City-zen: New Urban Energy

Amersfoort 'City-zen Roadshow' REPORT

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NEW URBAN ENERGY

Amersfoort Roadshow REPORT

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2	Stichting Amsterdamse Economic Board	AIM	NL
3	Universiteit van Amsterdam	UVA	NL
4	Westpoort Warmte B.V.	WPW	NL
5	Alliander	LIAN	NL
6	HESPUL Association	HESP	FR
7	The Queens University of Belfast	QUB	UK
8	Th!nk E	THNK	BE
9	KEMA Nederland BV	KEMA	NL
10	Technische Universiteit Delft	TUD	NL
11	Stichting Waternet	WAT	NL
12	Greenspread Projects BV (subject to reservation, provided acceptance by EU)	GREE	NL
13	Sanquin (subject to reservation, provided acceptance by EU)	SANQ	NL
14	AEB Exploitatie BV	AEBE	NL
15	Daikin Airconditioning Netherlands B.V.	DAIK	NL
16	Siemens Nederland NV	SIEM	NL
17	Universita'degli Studi di Siena	UNIS	IT
18	Ville de Grenoble	MUNG	FR
19	Commissariat a l'Energie Atomique et aux Energies Alternatives	CEA	FR
20	Compagnie de Chauffage Intercommunale de l' Agglomeration Grenobloise	CCIA	FR

21	Gaz Electricite de Grenoble	GEG	FR
22	SAS ATOS Worldgrid	ATOS	FR
23	Clicks and Links Ltd&L	C&L	UK
24	Grenoble-Alpes Métropole	METRO	FR

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ABSTRACT

The City-zen Roadshow travels with a team of internationally recognized experts, in the field of energy planning and design to help develop a sustainable agenda for cities and their neighbourhoods. It will visit 10 cities in total over a 4-year period who are seeking expert guidance on how to become more sustainable and wish to move towards energy neutrality. The overall aim of the Roadshow team is to work closely with people from the hosting city, whether they be city leaders, energy planners, local architect, professionals, academics, students and citizens. The Roadshow normally spends 5 days in each hosting city (in Amersfoort they were a compressed 3 days) to deliver energy and urban design fun-shops in which all local stakeholders are welcome and encouraged to join and to take ownership of the final outcomes, outcomes that will allow the cities resources, both people and energy, to be directed effectively, by highlighting the energy challenges and potentials to be found in their neighbourhoods, and to finally present a sustainable 'City Vision'.

The following report will describe the activities and outcomes of the City-zen Amersfoort Roadshow that took place in the Netherlands from the 16th to the 18th of October 2019.

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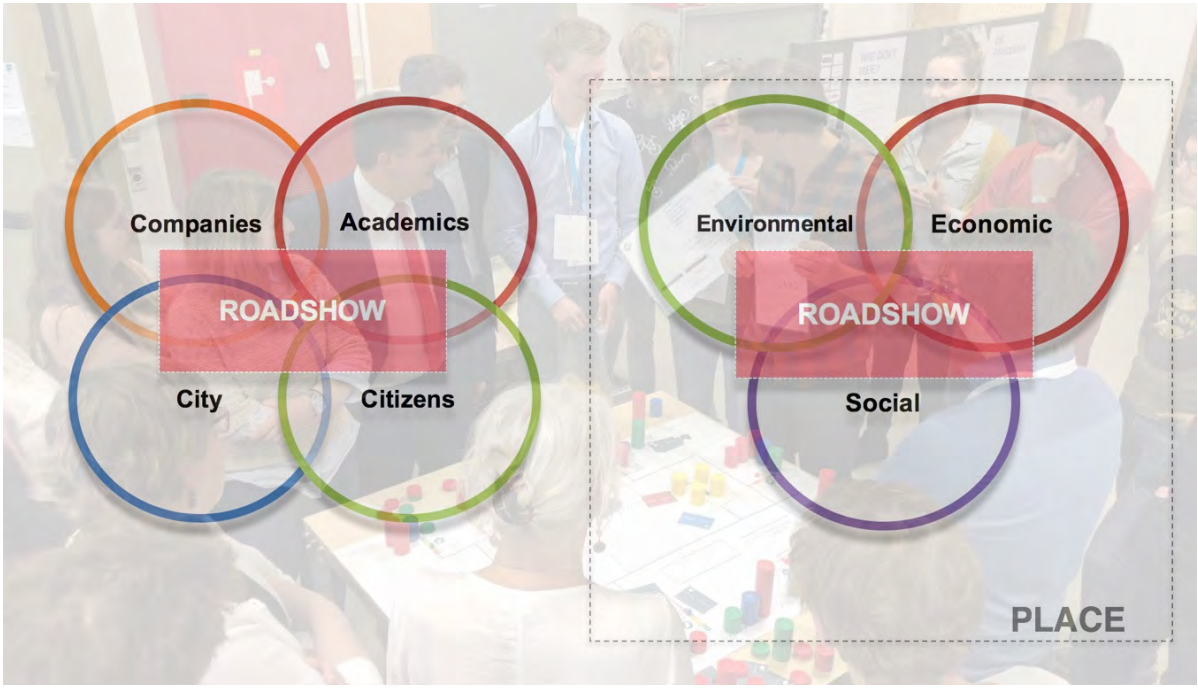
CHAPTER 1 – Introduction

1.1. CITY-ZEN ROADSHOW AND SWAT STUDIO

The Roadshow travels with a team of internationally recognized experts in the field of architectural design and energy planning to co-create a sustainable 'City Vision' with city stakeholders. It will visit 10 cities that are seeking expert guidance on how to become zero energy and carbon neutral over a 4-year period. The project has already successfully collaborated with Belfast, Izmir, Dubrovnik, Menorca, Sevilla, Roeselare, Preston and Nicosia. The overall aim of the project team, is to work closely with people from each hosting city, whether they be city leaders, neighbourhood associations, energy planners, architects, academics, students and of course most significantly the citizens themselves. The project consists of a 5-day event model, a culmination of a 3-month preparation including an educational design studio (the SWAT Studio) that promotes the Roadshow whilst building relationships and trust between all contributing partners. Local stakeholders are welcomed and encouraged to join and to take ownership of the process and the final outcomes. Outcomes that will allow the city's resources, people, knowledge and renewable energy potential to be directed effectively over a realisable timescale that will meet their energy transition. The process starts by identifying a neighbourhood's urban lifestyle and energy challenges. Then, on the final day of the event model, a definitive sustainable 'City Vision' is presented to the city, which responds to all scales of their built and natural environment.



(a) *(b)*

Fig 1. (a) The Roadshow investigates Environmental, Economic and Social aspects of each Roadshow city to develop a 'City Vision' that is specifically tailored to respond to place. (b) The Roadshow team brings together all stakeholders, it facilitates this 5-Day event to propose a sustainable 'City Vision' that is 'owned' by the City itself.

The following describes the underlying approach undertaken in Amersfoort and specifically in the project district of Hoogland and the historic inner city. It will include an explanation of the Sustainable 'City Vision' that resulted. City engagement is an exciting and thought-provoking prospect. Many questions arise at the beginning of the journey. Making first contact with a prospective project location, conducting preparations, explanations and agreements is far from an exact science. The method of achieving this successfully has evolved city-by-city and is arguably as valuable as the sustainable solutions that result. There can be many political, cultural and language obstacles that must be overcome. The outcomes have the power to inspire and potentially be realised post-project. The first questions are:

- Who is 'the City'?
- What are the city's sustainable expectations and aspirations?
- What is the current and future calculated energy demand?
- Where are the urban challenges and potentials?
- Are they purely energetic, spatial & social, administrative or a combination of all?
- Does the 'City' even realize or accept they have challenges, despite its desire to be sustainable?

To answer these questions and many more, the project team began the process of identifying the cities that need, and more importantly want to collaboration or co-create with the expert team. First contact begins with an educational architecture design workshop studio (known as the SWAT Studio). This takes place in the months prior to the Roadshow. Developed and led by TU Delft under Prof. Dr. Craig Lee Martin, the student-focused event facilitates an extended and detailed discussion with city stakeholders. The later 'expert' Roadshow event model then follows and is conducted over a 5-day period based on 'themes' that guide the evolution of the vision. Here, expert global input is delivered at key points. Each event is constructed to relate to individual citizen experiences and knowledge, giving confidence in the processes that are extended to relate to streets, neighbourhoods, districts, city and in some circumstances the region or island. The project is not intended to be a one-way stream of information and ideas, instead the process aims to activate, convince, openly invite and encourage 'the City' to be part of the process at any level that they feel comfortable with. The method includes going out of the studio and into the wider community. To engage with various initiatives, to meet and talk with their members, no matter their age or background or expertise. The project leader selects cities that have diverse climates, urban typologies, economies and cultural backgrounds to ensure that the project develops a highly adaptable and compact, yet replicable, approach whatever the city and its circumstances.

1.2. AIMS

The aim is to develop an event model capable of implementation in all cities, in order to co-create, with citizens from all backgrounds, a city's sustainable vision. Proposals developed exclusively by the project team, and not by the city stakeholders themselves, would physically and metaphorically leave with the Roadshow. Hence, a home-grown solution is key. A legacy must remain in which all participatory groups continue to exchange knowledge and speak with a common voice, making any future research bids (beyond the scope of the City-zen project) coherent, effective and impactful. The project wishes to extend its agenda by strengthening connections and bringing together a global family of project cities. Where experiences can be shared together with collaborative research bid proposals across the European community.

The most important target group are inhabitants of the neighbourhood, city and wider hinterland of the hosting city. Companies and start-ups in the field of technology and sustainability are encouraged to be active participants during the project. A key objective is to reach 600 students across the EU by visiting local universities, colleges and secondary schools. Students are the future.

