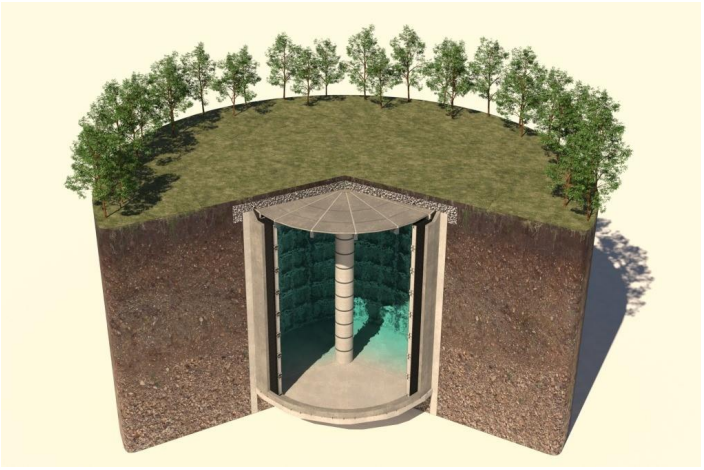
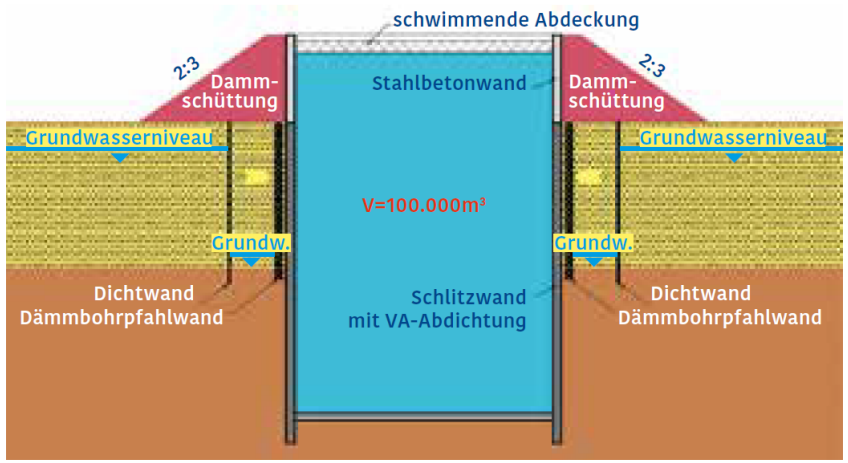
ecovat

gigaTES





Agenda:

1. (dis)Advantages
2. 2 example initiatives
3. Gigates
4. Ecovat
5. Integration
6. Legal

Underground Tank Thermal Energy Storage (TTES)

