Vroendaal Natural Gas Free

1st Residents Meeting

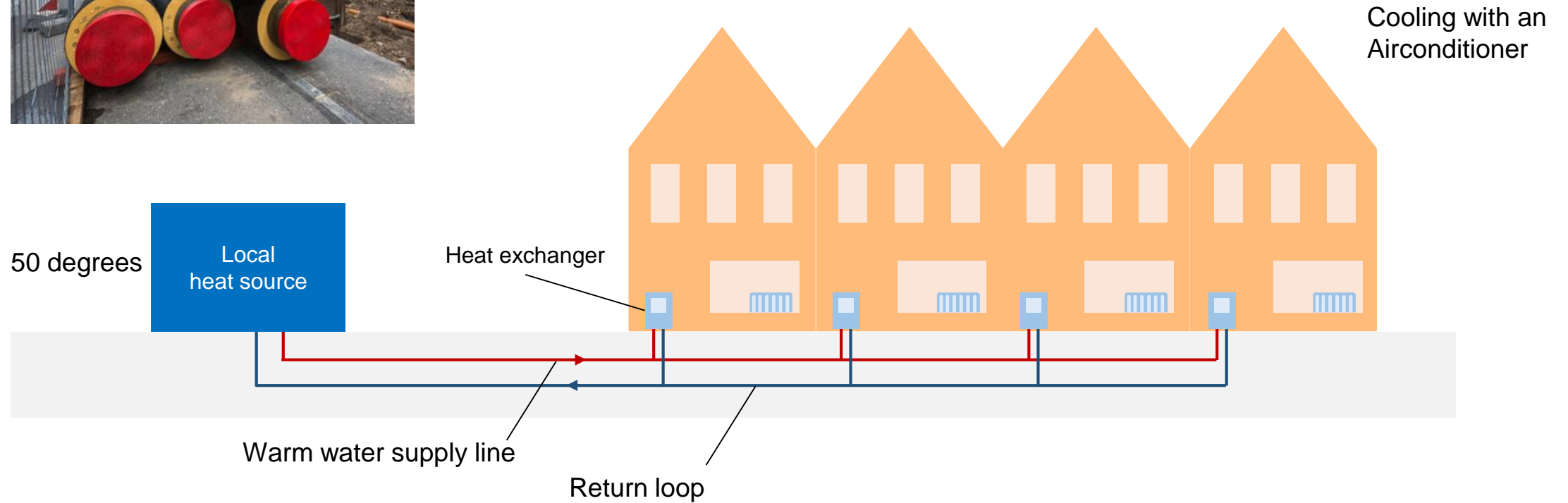|	
Contractor	Municipaility Maastricht
DWTM:	Michiel van der Vight
Date	30-10-2023