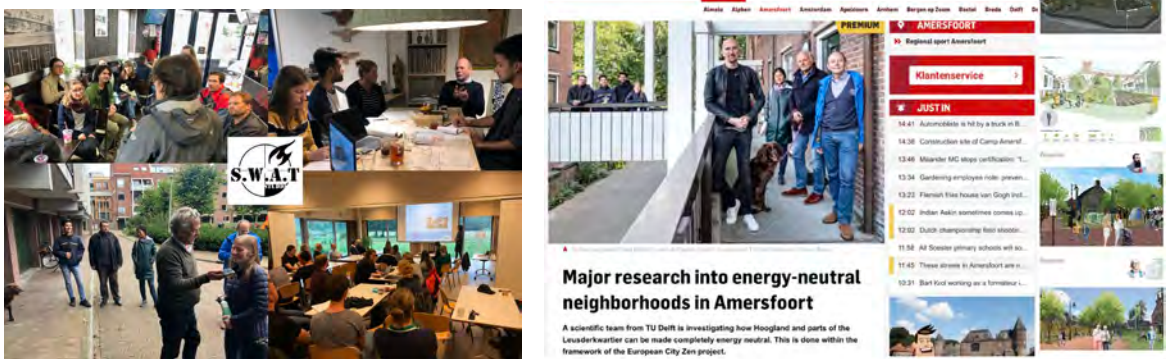
1.3. OBJECTIVES

1.3.1 Student Engagement

It has been a mutually beneficial approach to combine the energy and enthusiasm of building technology 'SWAT Studio' Master's students with the stakeholders and students from the hosting city. Close relationships that were forged of the SWAT Studio with the hosting city lay the foundation on which to build the intensive 5-day City-zen Roadshow. Promotion, active participation and dissemination contribute significantly to overall success. Consequently, the Roadshow and SWAT student workshop leader encourages interested groups such as municipalities, neighbourhood associations and universities to grasp the opportunity to do so. Taking the time to discuss what is expected and dispel any reservations or doubts that may arise, the Roadshow will not criticize a city's perceived lack of sustainability. Roadshow team specialists are aware of many complex global and local level challenges that must be overcome together for a renewable energy transition to take place.

The Amersfoort SWAT Studio has identical project aims as the professional 'expert' Roadshow. It too develops and proposes technologically innovative and sustainability-driven urban interventions. A key ambition of the design workshop is to demonstrate that, through building interventions at all scales – ranging from façade, building, street, neighbourhood and district – that sustainable lifestyles are possible within existing cities. The City-zen Roadshow having a similar approach in its effort to make zero-carbon cities.

The outputs of the SWAT Studio would be presented to a stakeholder audience on day one of the Roadshow. An audience compromising many individuals and companies who had collaborated previously with the SWAT and now would join with the opening of the Roadshow, see figures 2 and 3.



(a) *(b)*

Fig 2. (a) Selected photographs and outcomes of the Amersfoort 'SWAT Studio' (2-week 'Intervention' period - 16th to 27th September 2019), a MSc's Building Technology 'Onsite' design studio (TU Delft, The Netherlands) that took place 3 weeks prior to the start of the Amersfoort Roadshow. (b) During the SWAT Studio, the aims and objectives of the City-zen Amersfoort Roadshow would be disseminated at public SWAT presentations/Final reviews and on local media streams through various collaborative articles with stakeholders. Student design proposals and associated renders, drawings and models would be used to prompt discussions with stakeholders and communicate the expert aims of the upcoming Roadshow. Two of the neighbourhoods selected for design consideration during the SWAT Studio would also be used for the Roadshow, these being the Hoogland, seen as a priority for Gemeente Amersfoort, and the Binnenstad.

(a) Selected sustainable design intervention outcomes of the Amersfoort 'SWAT Studio' for the Binnenstad neighbourhood.

(b) Selected sustainable design intervention outcomes of the Amersfoort 'SWAT Studio' for the Hoogland area of Amersfoort.

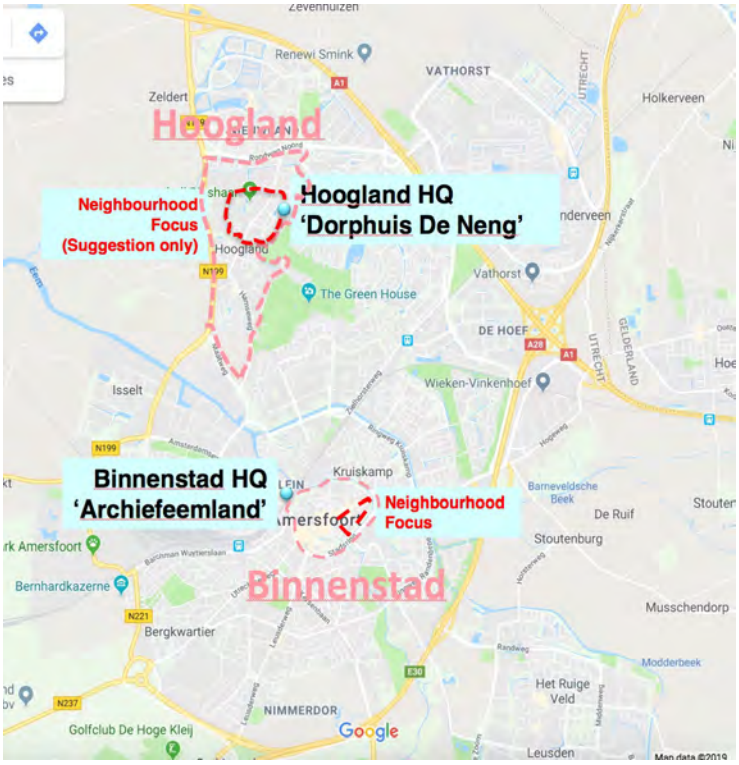
Fig 3. Selected photographs and outcomes of the Amersfoort 'SWAT Studio'.

1.3.2 Process

In Amersfoort, the process of Roadshow preparation, as described previously, began 2 months prior to the project start with a collaborative Master's level Building Technology and architecture student workshop. Both the workshop and the Roadshow itself were developed to be fun and yet 'intensive'. Components such as seminars, walking tours, design fun-shops and mini-masterclasses within the 9-day period were strategically timed and citizen focused. The outputs, synchronised with specific project team specialisms in energy and urban design. Outputs were qualitatively spatial and quantitatively energy focused, combining to form the Sustainable City Vision on the final day of the Roadshow on Friday 18th October 2019.

1.3.3 Daily Activities

Daily activities would involve citizens, architects, municipality staff, academics and energy providers visiting the Roadshow at various locations around the city would enable maximum participation. These included the Hogeschool Amersfoort, Dorphshuis De Neng, the Archiefeemland and De Observant. The 3-day programme was devised in such a way to encourage participants to 'drop-in' and 'drop-out' so that the project fun-shop activities and mini-masterclasses could fit into their professional and family schedules. This is a strategy that would increase stakeholder involvement dramatically.



(a) Overall map of Amersfoort highlighting the two neighbourhoods of project focus.

(b) Binnenstad neighbourhood.

(c) Hoogland focussed project area.

Fig 4. Map of Amersfoort highlighting the two neighbourhoods of focused Roadshow investigation, the Binnenstad and the Hoogland. It must be noted that whilst areas are chosen to allow more detailed solutions to be proposed at building, street and neighbourhood scale, the entire city is analysed in various ways to ensure a holistic city vision in terms of creative design interventions and carbon usage and subsequent proposed decent.

The first stakeholder event took place on the opening morning with a simultaneous walking site investigation. Here residents of the Binnenstad and the Hoogland joined the Roadshow team on walks that would take them around each neighbourhood, from there they would return to their respective studio bases at the Archiefeemland (Inner city) and the Dorpshuis De Neng (Hoogland) to continue on the sustainable solutions.

(a)

(b)

Fig 5. City-zen Amersfoort Roadshow 'Walks' and community 'Studio bases'. (a) Selected photographs of the walks. Their routes would take the teams through two neighbourhoods, the Binnenstad and Hoogland, in order for the Roadshow team to get a full understanding the of context implication, challenges and potentials. (b) In order to be logistically effective two public locations were kindly donated by Amersfoort Gemeente within each community. Both locations allowing the public to freely see the team working throughout the day and evening. The Archiefeemland is an historical map archive based in De Bibliotheek Eemland public library located on the edge of the Binnenstad. The Dorpshuis De Neng is a community centre and local public library in the heart of Hoogland.

This co-creative method aims to foster an intensive working environment, yet one, allowing adequate flexibility to ensure maximum stakeholder participation at whatever level they feel comfortable. It

must be respected and appreciated that all stakeholders are likely to have full-time jobs and a family life beyond any project, their attendance is self-financed. Therefore, a role of the Roadshow leader is to strike a balance between stakeholder commitments and availabilities. Discussions involve conveying the urgency of being part of the process, but not to an extent that distances prospective attendees. During the Amersfoort SWAT Studio, many face-to-face preparations and negotiations took place with stakeholders at their convenience. Various visual descriptors would be shown to communicate what is expected and gained during the Roadshow. Images taken during the previous Roadshows in Belfast, Izmir, Dubrovnik, Menorca, Sevilla, Roeselare, Preston and Nicosia would be highly effective in translating what was to come in Amersfoort. Coloured marker pens, rolls of tracing paper, laptops and notebooks are the tools of choice for the project participants.