By GroeneWarmte

14-12-2023

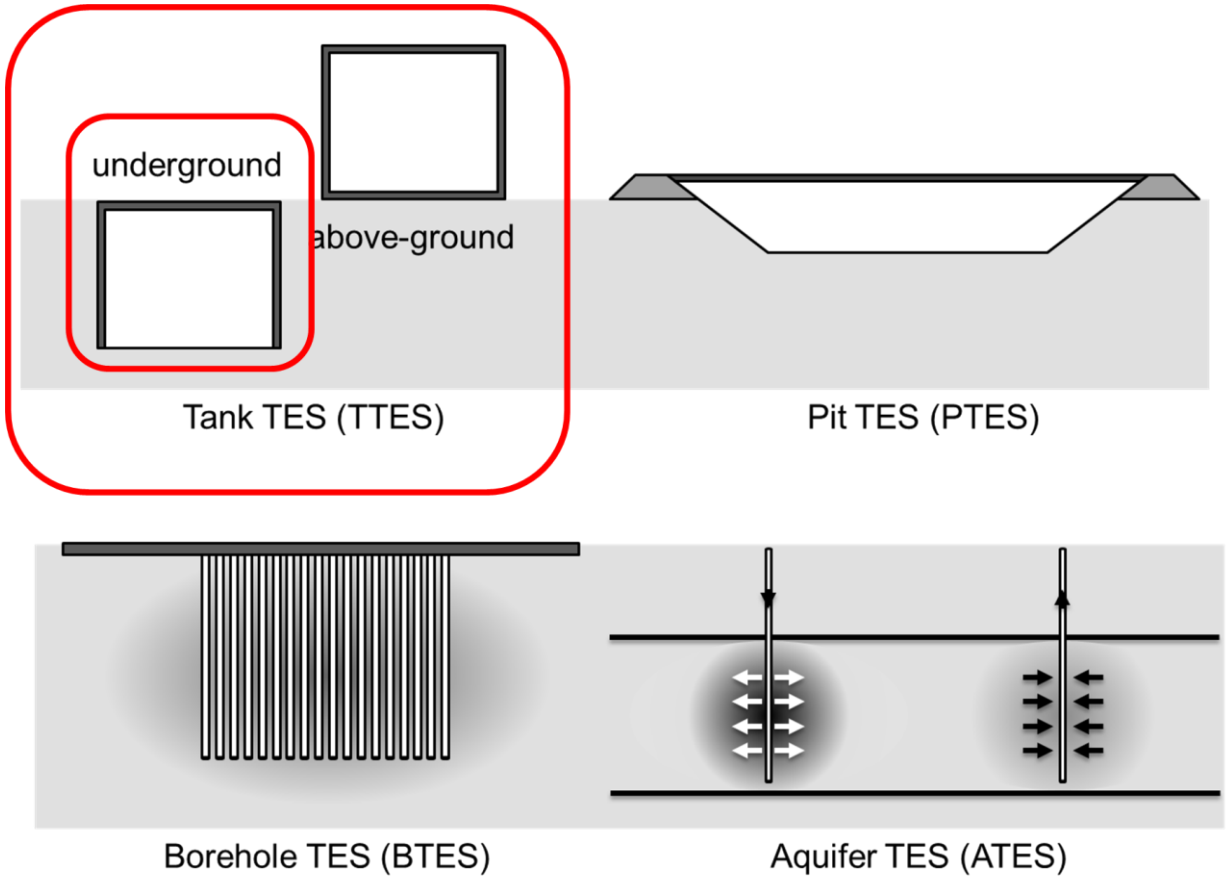
Ruud van den Bosch
Project Developer

GroeneWarmte

3D green heat system integrator

GroeneWarmte

Underground TTES



Sketch: Solites

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1. (dis)Advantages

Advantages compared to above ground:

- Smaller visual impact after construction

- Possibility to make larger volumes (>50,000m^3)

- Smaller losses due to soil temperature and less convection (wind)

- Double use of space

Disadvantages:

- Cost can be higher (depending on project and scale)

- Feasibility depending on local soil conditions / situation

- Can be challenging due to rocky soil and ground water level

- Longer construction time, higher impact during construction

- Unpresurised and <100°C

Following up on general TTES (dis)advantages in presentation PlanEnergi 14-12-2023