Tabel of content

1. Goal

Goal

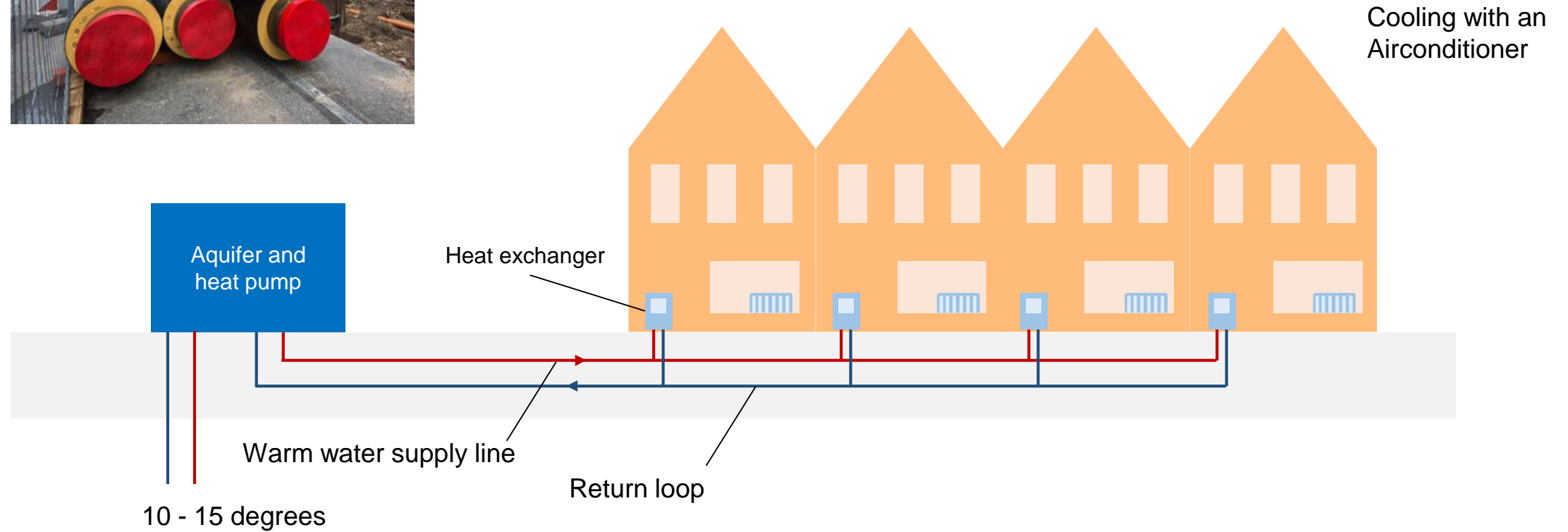Compare the cost effectiveness and sustainability of natural gas free scenario:

1. **District heating** (50 degrees) assuming a heat source will become available close to the neighbourhood

2. **District heating** (50 degrees) with heat from an aquifer and a large heat pump

3. **Cold district heating** an aquifer provides low temperature water for households equipped with very efficient household heat pumps

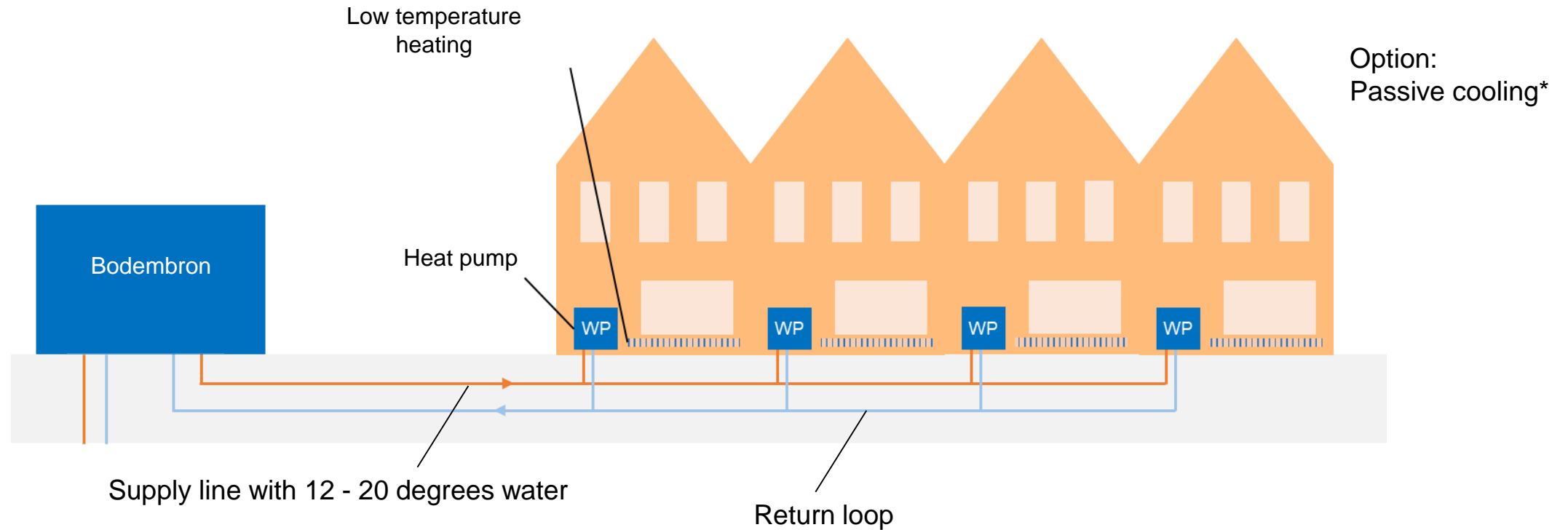4. **Individual heat pumps**. Each household has its own heat pump.

