



Netherlands Enterprise Agency

# Geothermal Energy in the Netherlands

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# Developing enabling frameworks for geothermal heating

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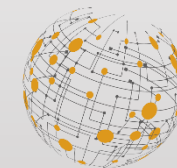
## The case of The Netherlands (NL)

 42.000 km<sup>2</sup>  
17 mio inhabitants > 400 inh/km<sup>2</sup>



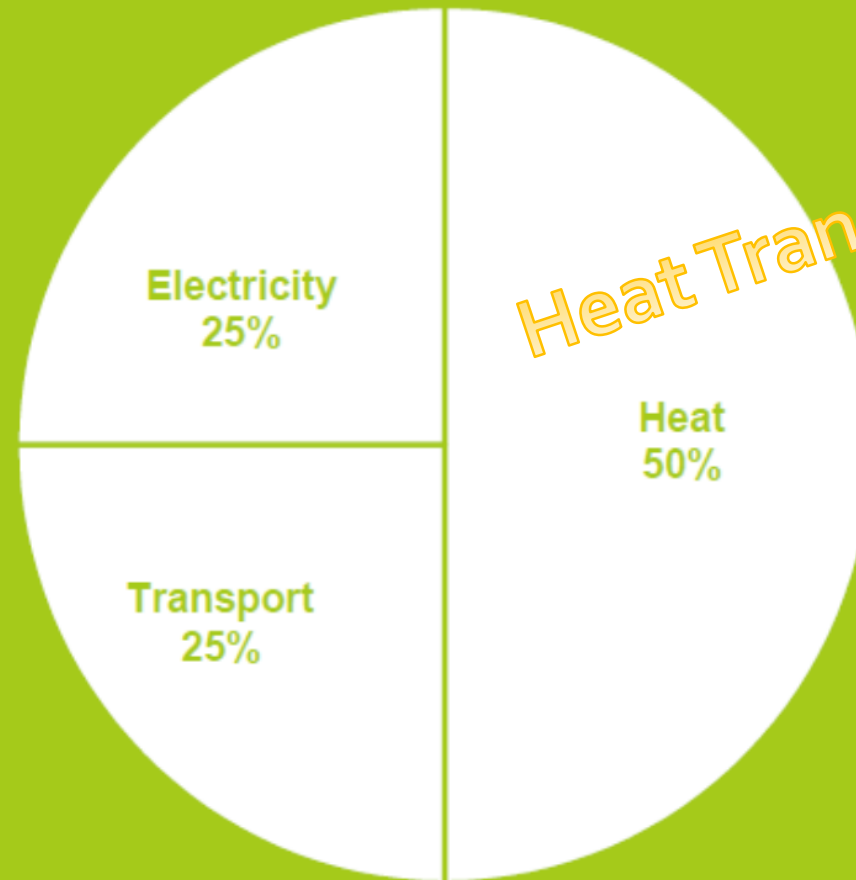
# Content

- intro
- **a heating & cooling transition**
- a country perspective: the case of The Netherlands
- enabling frameworks & instruments
- a (joint) way forward ?



GLOBAL  
GEOTHERMAL  
ALLIANCE

# ENERGY CONSUMPTION IN NETHERLANDS




*Heat Transition is key!*

Source: Phil Vardon, TUD [https://www.youtube.com/watch?v=\\_a6KKQ6y6f8](https://www.youtube.com/watch?v=_a6KKQ6y6f8)



## 2007 Geothermal MineWater Heerlen propelling the Energy transition





# Geothermal Energy in The Netherlands

2007 Geothermal Tomatoes – Bleiswijk (NL)



Home / Actueel / Nieuws / Eerste oogst aardbeien geteeld met aardwarmte

## Eerste oogst aardbeien geteeld met aardwarmte



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**Op 14 maart zijn in de Koekoekspolder bij IJsselmuiden heel bijzondere aardbeien geoogst. Deze aardbeien zijn namelijk de eerste aardbeien ter wereld die geteeld zijn met aardwarmte.**

De aardbeien komen van aardbeienteler Kalter Aardbeien. De aardbeienkas wordt sinds kort verwarmd door aardwarmte uit het [project Koekoekspolder](#). Het bedrijf heeft hierdoor geen aardgas of andere fossiele brandstof meer nodig.

Lees ook het artikel '[Eerste aardwarmte aardbeien ter wereld geplukt in de Koekoekspolder](#)' op de website AGF.nl.

In opdracht van

- Ministerie van Economische Zaken

Zie ook

- > [Beleid Bodemenergie/Aardwarmte](#)
- > [Financiële ondersteuning](#)
- > [Financiële regelingen warmte en koude](#)

**first Geothermal  
strawberries  
2015**

# Kabinet wil af van gasverwarming

AD  
2/4/2015

## Minister Kamp praat vandaag Kamer bij

**DEN HAAG | Het kabinet wil dat Nederland zo snel mogelijk minder afhankelijk wordt van aardgas uit Groningen. Huizen moeten in de nabije toekomst voor een groot deel worden verwarmd door restwarmte en warm water uit de aarde.**

HANNEKE PEULTJES

In veel steden is het gasnet aan renovatie toe. Om te voorkomen dat daar onnodig veel geld in wordt gestoken, kiest het kabinet nu al voor een overstap naar alternatieven voor gas. Dat schrijft minister Henk Kamp van Economische Zaken vandaag aan de Tweede Kamer in zijn Warmtevisie.

In de tuinbouw en industrie wordt veel warmte opgewekt, bijvoorbeeld als bij de productie hoge temperaturen nodig zijn. De warmte die na zo'n proces overblijft, gaat nu verloren.

**Warmte door de aarde biedt deel oplossing**

wordt geleverd aan huishoudens. Het kan niet via het bestaande netwerk: er moet een nieuw stelsel van buizen komen, dat de warmte

naar woningen transporteert. In Zuid-Holland wordt al gewerkt aan zo'n 'warmteronde'. Kamp komt op korte termijn met een wetsvoorstel om de aanleg van warmtenetten te stimuleren.

In gebieden die straks helemaal overstappen op restwarmte of aardwarmte zullen nieuwe woningen niet meer worden aangesloten op het gasnet. Dat betekent een elektrische, keramische ductiekookplaat. » PB



Den Haag — 2 april 2015  
The NL Minister of Economic Affairs

Now  
The beginning of a new end...

