Investing in geothermal heat

Towards a sustainable built environment

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HVC is a publicly owned heat company

Shareholders

HVC → 46 municipalities, 6 water boards → **Core task**: To shape and realize heat transition from a public interest perspective.

TRIAS WESTLAND → 45% HVC, 45% Capturam, 10% RFH, 100% Coöperation (48 greenhouse companies) → **Geothermal heat Project Ltd.**: 1st doublet (20MWth), 2nd doublet (~15MWth)

ENERGIE TRANSITIE PARTNERS → 50% HVC, 50% Capturam → **Acceleration heat transition Westland**: Realising geothermal heat projects (100MWth), Integrating residual heat (100MWth)

Content

1) Timelapse of a geothermal heat project

2) Geothermal heat in the energy transition

3) Challenges in the built environment

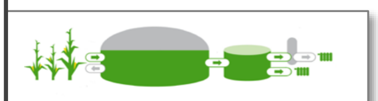
4) Three current examples

Timelapse

Geothermal heat in the heat transition

Long-term: all-electric as primary solution
Short-term: “no regret” opportunities for collective heat

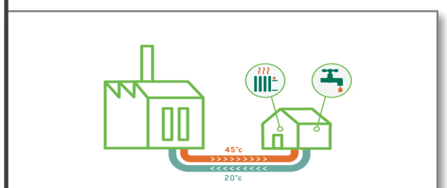
1) Green and (for now) unavoidable gas



Limited potential

- Limited availability of biomass for the production of green gas
- Gas remains a necessary fuel for the (high temperature) process-industry and as a back-up for district heating.

2) Collective heating systems



Direct potential

- Mature technology
- Existing infrastructure performs well and is under control.
- Geothermal heat sources will (amongst others) further reduce the environmental impact.

3) All-electric

High expectations, but…

- Innovations are necessary (electricity storage, laws and regulations, grid reinforcement, smart grids, E-heat pumps)
- Generation of renewable electricity

However, it all starts with the end user…

Collectives

Individuals

The transition starts with **housing corporations** and **municipal property**, and then continues to **individual home owners.**

Challenges for project development

- The demand-side development is relatively unpredictable (end-user driven), while demand-side requirements are stringent in terms of:
  - Sustainability
  - Security of supply
  - Price

- A business case for geothermal heat requires approximately 10.000 end-users. (SDE++ may lower this number to 3500-5500.)

- *Stringing beads* is a common approach to build-up to sufficient demand, however,….
  - Who can give guarantees to the individual beads?
  - What if the well produces less than expected? What if the risks are too high?
  - What are the fall-back scenarios?

A long-term development strategy and a long-term heat source strategy are necessary.

Thinking in terms of demand and supply

Current converstations are always about district heating infrastructure, however…

infrastructure always follows the development of demand and suppply,

therefore… we should actually talk about:

- How will the heat demand develop over time?
- What are suitable heat sources?
- Who will take system responsibility?

Heat demand

- Current and future
- Seasonal variation

Heat supply

- Base load
- Middle load
- Peak load
- Back-up

Multi-year source strategy

District heating networks can be fuelled by:

- Residual heat (decreasing)
- Biomass

→ Current heat sources

- **Geothermal heat**
- **Heat from surface water**
- **Heat-cold storage systems**

→ **Future proof heat sources,** when considering:

- The transition towards lower supply-temperatures.
- Concept development (combining technologies).
- Integration into the built environment.

- High temperature heat storage
- Power to Heat
- Hydrogen

→ Innovative technologies, heat sources of the future

HVC

Harvesting heat: essential differences

Greenhouses

- Production temp. = 85 ^{o}C
- Return temp. = 35 ^{o}C
- Power = 10 MWth
- 6000 full load hours **= 216.000 GJ**

New construction homes

- Production temp. = 85 ^{o}C
- Return temp. = 45 ^{o}C
- Power **= 8 MWth**
- 3500 full load hours? **= 100.800 GJ**

Existing built environment

- Production temp. = 85 ^{o}C
- Return temp. = 55 ^{o}C
- Power **= 6MWth**
- 3500 full load hours? **= 75.600 GJ**

Three examples of the same geothermal well, the same CAPEX and (nearly) the same OPEX.