Legenda

Panden - Labels

- A of beter
- B
- C
- D
- E
- F
- G

0   100   200 m

Option 1: District heating with a local heat source

Cooling with an Airconditioner

50 degrees

Local heat source

Heat exchanger

Warm water supply line

Return loop

Option 2: District heating with aquifer and heat pump

Cooling with an Airconditioner

Aquifer and heat pump

Heat exchanger

Warm water supply line

Return loop

10 - 15 degrees

Option 3: Cold district heating with indivdual heat pumps

Low temperature heating

Option: Passive cooling*

Bodembron

Heat pump

WP

WP

WP

WP

Supply line with 12 - 20 degrees water

Return loop

Note: passive cooling is only possible if house are equipped with suitable heating systems, such as underfloor heating or low temperature radiators

Option 4: Individual heat pumps

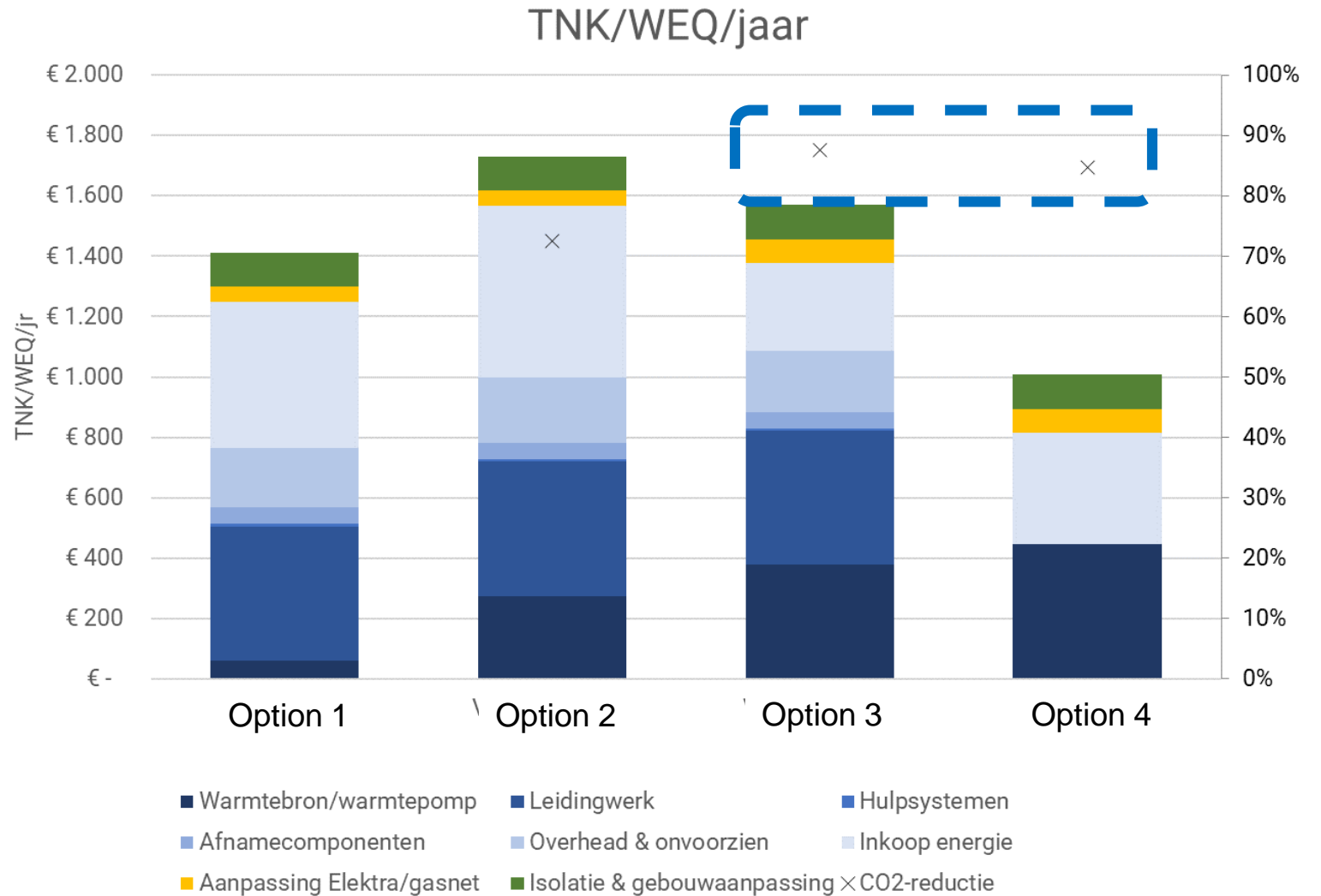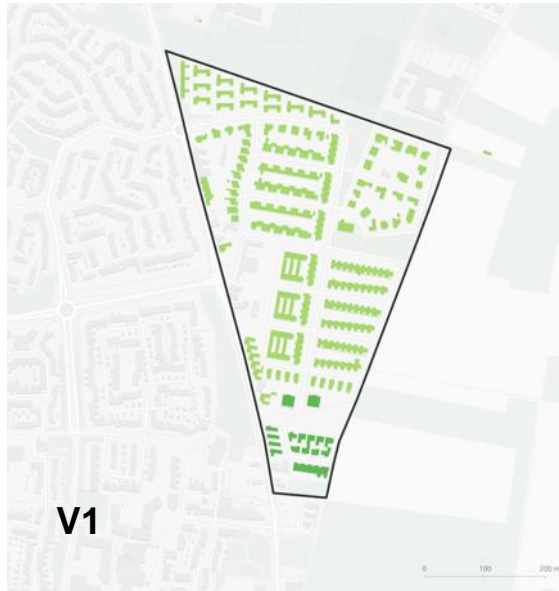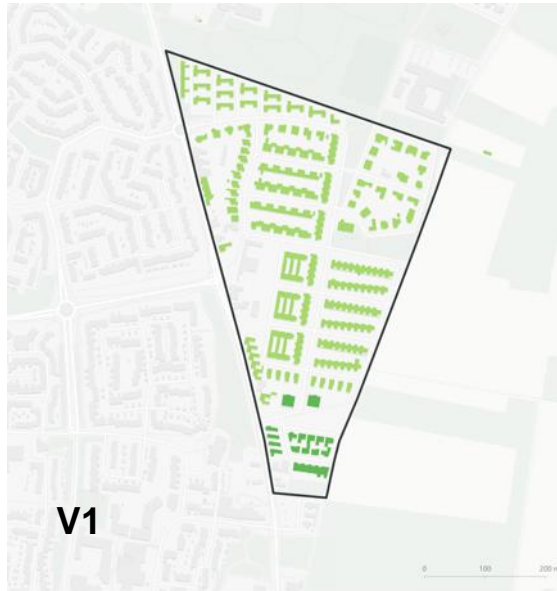Heat pump & warm water boiler