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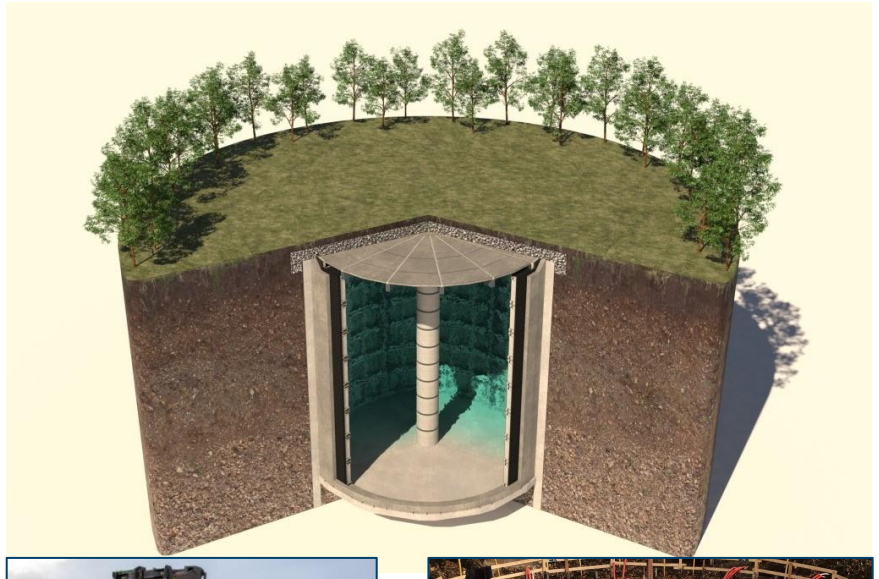
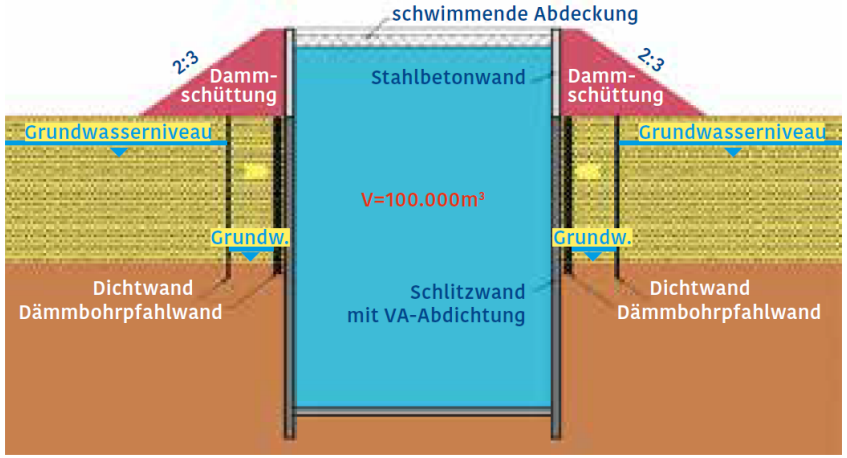
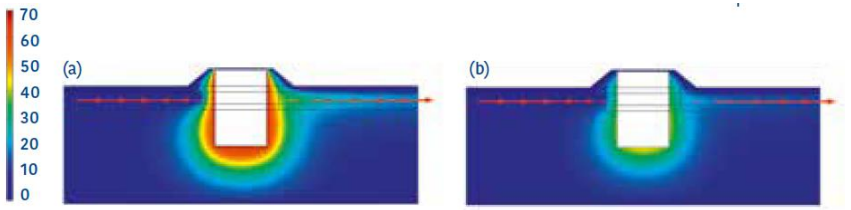
2. Two example initiatives

ecovat



gigaTES





Main difference:
Insulation attached to inside of Diaphagm-wall (Ecovat)
Insulation inside borepile wall (GigaTES)

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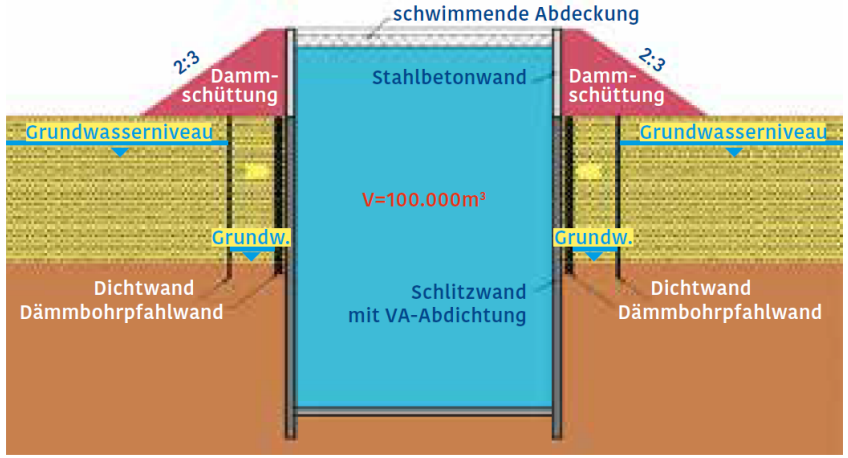
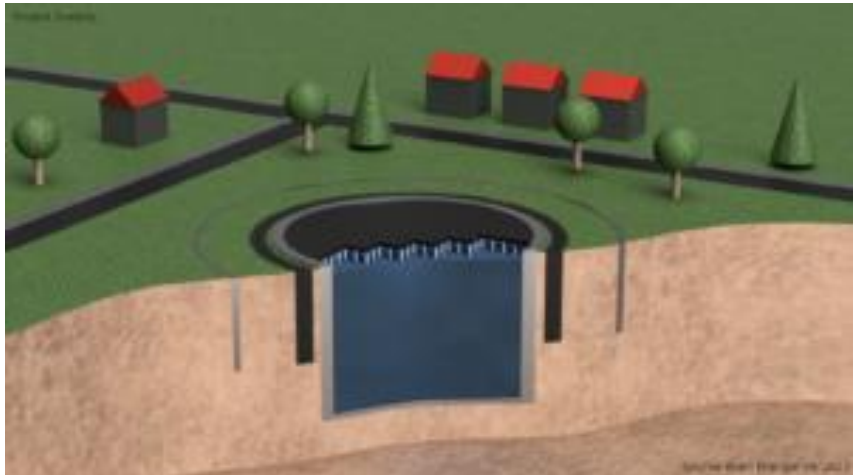
3. Gigates (Scale-up)