Three current examples of projects under development

District heating in the Ijmond region

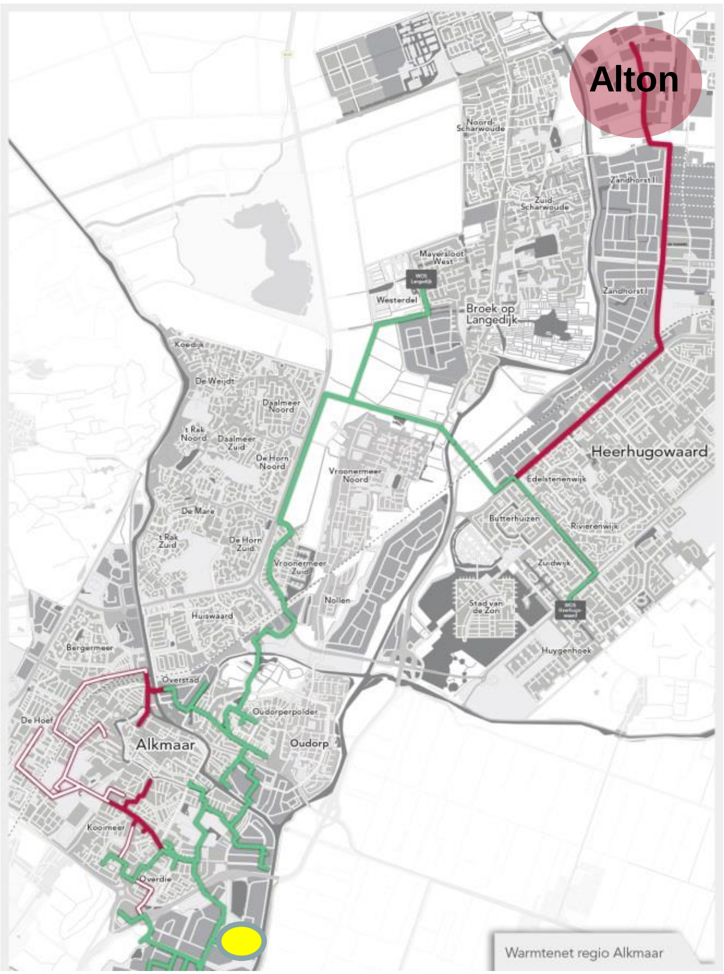
Activities

- Development of a district heating system (>20.000 woningen)

Unique opportunities

- Starting from a current geo-well
- Scaling through a second well
- Combining residual heat from Tata (12MWth) with geothermal heat (12MWth)
- Sufficient availably supply for ~15.000-20.000 households

District heating in Alkmaar - Heerhugowaard



Alton activities

- Back bone operational since dec. 2018
- Pipeline dimensioned for geothermal heat (temperatuur 85 ^{o}C -35 ^{o}C)
- Data exchange with the NAM

Unique opportunities

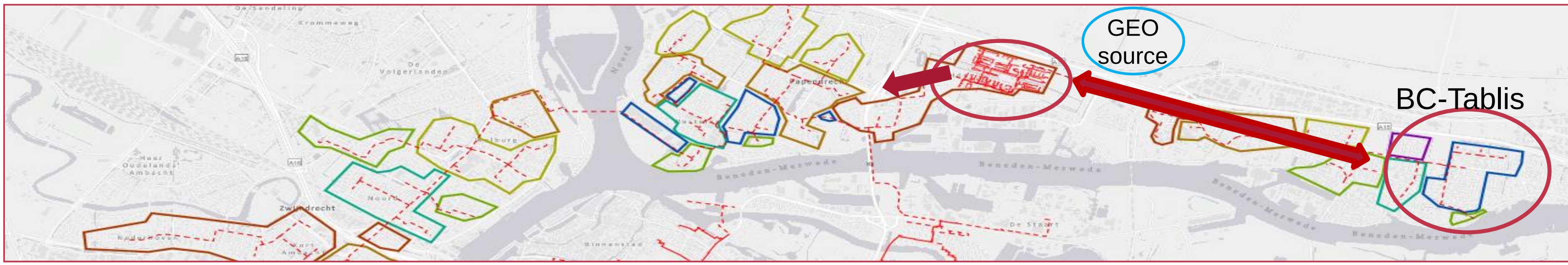
- High heat demand (built enviornment and greenhouses)
- Suitable location for geothermal well
- High potential, good geology

Status:

- Land has been purchased
- Tracing permit has been obtained
- SDE+ was granted

District heating Drechtsteden region

Example ‘Drechtsteden’



Activities Sliedrecht / Papendrecht

- Geological research shows high potential
- 1200 households in Sliedrecht (2019) contracted
- National subsidy granted for 600 households in Sliedrecht

Unique opportunities

- Sliedrecht and Papendrecht combined show good potential for a project based on geothermal heat.

Finally,

Geothermal heat (co-) determines the shape and speed of the heat transition.
However, geothermal heat is only a part of the system.

Moreover, geothermal heat projects face ***public acceptance*** and ***local participation*** as additional challenges.

www.hvcgroep.nl