8000  
BEL/LUX: €2,25 DUI/FRA/OOS: €2,75  
4 14 15  
8 710114 500014



FRONT PAGE ABOUT GEOTHERMAL ERA-NET PUBLICATION



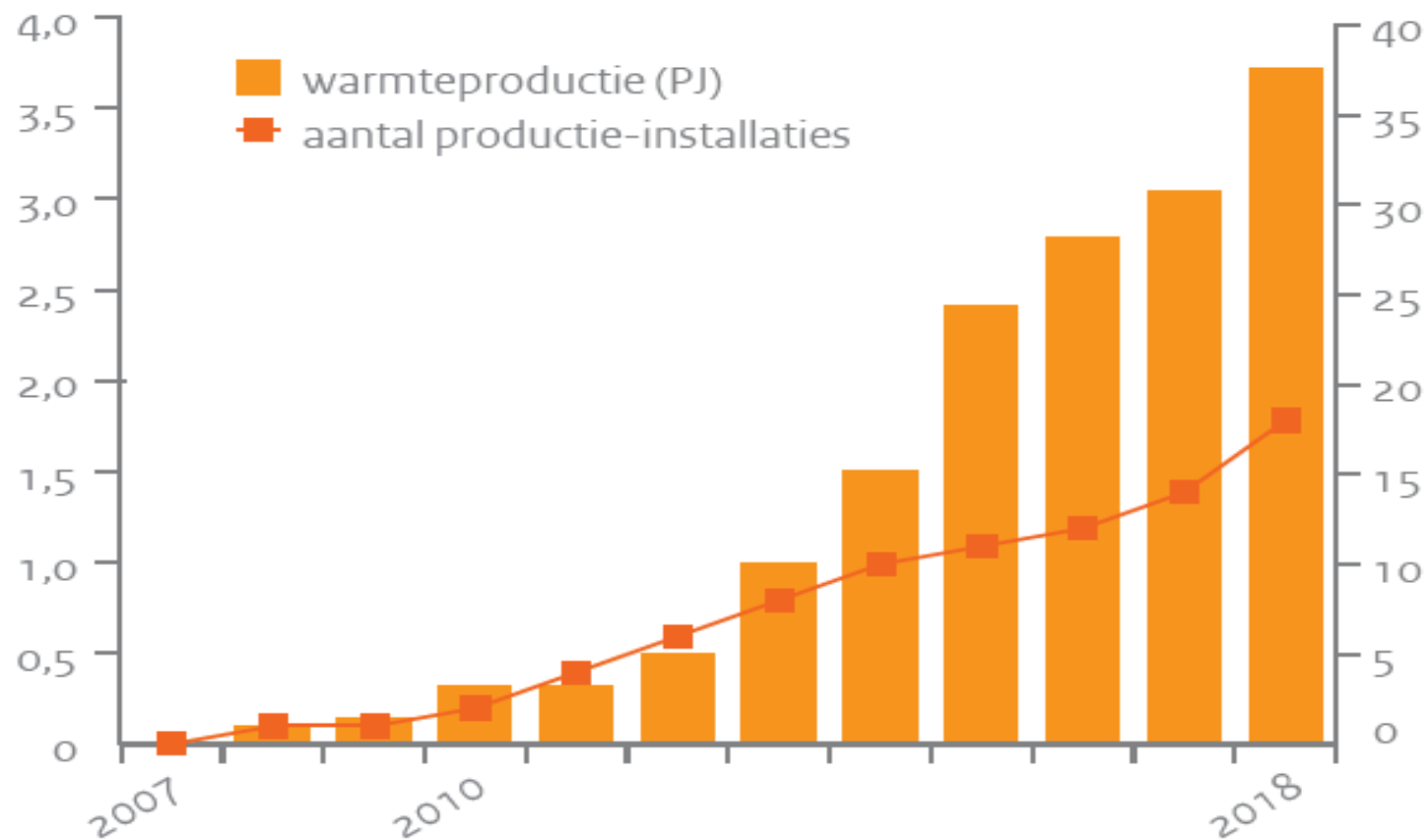
> water will be hot !