'Pecha Kucha' style presentations (meaning 'chit-chat' in Japanese) would be the chosen format of all presentations given by partnering stakeholders and the Roadshow team. This allowed an exchange of concise and fast-paced two-way information flows facilitating a multiple-involvement event. A strategy giving both Roadshow 'ownership' to the stakeholders of Amersfoort, and communicated coherently so that participants would know what to expect and how to get involved over the 3 days.

(a)

(b)

(c)

(d)

Fig 6. Lively discussions taking place at the Roadshow kick-off evening at the Stadscafe de Observant. (a) Policymakers, residents, entrepreneurs and home owners united in their journey for a sustainable carbon neutral city. (b) Fascinating story of grassroots organization Duurzaam Soesterkwartier told by Fokke De Jong showed the power of the collected individual and the role they can play in the transition acceleration. (c) & (d) Hark Tammoter founder of the 'Meet je Stad' group described how data collection can become a social movement, acting as a bridge between the technical, social and ideological. The carbon monitoring device they created earning a top spot in Trouw's Duurzame 100.

Roadshow activities have the same aims: zero energy and carbon neutrality. However, each component is also enjoyably diverse and offers new perspectives and skills on how to attain it. Whilst two parallel fun-shops ran continually over the week, stakeholders also signed up to play the Go2Zero Serious Game and the Carbon Pac-man events. Amersfoort's stakeholders from the Binnenstad, Hoogland and the rest of the city 'role played' during the Go2Zero at the Hogeschool Amersfoort in their city centre building. All having fun whilst experiencing the cause and effect of energy strategy decisions made at the regional, neighbourhood and family household level. In the evening of day 2 stakeholders also discovered how their current lifestyle choices impact on the amount of carbon dioxide they produce, also learning how that carbon can be dramatically reduced by implementing sustainable and available solutions at building, street, neighbourhood, district and city scale. They would graphically watch the Pac-man eat its way through the trees needed to sequest all that carbon, until it eats all and arrives at a carbon zero solution for their city of Amersfoort. A new strategy specifically tailored to the more intensified 3-day Amersfoort programme was to include a 'Where we're up to?' City Vision session. This allowed the dual design studios (Future Neighbourhoods & Energy) to discuss the challenges and solutions in live stakeholder time and with a more extended group of citizens.

(a) Go2Zero Serious Game.

(b) Carbon Pac-man.

(c) Where we're up to? City-Vision discussion mid-Roadshow.

Fig 7. Images from the various Amersfoort Roadshow activities. (a) The Go2Zero game. The serious game developed by DNV_GL and TU Delft was kindly hosted at the HU Hogeschool Amersfoort. 19 stakeholders with diverse backgrounds and various age groups played the game for over 3 hours. (b) Carbon Pac-man. Stakeholders took the opportunity to graphically discover how their own individual carbon choices consequences increase and decrease carbon. (c) Where we're up to? A new development in the Amersfoort Roadshow in which design ideas are freely discussed from the moment they are first sketched. This allows stakeholders to see first-hand how ideas begin and how they can develop in their own communities and cities.

City-zen Amersfoort Roadshow 3-day Schedule for both project neighbourhoods (Hoogland and Binnenstad):

Wednesday 16th Oct

Site Investigations with Key Stakeholders
For Hoogland Team:
11.30 to 12.30
Start/Finish Venue: Dorphuis De Neng (Engweg 7, 3828 CJ Hoogland).
(Times to be confirmed by Andy)
For Binnenstad Team:
12.30 to 14.00
Start/Finish Venue: (Archiefeemland Eemhuis. Eemplein 73 3812 EA Amersfoort)

14.00 to 17.30
'City Vision' Design Studios (Venue: Dorphuis De Neng & Archiefeemland, Eemhuis). Please note that closing times for Dorphuis De Neng and Archiefeemland is 17.30). The library itself closes at 21.00.

18.30 to 19.30
Evening Kick-off with City & Roadshow Pecha Kucha's Presentations (De Observant)

Thursday 17th Oct

08.30 to 17.30
'City Vision' Design Studios (Venue: Dorphuis De Neng & Archiefeemland)

09.00 to 13.00
Go2Zero Game (Venue: Amersfoort Hogeschool)

18.00 to 19.00
Evening Carbon 'Pac-Man' (Venue: De Observant)

19.00 to 19.30
'Where we're up to?' City Vision (Venue: De Observant)

Friday 18th Oct

08.30 to 18.00
'City Vision' Design Studios (Venue: Dorphuis De Neng & Archiefeemland)

19.00 to 20.00
Final Sustainable 'City Vision' Presentation (Venue: De Observant).

1.4. ROADSHOW AT A GLANCE

The following points list 18 keywords that best describe the story and ambitions of the City-zen Roadshow:

1. **ZERO ENERGY** Aims to develop and demonstrate Zero-Energy Cities with a central role for citizens.
2. **MOTIVATE & EMPOWER** End-users to a long-term energy saving attitude.
3. **CITIZENS** Placed in the heart of a creative process that develops designs, strategies, guidelines and timelines at all scales of their own cities built environment.
4. **NUMBERS** 4 Cities completed - 3 months prep / city - 5 days onsite / city - all citizens - 7 International sustainability experts - 6 Cities next.
5. **IMPACT** Healthy lifestyles, environmental comfort, building efficiency, independence from fossil fuel uncertainty. But most of all confidence that sustainability is for all who want it.
6. **TRUST** Citizen's need belief in the process, objectives and solutions, no matter how radical or unfamiliar. Students open the door!
7. **OWNERSHIP** Citizen's take ownership of their built environment without fear of hidden agendas, affiliations or political constraint.
8. **HOMEGROWN** The solutions stay with the people.
9. **WHO IS THE CITY?** Doesn't matter where the ideas come from, as long as they come and begin to be realized.
10. **DISRUPT** Project rocks the status quo to reach zero energy.
11. **GLOCAL** Specialist global expertise combined with local stakeholder energy and knowledge of context and lifestyle.
12. **GRAPHICAL** Use graphical descriptions to get your messages across.
13. **SACRIFICE?** It's not about losing, it's about what you gain. Replacing it with something better for your children and community.
14. **TIMETABLE TO SUIT** Schedule to fit stakeholders, not the other way around. Remember, stakeholders are not on the payroll, they have other daily priorities.
15. **INDIVIDUAL PERSPECTIVE** Make sure activities relate to the people and their experiences. These can be expanded later to other scales.
16. **COMPARISONS** To design what is possible is one thing, to show what has been realized or what can occur under the right circumstances is even better.
17. **HIGHLY VISUAL** Outcomes to be colourful representations of the future, before/after scenarios.
18. **BE INSPIRATIONAL** Encourage 'City Vision' participants to take the lead in the next step!

CHAPTER 2 – ROADSHOW COMPONENTS

Two parallel workshops continued throughout the project week. One focussed on the Binnenstad (Inner city), the other in the Hoogland to the north of Amersfoort. At the end of each day the workshops met to summarise their findings and to agree on that evenings and the following day's objectives. As an example of how the project approaches each city, the following describes the journey and activities undertaken in Amersfoort.

2.1. INNER CITY (WORKSHOP 1 – DAY 1-3)

Led by Prof. Greg Keeffe (Queens University Belfast, United Kingdom)

2.1.1 Aim & Objectives

The aim of the workshop was to develop strategies at a range of scales that allow a process-based adaptation of the city to carbon neutrality. The scales utilised were: the city, the neighbourhood, and the building. The city scale is important because city form is the basis for the behaviours engendered in the city. Here urban grain can encourage or discourage car usage, can allow safe routes for schoolchildren, and connect the inner city with the countryside. The neighbourhood scale allows us to visualise the commons – i.e. the things we share. This may be things such as smart grids, or other networks, but may also be spaces for meeting, playing or growing. Green networks are important too, not only allowing citizens to enjoy nature and travel free from traffic, but also that the softness helps to prevent flooding and adds eco-services to the city. Energy storage is most cost-effective at this scale too, as is car share. In addition, density is one of the key factors in making neighbourhoods function, and many behaviours are linked to this – such as car usage, local economy etc. The house or building scale is crucial, because here we see many of the technologies for neutrality being employed. Technologies such as PV cells, heat-pumps, shading devices, DHW production all have been developed to work at this scale.

2.1.2 Methodology

The workshop starts with an understanding of city form, historic and future growth, urban grain, climate, eco-system services and density. From these initial studies, an understanding of the city as a holistic super-organism is developed. This bioclimatic understanding allows new insights into current trajectories. Urban design is based on understanding urban trajectories and deflecting or manipulating them, to create new futures in a seamless way. Once a sustainable urban design strategy for the city is developed, we change to the neighbourhood and building scales to look at the issues this strategy creates at the smaller scales. More detail can be developed here, and the solutions become more technological. We then visualise the impact these technological insertions have on the built environment and the lifestyles of the residents.

2.1.3 Outcomes

The sustainable solutions proposed by the Binnenstad group would range from small scale building and street interventions to large scale infrastructural adaptions. All designed to ensure that all Amersfoort citizens can prospers in a non-fossil fuelled future. The design outcomes are integrated in the final presentation that was delivered in Amersfoort at De Observant on Friday 18th of October 2019. The full presentation is illustrated in Chapter 3 'Sustainable City Vision'.

Fig 7. New Station Square, Amersfoort. Here the current position of Amersfoort train station platform has been relocated by 800 meters along the existing line to allows citizens and those visiting the new zero-carbon city to arrive in the heart of the green city, promoting sustainable travel, green infrastructure, citizen spaces and community cohesion.

