



100% renewable heating and cooling
grid flexibility 2020-2050

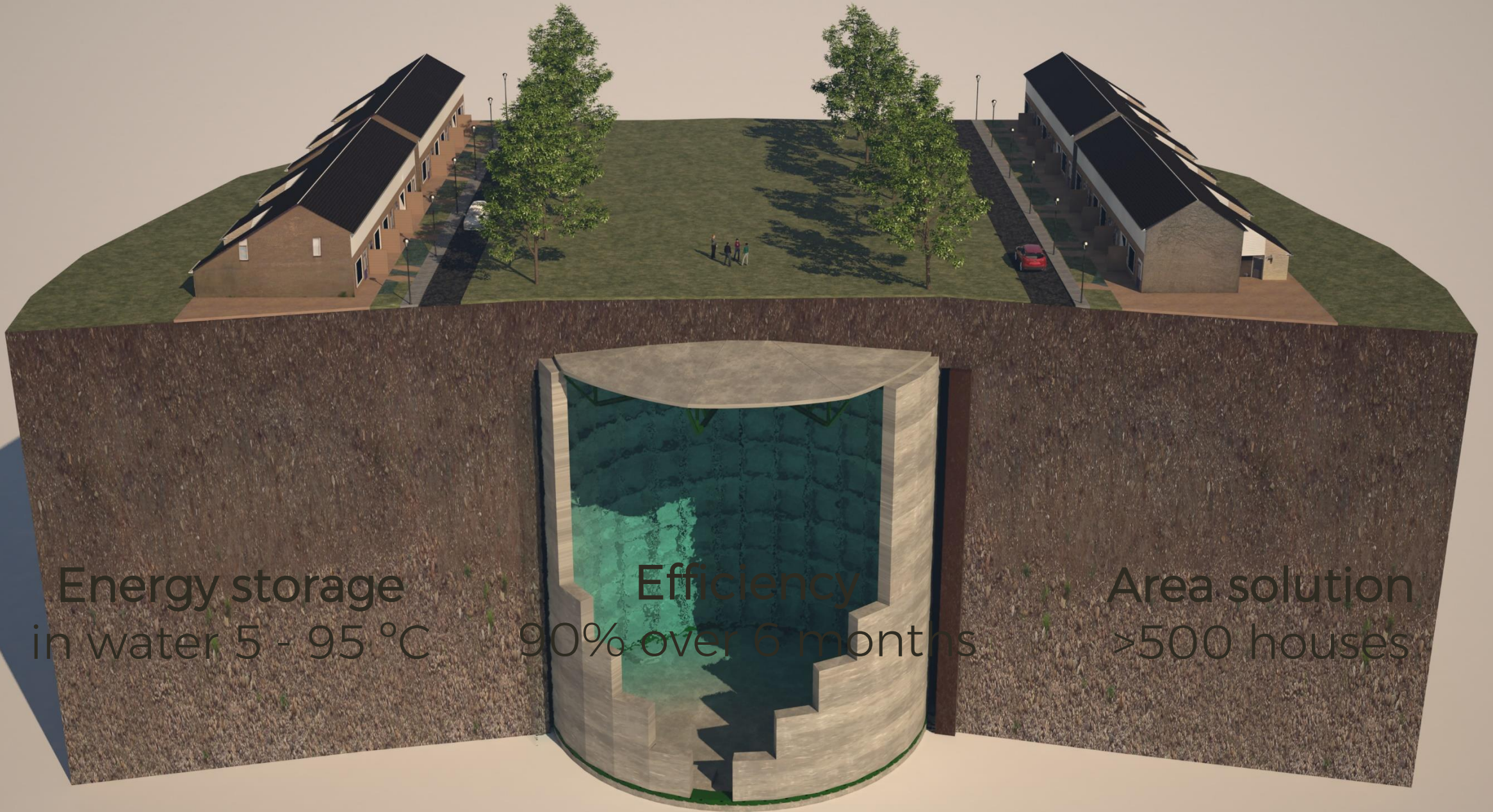
Na aardgas komt Ecovatt

AGENDA 21.09.2018

1. Ontvangst 09.00 – 09.30
2. Presentatie Ecovat Hardware en Software 09.30 – 10.30
3. Verplaatsen Veghel - Oss
4. Bezoek productielocatie Oss (Nieuwe Waterweg 1) 11.00 – 12.00
5. Afsluiting.