## ***The rapid development of Geothermal Energy in The Netherlands***

***Total Geothermal Energy produced in NL in 2019 > 5 PJ***

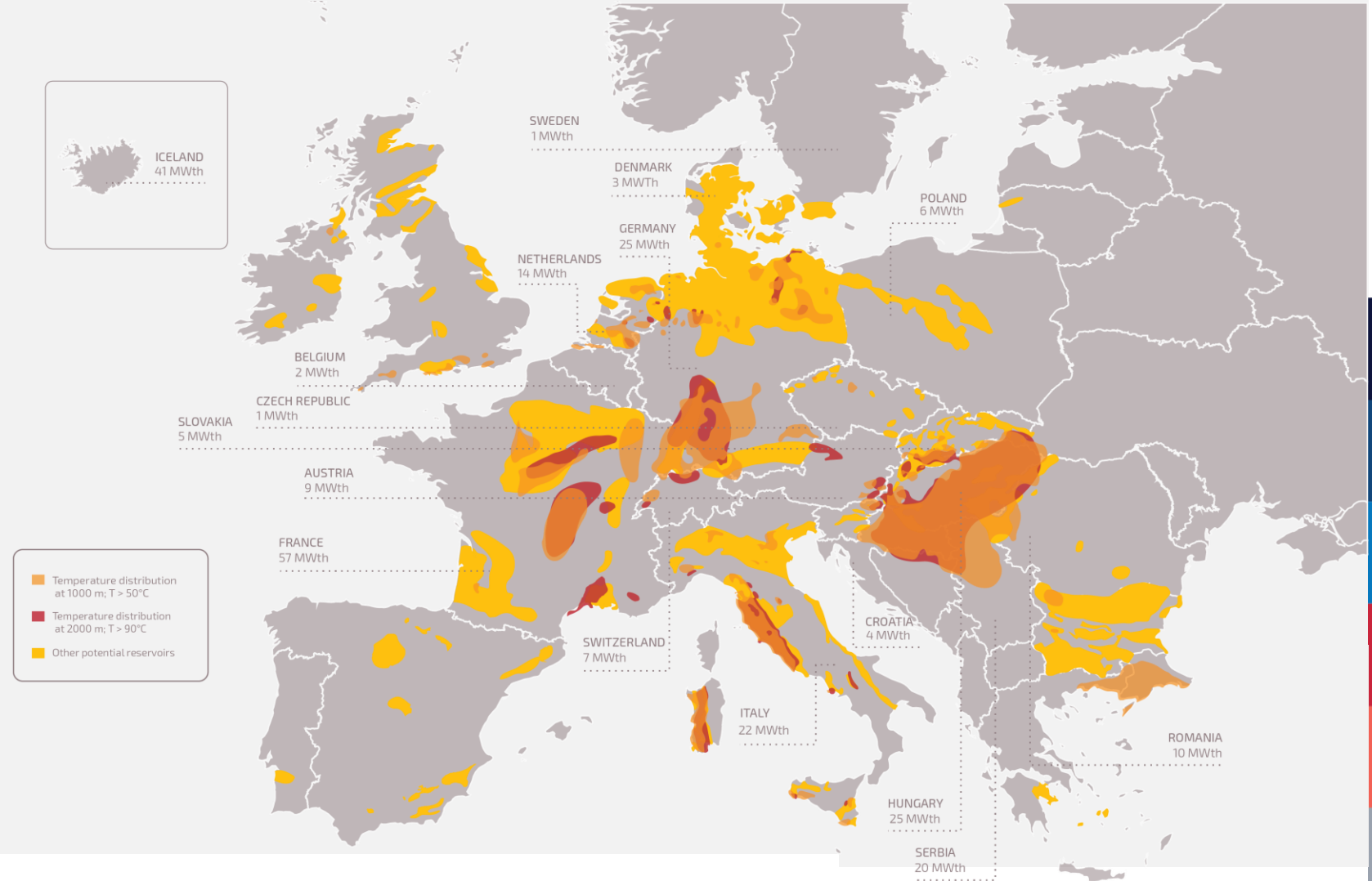


Totale aardwarmteproductie per jaar.

# More than 25% of the EU population lives in areas directly suitable for geothermal district heating

Map of areas suitable for geoDH networks and actual geoDH installed capacity according to available geological data

Source: ETIP-DG, adapted from GEODH and EGEC market report



# NL policy instruments and framework conditions





Paris 2015  
well below 2 °C



## NL Climate Agreement 2019

-95% CO<sub>2</sub> in 2050  
-49% CO<sub>2</sub> in 2030



Electricity

Agriculture  
 GEO

Built Environment  
 GEO

Industry  
 GEO

Mobility

# NL Climate Agreement 2019



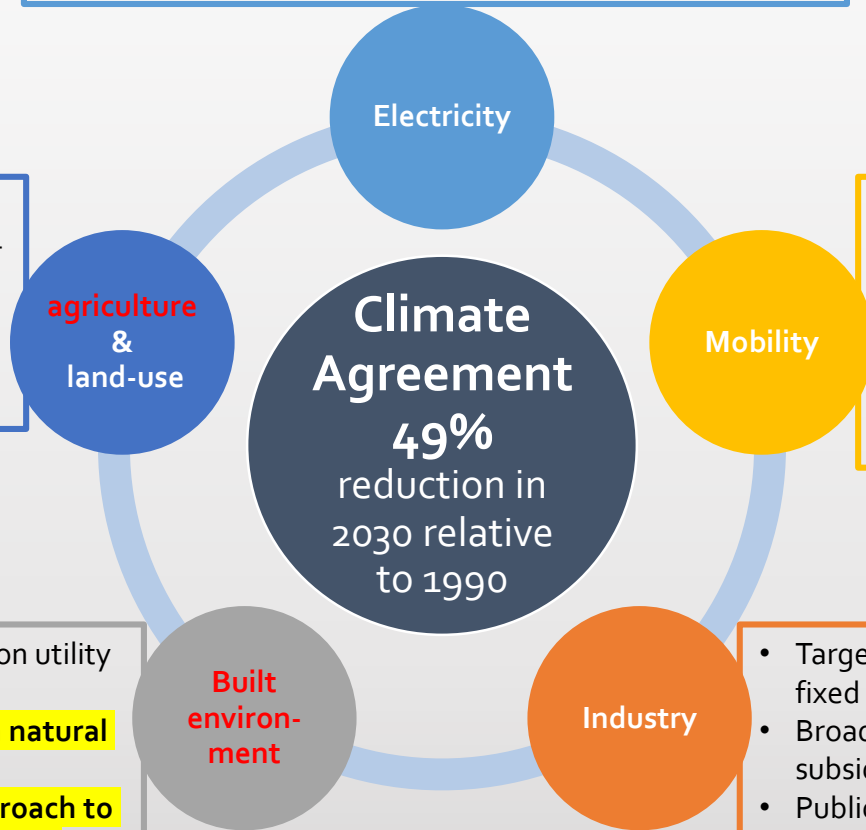
- Phasing out coal-fired electricity production by 2030
- Accelerating renewable energy (subsidized until 2025) to 70% in 2030
- CO<sub>2</sub>-minimum price for electricity-production



**-49% CO<sub>2</sub> in 2030**  
**10 years from now !**



- **Sustainable heating in greenhouse horticulture**
- Improved processing of manure to reduce livestock-emissions
- Exploring storage of carbon in soil and vegetation through pilot programmes and increasing forested surface



- 100% new-sold passenger cars zero-emission by 2030
- Promoting EV by taxation measures and 1,8 million charging points by 2030
- Modal shift to bicycle/public transport and smart logistics



- Enhancing EE of 1,5 million houses and 1 million utility buildings
- **New buildings will no longer be heated with natural gas**
- **Municipalities lead a local, participative approach to make housing emission free, neighbourhood by neighbourhood**



- Targeted carbon levy on every ton CO<sub>2</sub> emitted exceeding a fixed reduction path (push)
- Broadening the scope of subsidy scheme (SDE++) incl. limited subsidy for CCS (pull)
- Public-private innovation program for cost reduction in low carbon technologies
- Industrial cluster approach (incl. sector coupling)



