



How to get the Dutch to  
rehab from their  
temperature addiction?

**alliander**

# De Dutch are addicted to natural gas



- Slogteren Gas Field (Groningen, NL) in 1959
- Today 89% of building is heated with natural gas
- Since 2019 new buildings are heated without natural gas
- > 7 million houses have to get rid of their gas heating by 2050



# Alliander and the *heat transition*

alllander

2.250.000 gas connections

35.000 km gas pipeline

Asset value € 1,2 billion (10<sup>9</sup>)

Lifetime 40-55 years

The *heat transition* is the replacement anywhere of natural gas by a sustainable alternative

In our part of The Netherlands :

- 145 municipalities
- 1.000 districts
- 3.000 neighbourhoods

■ Elektriciteit en gas  
■ Alleen elektriciteit



# Heating of (existing) houses

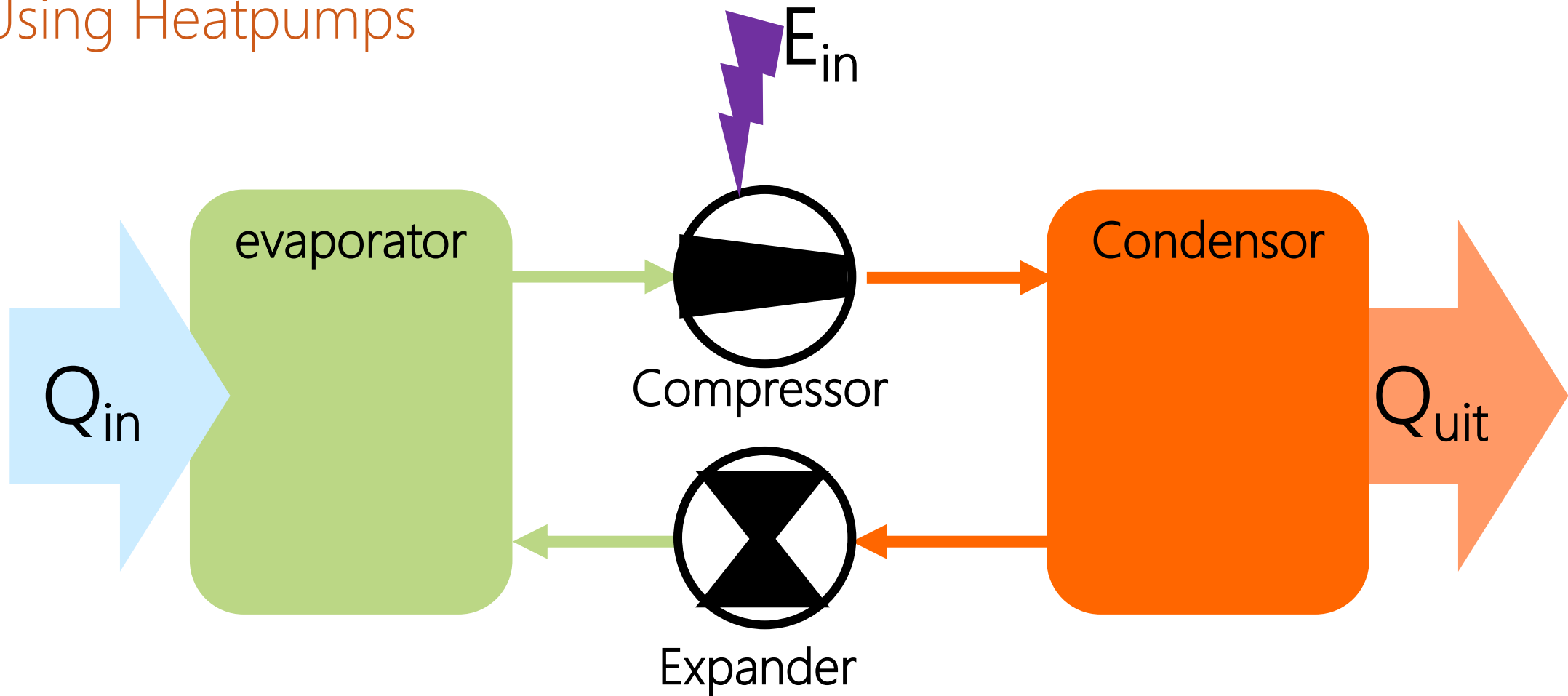
Avarage electricity use:	2.830 kWh pa*
Avarage gas use:	1.340 m <sup>3</sup> pa*
That is:	40 GJ pa**
With electricity :	11.100 kWh (+500%)

\*) bron: Milieu Centraal (2017)

