Gas-free Ramplaankwartier

Spatial Measures for the Implementation of Sustainable Energy in Existing Neighbourhoods

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4th of July, 2018

Smart Isle Urban

TU Delft

(Alarmy stock photos)

Russisch nepnieuws?
Propaganda van binnenuit is zeker zo eng
DE VERDIEPING 4|5

Mooi boek, die Bijbel
Verdwijnt religie?
DE VERDIEPING 10|11

Geen tropenartsen meer
Ziekenhuizen stoppen met opleiding
VANDAAG 3

Zwaarste beving in vijf jaar

(Trouw, 09-01-18)

?

(Nefit)

(Obly.nl)


NEFIT
200

?

Russisch nepnieuws?

Propaganda van binnenuit is zeker zo eng

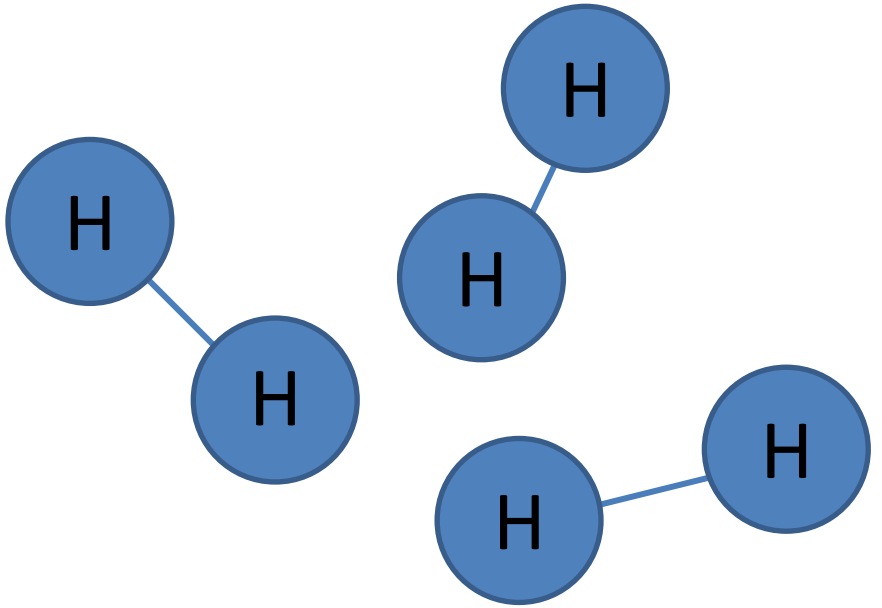
DE VERDIEPING 4|5

Zwaarste bevin

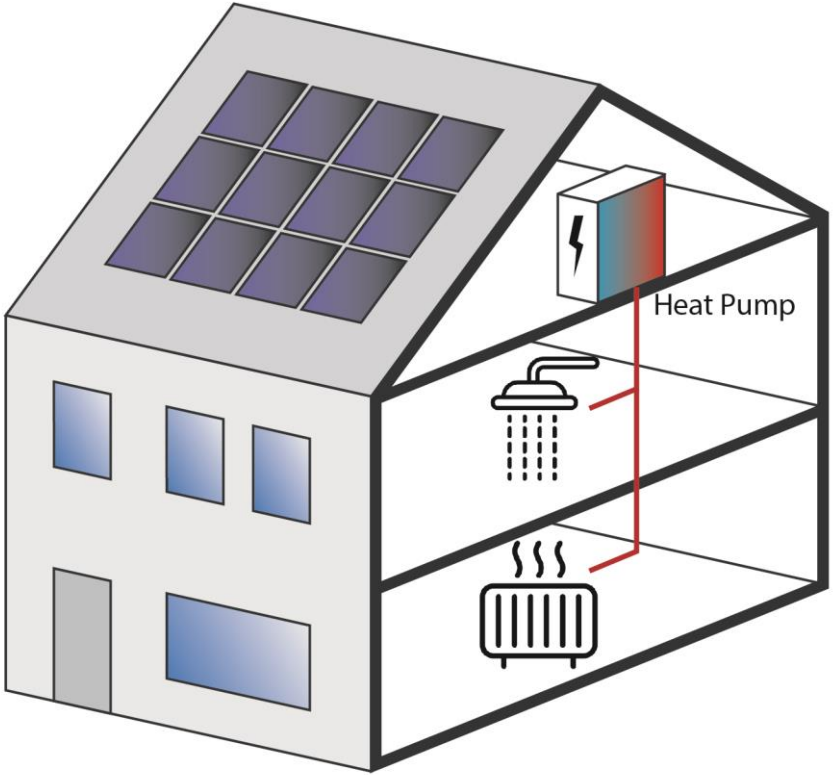
(wmagazine.com)

Biogas

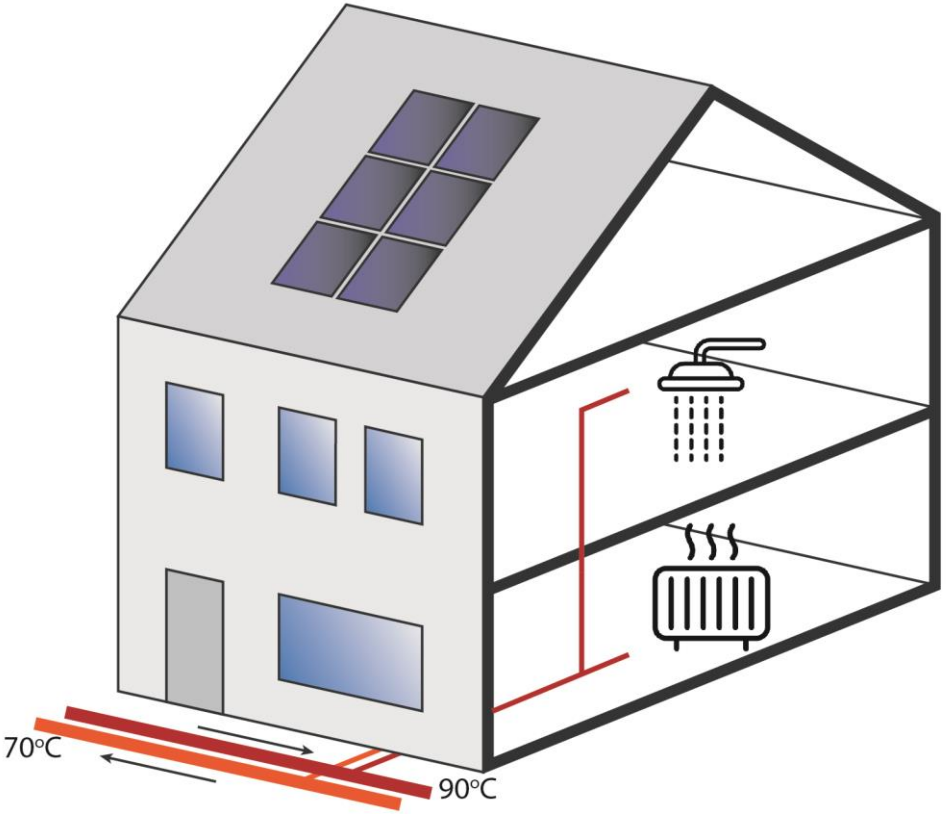
(Wikimedia)