gigaTES

- Vienna
- Project from 2018-22. Follow-up project: Scale-up
- 100,000 m^3
- Floating roof
- Insulation: option with foamglass gravel inside borepile wall
- Currently evaluating different options
- Goal is demo in 2 years





www.gigates.at/index.php/de/

https://positionen.wienenergie.at/blog/gastbeitrag-scaleup/

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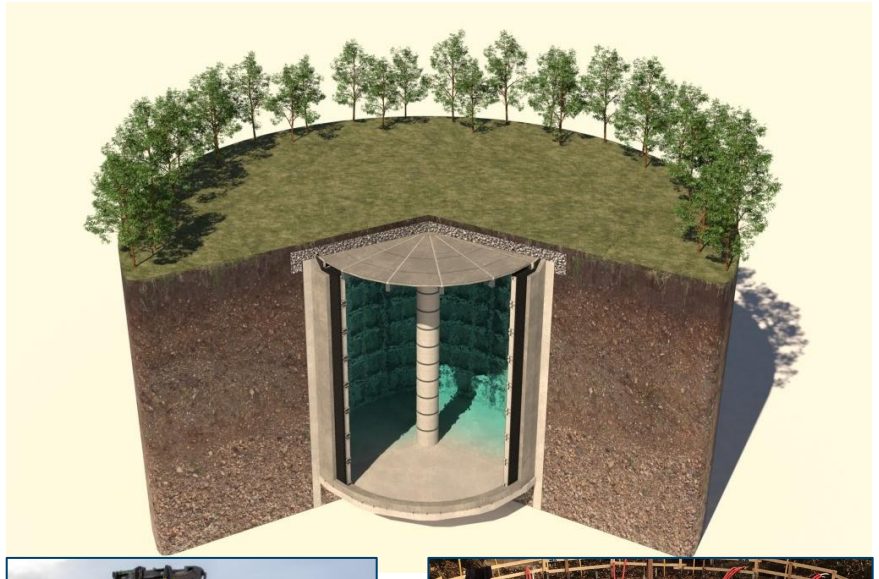
4. Ecovat

ecovat



- Development since 2013, Demo in 2017
- 10,000-100,000 m^3
- Supporting roof
- Insulation: attached to precast modules which are installed on the inside of the Diaphragm wall