outside unit

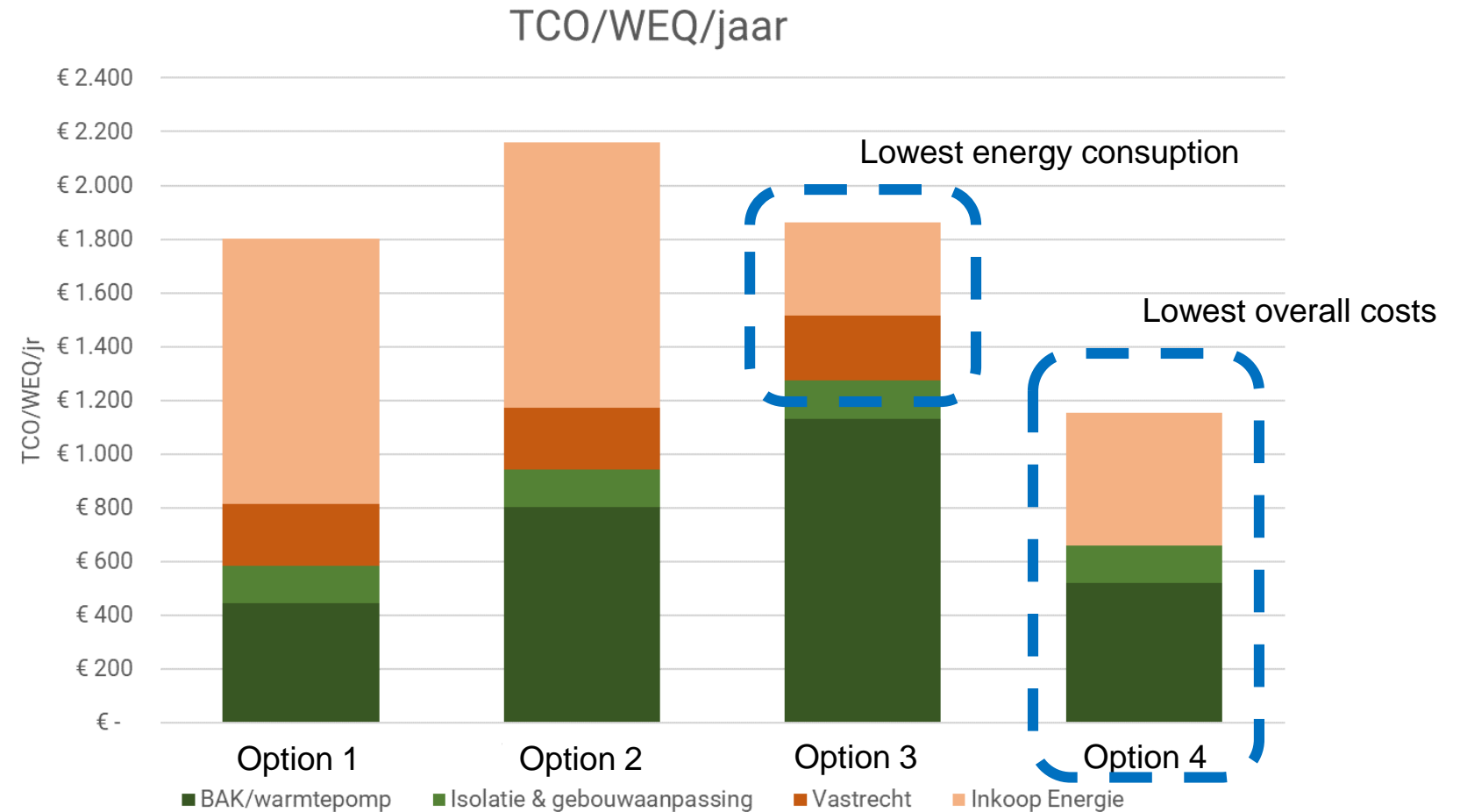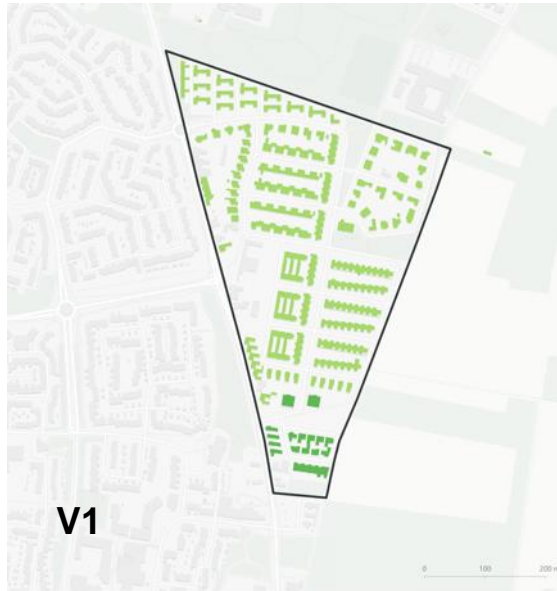Low-temperature