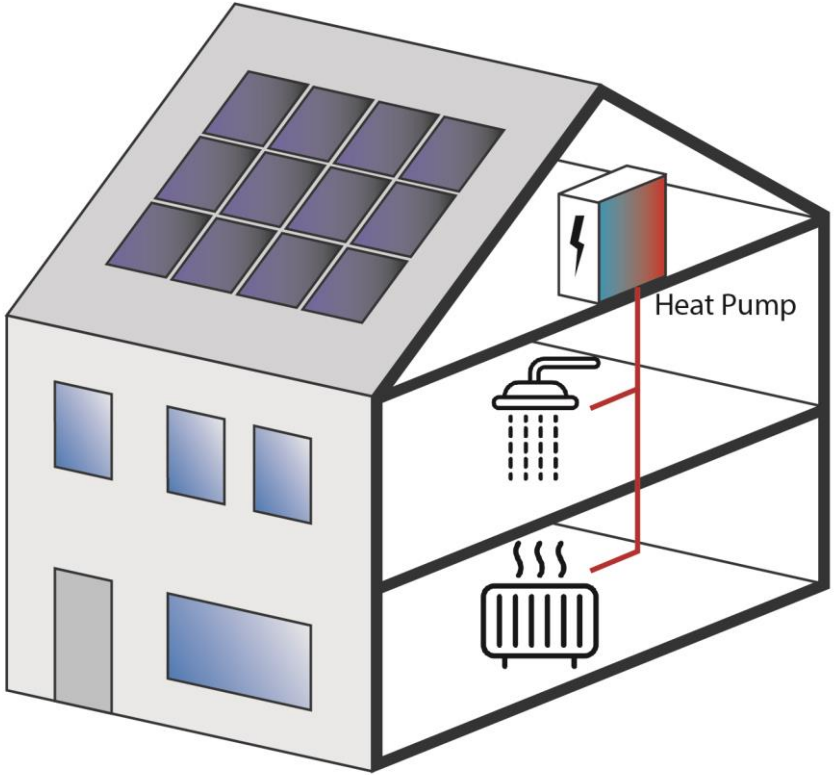
Synthetic Gas



All Electric

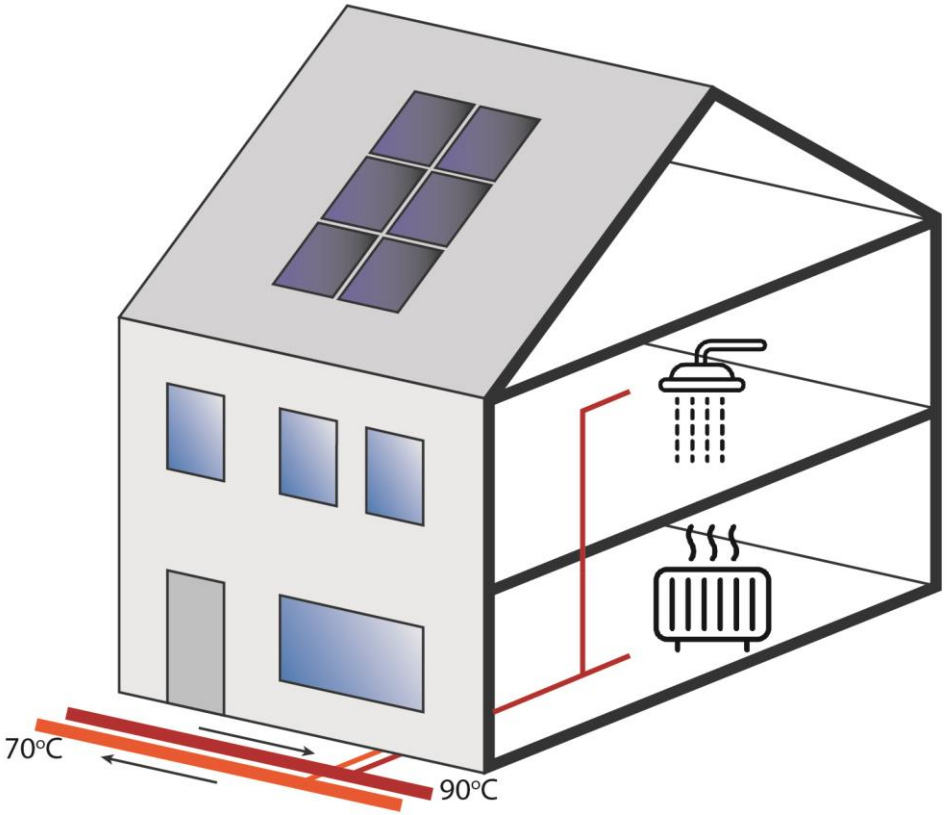


Heat Network (‘Stadsverwarming’)