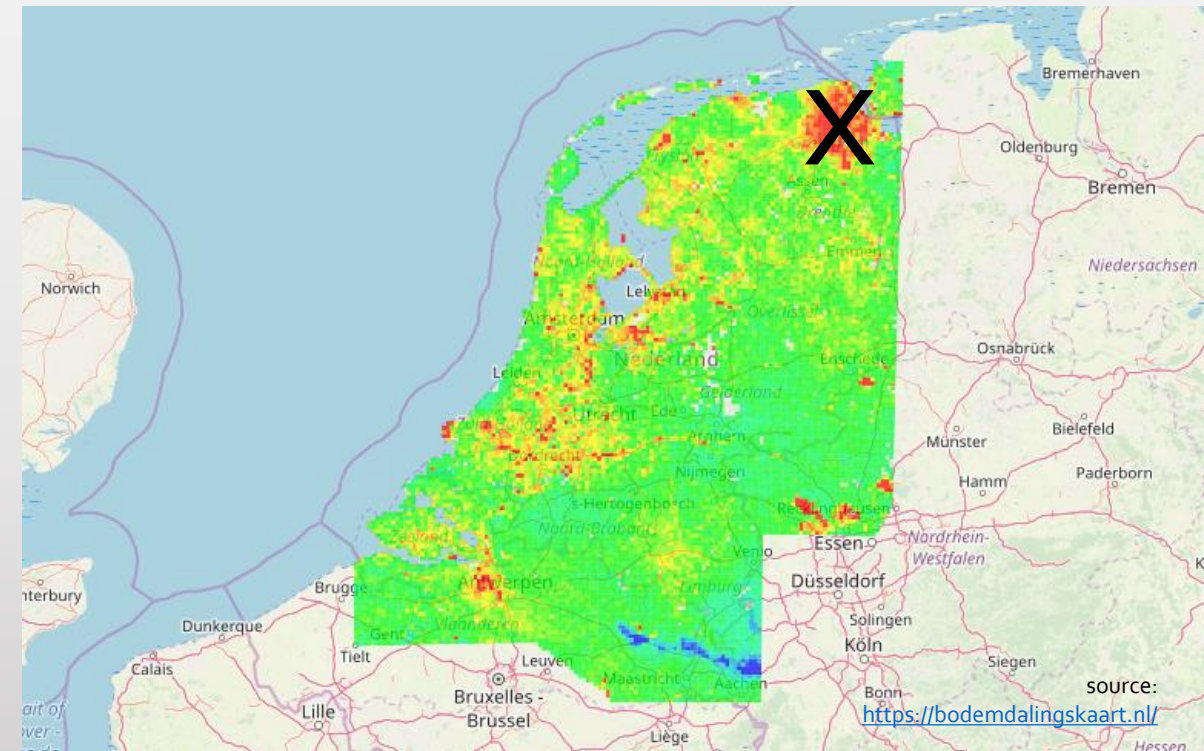
# NL Climate Agreement 2019

## Built Environment



- 2050: 7 mio houses + 1 mio other buildings 'van gas los'
- 2030: 1.5 mio existing houses 'van gas los'
  - Neighbourhood by neighbourhood
  - Municipalities know bij 2021 which neighbourhood will be tackled when
  - Residents will be involved
- Close of Groningen Gas field by 2022

**VAN  
GAS  
LOS**

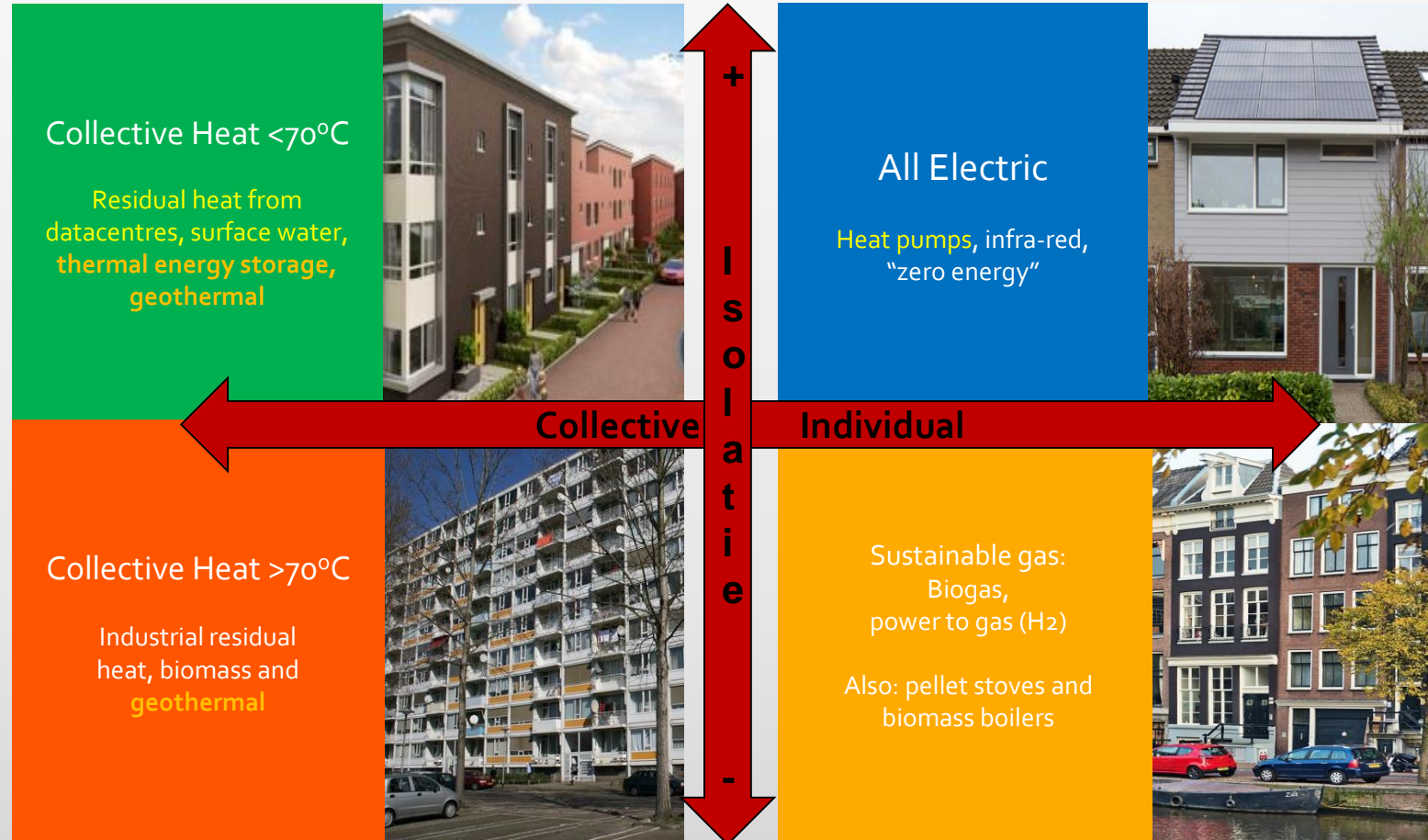


# Alternatives for Heating with natural gas



Switch from high temperature to low temperature (district heating) systems

Geo-thermal energy including geo-thermal energy storage as a source for district heating



