
HoCoSto
HOT COLD STORAGE
- F R A N C E -

Chronology and history of HoCoSto

NL 2012 Concept development — 2015 Creation — Patent — Commerc. — Inno awards — Nagele — Mult. projects — Orders +30M€, *2021 salaries → 25*

FRANCE — Exploration — Networks, 1st projet — Creation of HCS France, TO → 1-3M €, employees 5 - 8

HoCoSto Netherlands:

- 2012 - 2015: the development of the product and the concept
- End of 2015: creation of HoCoSto BV (Netherlands) by founders René and Gerda Geerts
- 2016: patent application period
- 2017: commercial market development in the Netherlands
- 2018: winner of two Innovation Awards
- 2018 October: winner of the Village Nagele project
- 2019: Several projects won, prepared and put into service
- 2020: +/- 15 MES project and 30 projects sold, orders + € 30M, 11 employees, 2021 to grow towards 25 employees

HoCoSto France

- 2018: exploration of the French energy market
- 2019: market and network development in France, 1st project: EPF Engineering School in Montpellier
- 2020: creation of HCS France SAS (HoCoSto France) and exclusive contract included in +/- 10 commercial trajectories
- 2021 - 2023: Turnover 1 - 3M €, 5 - 8 employees

Challenges / barriers

In developing the French market for HoCoSto I encountered the following points:

Barriers:

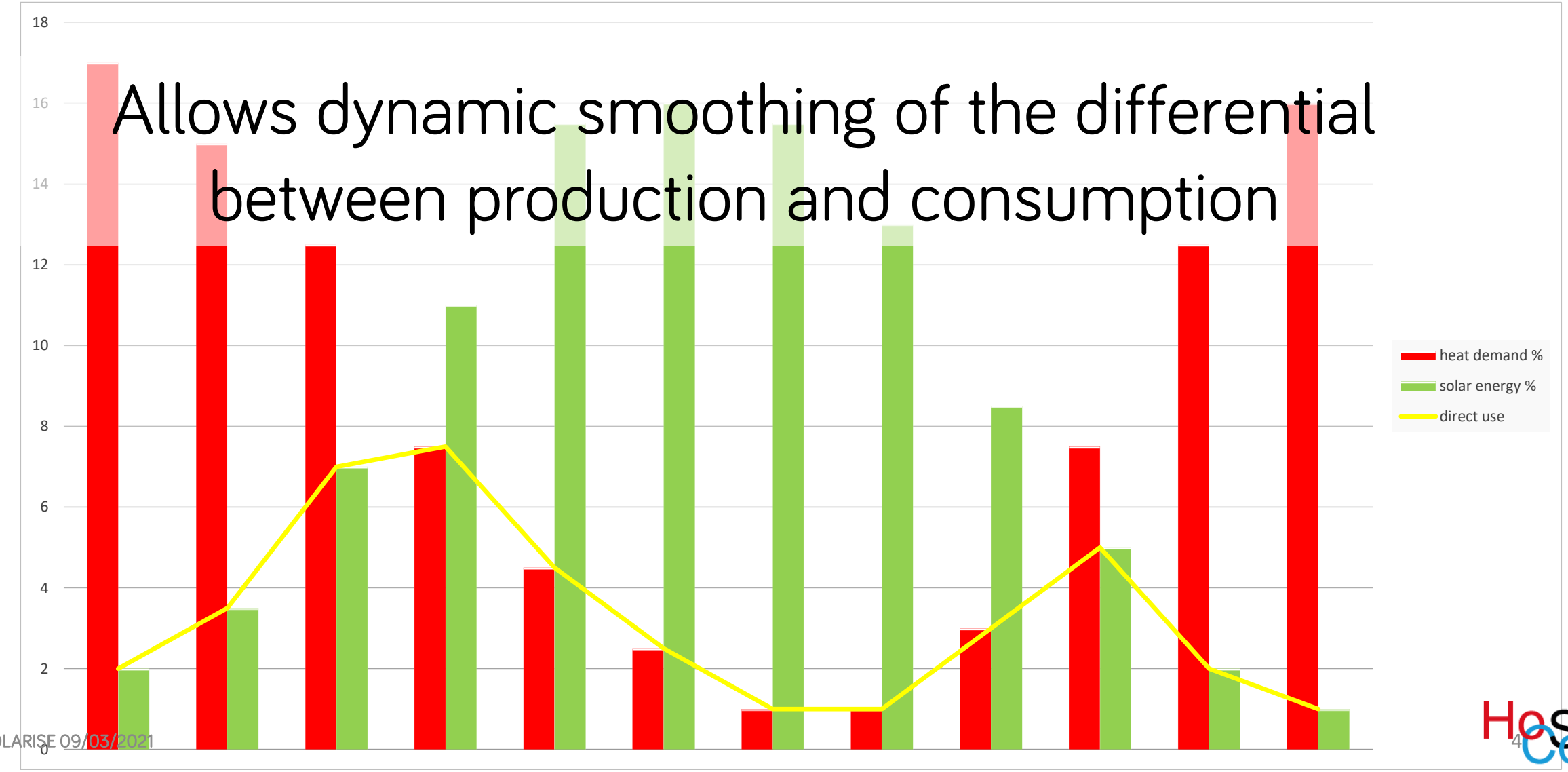
- not high tech, it is based on simple (physical) principles with measurement and control technology that organizes it
- unfamiliarity with the subject, while the principle is already old. The first district heating project based on the principle of seasonal storage dates from 2007 (Munich).