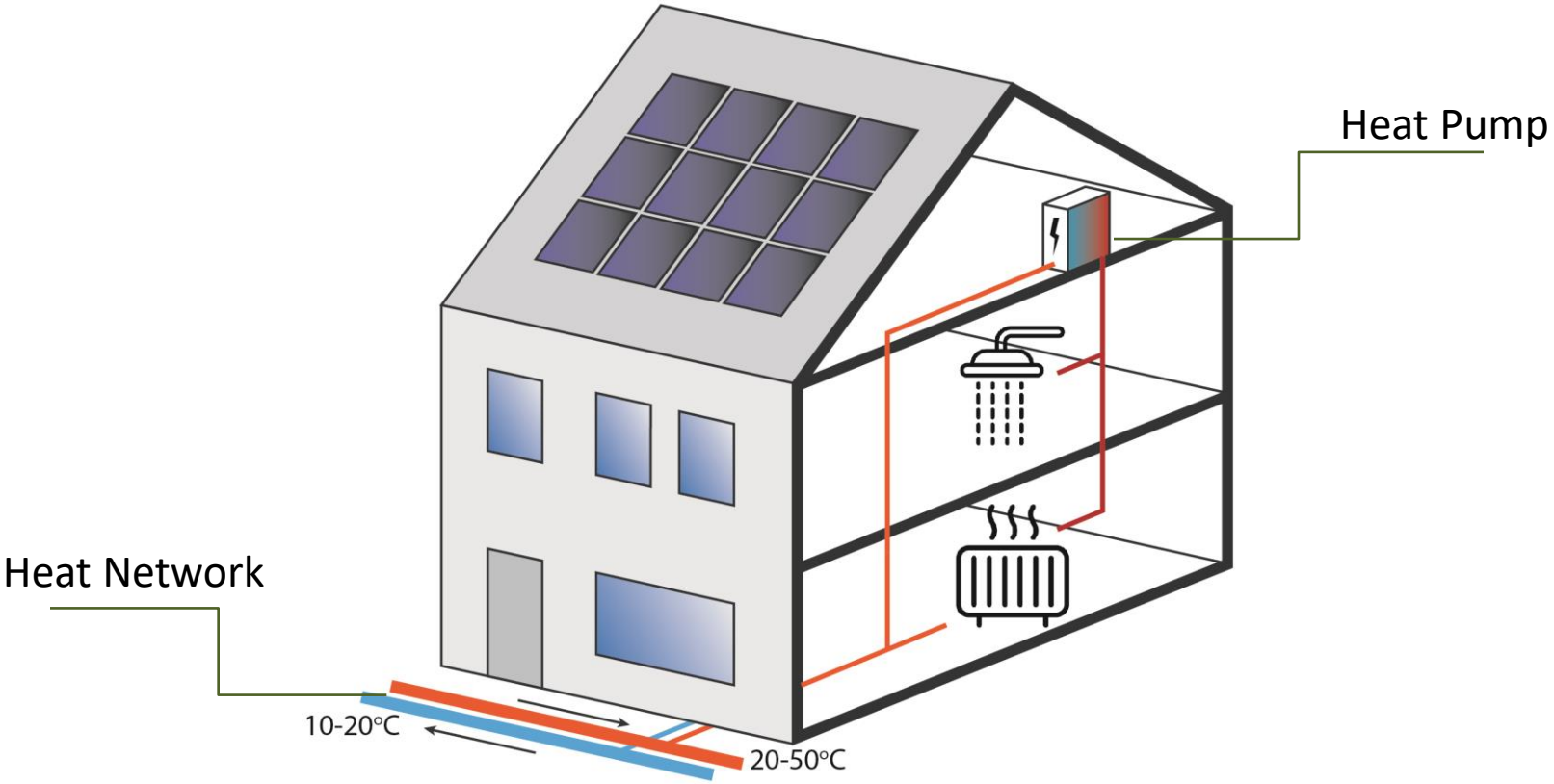


All Electric

(cvtotaal.nl)