Seasonal Thermal Energy Storage

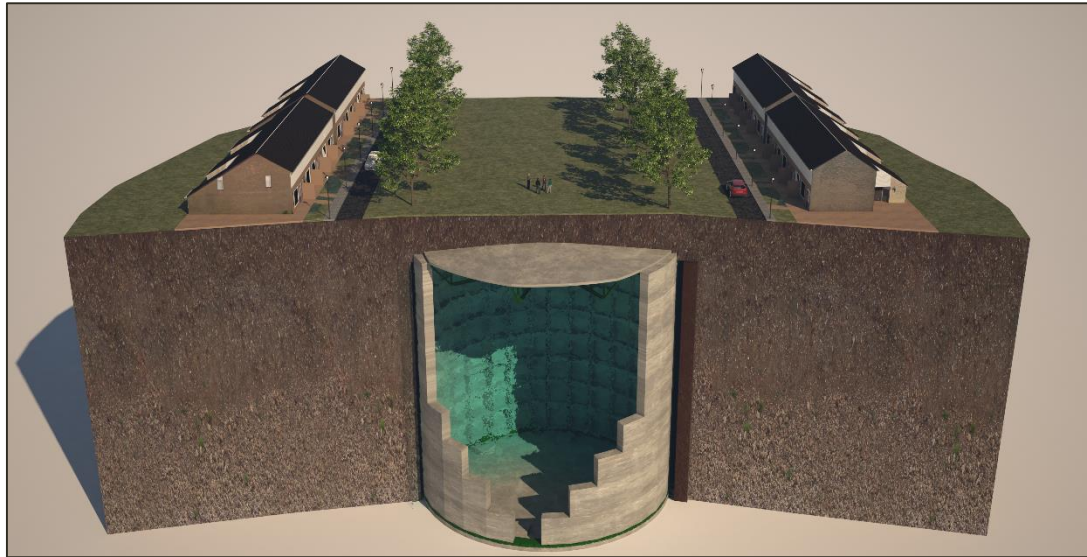


Energy storage
in water 5 - 95 °C

Efficiency
90% over 6 months

Area solution
>500 houses

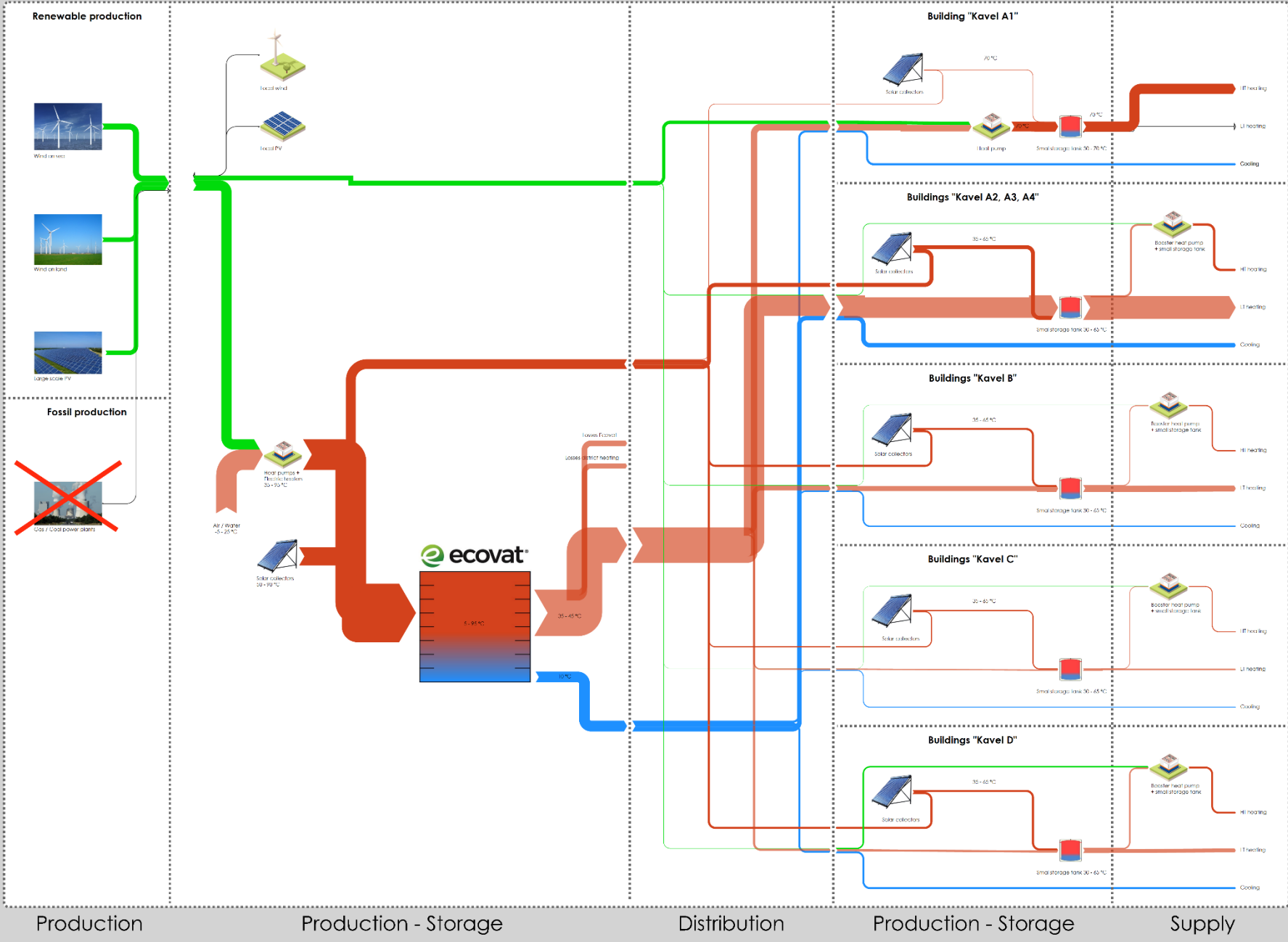
ECOVAT IN PERSPECTIVE



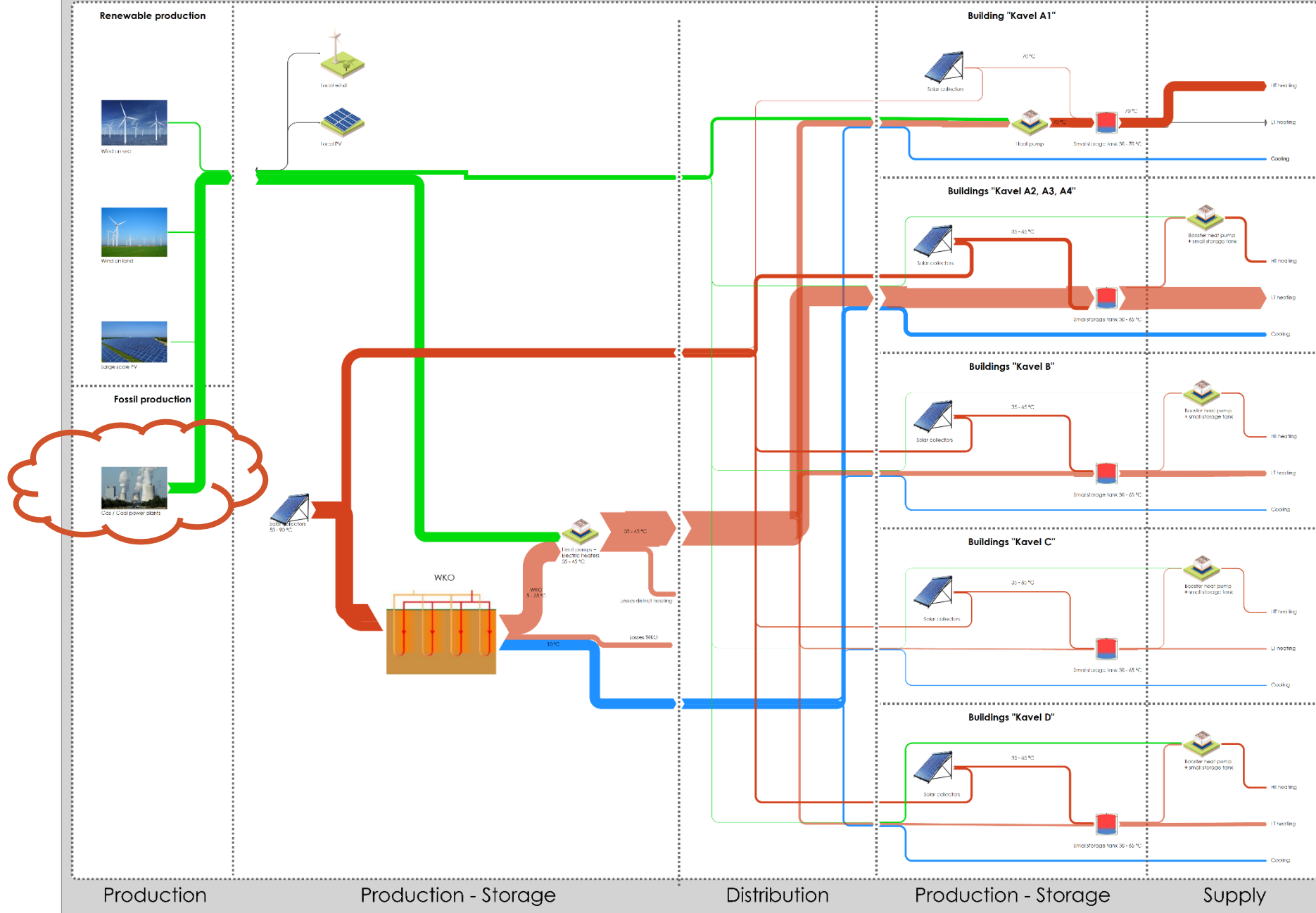
1
Ecovatt
1.000 MWh



70.000
Tesla Powerwall 2
1.000 MWh



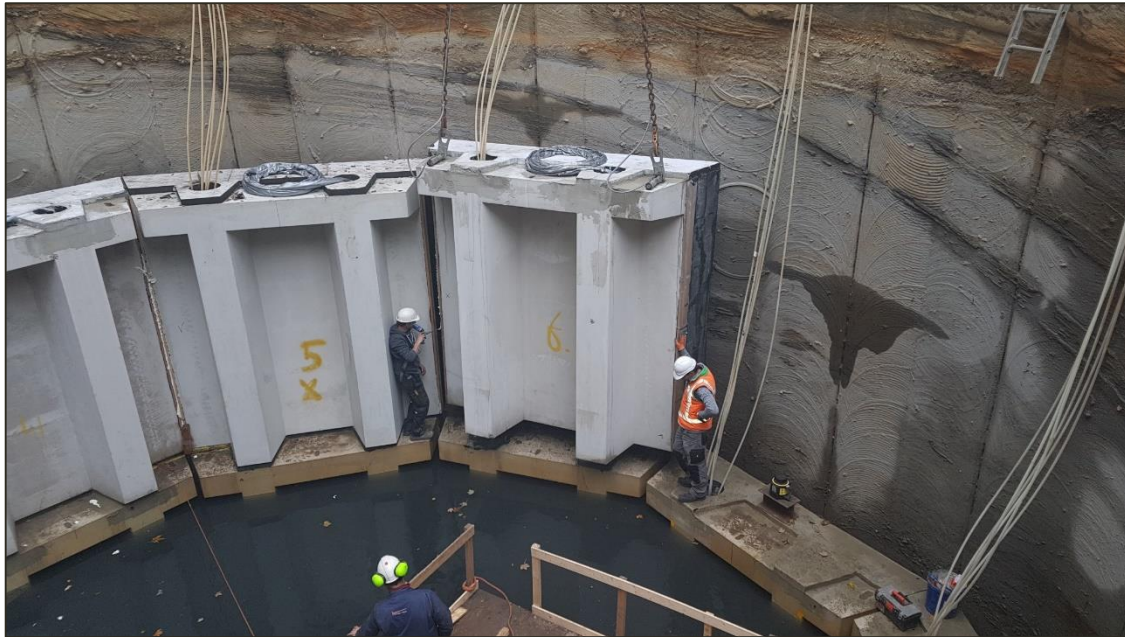
■ Electricity
■ Heating High Temperature >45°C
■ Heating Low Temperature <45°C
■ Cooling



- Electricity
- Heating High Temperature >45°C
- Heating Low Temperature <45°C
- Cooling

TECHNOLOGY VALIDATION

EU and US patented technologies



	layers (#)	depth (m)	diameter (m)			
			30	36	42	48
Volume			Volume (m3)			
	8	28,8	20.347	29.300	-	-
	9	32,4	22.891	32.962	-	-
	10	36,0	25.434	36.625	49.851	-
	11	39,6	27.977	40.287	54.836	71.622
	12	43,2	30.521	43.950	59.821	78.133
	13	46,8	33.064	47.612	64.806	84.644