Construction of the seasonal heat storage in Munich, 5700 m³, 2007

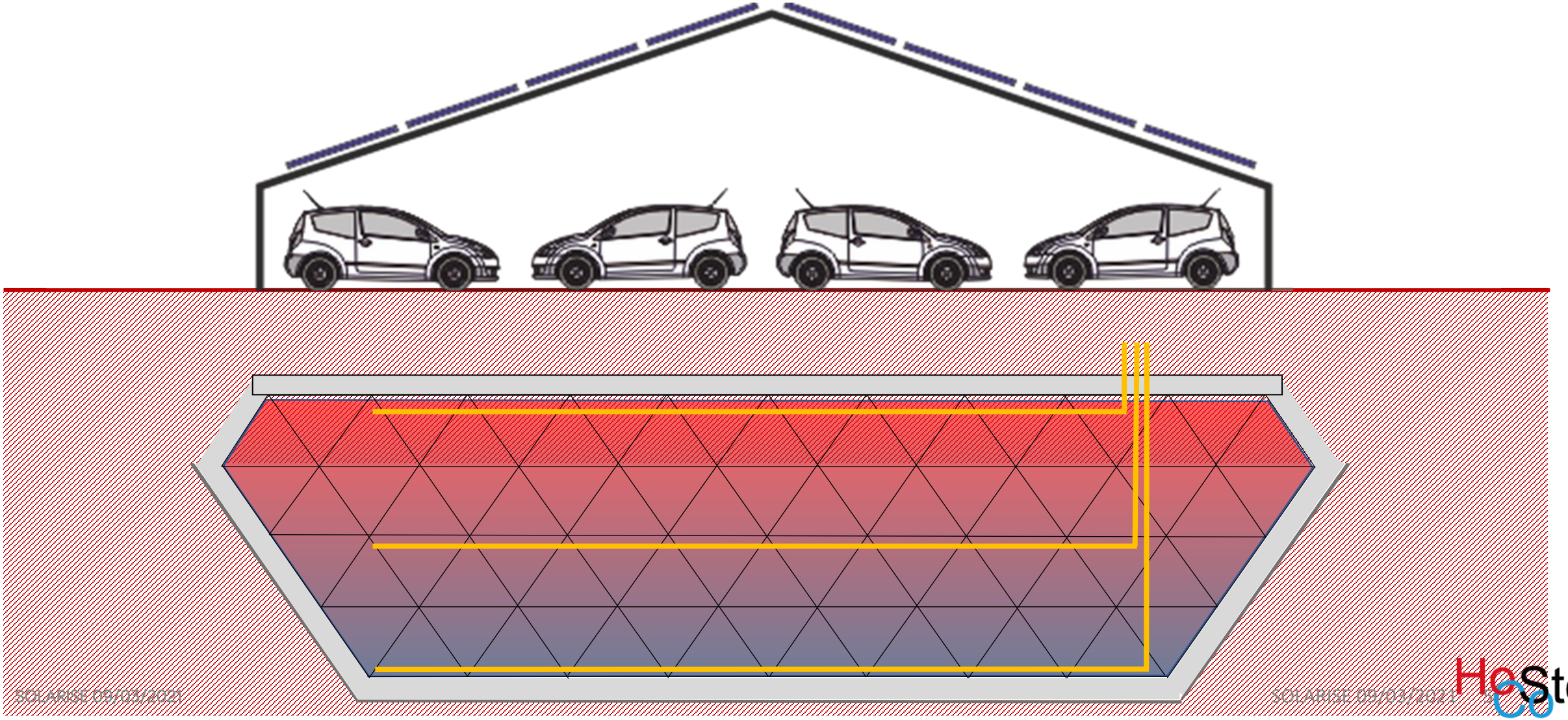
Challenges:

- Focus on "all electric", especially in France. While the networks are already overloaded, and the direct use of heat is many times more efficient.
- There is (still) a lack of regulations for (underground) seasonal storage for heat.
- Even at the level of the Adème Heat fund, it seems not to fit into the existing formats. Have had advice to adjust the concept to make it suitable

The conceptual solution



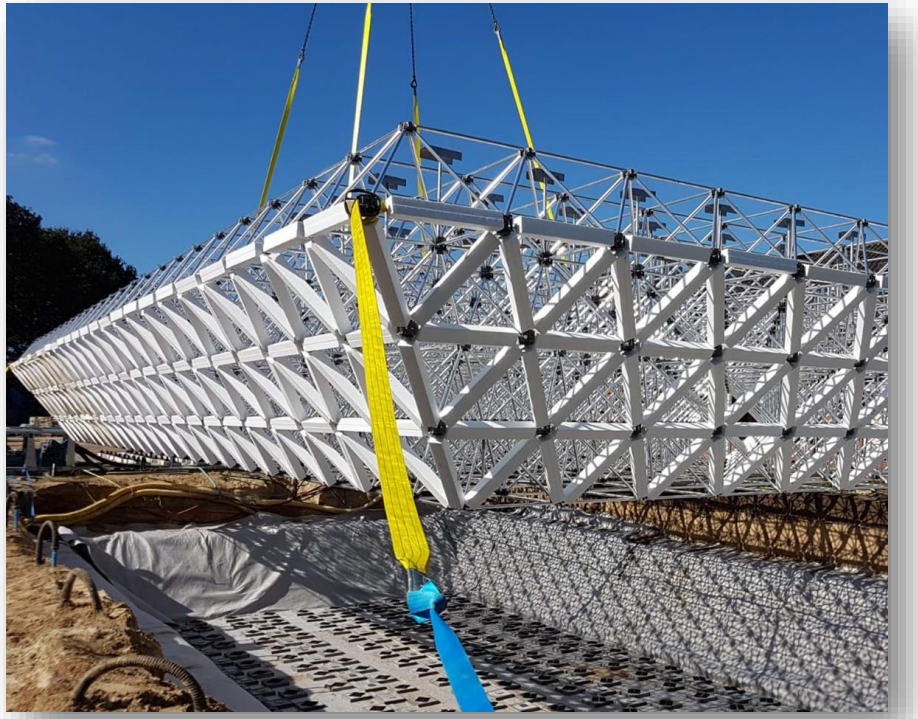
What is the HoCoSto storage?