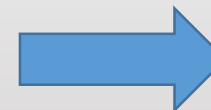


# Geothermal in the Built Environment



- Substantial potential share of **district heating** in 2050 (15 tot 45%)
- **Geothermal**: important source for district heating
- Without growth in (LT-)district heating, little growth geothermal energy
- Currently all (but one) geothermal projects connected to **greenhouses**
- Only one district heating system connected to geothermal ---> **Minewater Heerlen**

	2030	2050
Letter to Parliament	15 PJ	110 PJ
Climate Agreement	20 PJ	135 PJ
Masterplan (sector)	50 PJ	200 PJ



- 30 PJ Industry
- 80 PJ Built Environment and Horticulture

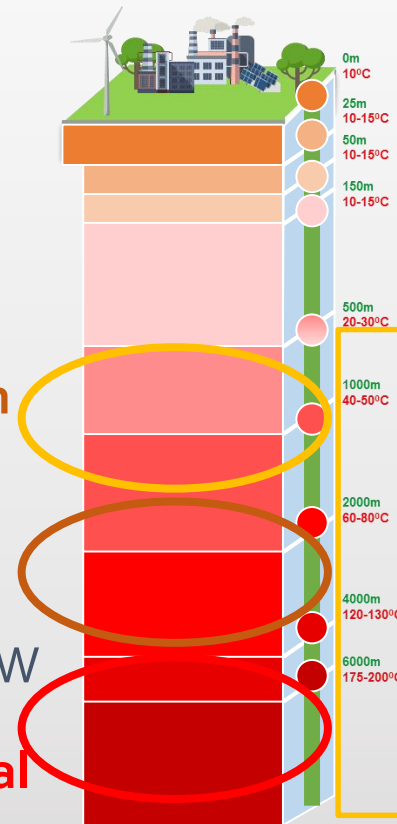


# Geothermal energy in the Netherlands



Status per 1/1/2019:

- 17 projects in use (≈4 PJ)
- 5 in test phase, 11 in preparation
- Current depths typically **between 2000 and 3000 m**
- Temperatures 70 – 90 °C
- Projects becoming larger: > 20MW
- Looking at **UltraDeepGeothermal**
- But **also shallower 500-1500m**



source: [www.hoewerkaardwarmte.nl](http://www.hoewerkaardwarmte.nl)

source: [www.geothermie.nl](http://www.geothermie.nl)



# Policy: to strengthen and accelerate



**Target: 20 PJ in 2030; 135 PJ in 2050**

- On top of **regular subsidy (SDE+)** and **geothermal guarantee schemes (RNES)**
- Special legislation for geothermal (before equal to oil and gas)
- Exploration of subsurface: SCAN
- Center of Expertise Heat: ECW
- State participation
- **Innovation**

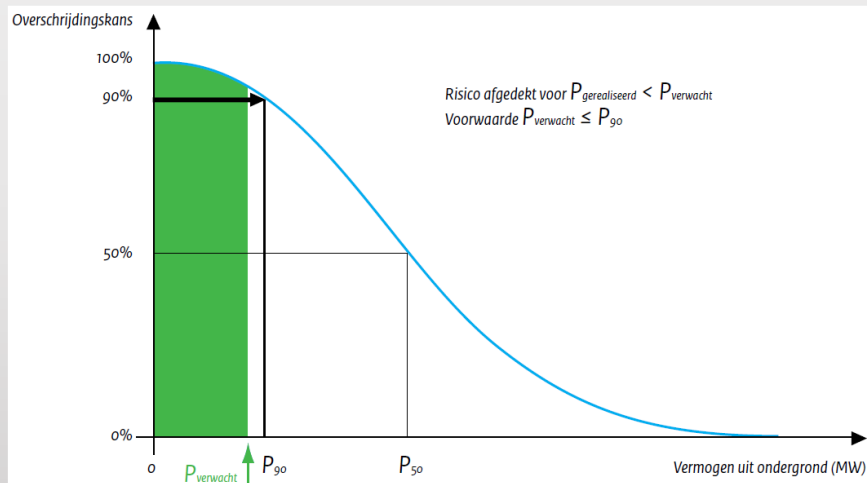
# Subsidy & Garantie schemes



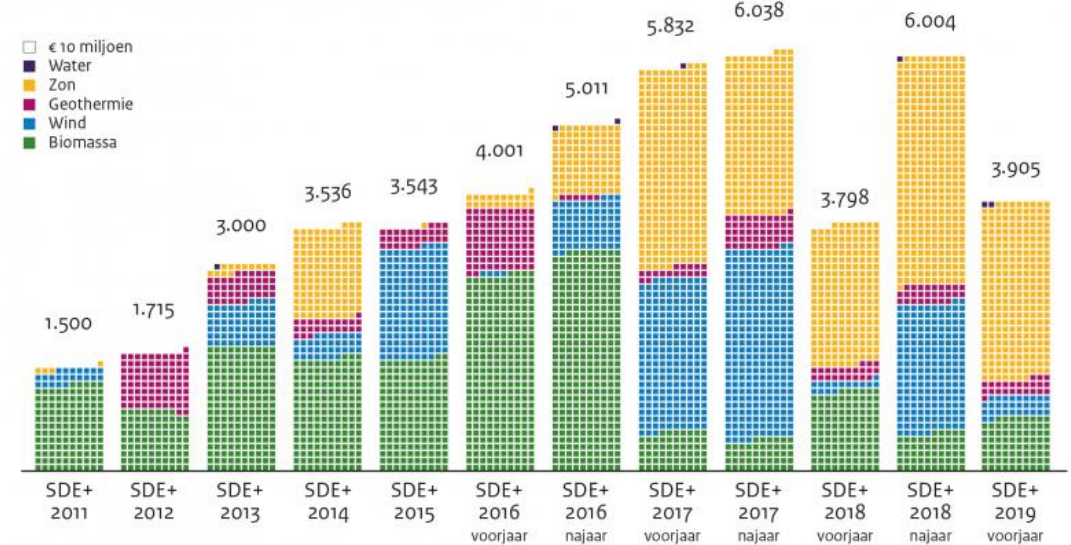
## Geothermal Guarantee Scheme [www.rvo.nl/aardwarmte](http://www.rvo.nl/aardwarmte)

To cover the geological risk ( $P_{90}$ )  
9 rounds, start in 2009

- 28 projects submitted, 11 realized
- **M€ 146** cumulative guarantees
- **4** claims