2.2. HOOGLAND (WORKSHOP 2 – DAY 1-3)

Led by Prof. Dr. Andy van den Dobbelsteen (TU Delft, The Netherlands)

2.2.1 Background

The Energy Transition Approach developed for and during the roadshows has evolved in time and the results depend, amongst other factors, on the availability of data of energy use and other data. The energy transition workshop, also that of the Nicosia Roadshow, always starts with an analysis of the characteristics of the place under scrutiny by looking at the local climate, the technical features of buildings and the urban situation, as well as a quantitive assessment by means of Carbon Accounting and Energy Potential Mapping. This concerns the definition of current energy demands, carbon emissions and energy potentials. Next, scenarios are discussed and the most feasible one, fitting the future goals, is elaborated and calculated. As basis for effective energy interventions, the New Stepped Strategy is used: Reduce, Reuse, Produce. Different energy interventions are proposed throughout all scale levels, from the scale of single households to that of building blocks and streets, up to the neighbourhood and the whole city.

Finally, the proposed future scenario for the municipality is assessed again by Carbon Accounting.

2.2.2 Outcomes

The design outcomes are integrated in the final presentation that was delivered in Amersfoort on Friday 18th of October 2019. The full presentation is illustrated in Chapter 3 'Sustainable City Vision'.

The Hoogland team started with an analysis of this district of Amersfoort, understanding the history, culture, strengths, opportunities and boundary conditions of the village that in 1973 was unwillingly merged with the city of Amersfoort. Since, the district has developed itself from a largely agricultural community to a housing area with still a coherent community. In the meantime, Hoogland has been surrounded by new Amersfoort expansion areas as Kattenbroek and Nieuwland, but it has retained its charm and still has a large agricultural area to the west, between the Eem river and provincial road that forms the western boundary of Amersfoort.
As such, Hoogland has been surrounded by barriers: roads, other districts and a green park to the south. It is an island still, just as its name ('highland') once meant: relatively high grounds in a floodable area. With climate change and an increased probability of new floods, Hoogland may again become a refuge.

The prime focus of the Hoogland team was on making the district fully energy neutral or even energy positive. From the current predominant use of natural gas, Amersfoort will have to shift to renewables, and this can be supported by the New Stepped Strategy. Possible routes for heat alternatives are: all-electric, with heat pumps, for new projects or buildings that can be renovated seriously; heat (and cold) networks powered by geothermal heat (for which Hoogland seems to have just the right geological position); green gas (biogas from biodigestion, or hydrogen or synthetic methane from excessive renewable power). In-between solutions (hybrid heat pumps and heat pump/heat networks) are also possible.

Because Hoogland still encompassed a lot of land, including farmland, the strategy proposed was to found the 'Hoogland EnergieBedrijf', which will take care of all future renewable energy. There is a great potential, both in electricity and heat/cold: deep geothermal heat, the soil, roads (as thermal collectors), aquathermia from the Eem river, wind turbines along the A1 motorway, solar panels on roofs and noise barriers, organic waste, waste water and industrial waste heat, agricultural biomass…

Drilling geothermal wells just north of the A1 motorway, a heat pipe could be laid towards the Amersfoort inner city, through the difficult old centre of Hoogland, connecting with buildings that cannot be easily renovated. This heat network could also be powered by solar heat, possibly interseasonally stored.
The main pipeline could be connected to smaller local heat networks on lower temperatures (MT or LT), which supply the more recent neighbourhoods of Hoogland.

Further elaborations were done of renovation potentials and potential positions of PV panels. All in all, Hoogland could indeed be the energy supplier of Amersfoort, which in most parts in not as 'energy rich'.

Energy and carbon calculations by Siebe Broersma and Riccardo Pulselli demonstrated that Amersfoort as a whole could almost reduce all its carbon emissions; for the remaining output, a forest of 1500 hectares is still needed, coming from 60,000, a 97.5% reduction.

CHAPTER 3 – SUSTAINABLE CITY VISION

3.1. FINAL DAY PRESENTATION AT 'DE OBSERVANT'

The final day of the Amersfoort Roadshow took place in the De Observant on the 18th of October 2019. The final 'Sustainable City Vision' was presented to a stakeholder audience including the Mayor of Amersfoort Lucas Bolsius and the Alderman for Sustainability, Spatial Planning and the Environment at the Gemeente Amersfoort, Astrid Janssen.

The final evening of the Amersfoort Roadshow took the form of several integrated presentations. The first briefly outlined the overall objectives, ambitions, format and activities completed during the week. The second and third components composed the major body of the 'City Vision'. These being the 'Hoogland' workshop presentation, a complementary quantitative approach focused on energy strategies, scenarios and carbon offsetting measures at overlapping scales. The 'Inner City' workshop, more qualitative in nature, including urban planning intervention proposals at the façade, building and neighbourhood and city scale, together with spatial, social and guidelines. These elements would be brought together by urban observations instigated by the walking event and in-depth carbon investigations that graphically demonstrated how the city would reach zero-carbon by implementing the variously scaled interventions outlined earlier in the presentation.

The Roadshow's key to success has been to identify, reach and gain the trust of city inhabitants and decision makers. To achieve this, an exchange of knowledge, experience and commitment continues to be crucial. The Roadshow team has the ambition to further develop and implement innovative methods that increase city engagement, awareness and understanding of the solutions needed to counter climate change, become carbon neutral and make cities happier and healthier places to live.

Fig 8. Photographs from the Final Roadshow presentation depicting Astrid Janssen beginning the proceedings with words of appreciation to the Roadshow team (top left). Prof.Dr. Craig Martin then began the 'Sustainable City Vision' with an overview of the Roadshow methodology.

Fig 9. Photographs from the Final Roadshow presentation (Continued). Han Vandevyvere, Siebe Broersma and Riccardo Pulselli continue the presentation highlighting the energy potential, urban and carbon challenges faced.

Fig 10. Photographs from the Final Roadshow presentation (Continued). Prof.Dr. Andy van den Dobbelsteen and Prof. Greg Keeffe continue the presentation with an in-depth description of the sustainable outcomes of the Binnenstad and Hoogland studios.

Fig 11. Photographs from the Final Roadshow presentation (Continued). On behalf of the Roadshow team Prof.Dr. Craig Martin ended the proceedings with gifts of appreciation and thanks to key stakeholders who made the Roadshow possible and helped it reach and co-create with so many of Amersfoort's citizens. Special gifts of thanks would be handed to Wethouder Astrid Janssen & Mayor Lucas Bolsius, Hanneke Dekkers & Esther Stadhouders and finally, to Jo Pieters, leader of the Binnenstad project team.

3.2. THE PRESENTATION

The Sustainable 'City Vision' presentation (Roadshow outcomes) presented in Amersfoort on Friday 18th of October 2019 can be seen hereafter.

City-zen Amersfoort Roadshow

Oct 16-18

Roadshow Team

Prof.Dr. Craig L. Martin (TU Delft/UCLan)
Prof.Dr. Andy vd Dobbelsteen (TUD)
Prof. Greg Keeffe (QUB)
Dr. Riccardo Pulselli (UoS)
Siebe Broersma (TUD)
Dr. Andy Jenkins (QUB)
Dr. Han Vandevyvere (ViTO/NTN)
Dylan Alling (Amsterdam Smart City)
Anneleen Vanderlinden (Th!nk-e)
Achille Hannoset (Th!nk-e)
Tolga Özdemir (TUD)
Lincheng Jiang (TUD)
Javier Montemayor Leos (TUD)

This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 608702

WHAT IS IT?

- **Live. Onsite.**
- **City-specific.**
- **Sustainable Neighbourhood / City Visions.**
- **Heart of Community.**
- **Team specialisms**

City-zen Roadshow Leader – Prof.Dr. Craig Martin

Amersfoort, Oct 2019

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Amersfoort, Oct 2019

WHAT IS IT?

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- **Heart of Community.**
- **Team specialisms**

WHAT IS IT?

- **Too radical!? Fantasy?**
- **Aim: Carbon Zero city!**
- **Not preaching to the converted.**
- **Cards on the table.**
- **Not a closed shop!**

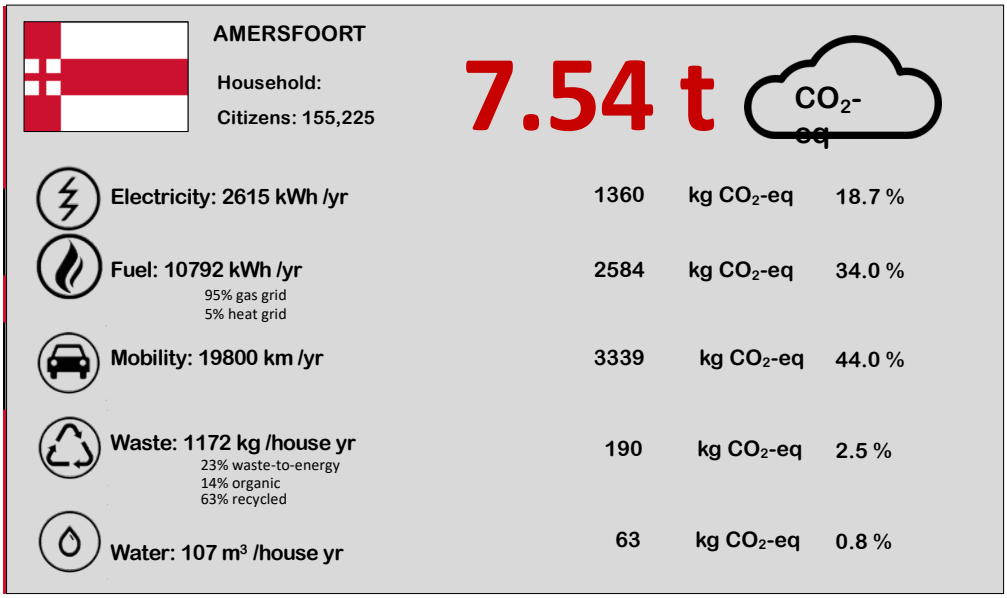
WHAT IS IT?

