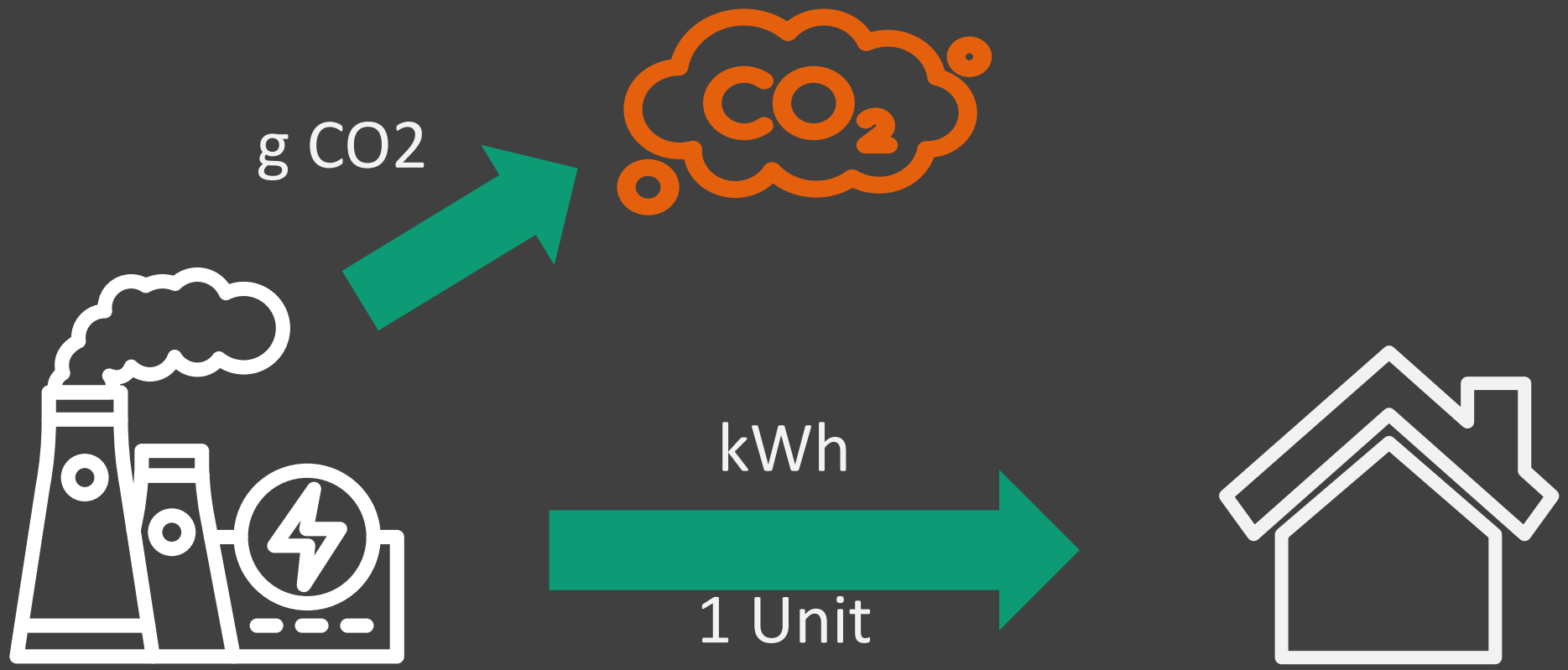
SMR impact at 700 MW



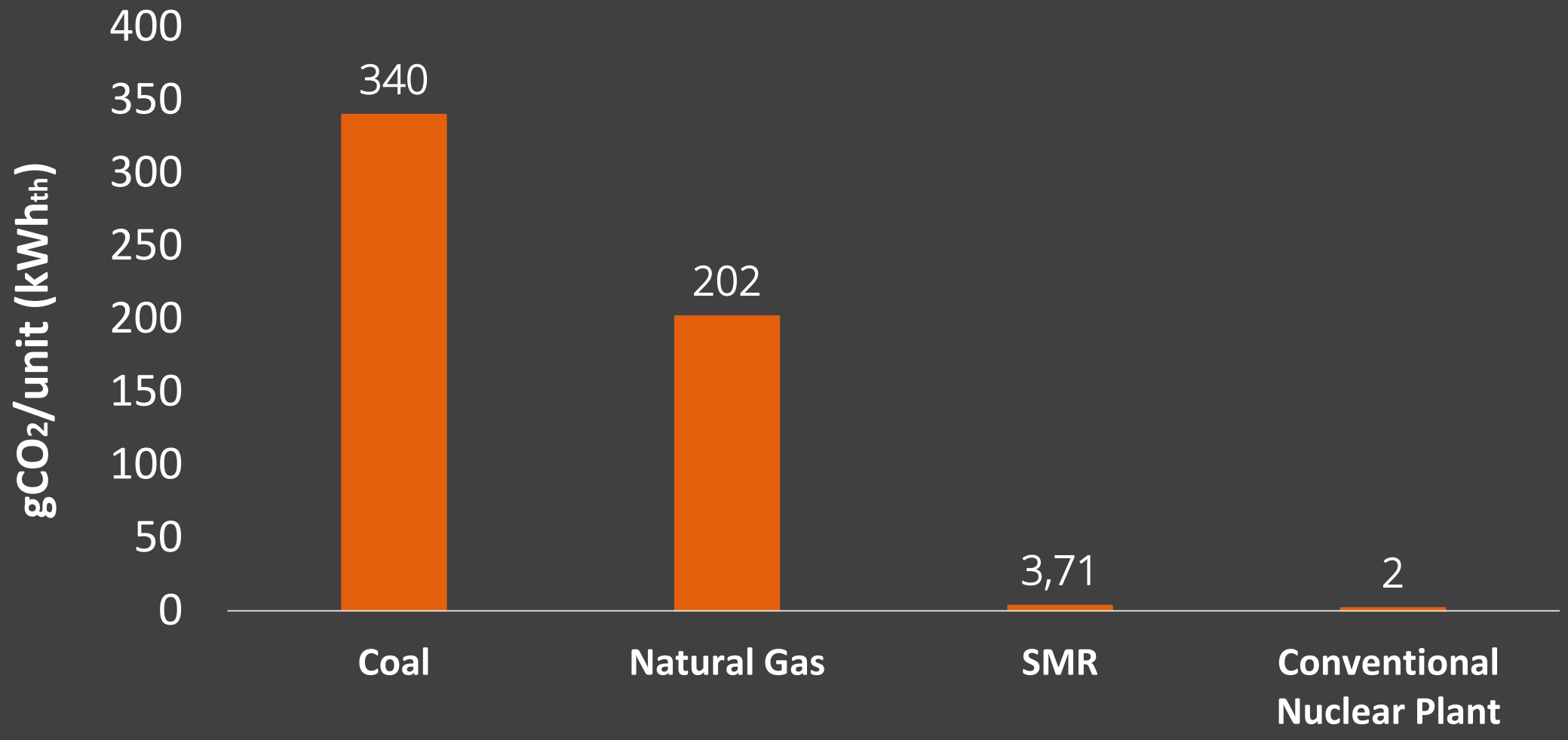
3528 full load hours

Not flexible

Emission factor

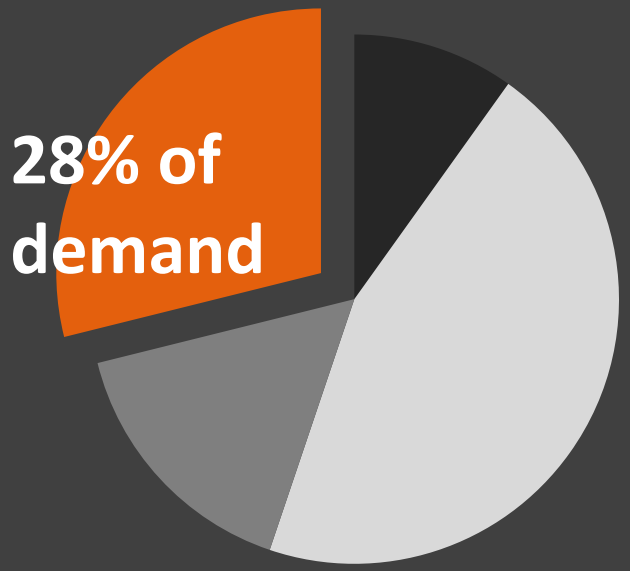


CO_2 emission factor of various sources



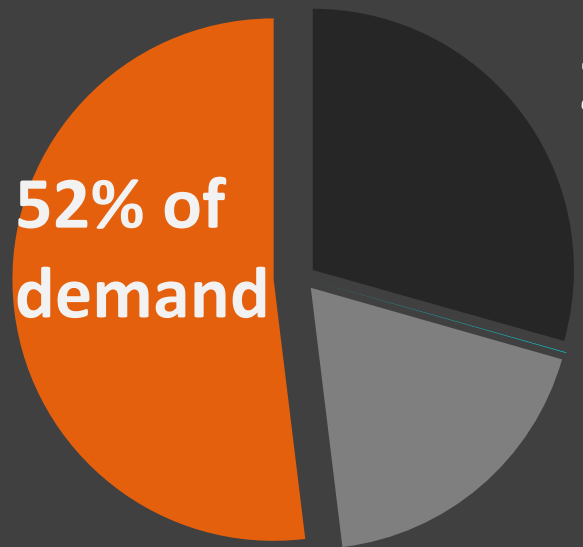
CO_2 emissions from SMR