heating and/or radiators
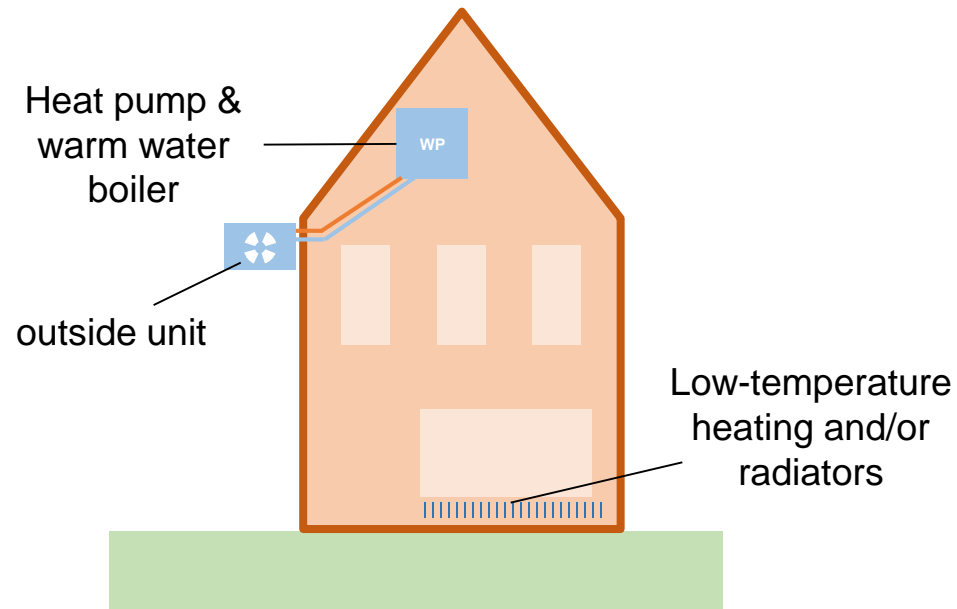
Air-water heat pump