Verplichtingenbudget  
per technologie in de verschillende SDE+-rondes

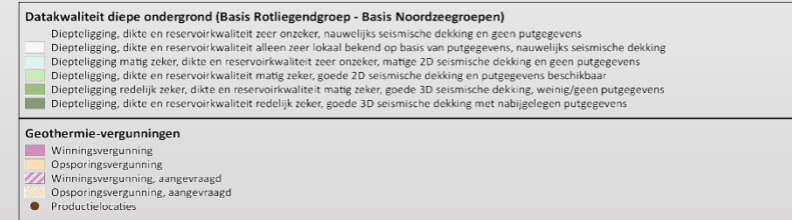
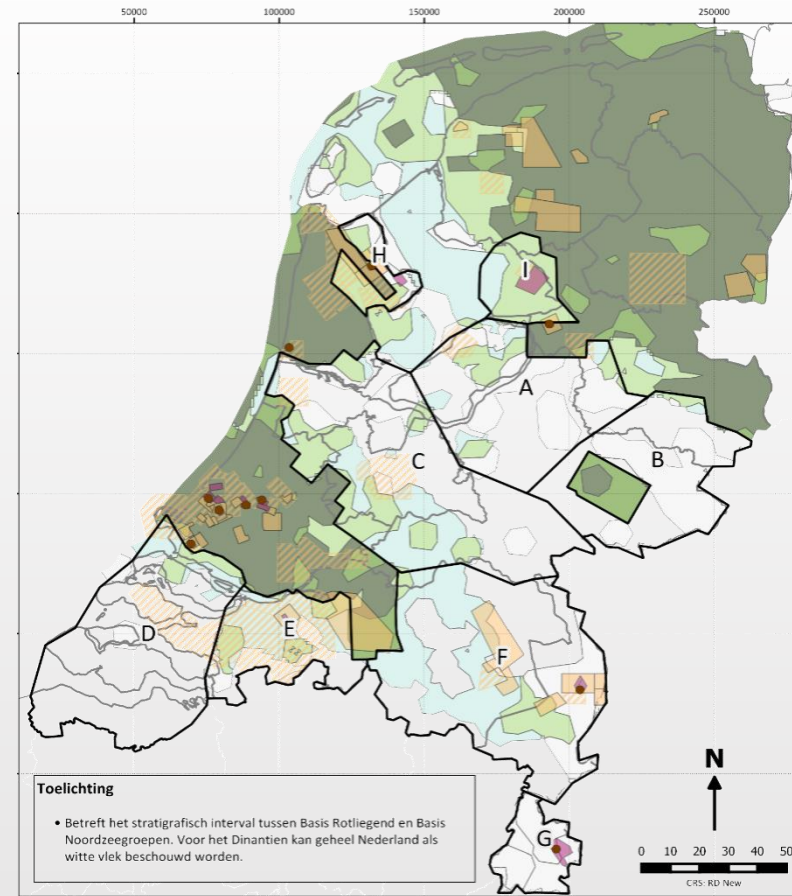


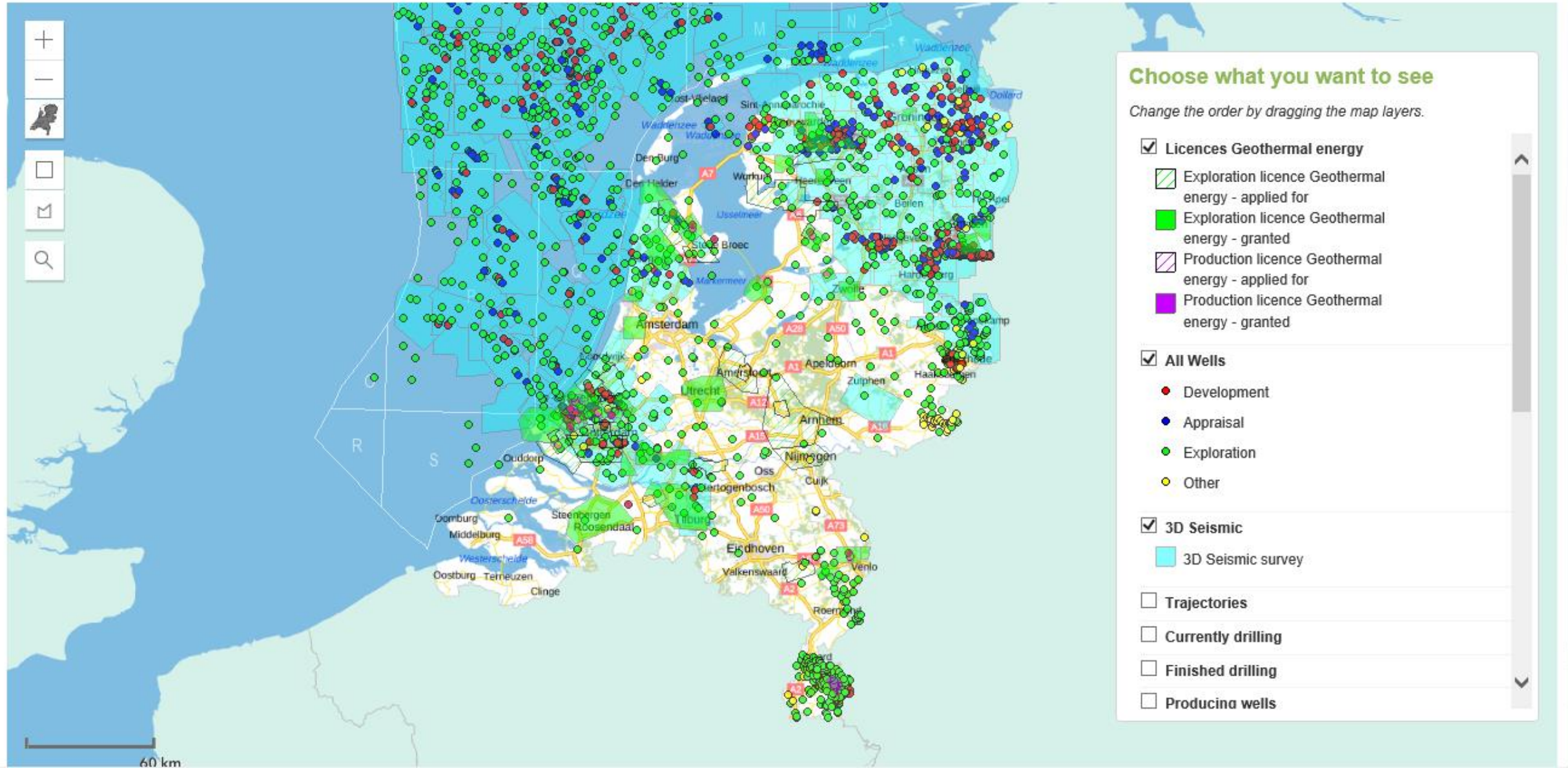
## SDE+/SDE++ [www.rvo.nl/sde](http://www.rvo.nl/sde)