	14	50,4	35.608	51.275	69.791	91.155
	15	54,0	38.151	54.937	74.776	97.667
Usable heat capacity (dT = 50K)			Usable heat capacity (MWh/cycle)			
	8	28,8	1.184	1.705	-	-
	11	39,6	1.628	2.345	3.191	4.168
	15	54,0	2.220	3.197	4.352	5.684
Natural gas equivalent (AEQ)			Natural gas equivalent (m ³ /cycle)			
	8	28,8	121.197	174.524	-	-
	11	39,6	166.646	239.970	326.626	426.613
	15	54,0	227.244	327.232	445.399	581.745
CO2 reduction			CO2 reduction (ton/cycle)			
	8	28,8	239	344	-	-
	11	39,6	328	473	643	840
	15	54,0	448	645	877	1.146
Storage temperature (cooling and heating)			0-95 °C			
Efficiency 6 months			91%	93%	95%	95%
Technical life expectancy			> 100 years			
Storage medium			natural water (H2O)			

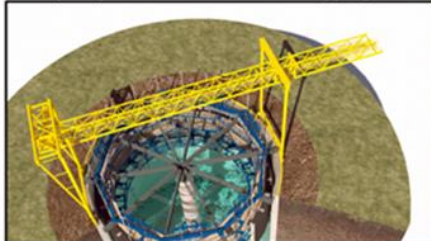


ECOVAT CONSTRUCTION

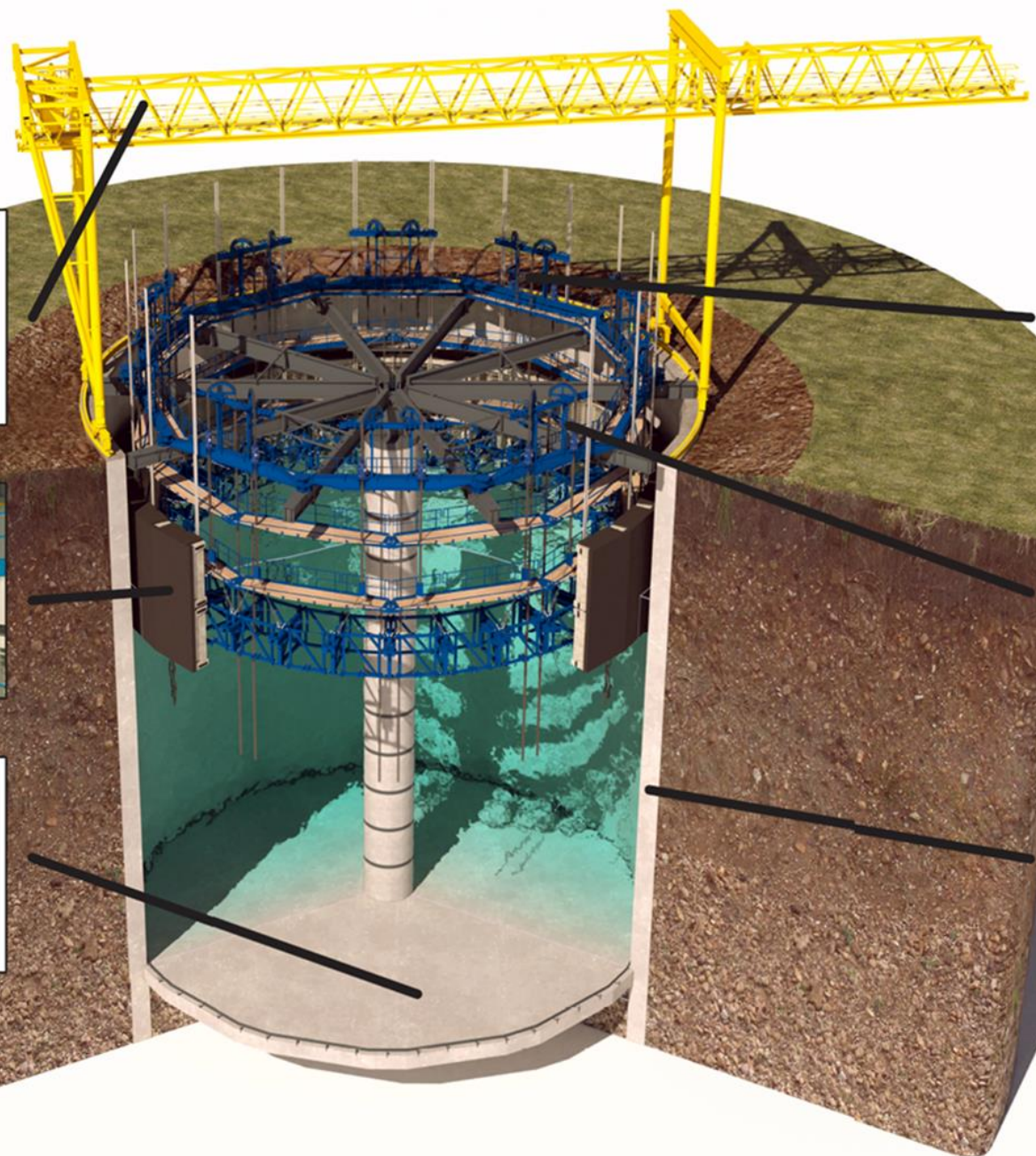
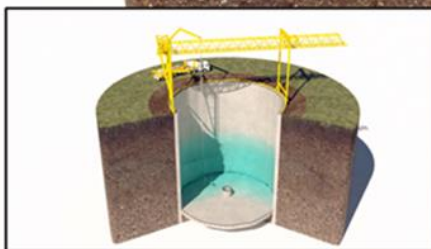