SOLARISE 09/03/2021

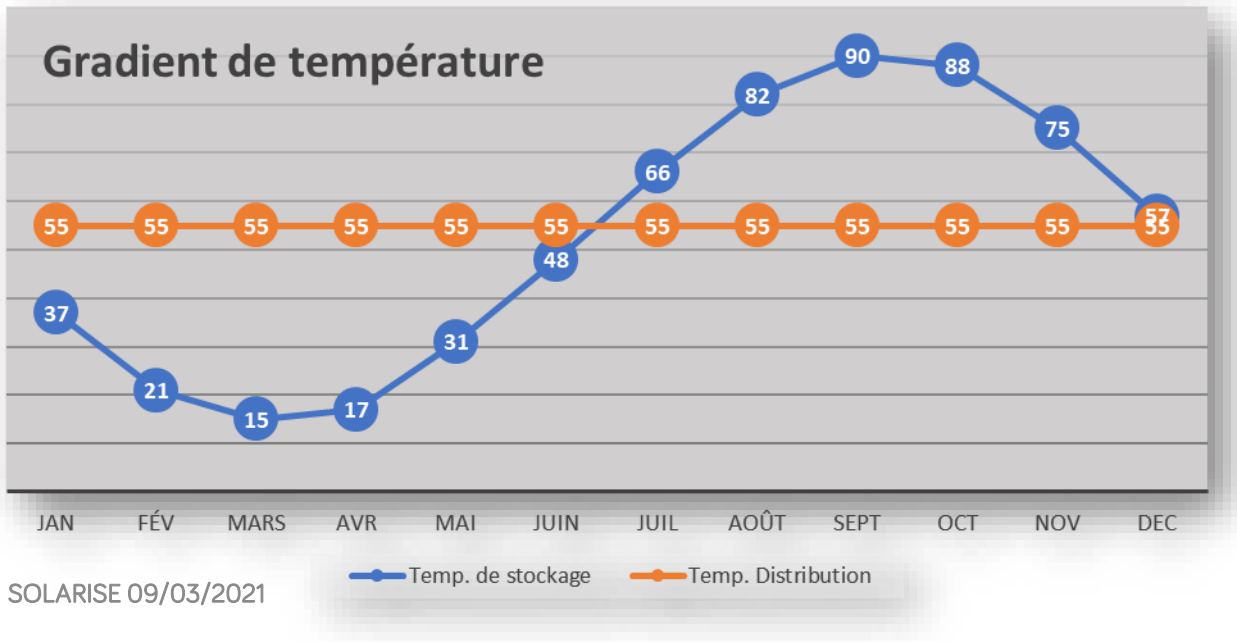
What is the HoCoSto storage?

- Underground Seasonal thermal energy storage
- Patented internal load-bearing structure (4 ton / m2)



What is the HoCoSto storage?

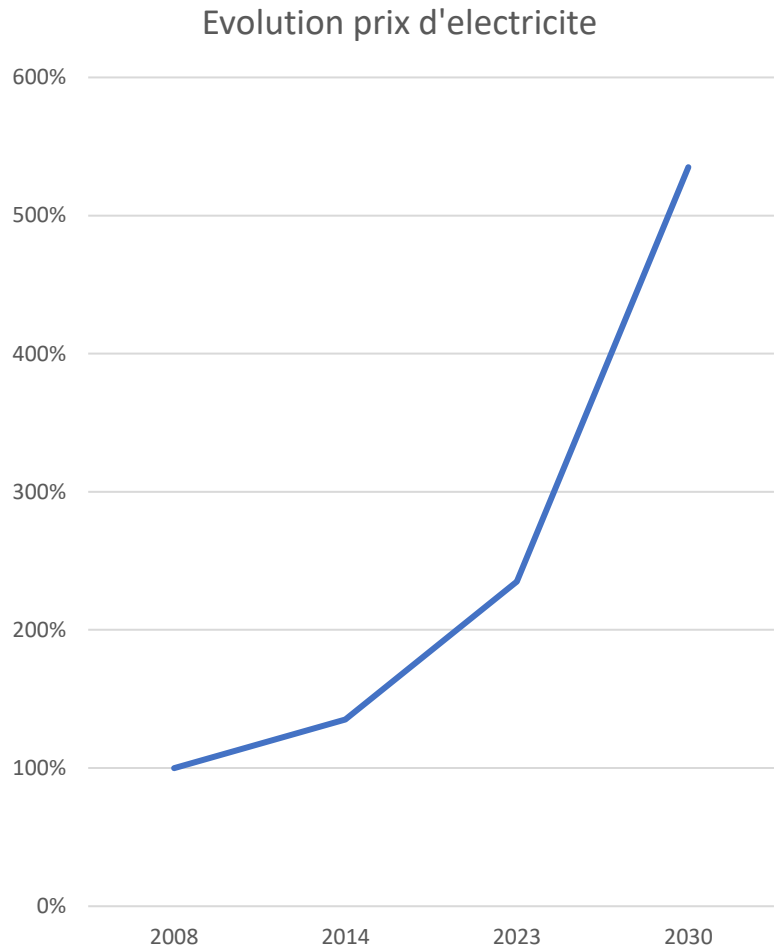
- Unique and patented seasonal thermal energy storage (STES)
- With patented internal load-bearing construction
- No concrete construction required, so quick installation possible (approx. 1 month)



- Not an air-ground heat exchanger
- SETS works with higher temperatures (up to 90 ° C) (blue line)
- System temperature depends on the project (orange line)

What is the HoCoSto storage?