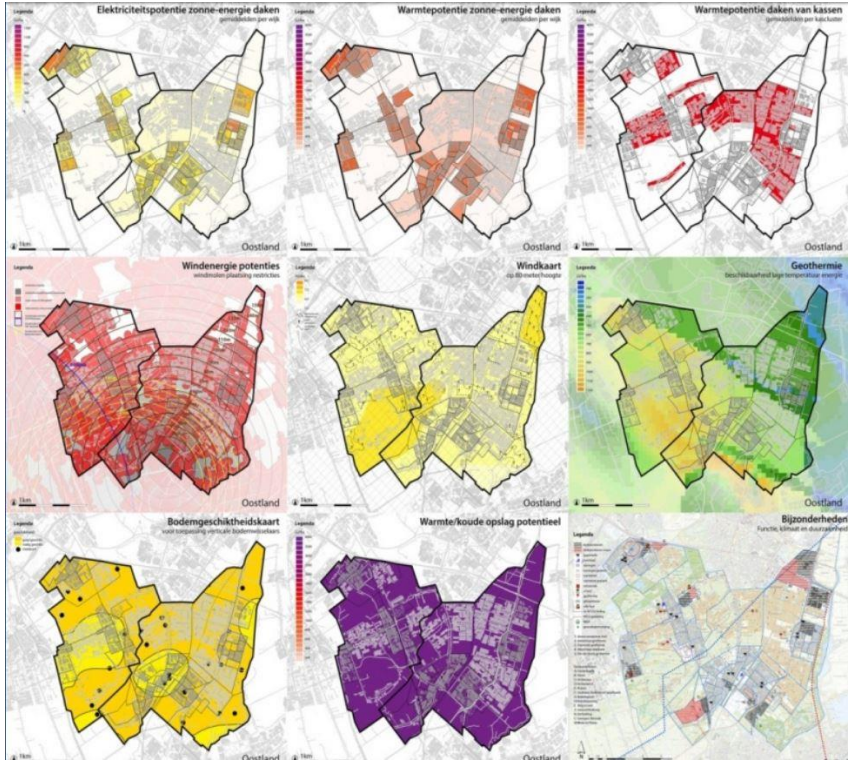


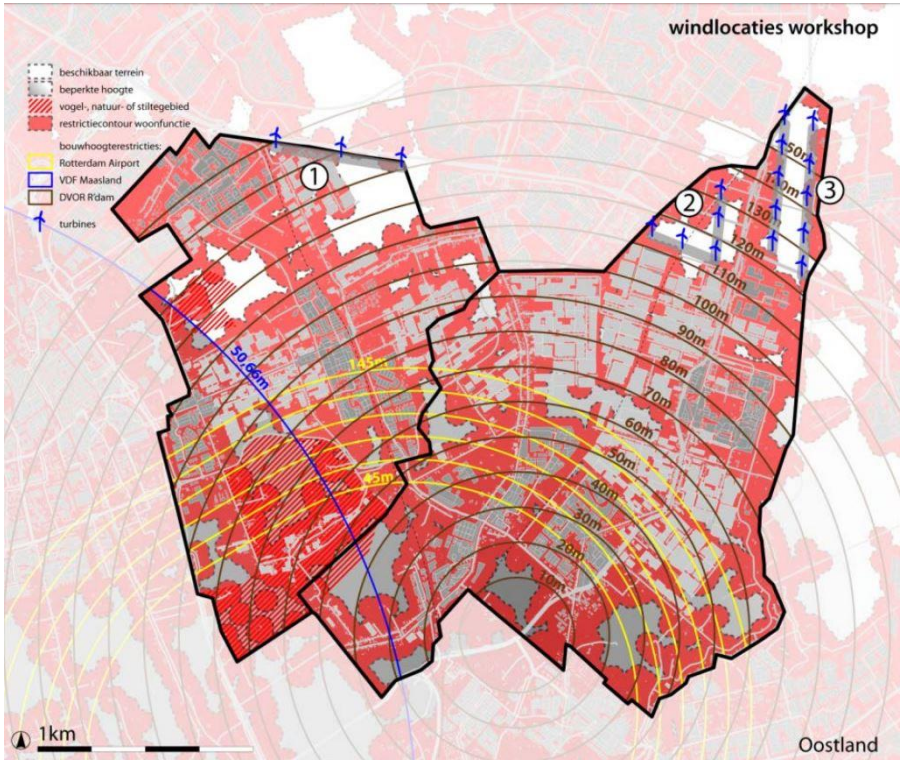
Heat Network (‘Stadsverwarming’)



Combination

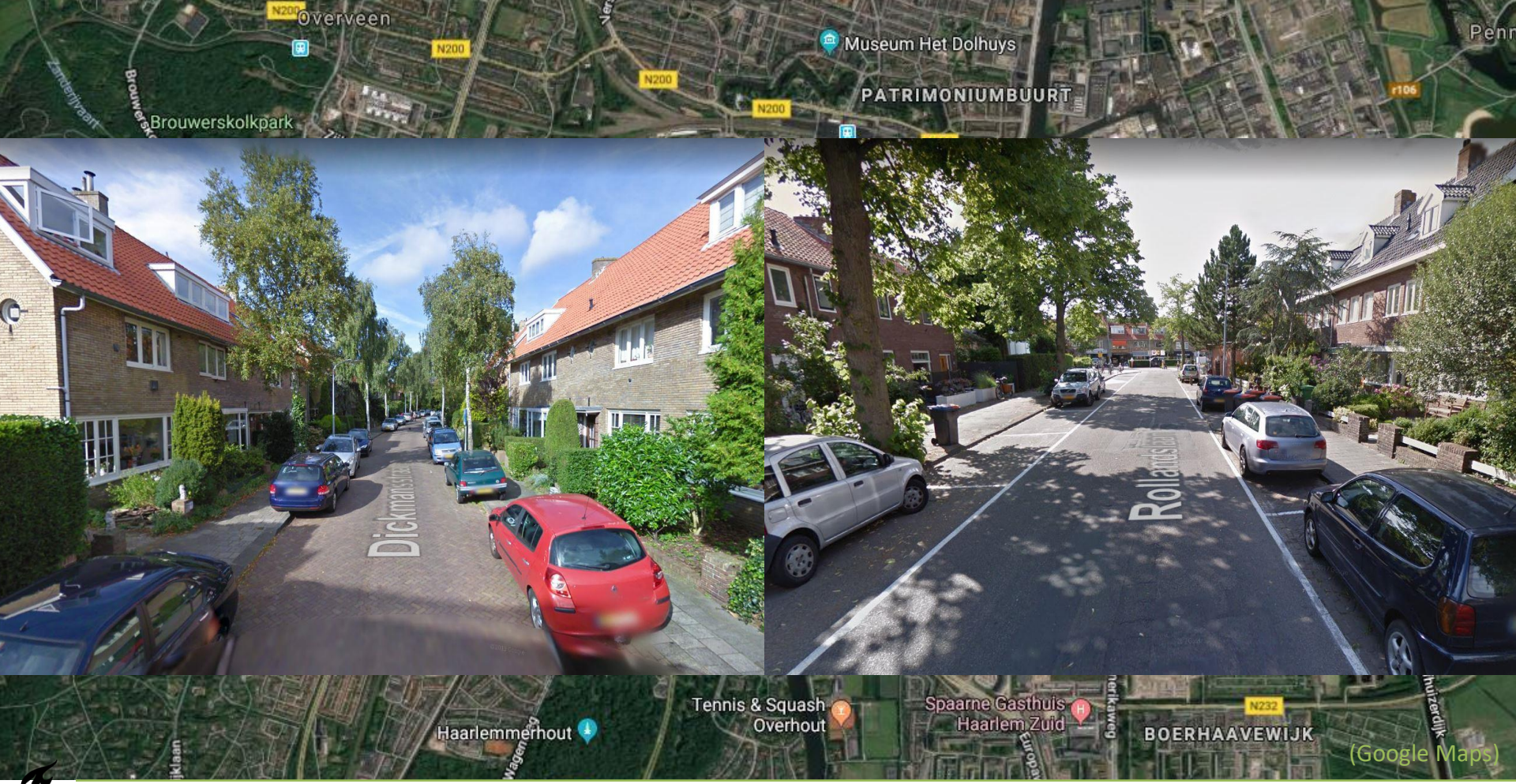

(hertz.nl)