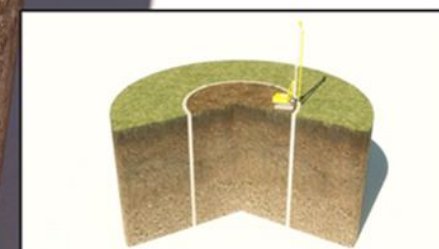
20t capacity. For excavation and lifting purpose



Safe work access at all levels



synchronized lifting by means of strandjack system

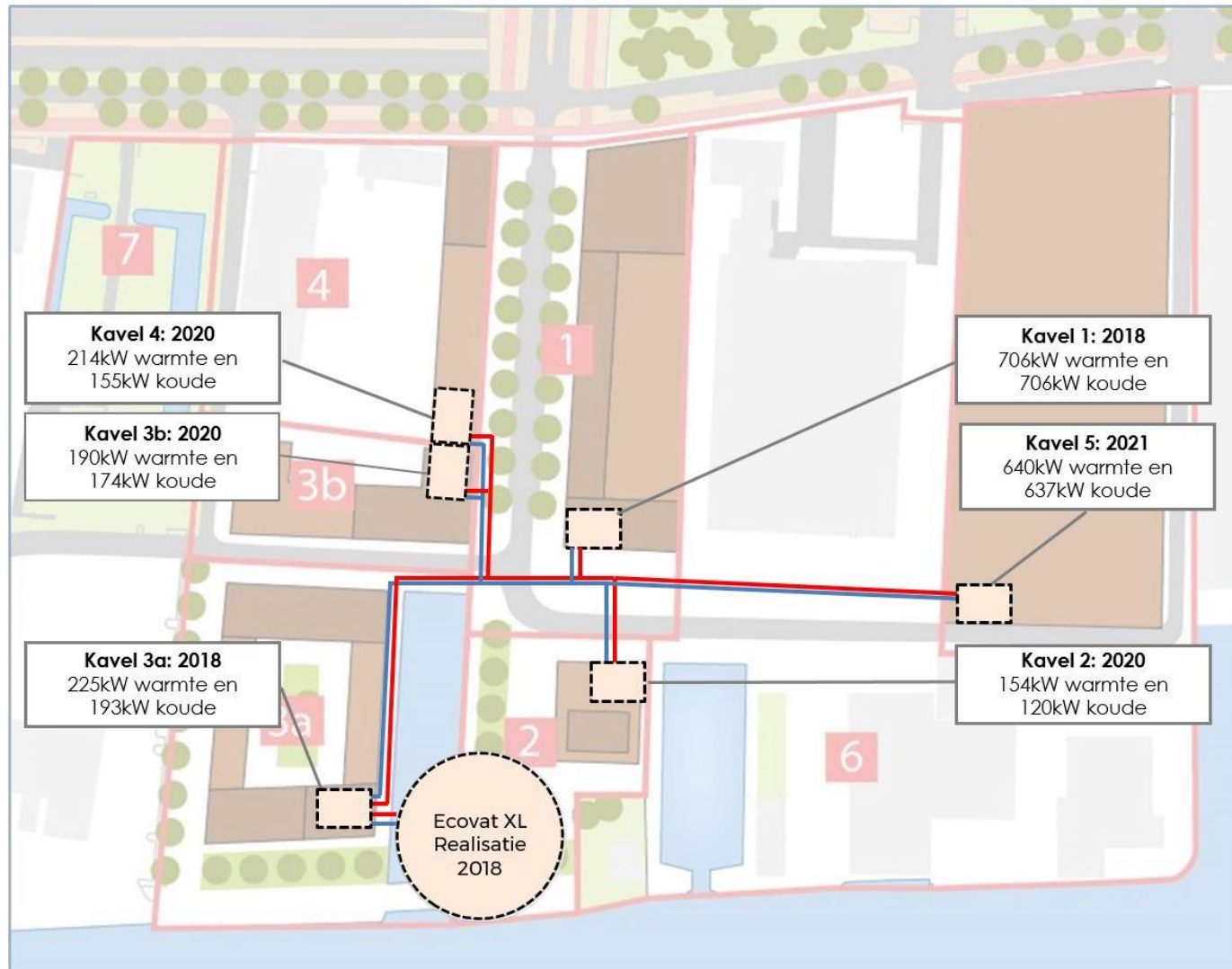


BOUW VOLGORDE

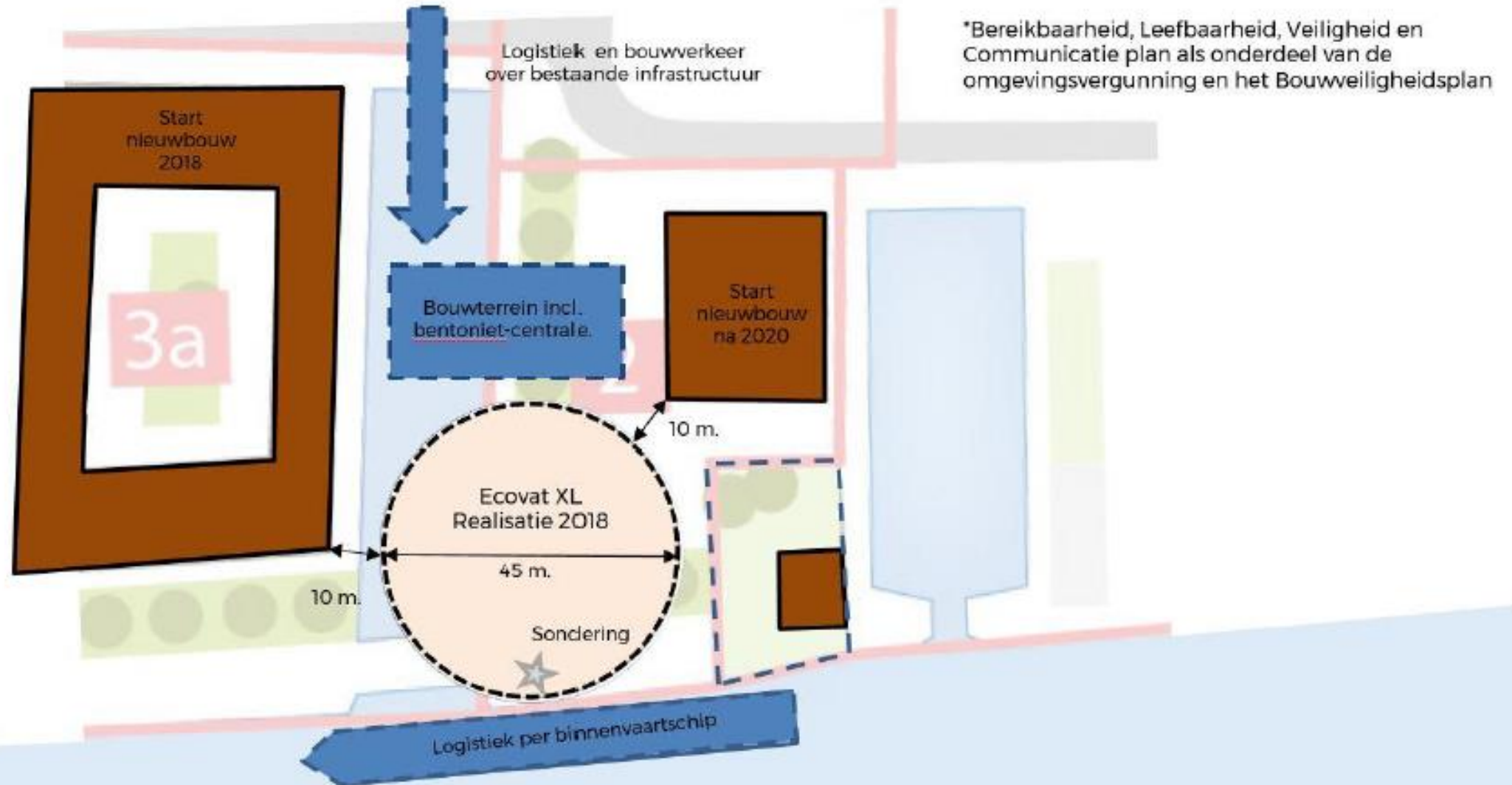
CASE 800 APARTMENTS



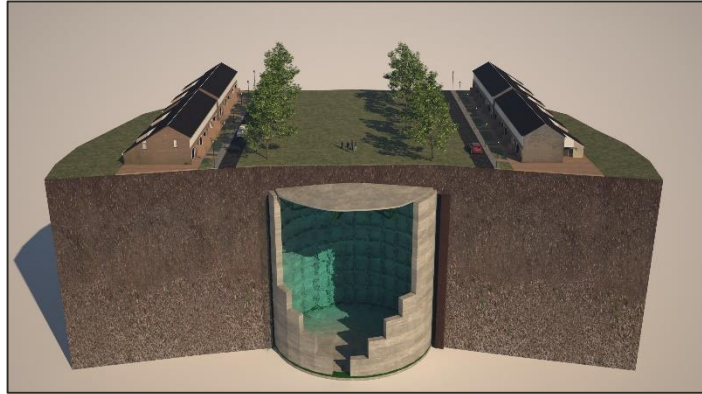
CASE 800 APARTMENTS