- Very good alternative for "all electric" heating given the price evolution in the years to come
- Possibility of local and decentralized energy collection and storage

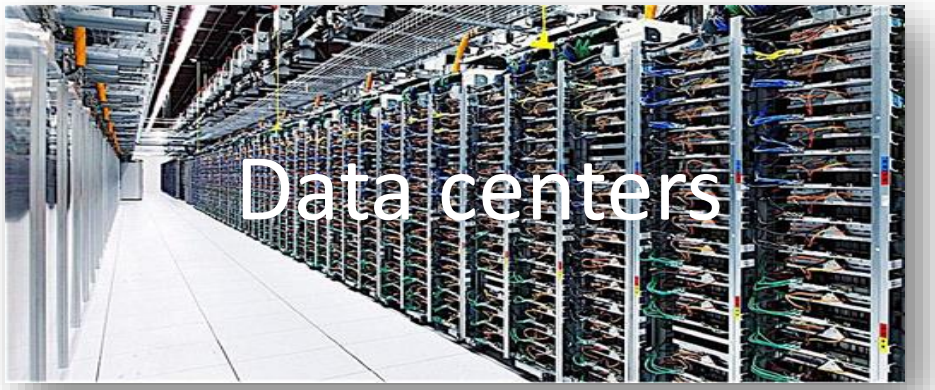


Source:

1: Heating & DHW buildings

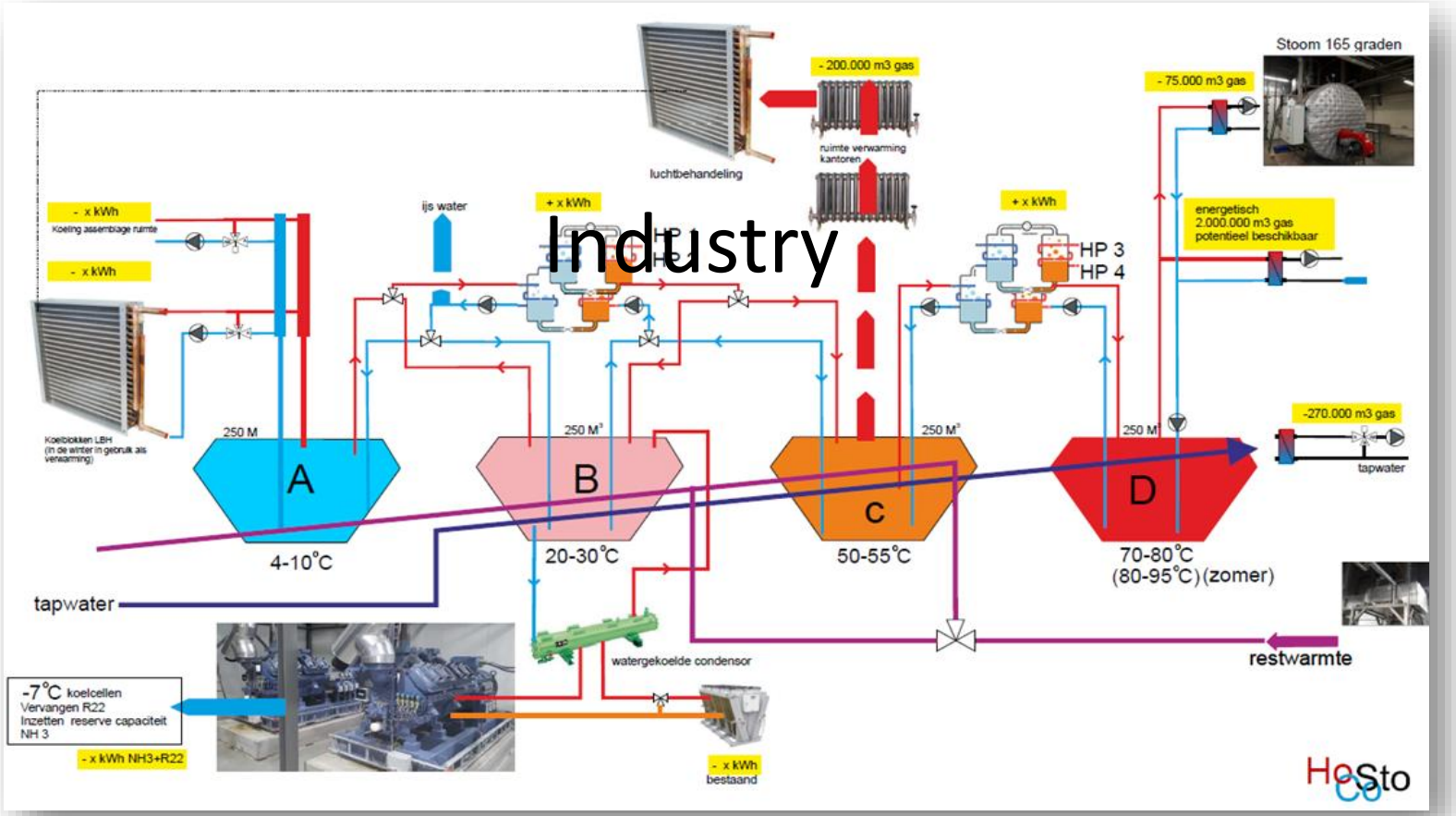
- Create the possibility of 100% thermal neutrality
- Reducing CO2 emissions, reducing carbon tax costs
- No fossil fuels for heating & DHW