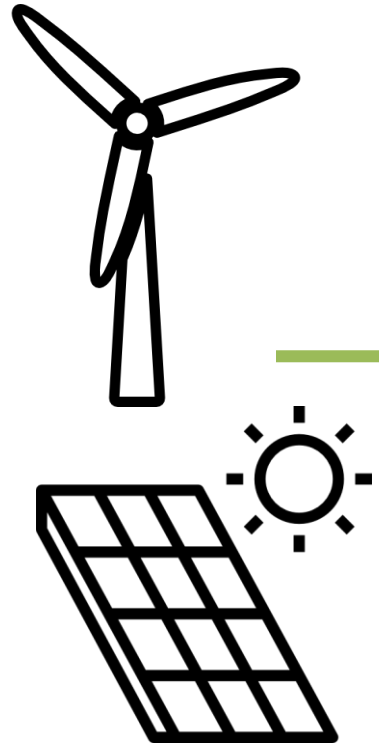


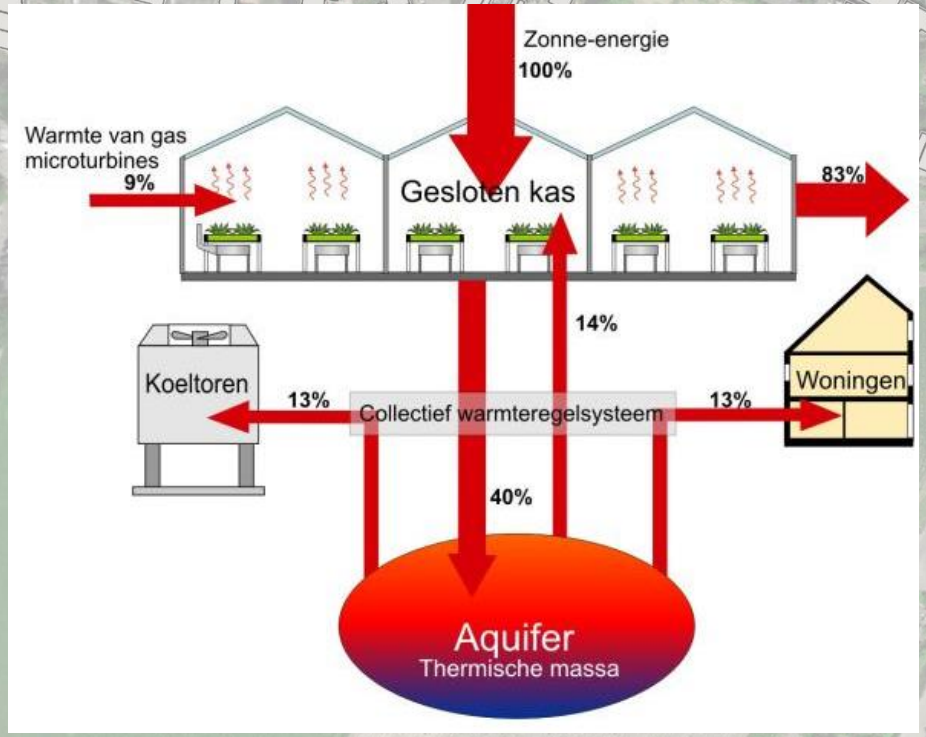


Energy Potential Mapping

(Broersma et al., 2013)


Overveen
N200
Museum Het Dolhuys
PATRIMONIUMBUURT
Brouwerskolkpark
Dickmanstraat
Rollandstraat
Haarlemmerhout
Tennis & Squash Overhout
Spaarne Gasthuis Haarlem Zuid
N232
BOERHAAVEWIJK
(Google Maps)




Zonne-energie
100%
Warmte van gas
microturbines
9%
Gesloten kas
83%
14%
Koeltoren
13%
Collectief warmteregelsysteem
13%
Woningen
40%
Aquifer
Thermische massa


Dickmansstraat


(Mijnwater Heerlen)

Solar dormers

Renewable energy production	600 MWh$_e$/y 2400 MWh$_{th}$/y	Added function	Very positive
Peak power	1 MW$_e$	-	Social cohesion	Neutral
Energy usability	Medium	Low	Presence of green	Neutral
Footprint	4900 m^2		Recreation & sports	Neutral
Visibility	Medium		Aesthetic quality	Positive
Noise	Low		Promote sustainability	Low

Another option, specifically for roofs facing north, east, and west, is to include a dormer into the design with a small array of panels at a lower inclination (0°-10°). This dormer slightly reduces the available roof space, but can increase the efficiency of the panels by 25% for a west- or east-facing roof and for a north-facing roof by up to 70%, see appendix 2.

At the same time, the dormer adds quality and value to the building, as the usable floor area of the top floor is increased. Therefore it adds both function and energy production to the roof. The available roof area for this option is also 35%, but the dormer can only occupy part of this space and the amount of panels is limited. Assuming around 20% of this space is available for this option, this brings the available are to 4900 m^2.

The dormers can be changed or made larger depending on the roof it's placed on, so it fits with the building style and creates continuity in the streets.

Figure 5.7: Map with suitable roofs highlighted (Ow

Figure 5.8: Close-up of small solar dormer (Own il

Figure 5.9: 'Solar dormers' in the Abraham Mensstraat (l) and Midden Tuindorpslaan (r) (Own ill.)

Heat stations

Landmark pump house

Renewable energy production	Not applicable	Added function	Positive
		Safety	Neutral
Peak power	Not applicable	Social cohesion	Positive
Energy usability	Not applicable	Presence of green	Negative
Footprint	30 m^2	Recreation & sports	Neutral
Visibility	Medium	Aesthetic quality	Positive
Noise	Low	Promote sustainability	High

Tauw proposes that the medium- and high-temperature networks need a minimum of 3 l stations of 40 m^2 each. However, for the low-temperature network much less space is needed there is no heat pump required, so three small technical spaces of 10 m^2 should be sufficient.

These heat stations are technical space and in itself have little potential to add quality, but one heat station could be made visible to the public as a 'landmark', as has for instance been done for the MineWater project in Heerlen. There the main pump station is designed as a landmark, which draws attention to the innovative energy network and at the same time functions as a cultural centre for the neighbourhood.

This would also be an option for the heat station in the Ramplaankwartier; developing a central building that functions as a meeting place for the neighbourhood, going beyond just its technical function.

Figure 5.36: 'Gen Coel' in Heerlen (www.mijnwater.