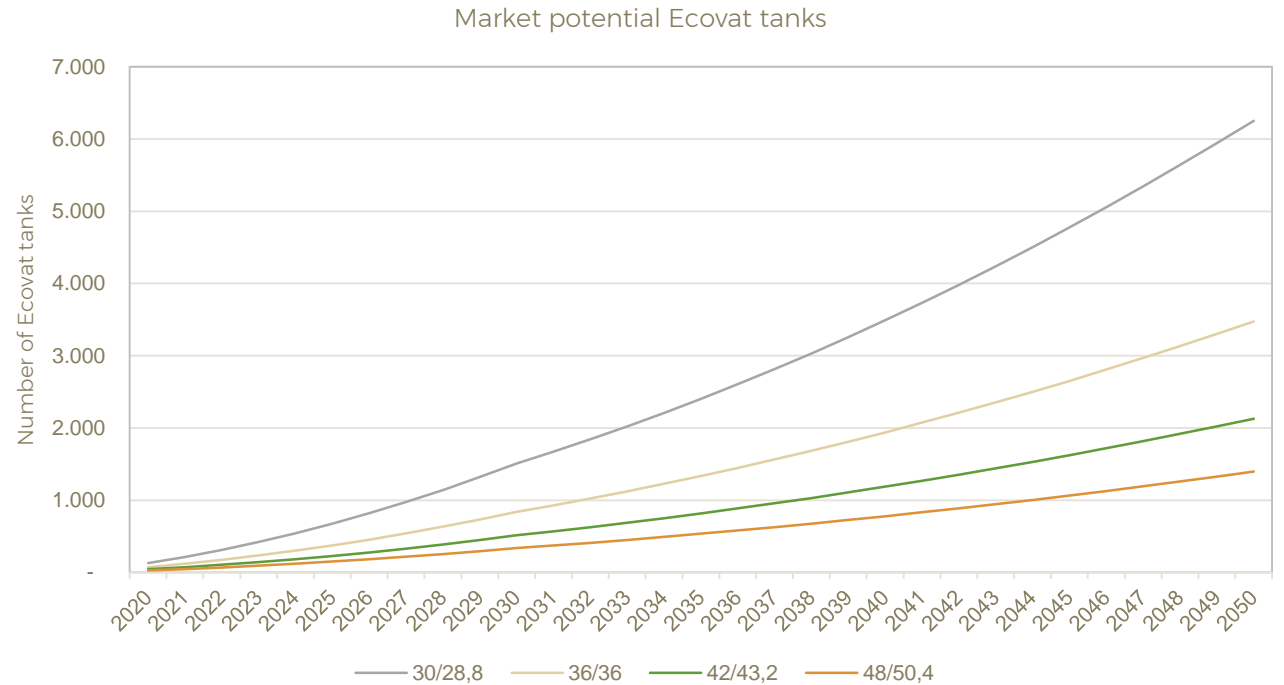
Locatie, logistiek en bouw + BLVC plan*



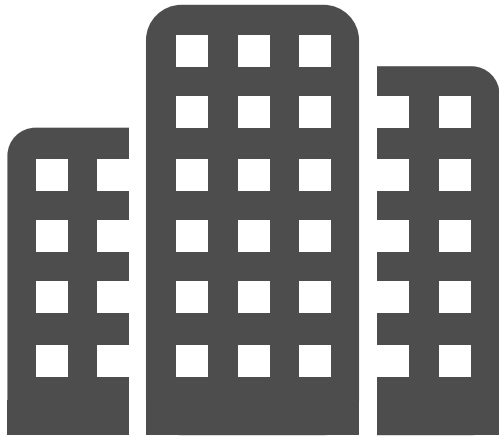
MARKET POTENTIAL



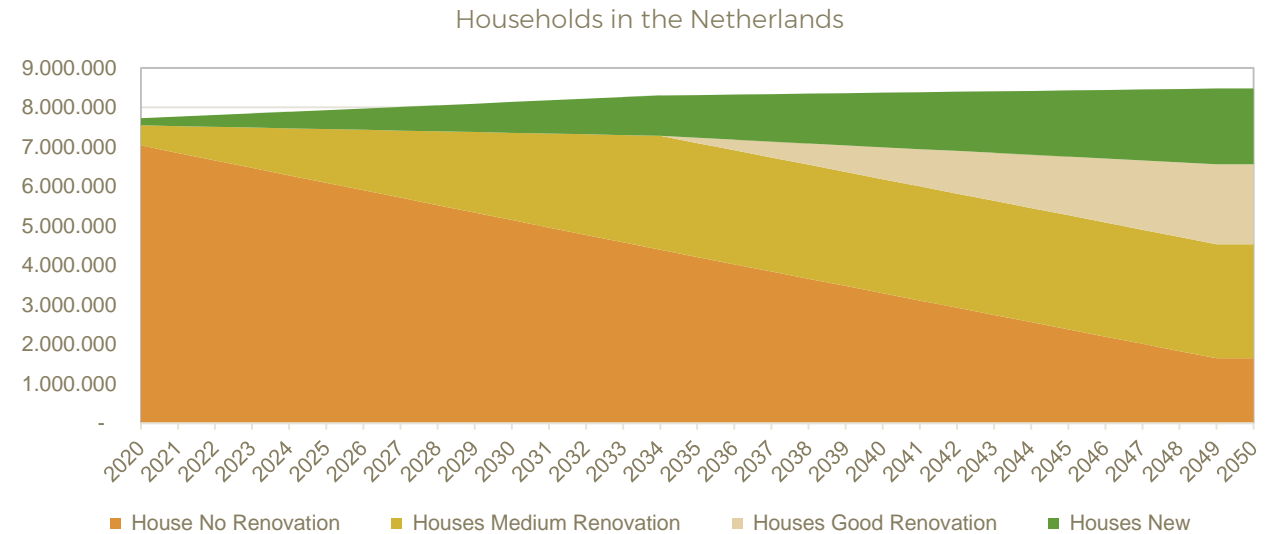
>2,000
Ecovat tanks
in the Netherlands



MARKET POTENTIAL



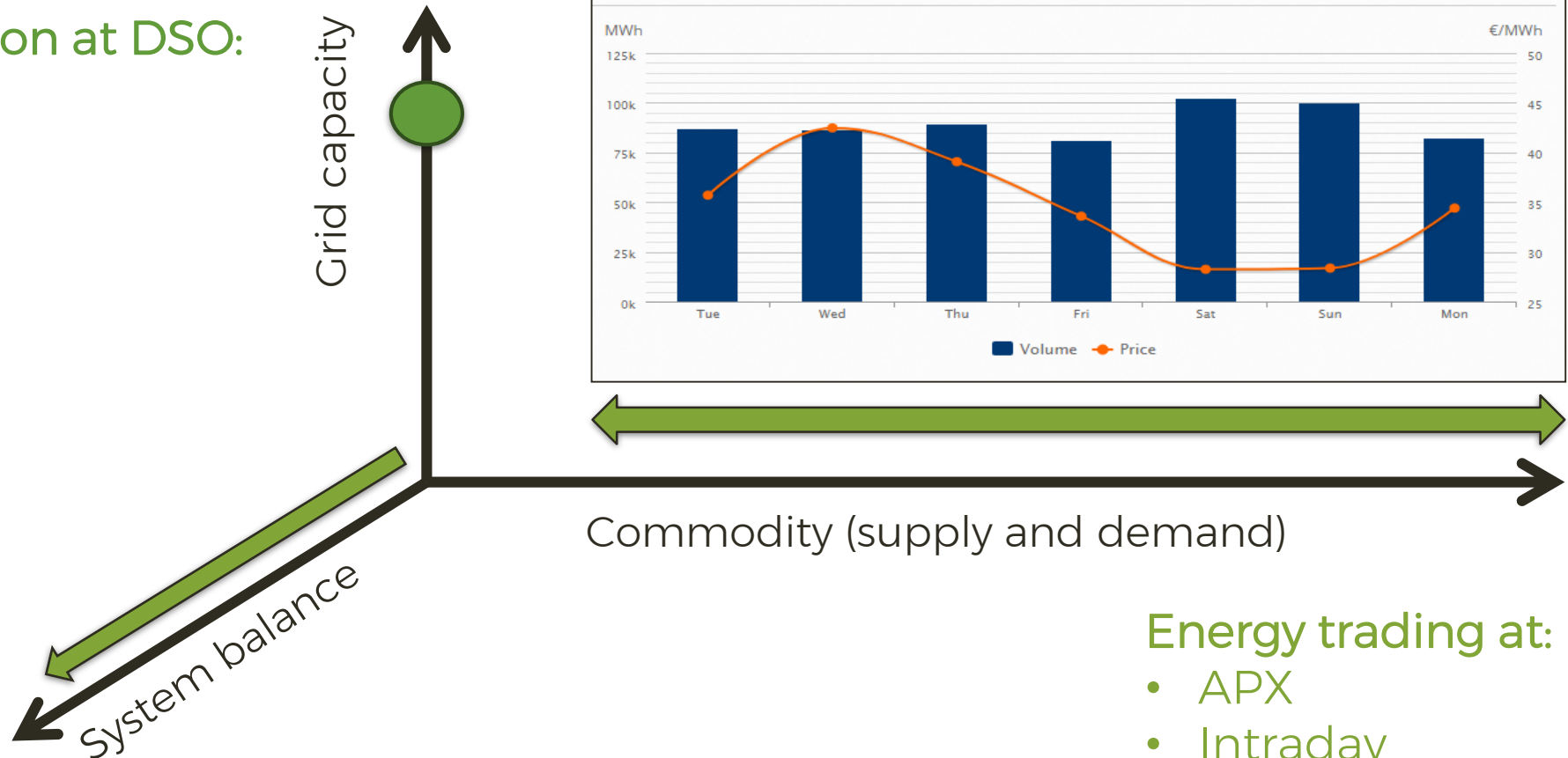
>2,0 million households in 2050



FLEX OPPORTUNITIES