2: Intermediate / peak shaving



- Reuse of cooling residual heat
- Minimize energy loss
- Heat return to nursing homes or even to districts and villages
- Reduce the power of the heat pumps (-50%)
- Heat return to buildings or even neighborhoods

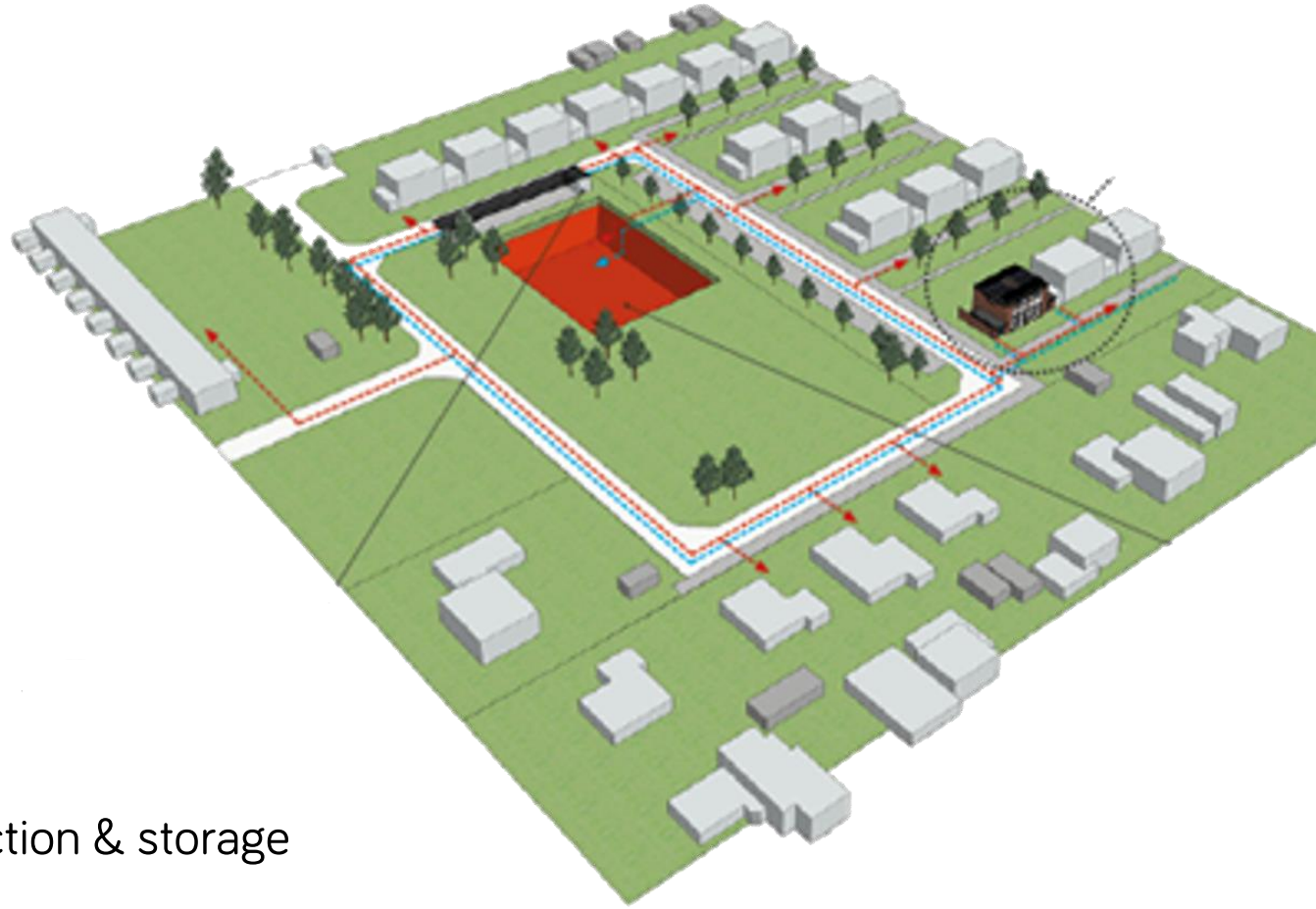
3: Recovery of heat



- Reduction of CO2 emissions
- Reduce carbon tax costs
- Recovery and reuse of process heat
- Process temperatures up to 150 ° C

Applications:
Eco-districts - Community networks

- Eco-districts with:
  - townhouses,
  - apartment complexes,
  - schools,
  - sports complexes



- Self-consumption:
  - heat without natural gas
  - local and decentralized thermal energy production & storage

Project Eco-district:
Village Nagele Pays-Bas

- **Environmental benefit:**
  all the thermal energy required comes from renewable energies.
- **Solution:** gradual transition to collection with thermal panels and HoCoSto combined with heat pumps.
- **Storage and distribution** to "smart grid" and 4 storage areas of 1.500m3

Nagele village heating network, N-O polder Netherlands

- elected by the government as one of the pilot projects to realize a village without natural gas and / or electricity for heating and DHW
- **Project size:** 497 family houses, 4 churches, 3 schools & 6,200 m2 utility buildings

Investment:

- average € 28,000 per house

Project phase:

- work preparation and engineering

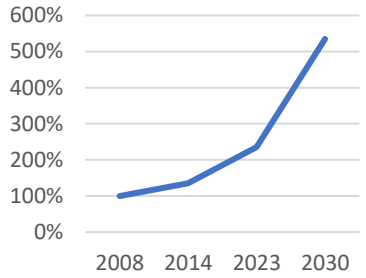
4 Steps:

- Implementation 2020 - 2024

The value proposition

- ✓ Reduced energy costs, free heat, all year round

- ✓ Good alternative to "all electric" and its increases + 400%



- ✓ Reduction of CO2 emissions, avoid carbon tax

- ✓ Save on the power of the heat pump - / - 50%

- ✓ Reasonable return on investment (11.7 - 17.2 years)

THANK YOU

HoCoSto

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HoCoSto
HOT COLD STORAGE
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Project : Energiek Nagele (NL)

Kernproject

Pilot project

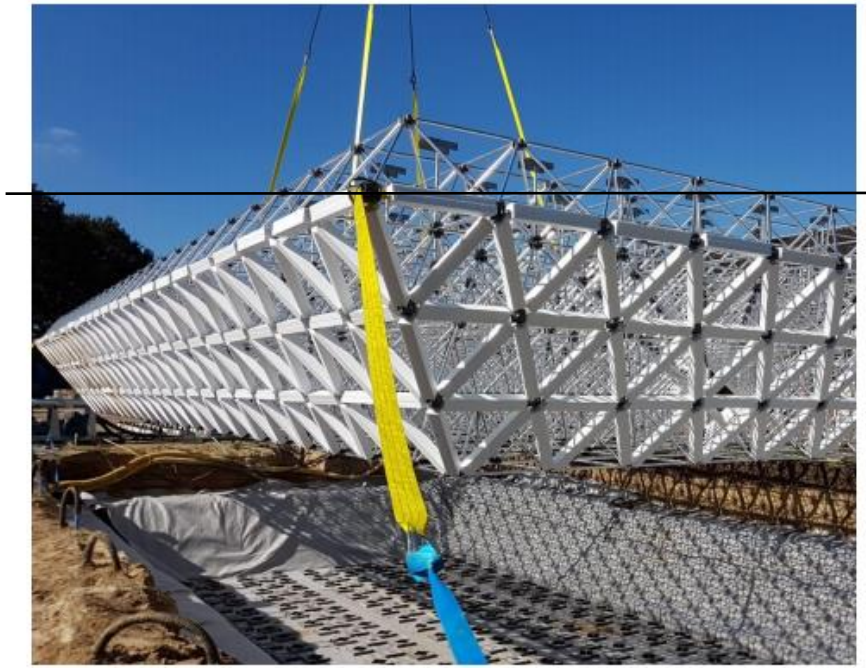
Energiek Nagele

Proeftuin aardgasvrije wijken

Pilot project
Eco-district without natural gas

Duurzame warmtevoorziening Kernproject.

Sustainable heat supply
Base project



Project : Energiek Nagele (NL)

Kernproject

Base project

Om ervaring op te doen starten we met een voorbeeldproject, voordat de andere woonhoven aan de beurt zijn. 8 woningen aan de Ring en voormalig schoolgebouw de Acht worden op deze manier als eerste voorzien van het nieuwe warmtesysteem.

Dit systeem bestaat uit opwekking van warmte door zonnecollectoren en een seizoensopslag van warmte (HoCoSto buffer).

As a first experience, we start with a pilot project before the arrival of the other residential lots.
There are 8 houses on the road “Ring” and the old school building “Acht” which will be the first to be equipped with the new heating system.

This system consists of heat production by solar collectors and seasonal heat storage (HoCoSto storage).

Project : Energiek Nagele (NL)

Warmte-opwekking

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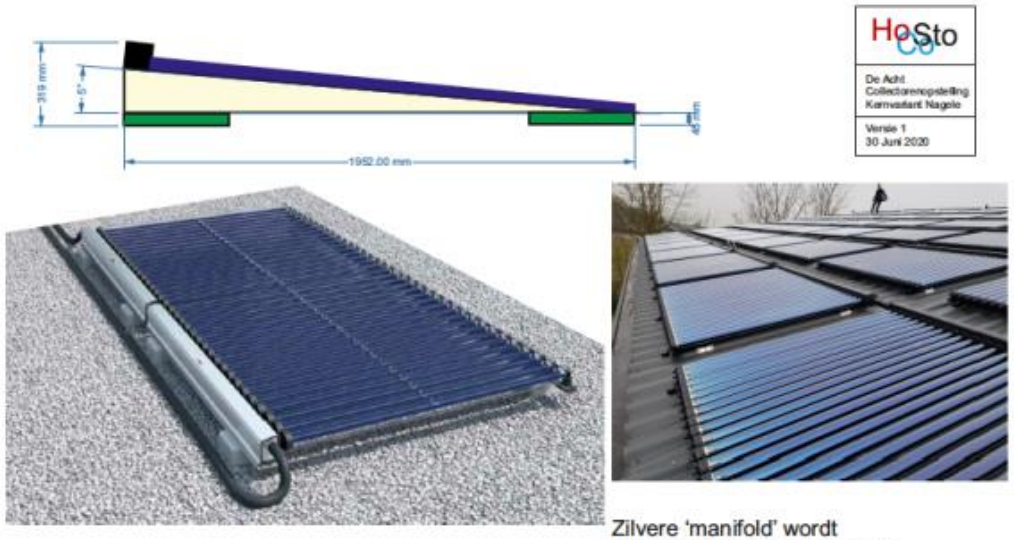
ENERGIEK NAGELE

Heat production

De warmteopwekking zal plaats vinden met behulp van zogenaamde U-pipe collectoren die op de (platte) daken liggen. Het voordeel van deze collectoren is dat ze zo goed als horizontaal liggen, en dus vanaf de grond niet te zien zijn.