Figure 5.37: Impression of landmark heat station in the centre of the neighbourhood (Own ill. based on mijnwater.nl and Google Maps)

Above-ground tank storage

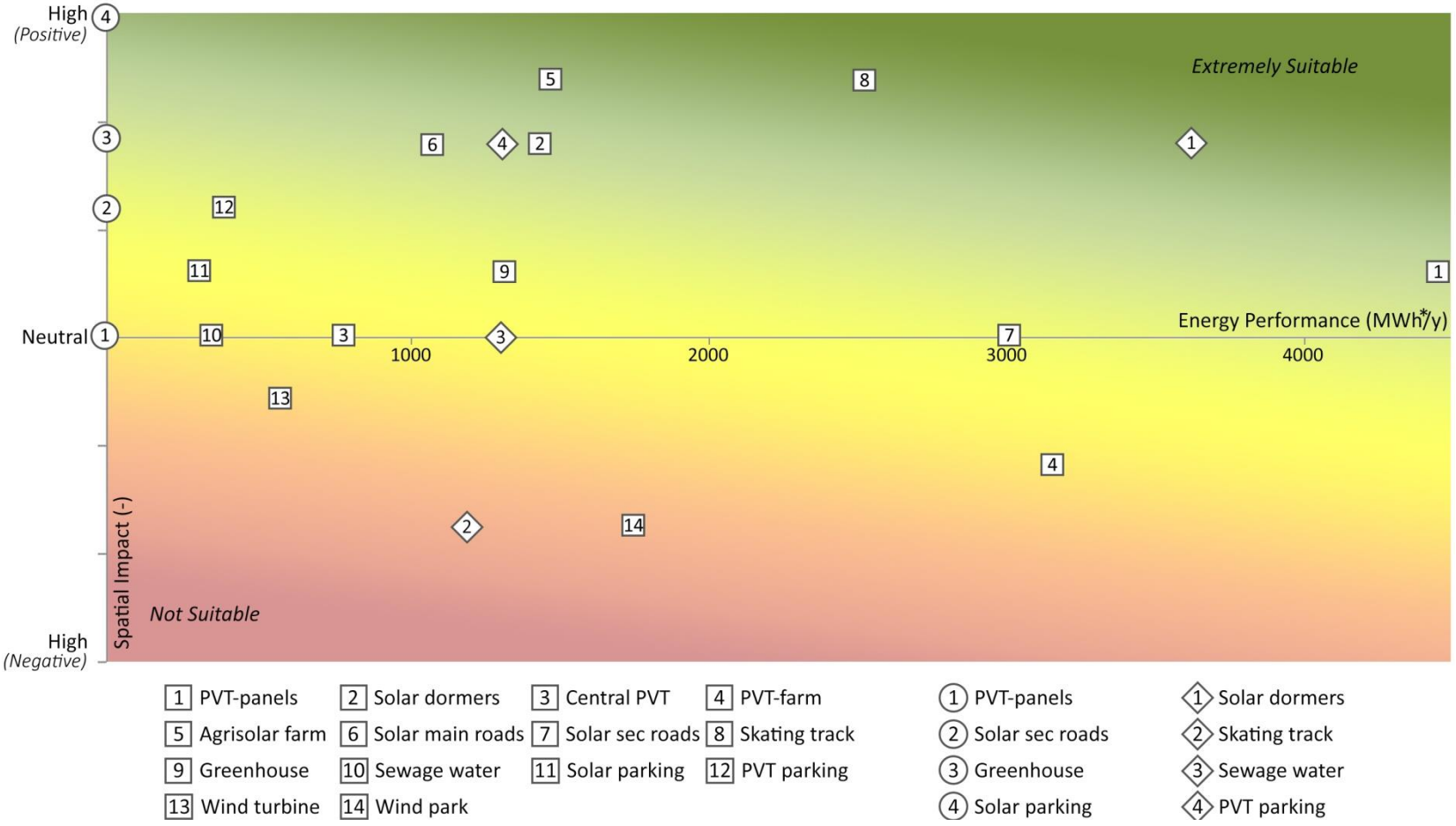
Renewable energy storage capacity	1100 MWh$_e$/y	Added function	Positive
		Safety	Neutral
Peak power	2 MW$_e$	Social cohesion	Positive
Energy usability	Medium	Presence of green	Neutral
Footprint	650-1000 m^2	Recreation & sports	Positive
Visibility	Medium	Aesthetic quality	Debatable
Noise	Low	Promote sustainability	Medium

An alternative is to place the same tank (partially) above ground and cover this with soil, creating a landscape element instead. The empty area to the north-east would have enough space for this intervention. This would actually fit really well with the surrounding dune landscape and could be an interesting element, highlighting the potential for renewable energy production in the area. It also creates a favourable slope for the placement of solar panels, which could combine production with storage in a single element.

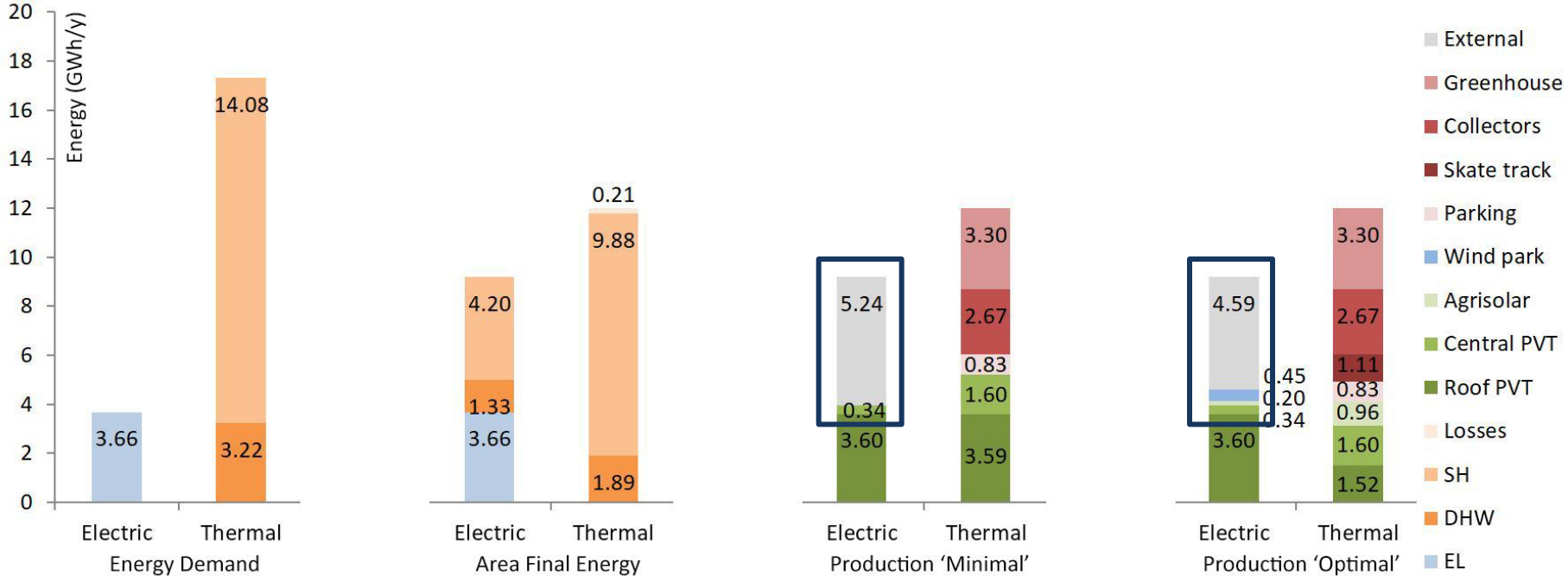
Figure 5.47: Map with potential storage locations (Own ill.)