- Subsidises production of renewable energy including **Renewable Heat** since 2012
- **41** projects, > 850 MWth
- 18 projects operational (1/1/2020)
- 0,023 €/kWh subsidy for geothermal heat

# Public Mining Data & Subsurface Exploration

- **NLOG**: central database [www.nlog.nl](http://www.nlog.nl)  
all mining data in NL  
public after 5 years
- Knowledge from oil and gas
- **SCAN**: Seismic Survey to increase knowledge of the subsurface ('White spots')

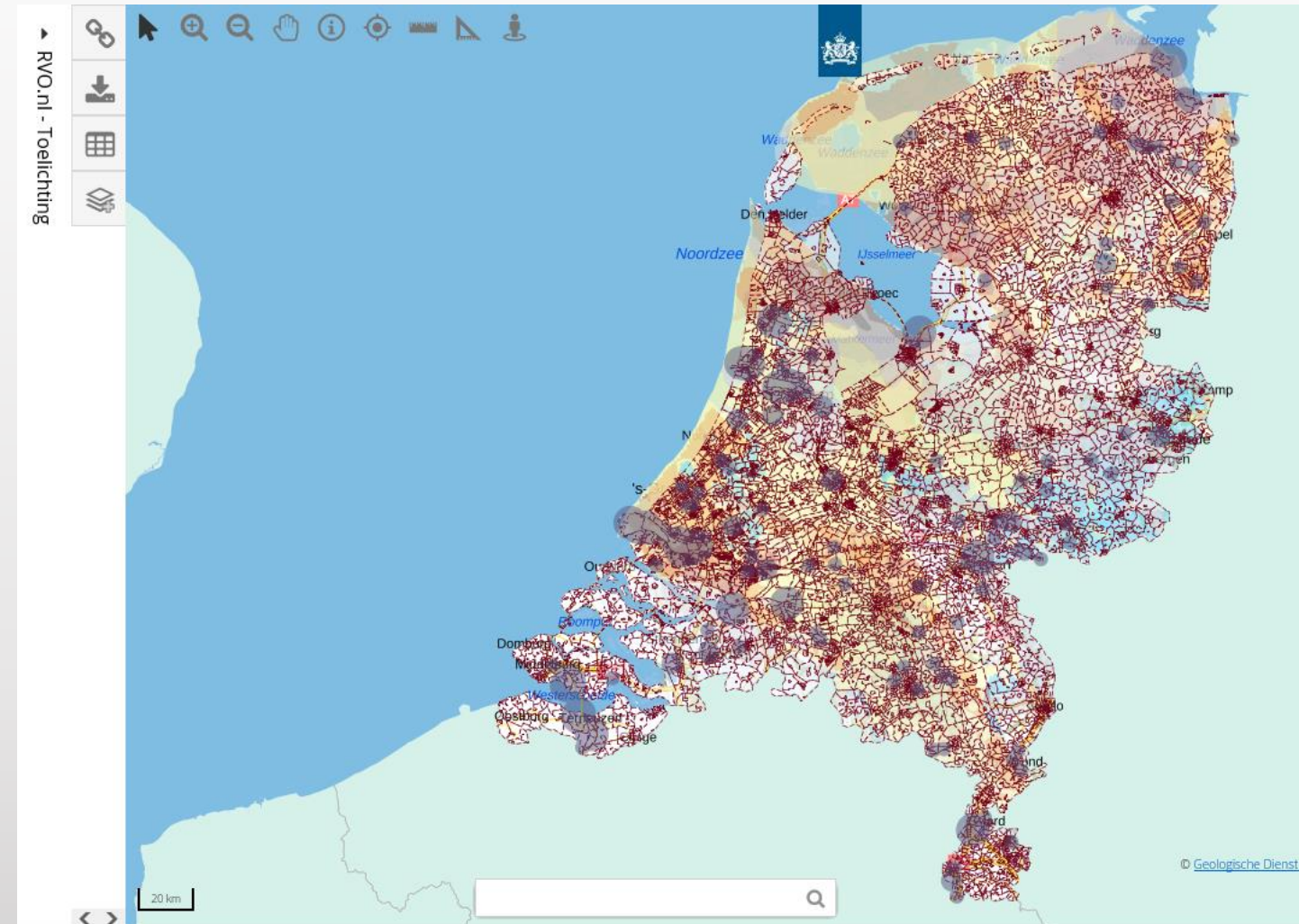




# Centre of Expertise Heat & Heat Atlas



- **ECW**: Center of Expertise Heat @ RVO  
Knowledge Center for **Heat Transition in the Built Environment**  
[www.expertisecentrumwarmte.nl](http://www.expertisecentrumwarmte.nl)
- **WarmteAtlas.nl**  
RVO HeatAtlas of the Netherlands:  
database with **heat demand & sources** per neighbourhood  
[www.warmteatlas.nl](http://www.warmteatlas.nl)



# Innovation


- New markets
- Innovative technology
- **Innovative concepts !!!**
- **Large scale Demonstration > Implementation**
- Integral approach needed
- make geothermal robust, affordable and widely applicable > **Make Heat Transition possible**



OICW: Rijswijk Open  
Innovation Center for  
Sustainable Geo-Energy



## Innovation Instruments @RVO

- **MMIP Renewable Heating & Cooling**   
Multi-annual Mission oriented Innovation Programme (*mid-TRL*)  
**Warming Up (19 M€**, started 1/1/2020)  
integral approach incl. Geothermal / Storage
- **DEI+ (*high-TRL*)**   
Demonstration Energy & Climate Innovations  
**95M€** in 2020, max. 15M€/project
- **HE (*high-TRL*)**   
Renewable Energy Innovation projects  
**2x50 M€** in 2019 and 2020, max. 6M€/project
- **European+ cooperation:**