The heat will be generated by collectors called "U-pipe" collectors on the (flat) roofs. The advantage of these sensors is that they are almost horizontal, therefore invisible from ground level.



Zilvere 'manifold' wordt
Zwart voor het project Nagele
I.v.m. zwarte dak

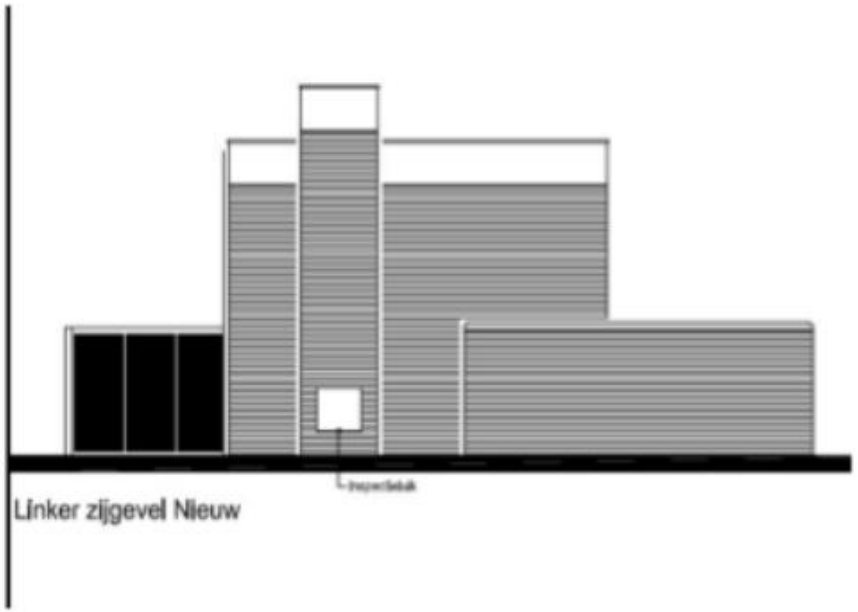
Project : Energiek Nagele (NL)

Maatregelen woningen aan de Ring

Preparation of houses on the “Ring"

- Zonneschoorsteen aan zijkant woningblok
- Warmtenet over het platte dak
- Dak doorvoer bij huidige rookgasafvoer
- Plaatsing afleverset (op plek van huidige CV)

- Solar fireplace on the gable of the building
- Roof heat network
- Roof terminal in the chimney flue
- Installation of the control unit next to the current CV



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Graafwerk voor de seizoensopslag

5

ENERGIEK NAGELE

Excavation for the seasonal storage

De warmte wordt opgeslagen in de ondergrondse buffer.
Het graafwerk voor deze seizoensberging moet heel precies gebeuren maar is met een paar dagen klaar.

The heat is stored in the underground buffer.
The excavation work for this seasonal storage must be done precisely,
but they will be ready in a few days.

Project : Energiek Nagele (NL)

Seizoensopslag

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Seasonal storage

Tegelijkertijd wordt de inwendige constructie voor de buffer gebouwd. Dit is een soort van groot K'Nex bouwwerk, wat we samen in elkaar kunnen zetten. Het dient om het bassin te verstevigen, en om te zorgen dat straks het terrein boven op de buffer weer gewoon gebruikt kan worden.

At the same time, the internal structure of the repository is assembled on site.
She went up like the "K'Nex" child's play.
The structure serves to strengthen the basin and ensure that the space above the storage can be reused normally.

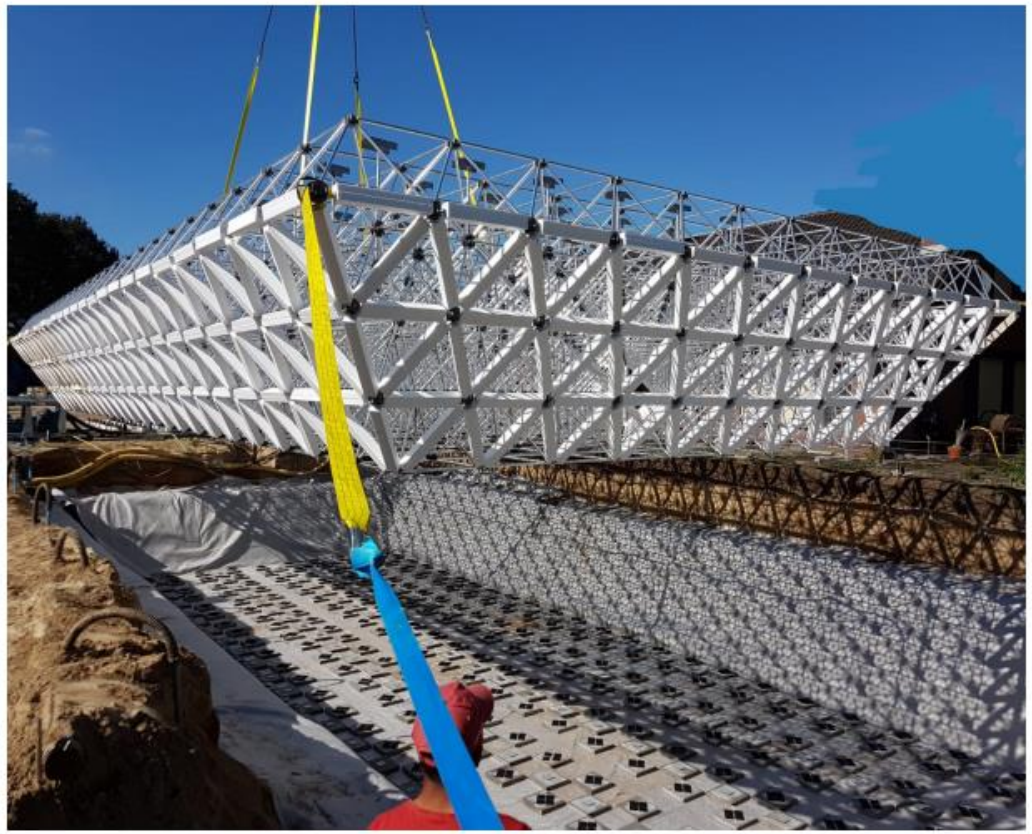
Project : Energiek Nagele (NL)