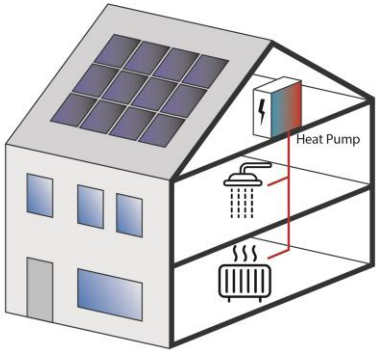
This does have its spatial impact, as the visual impact will be much higher than for an underground storage tank, but the extra functionality and landmark quality give it a positive effect. The exact dimensions for the tank can be determined based on the desired size, required storage capacity, and even on the shape of the 'dune'.

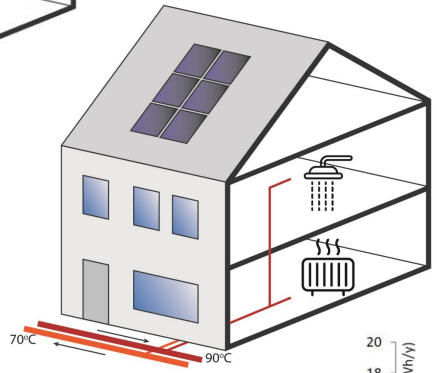
Figure 5.48: Impression of tank energy storage options from the N208 highway (Own ill.)

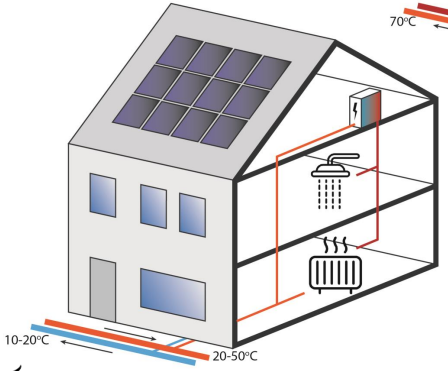

High
(Positive)
Neutral
High
(Negative)
Spatial Impact (-)
Extremely Suitable
Not Suitable
Energy Performance (MWh*/y)
1000
2000
3000
4000
1 PVT-panels
2 Solar dormers
3 Central PVT
4 PVT-farm
5 Agrisolar farm
6 Solar main roads
7 Solar sec roads
8 Skating track
9 Greenhouse
10 Sewage water
11 Solar parking
12 PVT parking
13 Wind turbine
14 Wind park
1 PVT-panels
2 Solar sec roads
3 Greenhouse
4 Solar parking
1 Solar dormers
2 Skating track
3 Sewage water
4 PVT parking

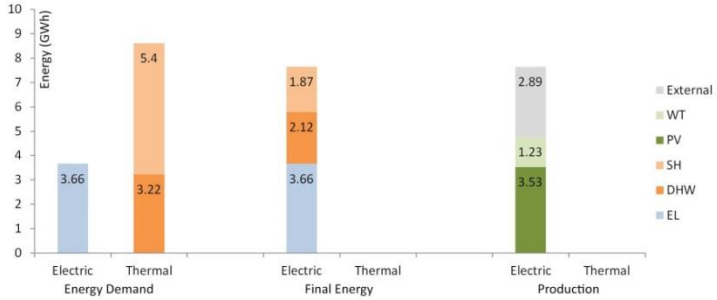

Energy Park
Legend
Eave heat network
Asphalt Collectors
Heat stations
PVT-panels
N
50m
100m

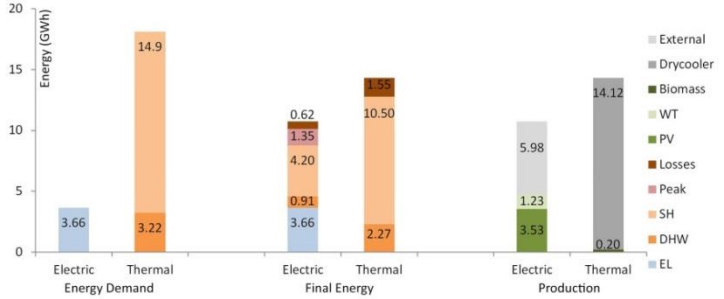

Energy (GWh/y)
20
18
16
14
12
10
8
6
4
2
0
3.66
14.08
3.22
Electric
Thermal
Energy Demand
4.20
1.33
3.66
0.21
9.88
1.89
Electric
Thermal
Area Final Energy
5.24
0.34
3.60
3.30
2.67
0.83
1.60
3.59
Electric
Thermal
Production 'Minimal'
4.59
0.45
0.20
0.34
3.60
3.30
2.67
1.11
0.83
0.96
1.60
1.52
Electric
Thermal
Production 'Optimal'
External
Greenhouse
Collectors
Skate track
Parking
Wind park
Agrisolar
Central PVT
Roof PVT
Losses
SH
DHW
EL