2. Results

Total National Cost − Vroendaal

TNK/WEQ/jaar

Legend:
- Warmtebron/warmtepomp
- Leidingwerk
- Hulpsystemen
- Afnamecomponenten
- Overhead & onvoorzien
- Inkoop energie
- Aanpassing Elektra/gasnet
- Isolatie & gebouwaanpassing
- ✕ CO2-reductie

Total Cost of Ownership – Vroendaal

V1

TCO/WEQ/jaar

Legend:
- ■ BAK/warmtepomp
- ■ Isolatie & gebouwaanpassing
- ■ Vastrecht
- ■ Inkoop Energie

Y-axis (TCO/WEQ/jr): € -, € 200, € 400, € 600, € 800, € 1.000, € 1.200, € 1.400, € 1.600, € 1.800, € 2.000, € 2.200, € 2.400

X-axis: Option 1, Option 2, Option 3, Option 4
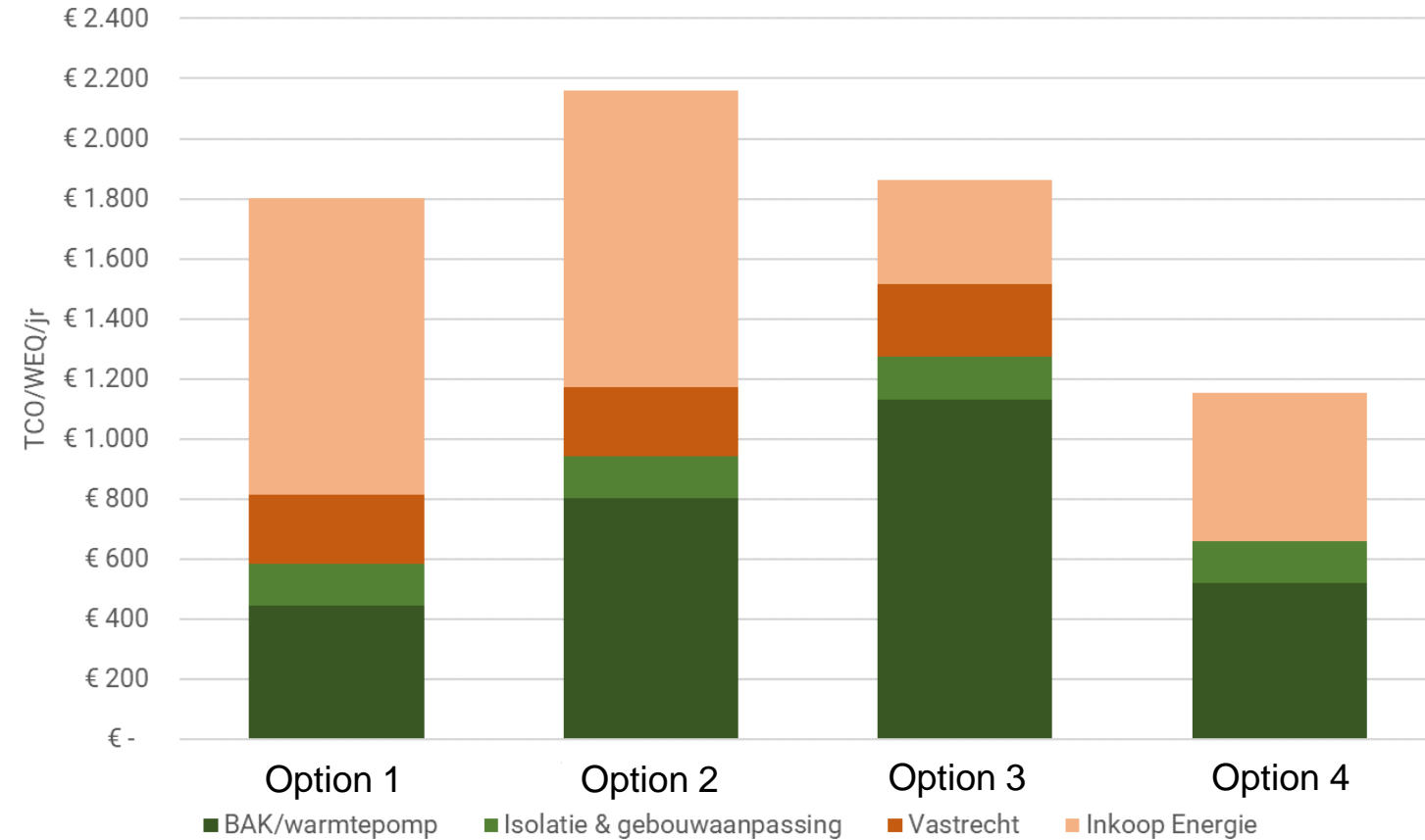
Total cost of ownership – Vroendaal 1

3. Conclusions

Conclusions

- District heating is significantly more expressive, even is a relatively cheap local heat source would become available in the future.

- Creating a local heat source with an aquifer and neighbourhood heat pump is even less cost effective and requires more energy.

- Cold district heating is also less cost-effective, compared to a solution with individual heat pumps. It does result in a very low energy consumption for the neighbourhood as a whole. However, the high current in the groundwater layers and geography (composition of the ground layers), make seasonal heat and cold storage impossible and make drilling an aquifer difficult and risky.

- Individual heat pumps are the most cost-effective solution for the neighbourhood. Because Vroendaal is mostly in a water win area, most house will need an air-water heat pump or other type of heat pump without a ground source.