\*\*\*) bij 85% rendement op bovenwaarde



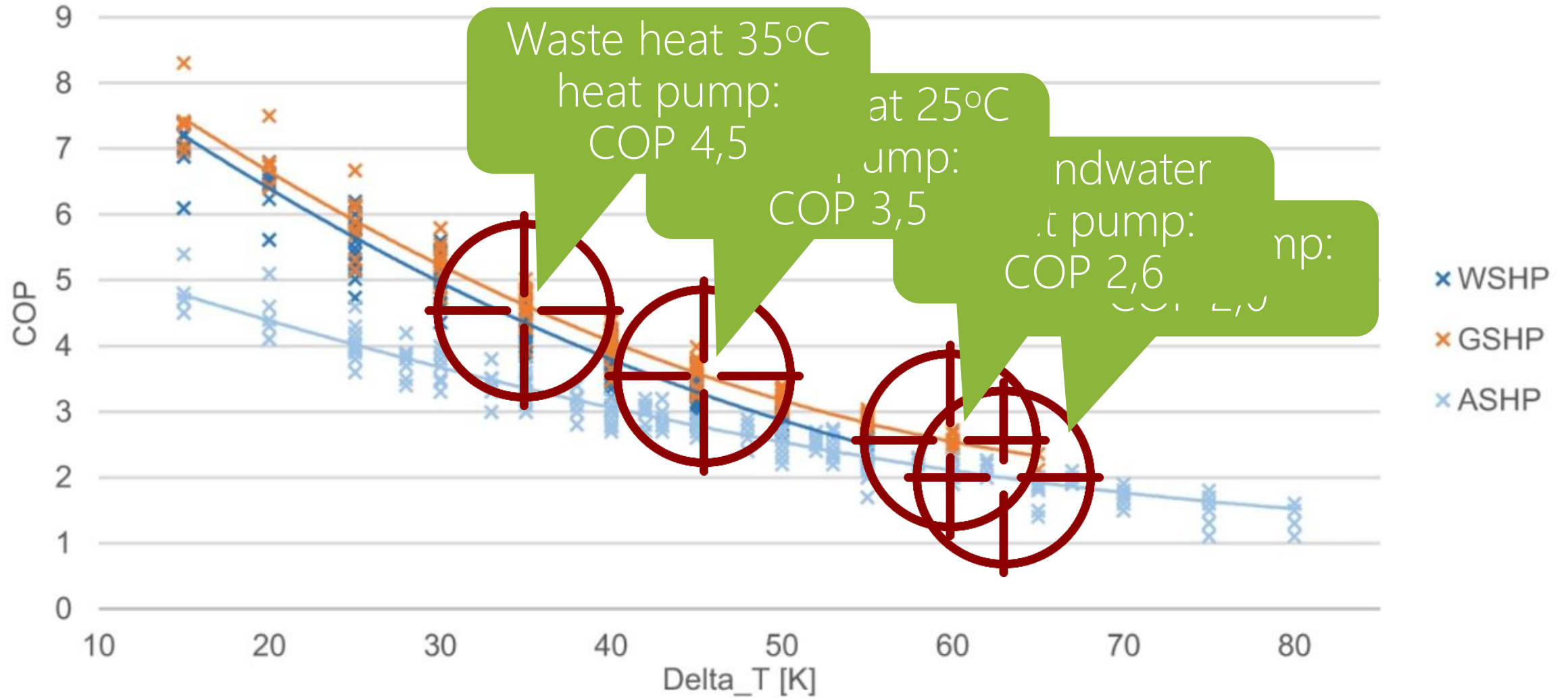
## Using Heatpumps



$$Q_{out} = Q_{in} + E_{in}$$

$$COP = \frac{Q_{out}}{E_{in}}$$

# COP heat pump



# Impact of the heat source to a heat pump



System	Source temperature	COP	E-use	Increase*
Resistance	n.v.t.	1,0	11.100 kWh	392%
Air	6,1°C	2,0	5.600 kWh	198%
Ground water	10°C	2,6	4.300 kWh	152%
Waste heat	25°C	3,5	3.200 kWh	113%
Waste heat	35°C	4,5	2.500 kWh	88%

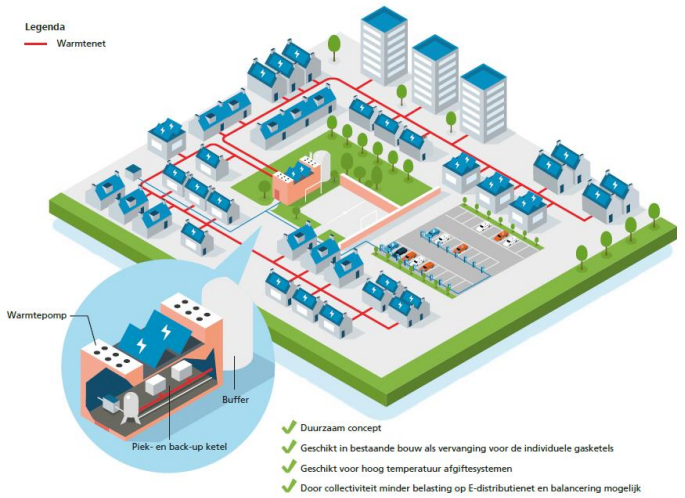
\*) The average household (gas fired) uses 2.830 kWh pa