www.ecovat.eu/bouw-ecovat-beeld/

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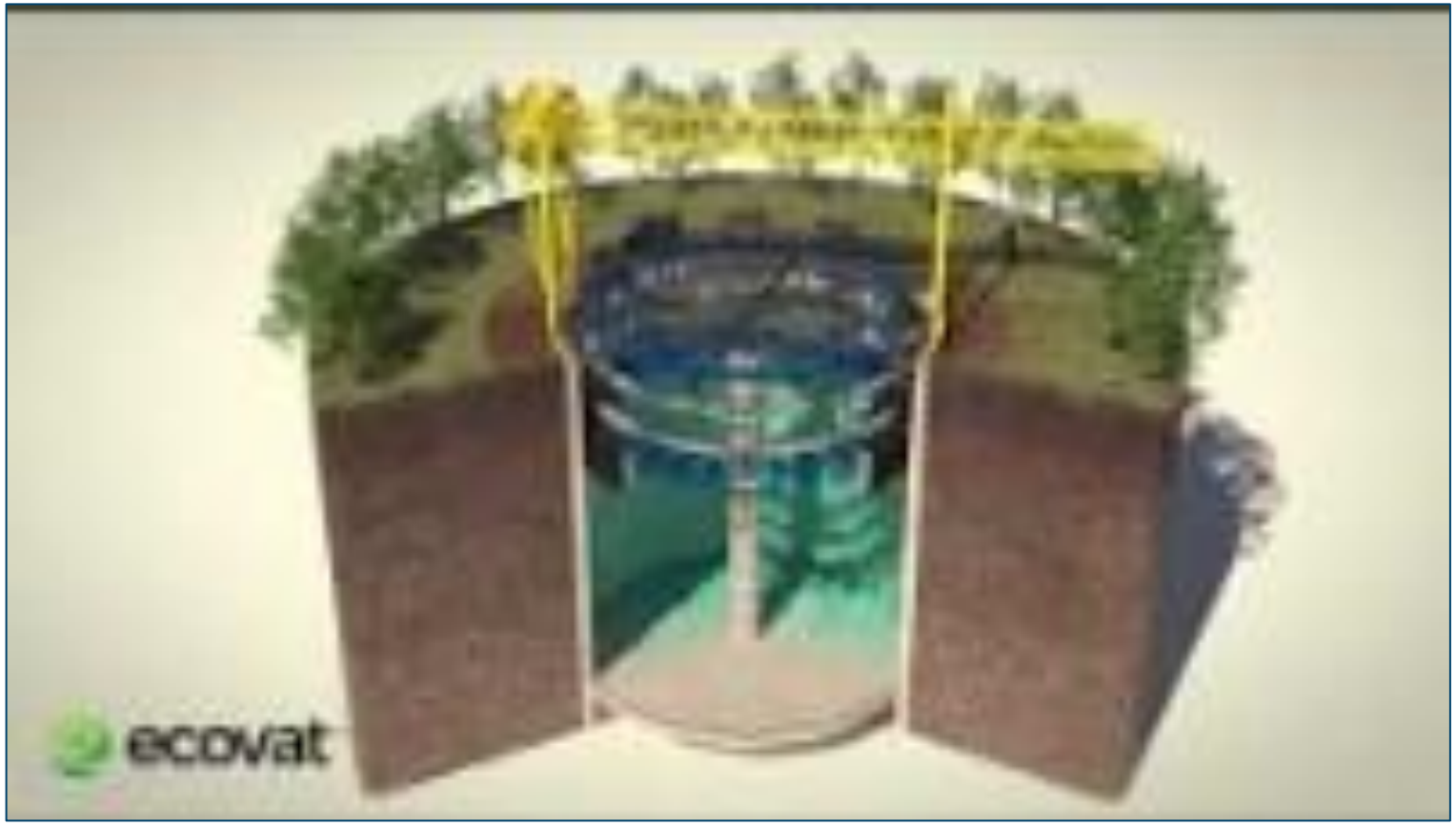
4. Ecovat Construction