- **Health & Well being.**
- **Even more enjoyable.**
- **Zero carbon city & Future…**
- **For Amersfoort families.**

City-zen Roadshow Leader – Prof.Dr. Craig Martin

Amersfoort, Oct 2019

What's the emission of one single household in Amersfoort?



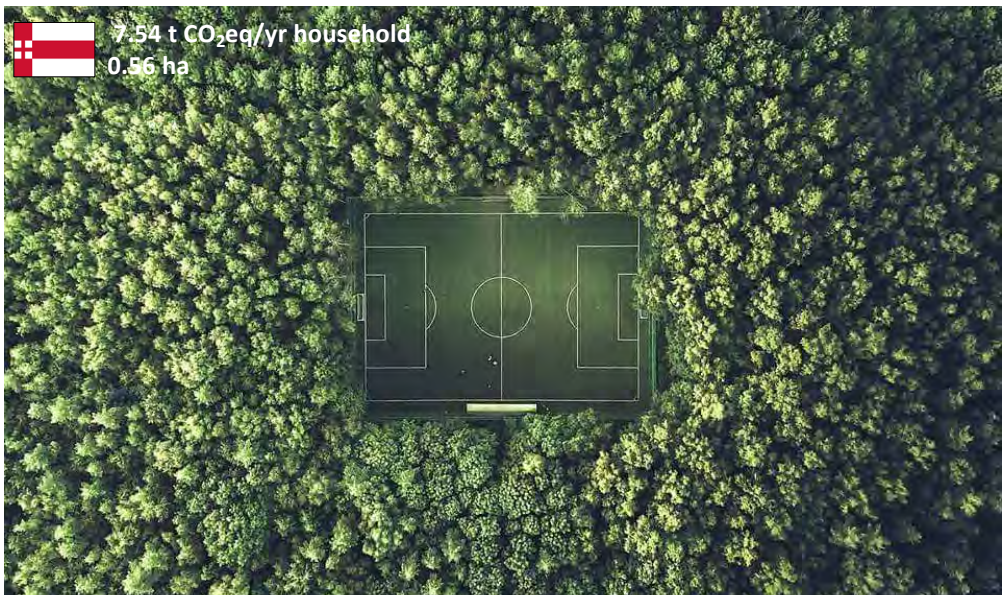
EU household

2.3 citizens

6.93 t CO_2 eq/yr

Pulselli et al."Carbon accounting framework for decarbonisation of European city neighbourhoods". Journal of Cleaner Production 208 (2018) 850-868.

Carbon Footprint per household



EU household

2.3 citizens

6.93 t CO_2 eq/yr

0.51 ha

Virtual forestland

1 field

Pulselli et al."Carbon accounting framework for decarbonisation of European city neighbourhoods". Journal of Cleaner Production 208 (2018) 850-868.

155,225 people
67675 households
63.78 km2 area

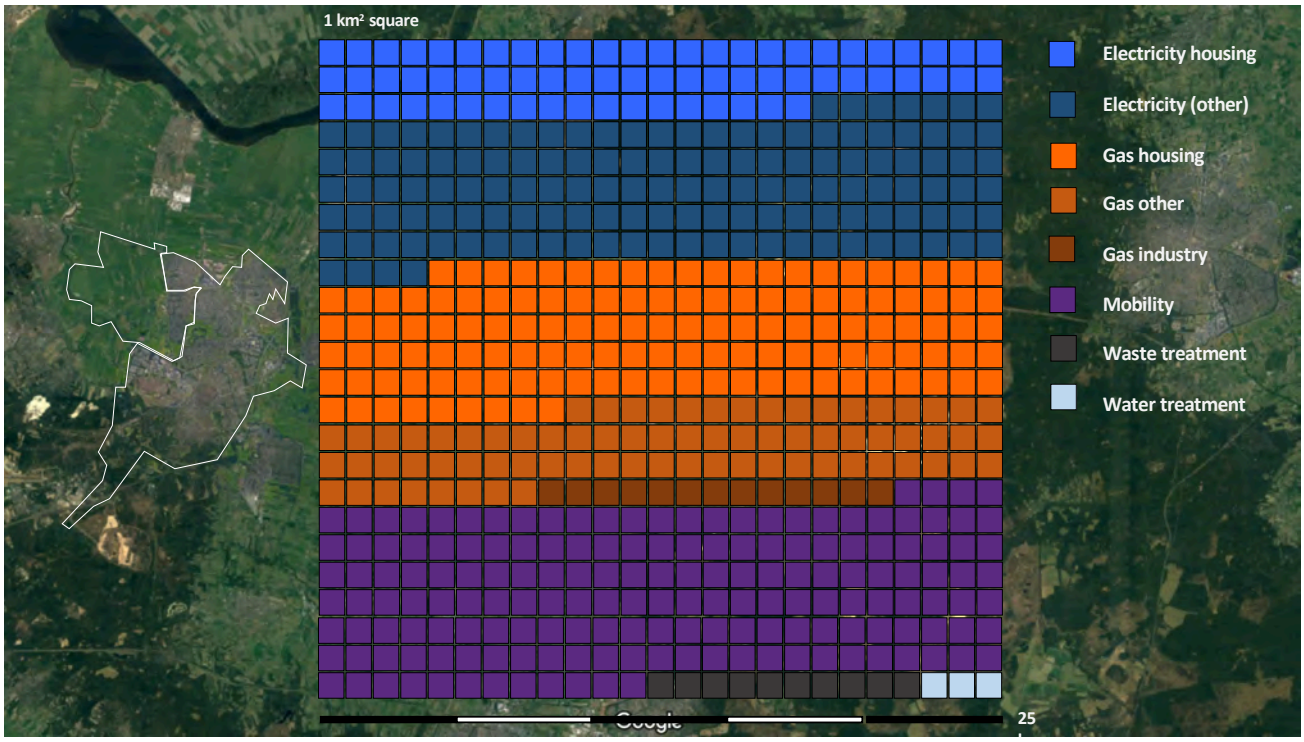
		AMERSFOORT	HOOGLAND	CITY CENTRE
ELECTRICITY	**MWh**	**529,209**	**38336.4**	**56671.2**
Housing	MWh	176,959	12778.8	6667.2
Other	MWh	352,250	25557.6	50004
HEAT	**MWh**	**1,127,590**	**70,283**	**66,394**
GAS (housing)	MWh	694,778	51948.6	30835.8
Heat grid (housing)	MWh	35,558	0	0
GAS (other)	MWh	397,254	18334.8	35558.4
GAS (industry)	–	62,227	0	0
TRANSPORT	n. cars	103,121	6,273	4,853
	km	1,340,573,000	81,553,588	63,091,614
WASTE TREATMENT	kg	79,319,975	4,825,421	3,733,049
	recycled	50,521,081	3,073,444	2,377,682
	organic	10,555,300	642,130	496,766
	incinerated	18,243,594	1,109,847	858,601
WATER TREATMENT	m3	7,252,112	441,181	341,307
t CO_2eq		**808,800**	**52,400**	**57,600**
			6.4%	7.1%