# Our favorite approach

1. Collective heating systems (district heating)
2. Cooperative ownership  
BES = Buurt Energie Systeem (neighbourhood energy system)
3. Modular build collective system
4. Modular Starting point:
  - Houses connected to heating network, disconnected from gas
  - Medium temperature (70 °C) delivery
  - Central heat-water heat pump with gas-fired auxiliary boiler



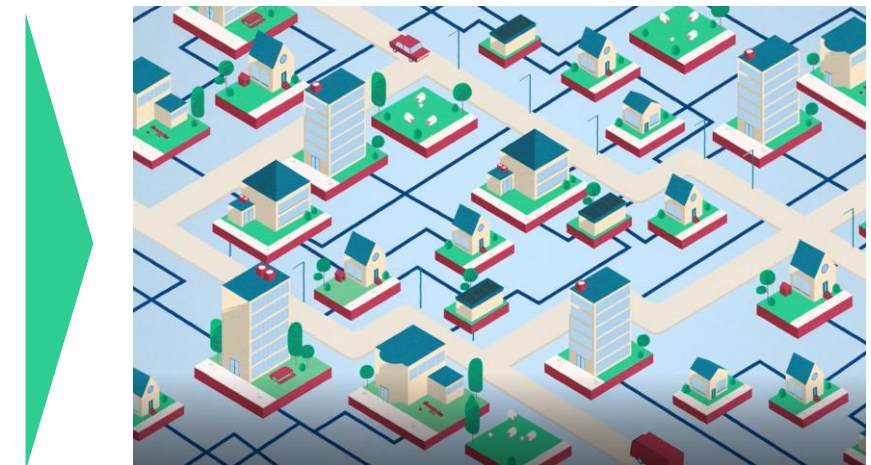
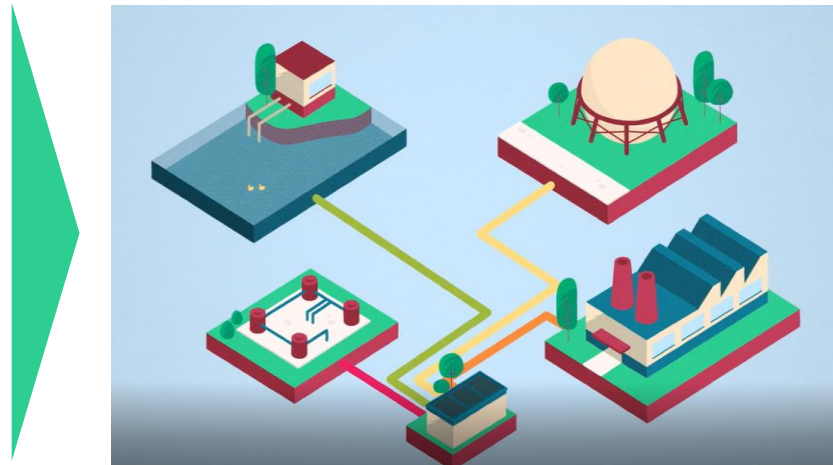
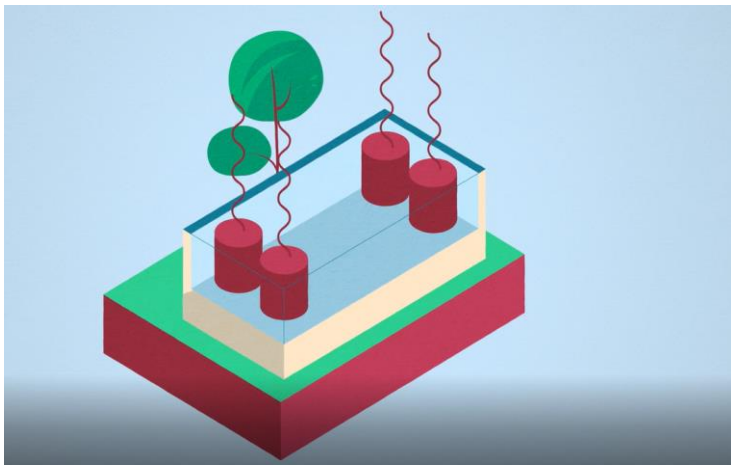
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5. Develop towards a low temperature delivery, high(er) temperature waste heat source
  - Insulation and improvement of the houses (lower temperature need)
  - Replacement of central unit(s)
  - Interconnecting the neighbourhood systems



We believe...



that this is a (the only) feasible approach towards low temperature heating in existing buildings and lowering power peaks and electricity consumption for domestic heating