Seizoensopslag

Seasonal storage

Als alle voorbereidingen klaar zijn wordt de constructie ingetakeld.

When the assembly and all the preparations are complete, the structure is integrated.



Project : Energiek Nagele (NL)

Seizoensopslag

Seasonal storage

Het bassin wordt gevuld met water. De seizoensbuffer van HoCoSto is dus een goed geïsoleerd, ondergronds waterbassin. Door de goede isolatiematerialen en de natuurlijke isolatie van de aarde kan de warmte in de buffer maandenlang bewaard blijven.

De opslag voor het Kernproject krijgt een volume van ca. 1000 m3

The basin is filled with water. The HoCoSto storage is a well insulated underground basin.

Thanks to the choice of materials insulation and natural insulation from the earth, the heat of storage can be retained for months.

The storage for this pilot project will have a volume of approximately 1,000 m3.

Project : Energiek Nagele (NL)

Afdekken

9

De buffer wordt vervolgens geïsoleerd, afgedekt met bijna een meter grond, en is straks niet meer zichtbaar.

Coverage

The top of the storage is then isolated, covered with nearly a meter of earth and will remain invisible.

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Situatieschets Kernproject

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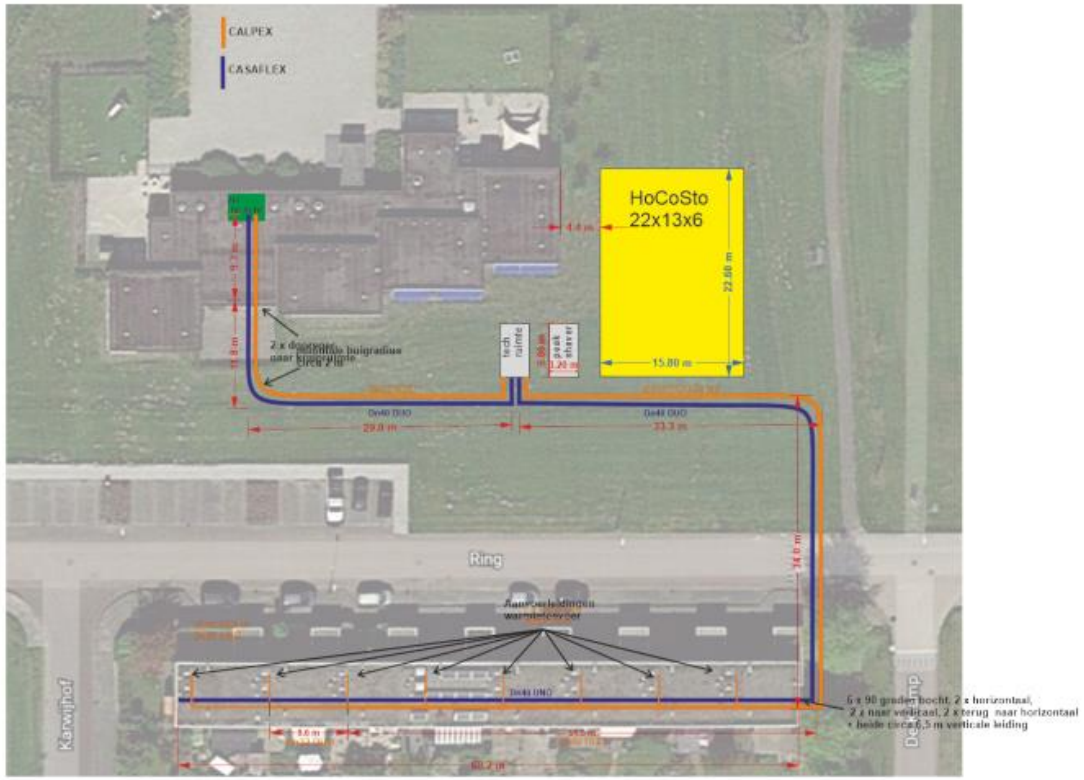
ENERGIEK NAGELE

Overview of the pilot project situation

De buffer en technische ruimte worden dus allemaal ondergronds aangelegd. Het warmtenet ligt deels boven op het dak. Het terrein is na oplevering weer gewoon bruikbaar als speelveld.

The storage and the technical area are therefore all installed underground. The heating network is partly on the roof.

Once completed, the site can once again be used as a playground.



Project : Energiek Nagele (NL)

Robert weet meer

Robert knows more ...

Voor meer informatie bekijk ook de animatiefilms met Robert de Robot op www.energieknagele.nl

For more information, see also the animated films with Robert de Robot on the website: www.energieknagele.nl

They even have their own mascot: Robert the robot

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www.hocosto.com

Thank you

HoCoSto

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