1. Diaphragm wall
2. Excavation
3. Bottom
4. Precast modules
5. Roof



https://www.ecovat.eu/bouw-ecovat-beeld/

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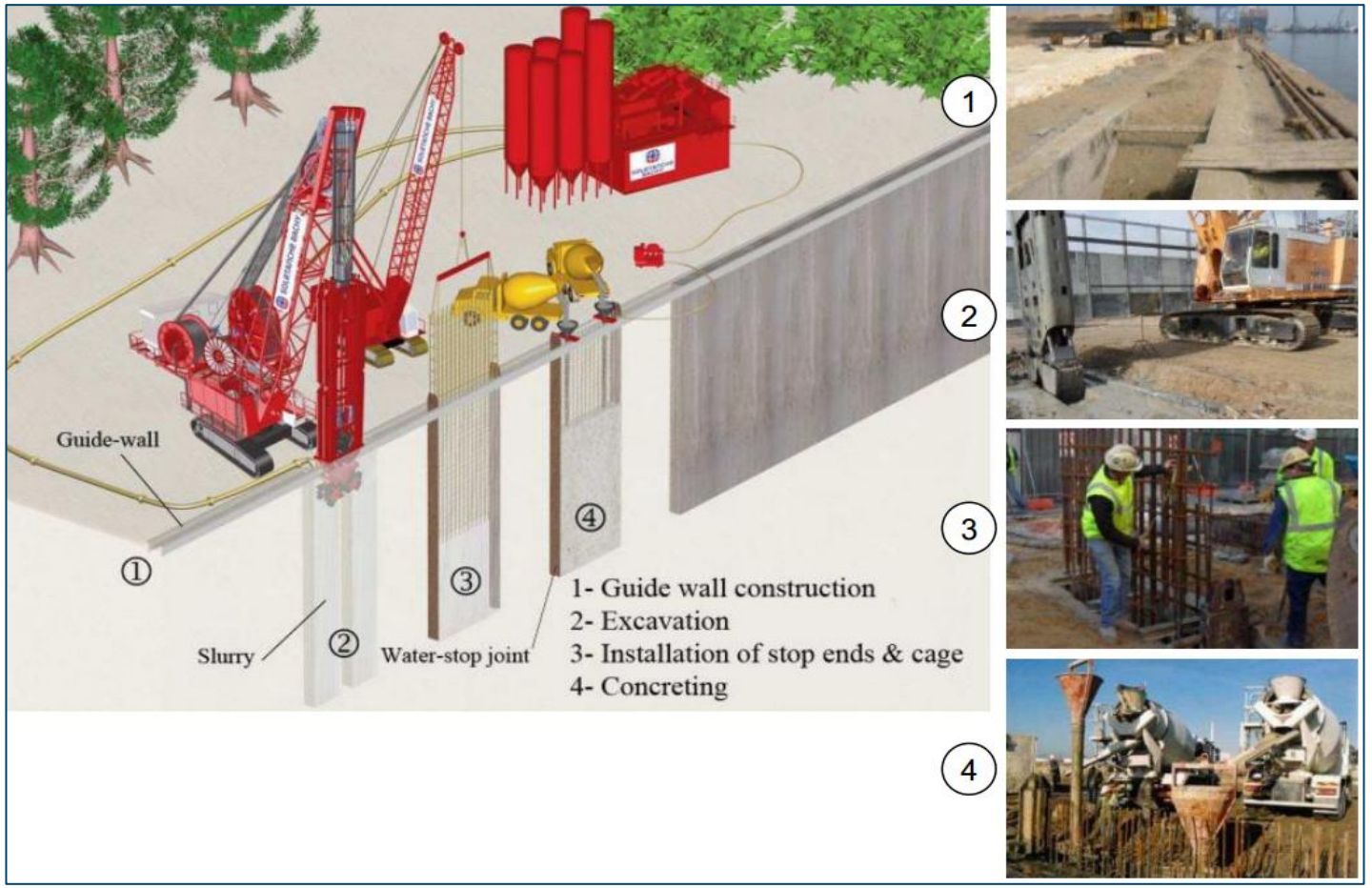
4. Construction – Diafragm wall

- **Common technology**
- **Used for underground parking garages and subway stations.**
- **Water tight**
- **Suitable for deep construction sites**



4. Construction – Precast insulation modules

- **Precast modules**
- **Insulation + reinforced concrete**
- **Foamglass insulation**

https://www.ecovat.eu/bouw-ecovat-beeld/

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4. Ecovat demonstration

First pilot:

- 1.500 m3
- Proof of technology
- Proof of construction
- Proof of efficiency

Lessons learned:

- Better roof design
- Better module design
- Better diffusor design

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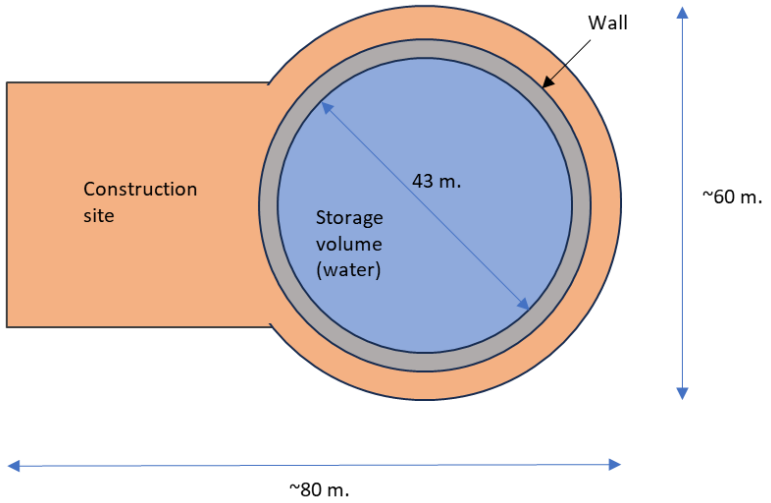
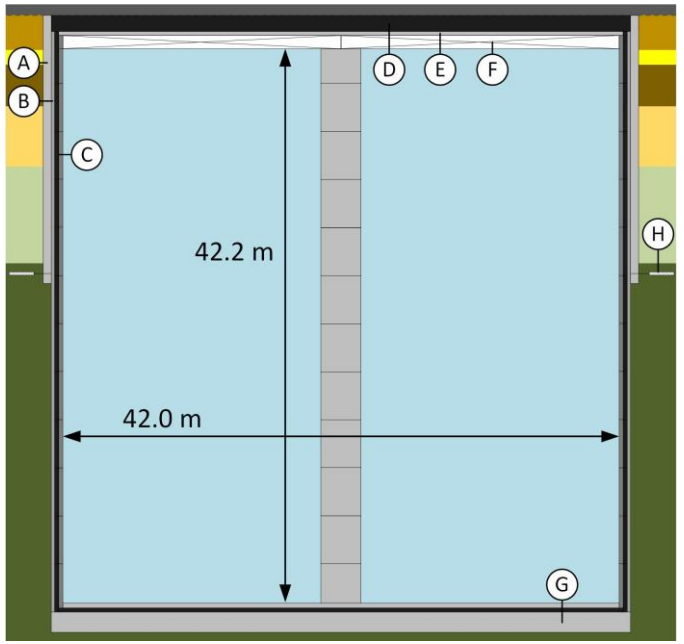
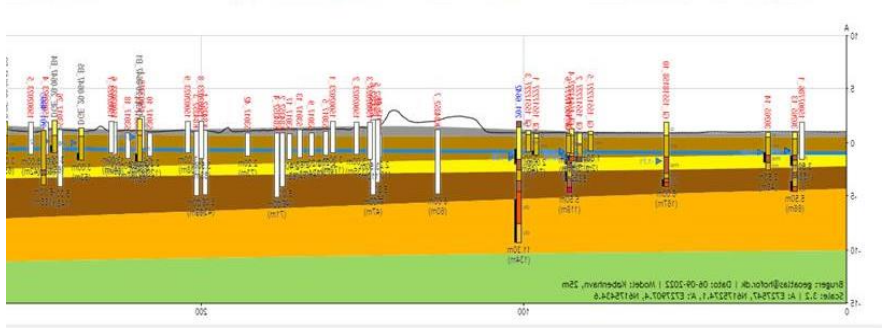
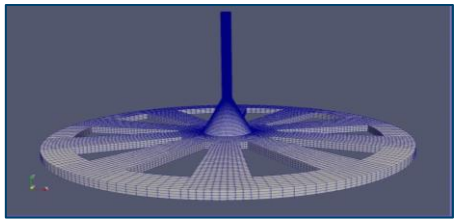
4. Ecovat scale-up example

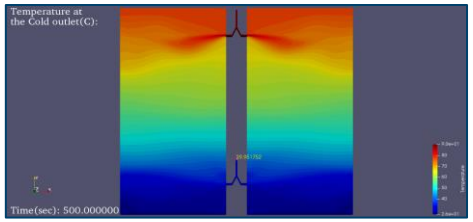
- **Volume 60,000 m^3**
- **100 MW**
- **Feasibility study finished**