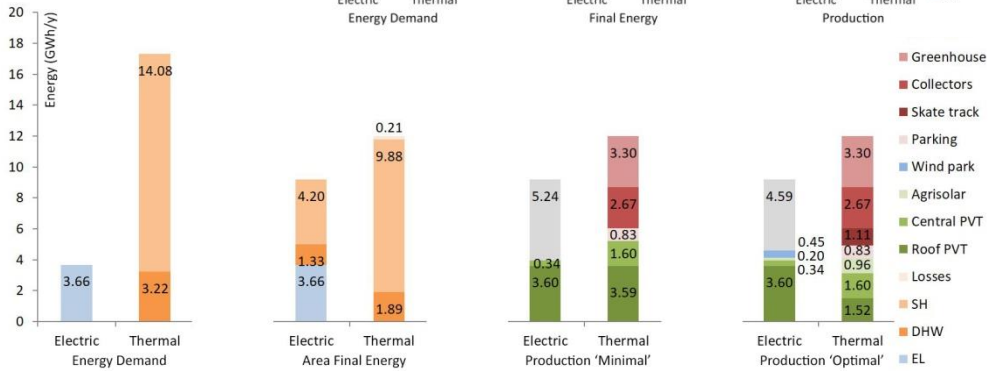

Heat Pump


70°C
90°C


10-20°C
20-50°C

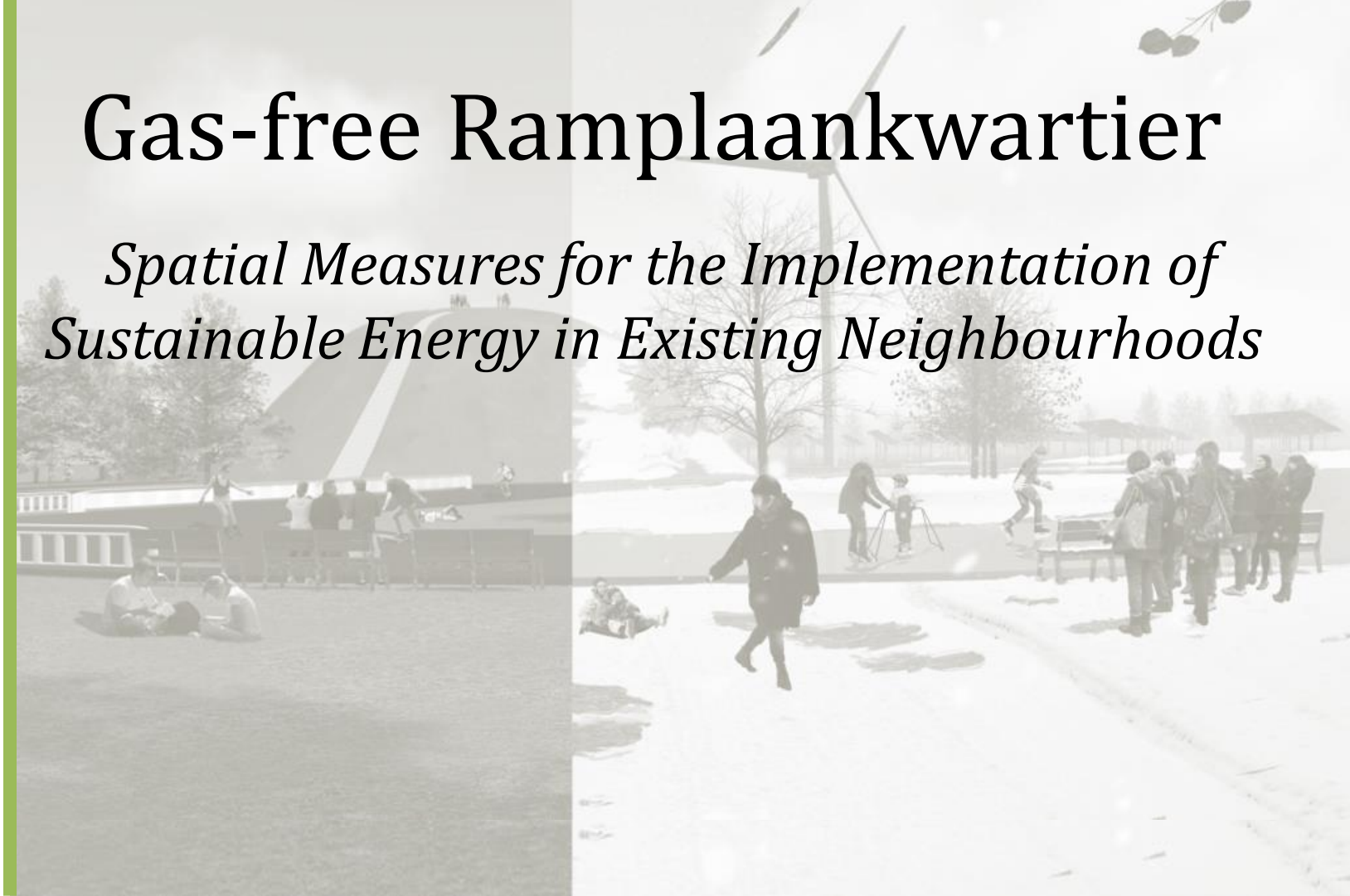

Energy (GWh)
10
9
8
7
6
5
4
3
2
1
0
5.4
3.66
3.22
1.87
2.12
3.66
2.89
1.23
3.53
Electric
Thermal
Energy Demand
Final Energy
Production
External
WT
PV
SH
DHW
EL


Energy (GWh)
20
15
10
5
0
14.9
3.66
3.22
0.62
1.35
4.20
0.91
3.66
1.55
10.50
2.27
5.98
1.23
3.53
14.12
0.20
Electric
Thermal
Energy Demand
Final Energy
Production
External
Drycooler
Biomass
WT
PV
Losses
Peak
SH
DHW
EL


Energy (GWh/y)
20
18
16
14
12
10
8
6
4
2
0
14.08
3.66
3.22
0.21
9.88
4.20
1.33
3.66
1.89
5.24
0.34
3.60
3.30
2.67
0.83
1.60
3.59
4.59
0.45
0.20
0.34
3.60
3.30
2.67
1.11
0.83
0.96
1.60
1.52
Electric
Thermal
Energy Demand
Area Final Energy
Production 'Minimal'
Production 'Optimal'
Greenhouse
Collectors
Skate track
Parking
Wind park
Agrisolar
Central PVT
Roof PVT
Losses
SH
DHW
EL

Gas-free Ramplaankwartier

Spatial Measures for the Implementation of Sustainable Energy in Existing Neighbourhoods



Smart Isle Urban

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