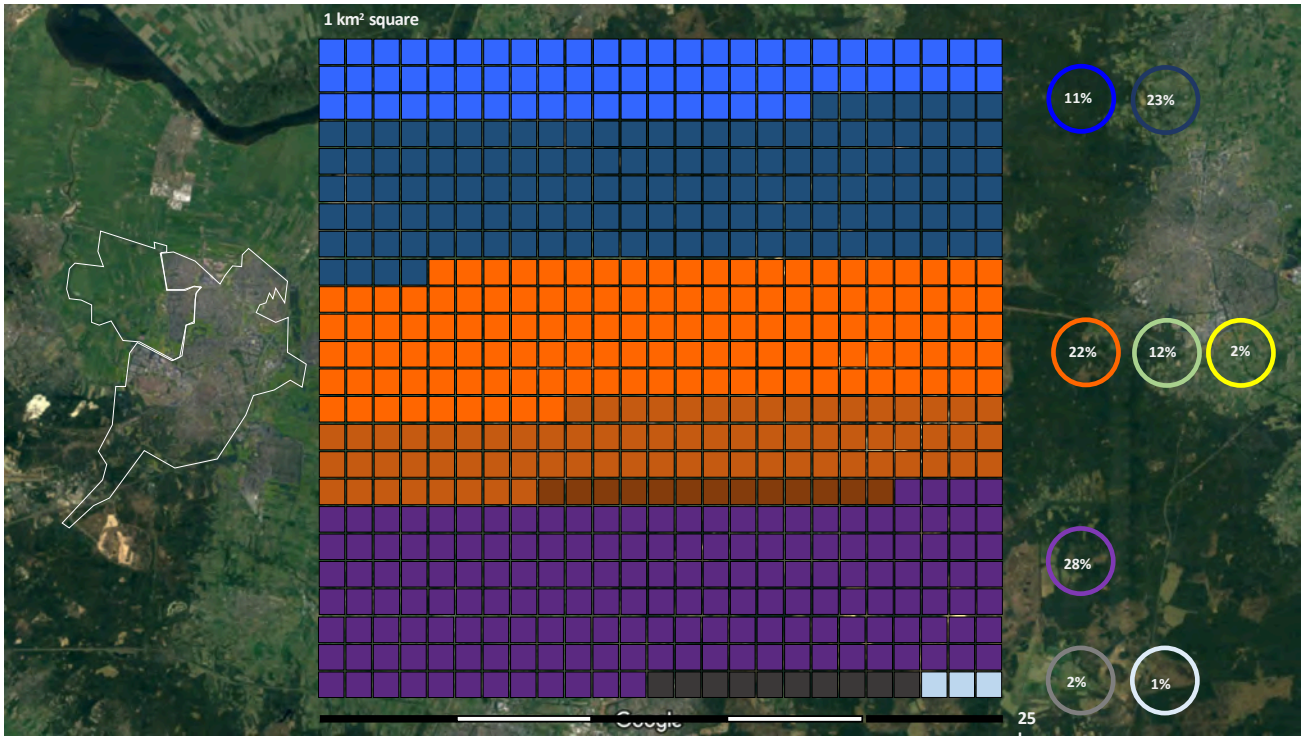
Google

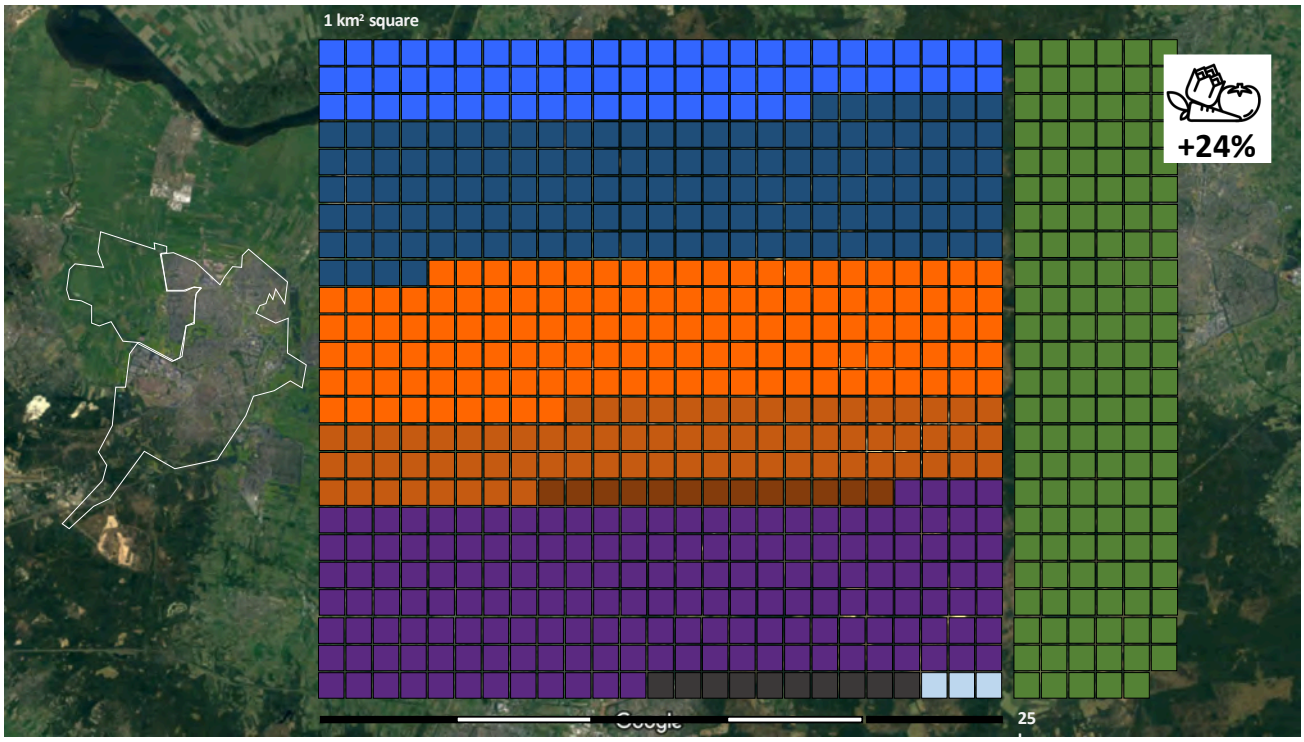
808,800 t CO_2eq
= 59,900 hectares
VIRTUAL FORESTLAND