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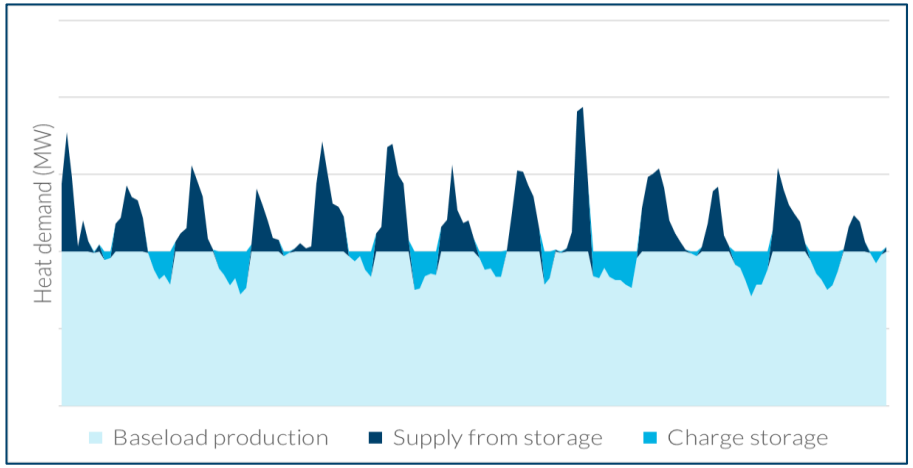
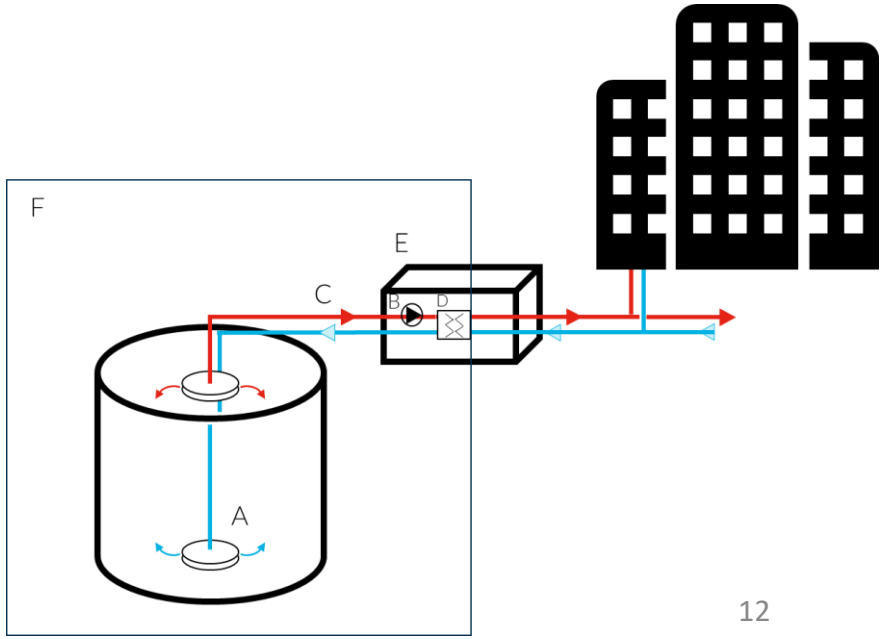
5. Integration

- Unpressurised tank
- Heat Exchanger between tank and DH system for water quality and pressure
- Pump station required near tank (below water level)
- Application: Main focus now → integration in District heating for day/weekly storage
- Application: Future goal → towards seasonal





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6. Legal

- Contaminated soil present? → Permitting and costs
- Studies on ground water effect (temperatures)
- Structural integrity (safety)
- Logistics, permitting of disposal of soils / rocks and transportation movements

Want to know more?

- **Heat storage**
- **Tank storage**
- **District heating and cooling**
- **Sustainable heat sources: solar thermal, waste heat, geothermal, etc.**

Lets stay in touch

Ruud van den Bosch
Projectontwikkelaar
ruud.vandenbosch@groenewarmte.com
www.linkedin.com/in/ruudvandenbosch