**Deep GEOTHERMAL IWG**  
SUPPORT UNIT



a huge task in front of us  
the **Heat Transition**

we need  
large scale  
**Demonstration & Implementation of Geothermal**

and  
**innovation**  
(concepts & technology)  
to make geothermal robust, affordable and widely applicable

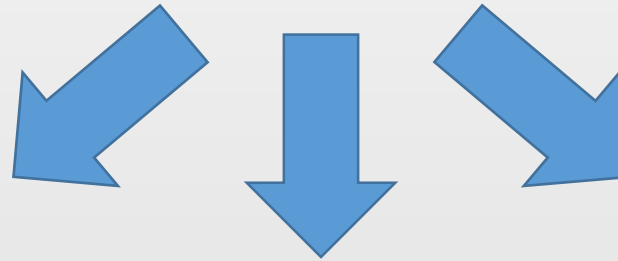






a huge task in front of us  
the **Heat Transition**

we need  
a **vision**  
for our future



Geothermal Food



Geothermal Industries

Geothermal Cities



# Our Geothermal Food



# Our Geothermal Cities



# Our Geothermal Industries



a huge task in front of us  
the **Heat Transition**

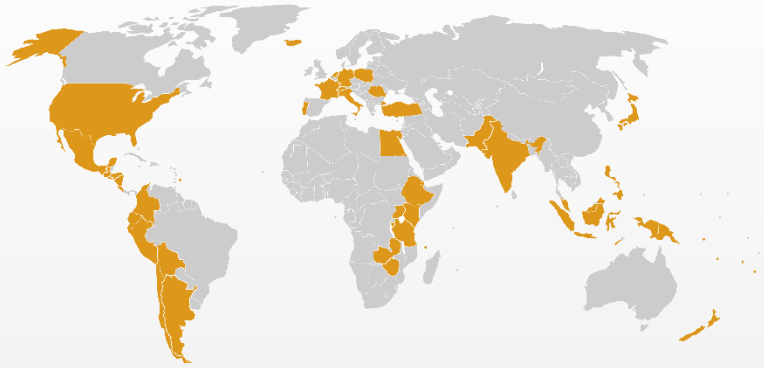
we need  
**all of you !**

Industry

Research

Public authorities  
National, Regional & Local authorities





**Geothermal**  
**=**  
**'Local for Local'**

*but we need as well*

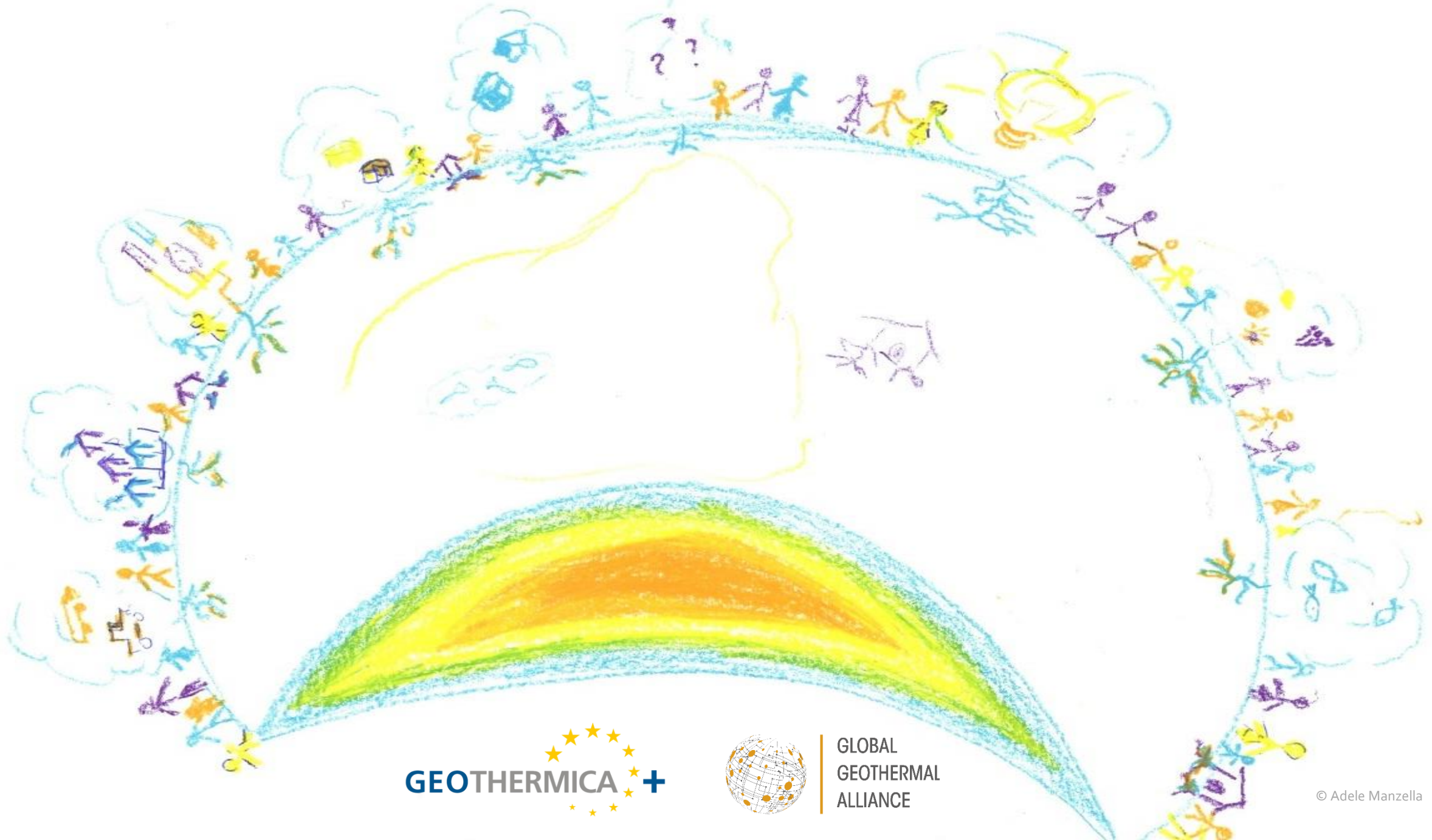
**global cooperation**  
**for a**  
**heating & cooling transition**

*a joint vision*

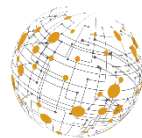
*a common strategy*

*technology & knowledge-sharing & hands-on cooperation*





  
**GEO THERMICA +**



**GLOBAL  
GEO THERMAL  
ALLIANCE**

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# Thanks for your attention !

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