Grid congestion at DSO:

- Stedin
- Enexis
- Liander



Balance management by TSO (Tennet):

- Imbalance market

Energy trading at:

- APX
- Intraday

FLEX OPPORTUNITIES

Congestion management for DSO:

2018

90% natural gas

10% district heating & all-electric



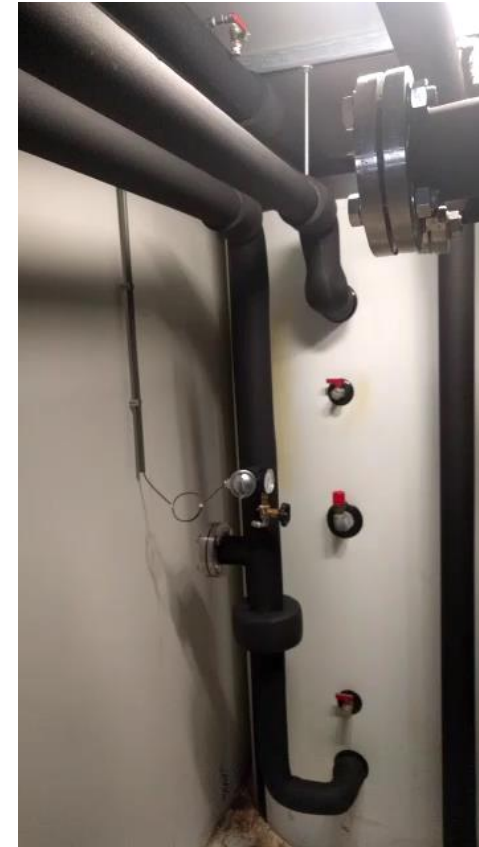
2020-2030

All-electric boom (NOM = Dom)

Vs.