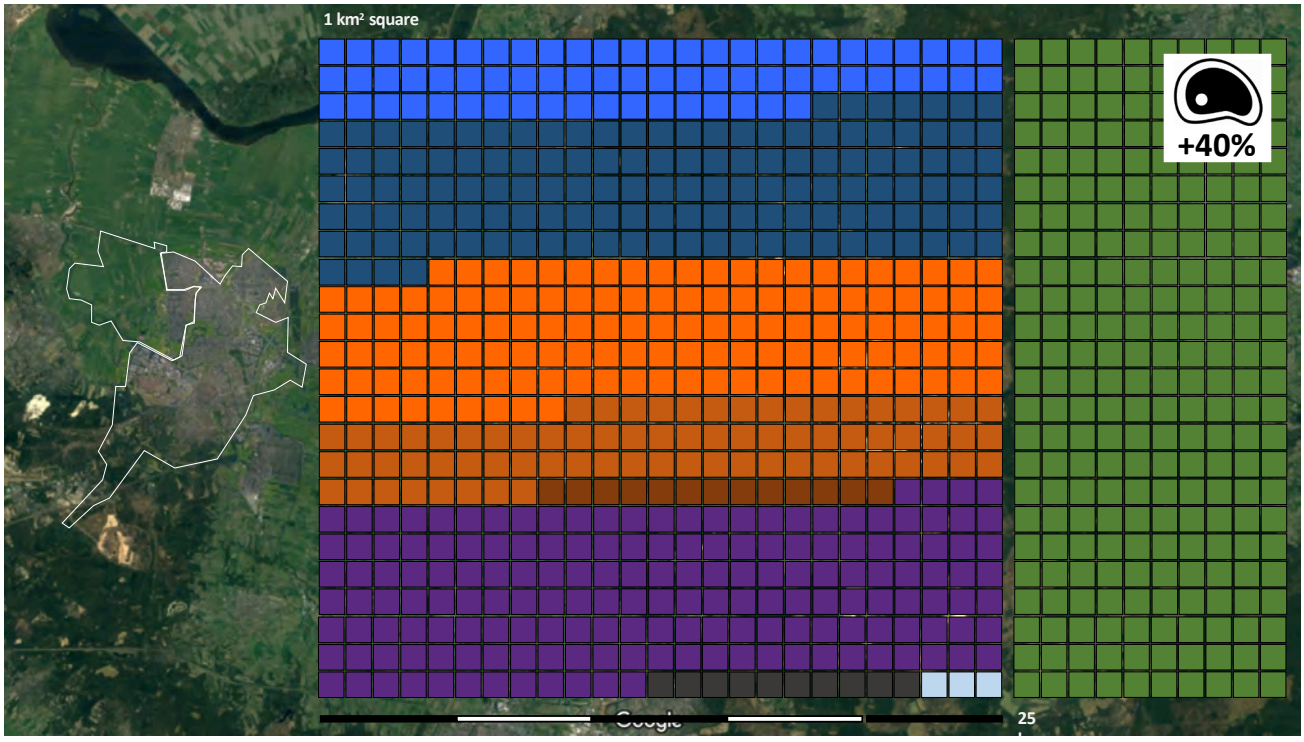
6378 hectares

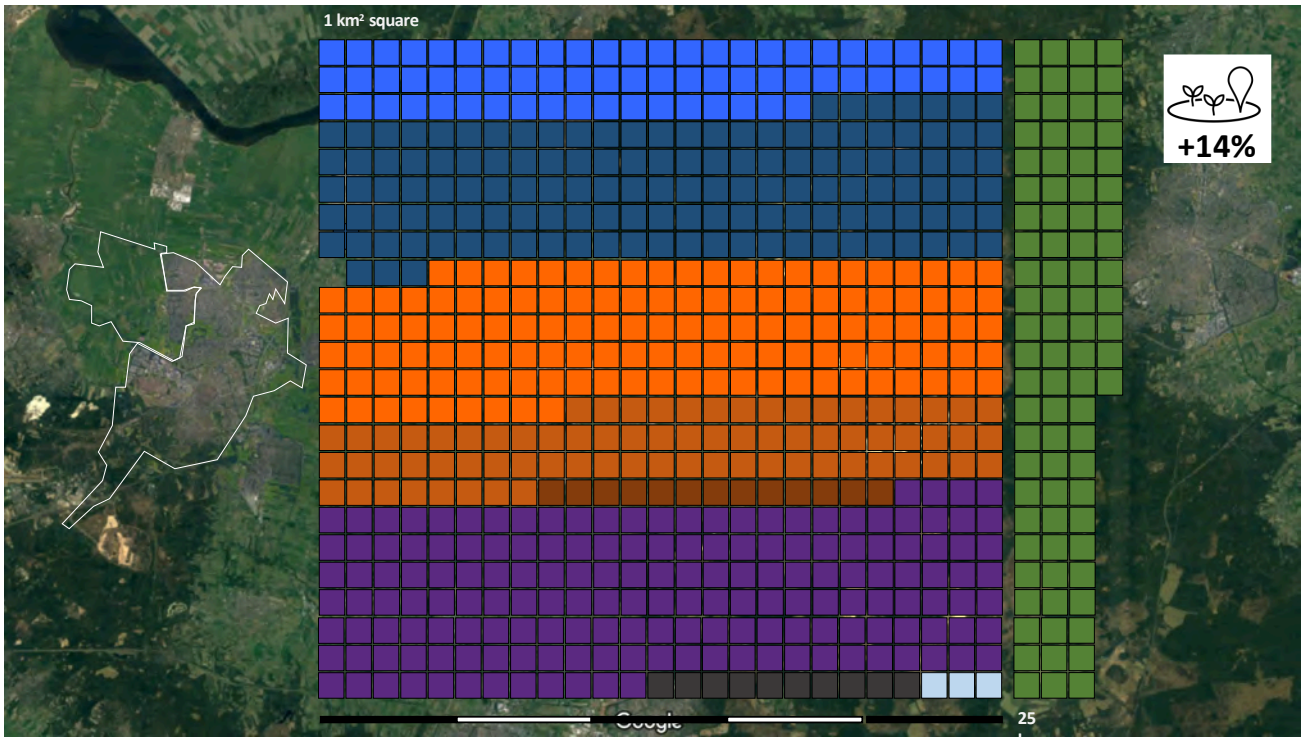
X 10

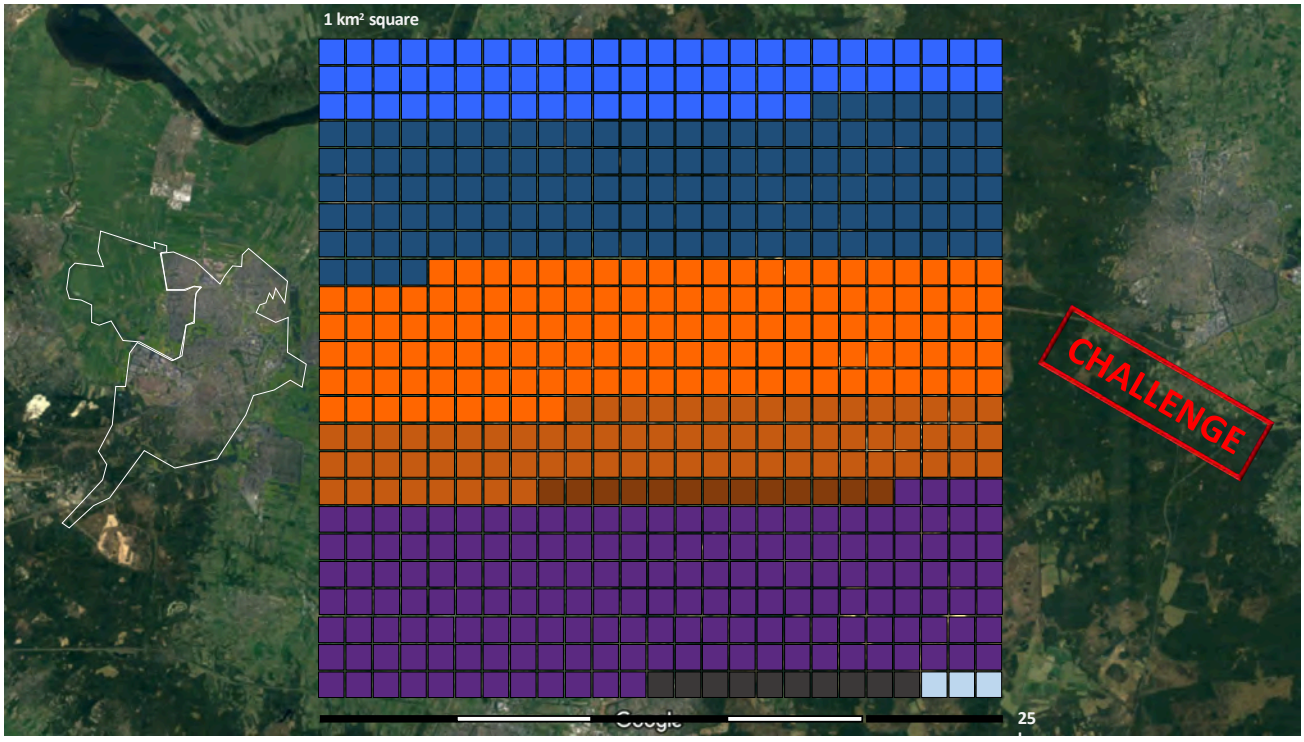

1 km² square
Electricity housing
Electricity (other)
Gas housing
Gas other
Gas industry
Mobility
Waste treatment
Water treatment
25


1 km² square
11%
23%
22%
12%
2%
28%
2%
1%
25


1 km² square
+24%
25


1 km² square
+40%
25


1 km² square
+14%
25


1 km² square
CHALLENGE
25


Low-Carbon Hoogland
Amersfoort Roadshow – 18th of October 2019
Co-funded by the European Union's Seventh Programme for research, technological development and demonstration
Haarsche Wetering
Achterhoek
De Veenhuis
Baarn
Zevenhuizen
Renewi Smink
VATHORST
Zeldert
NIEUWLAND
Van der Valk Hotel Amersfoort-A1
Paleis Soestdijk
Soestdijk
Grote Melm
B&B Krachtwijk
KATTENBROEK
Hooglanderveen
Hoogland
Cafe The Note
ZIELHORST
Vathorst
Soest
DE HOEF
Wieken-Vinkenhoef
Hoevelaken
Wiekslоot
Overhees
Smitsveen
Isselt
Amersfoort
Stoutenburg-Noord
De Ruif
Stoutenburg
DierenPark Amersfoort
Bernhardkazerne
Soestduinen
Bergkwartier
Google
Modderbeek
Holkerveen
Nijkerkerveen
Corlaer
Slichten
UTRECHT
GELDERLAND


Andy van den Dobbelsteen
Han Vandevyvere
(Riccardo Pulselli)
Tolga Özdemir
Lincheng Jiang
Amersfoort Roadshow
The Highlanders

Content

Understanding Hoogland
Sustainability Opportunities
Energy Strategies

Understanding Hoogland

Understanding Hoogland

Hoogland is a part of Amersfoort. On paper.