Scenario 1 : 250 MW of SMR



29% CO_2 reductions

Scenario 2: 700 MW of SMR



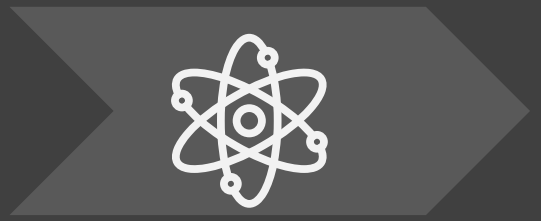
Zero gas production

32% CO_2 reductions

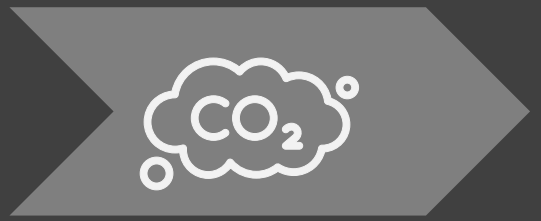
Coal production
Gas production
Waste production
Pellet production
SMR production

Key takeaways

How to integrate SMRs in a district heating system (DHS)?



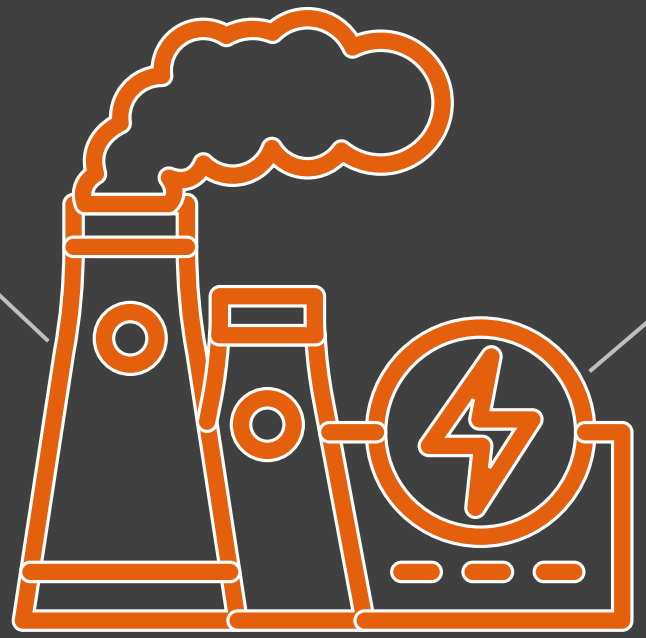
How much CO_2 does an SMR emit?



Does SMR technology reduce CO_2 emissions from DHS?

Is SMR technology a feasible solution to decarbonize DHS?

Way Forward



Flexibility

Policies

Practicality in other cities

Public acceptance