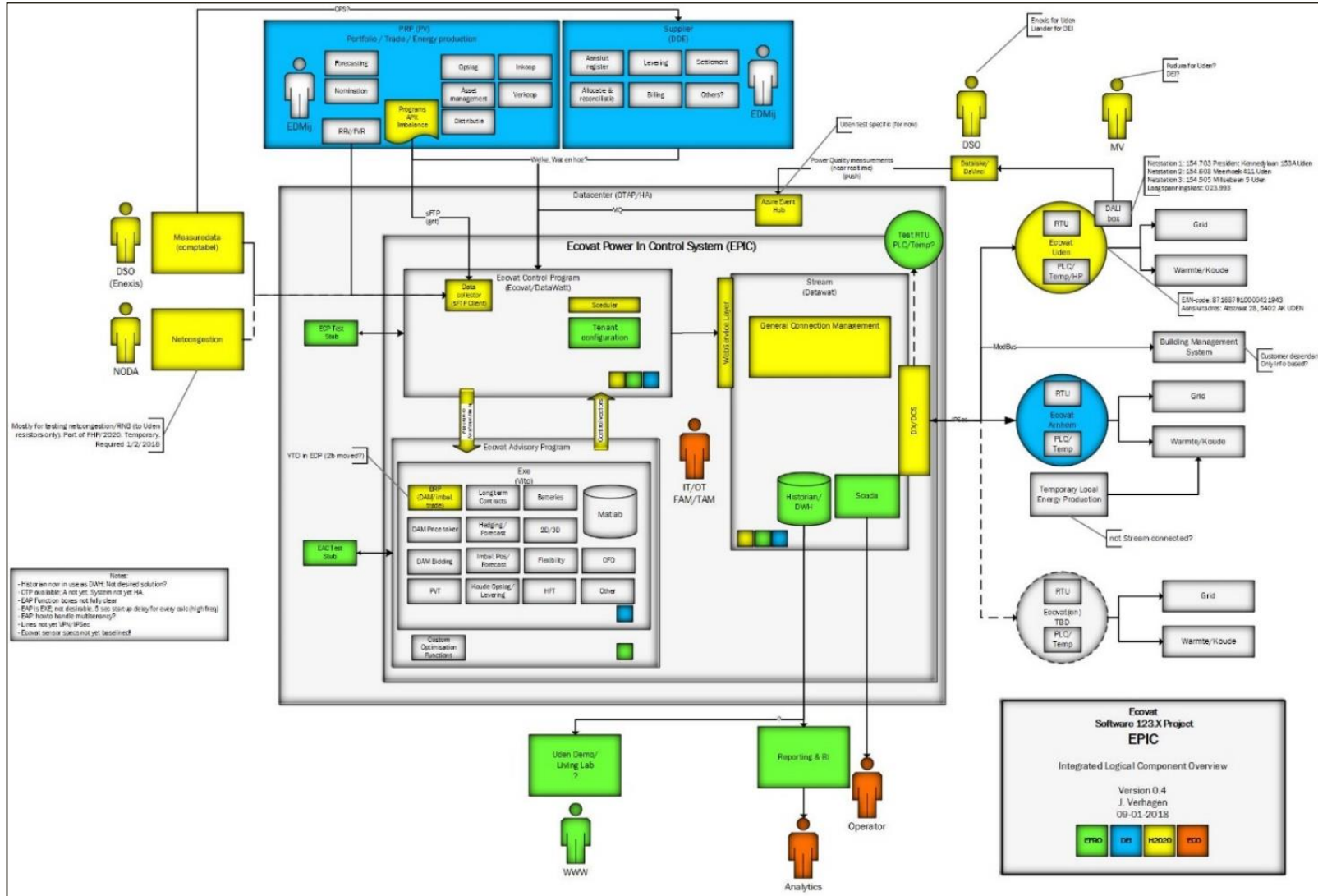
District heating (Smart multi energy grid)

DEMO UDEN

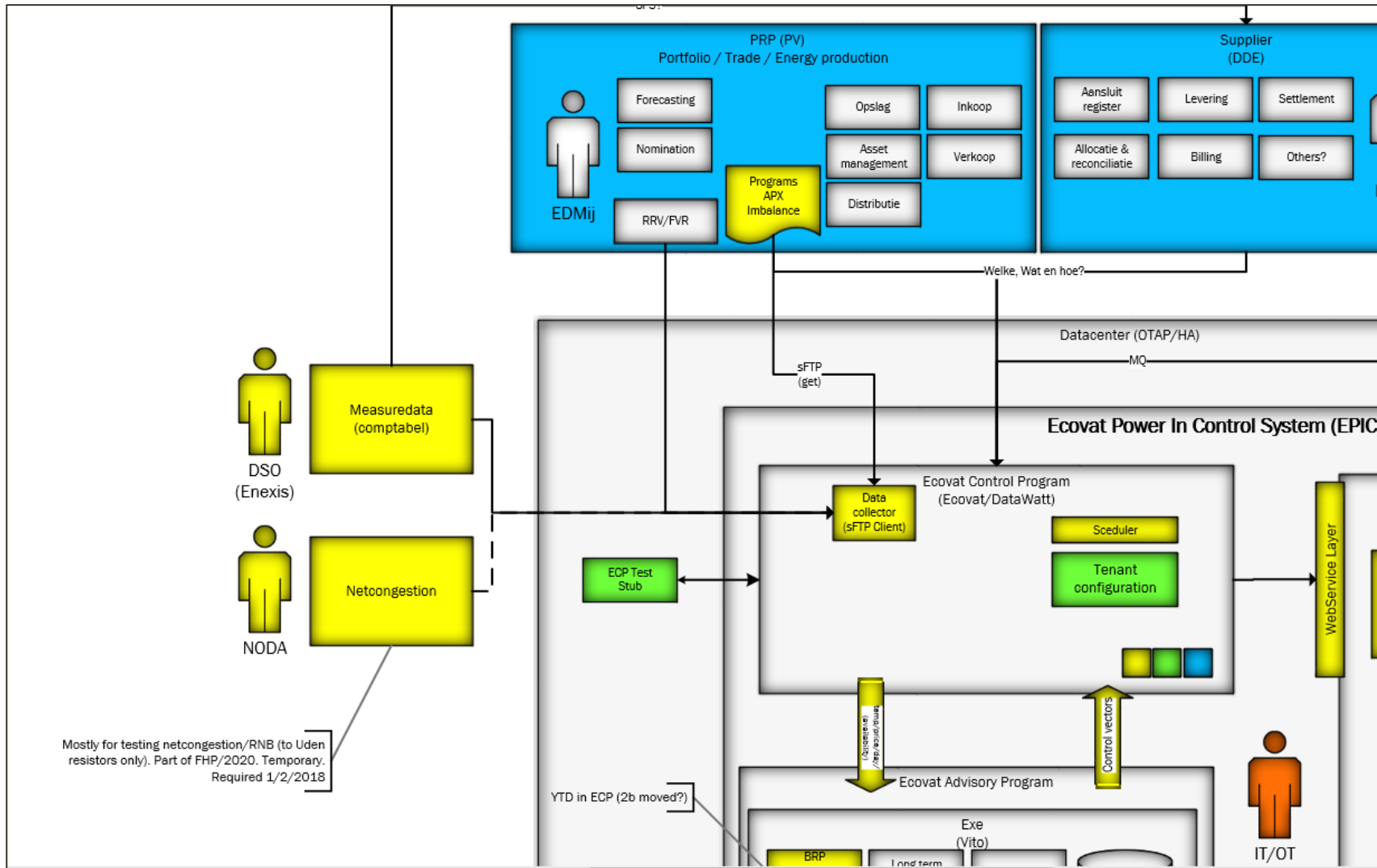


**KORTE VIDEO
DEMO UDEN**

ECOVAT SOFTWARE

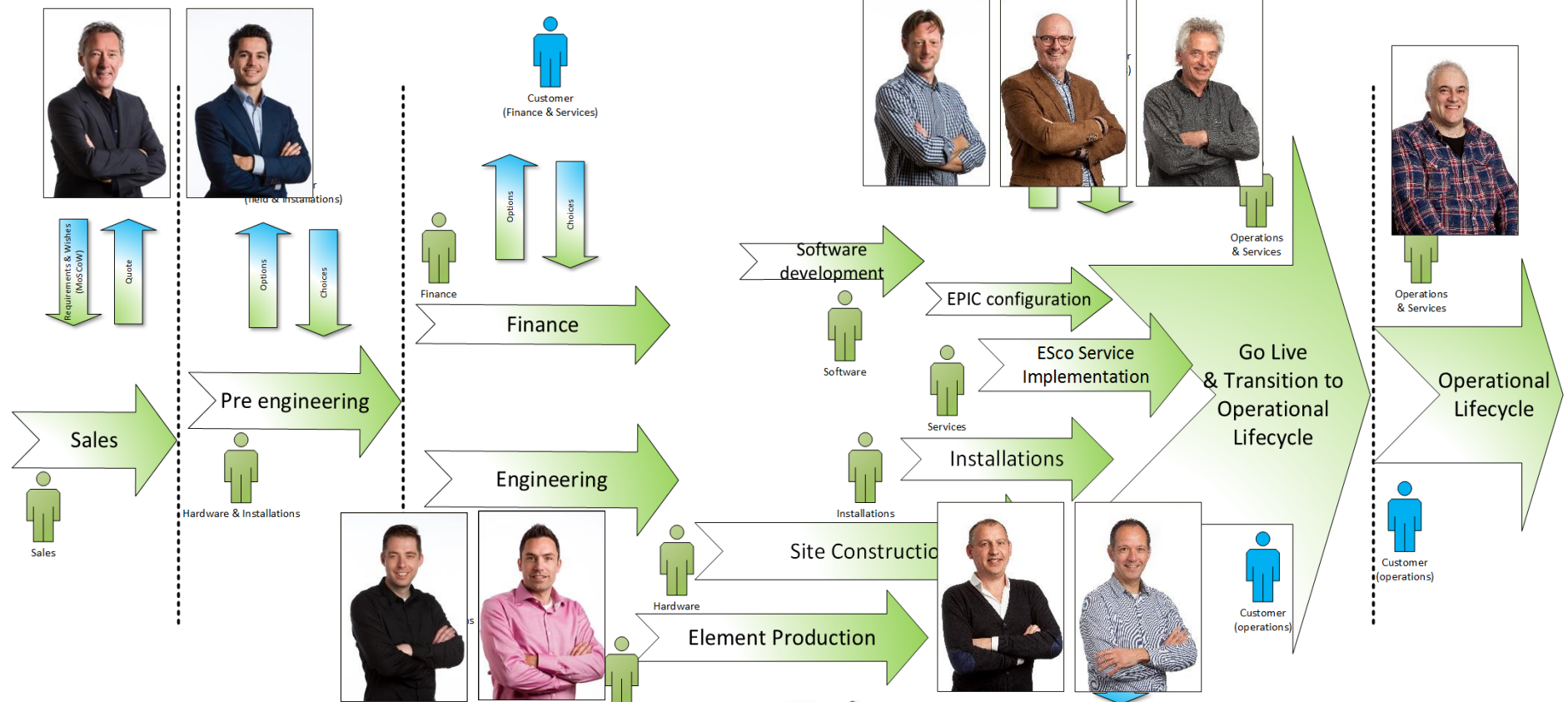


ECOVAT SOFTWARE

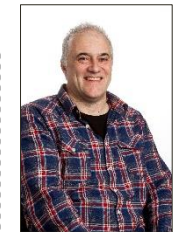


PROJECT APPROACH

Management &
Two member Advisory board

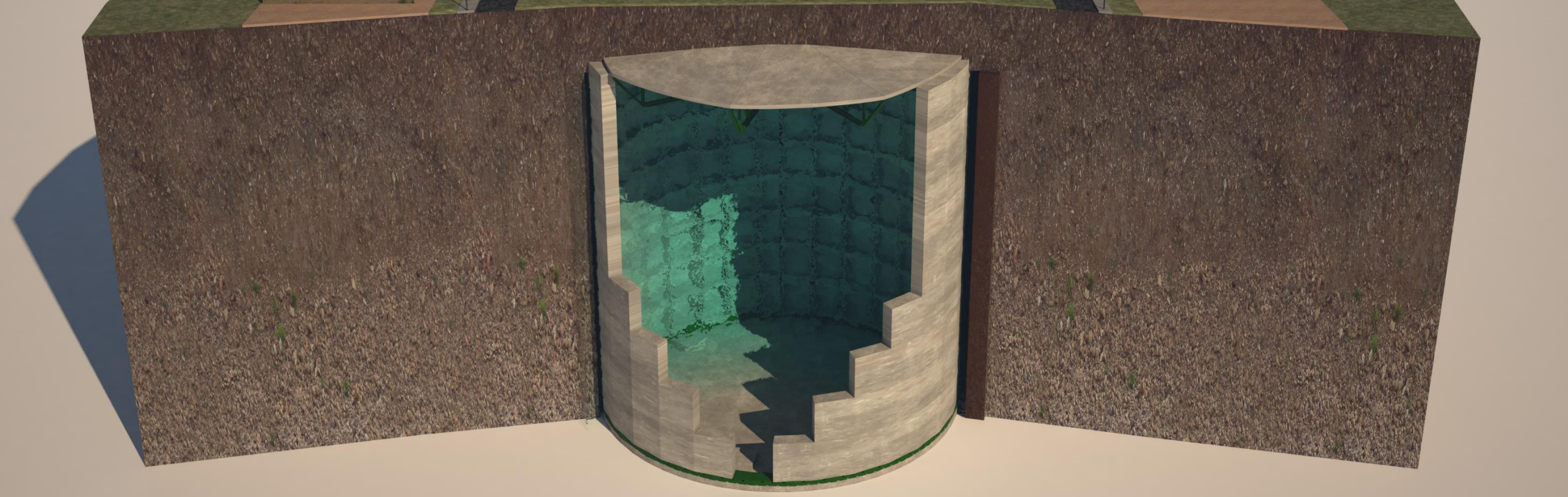


Staff: Finance/HR/Purchase/
Mar-co/Partners/Quality/
Safety/Aftersales



ECOVAT PROJECTS





100% renewable
heating & cooling

Solution for
flexibility challenges
2020-2050

Na aardgas
komt Ecovat