Welcome to Hoogland!
LUCTATI
NON EMERSIMUS
GEM. HOOGLAND
OBIIT AD MCMLXXIII

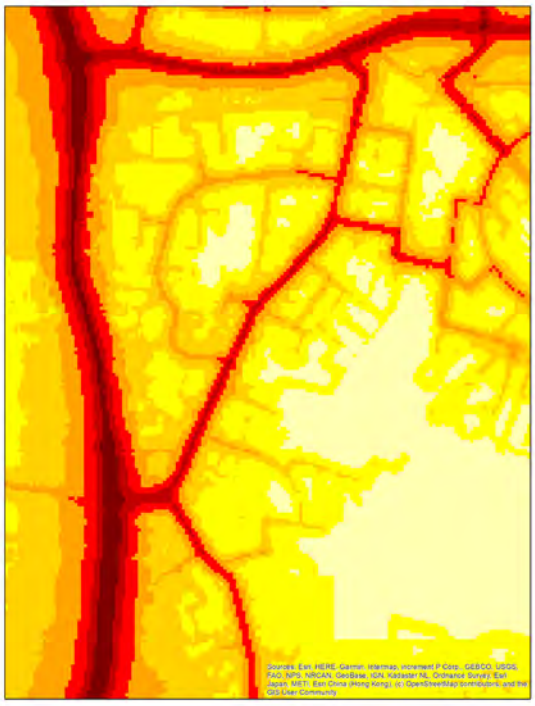

Strengths


Strengths


Strengths

Challenges

Noise




Challenges
Public space
Children
Urban heat island
Water management
Google

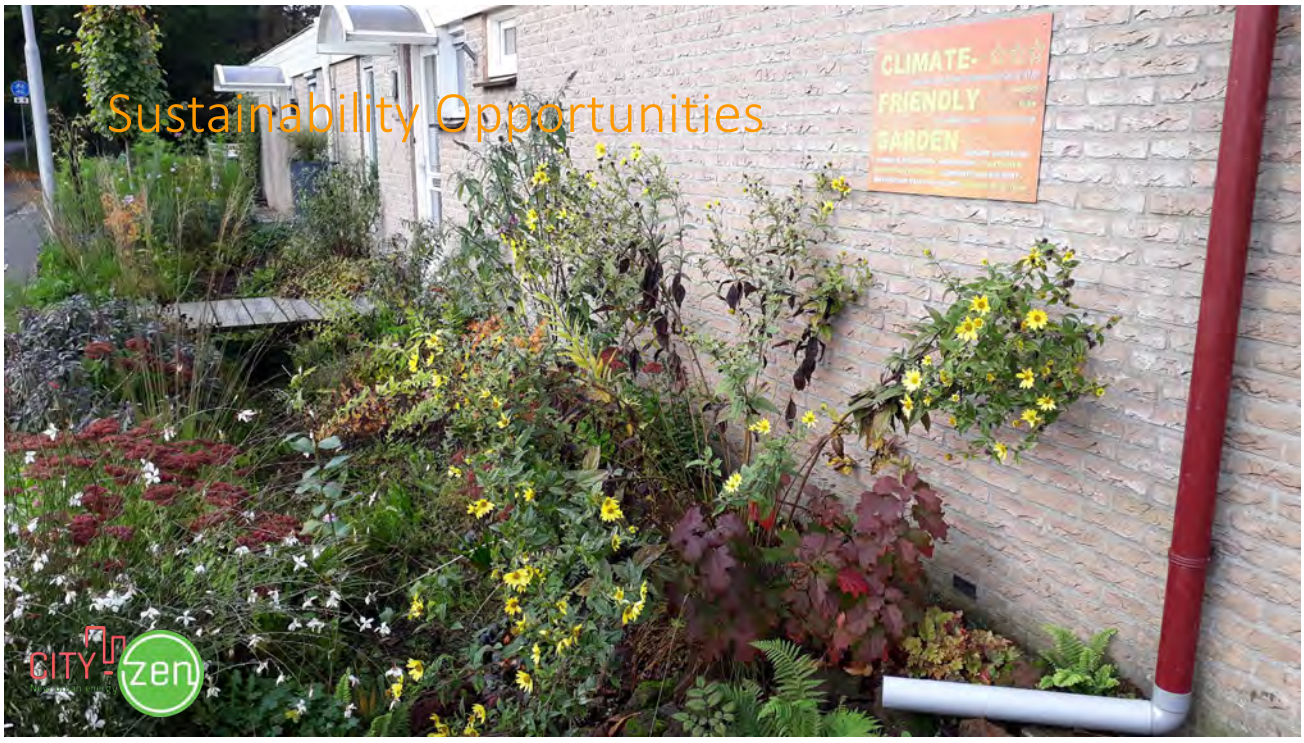

Challenges


Challenges
Green as decoration versus green
as an urban building material


Challenges
Green as decoration versus green
as an urban building material

Sustainability Opportunities

In and around Hoogland – starting from what is already present



Sustainability Opportunities

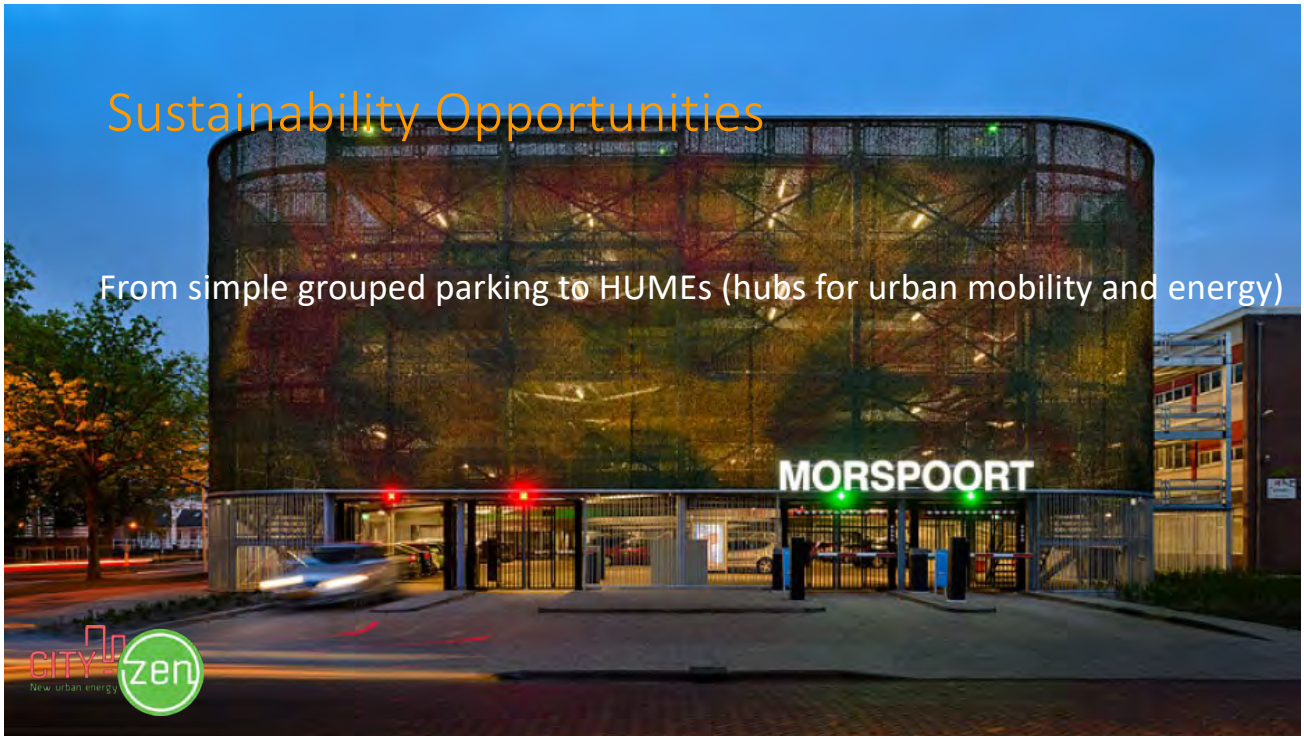
Sustainability Opportunities

Undoing the empire of the car

Group the cars in dense, peripheral parking lots or parking buildings so that **space is liberated for:**

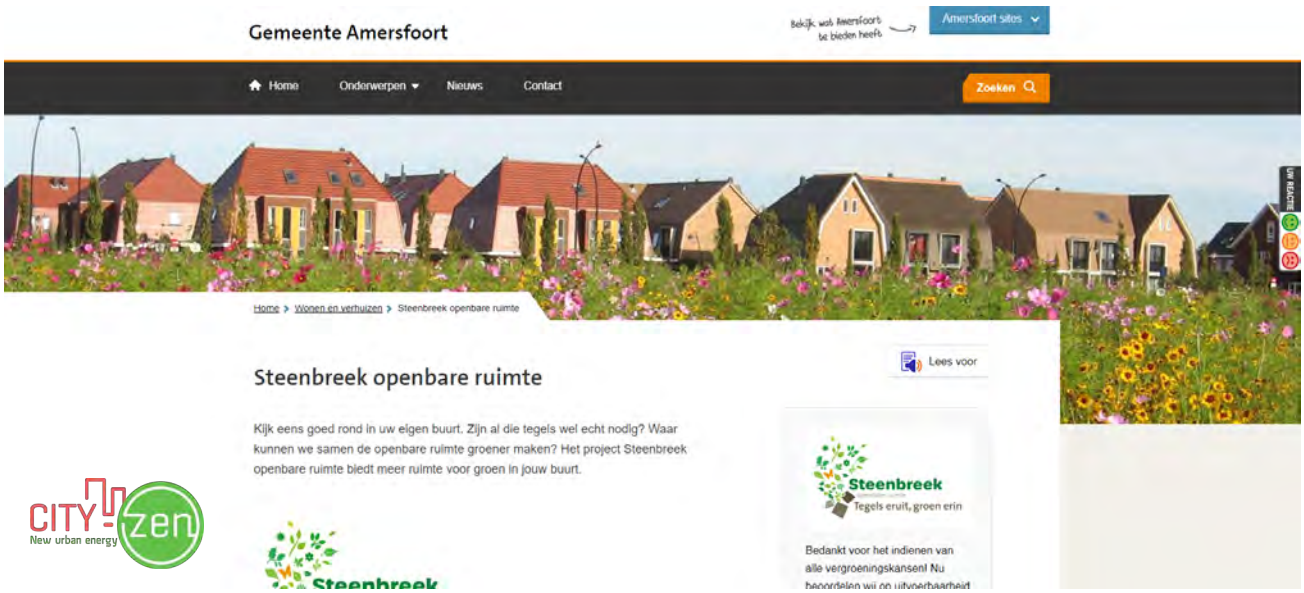
- Effective public green spaces and meeting places
- Climate adaptation, water buffering and biodiversity
- Safe kids playing
- Urban agriculture

Sustainability Opportunities



From simple grouped parking to HUMEs (hubs for urban mobility and energy)

Sustainability Opportunities



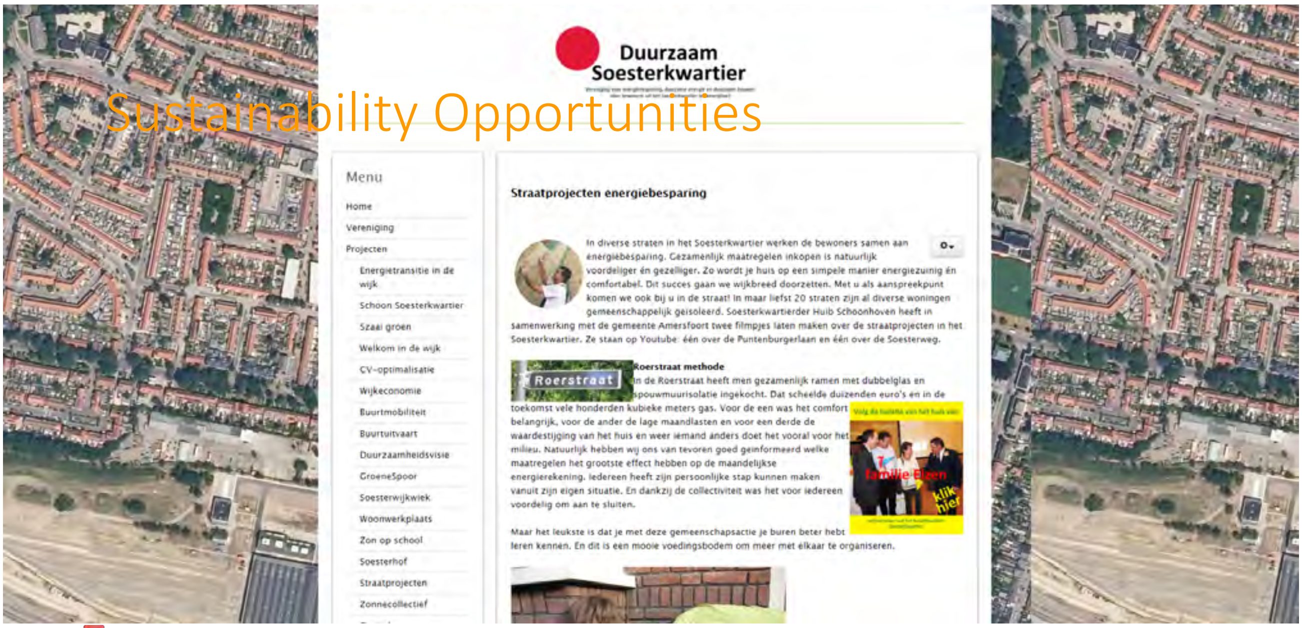

Sustainability Opportunities


Sustainability Opportunities


Sustainability Opportunities

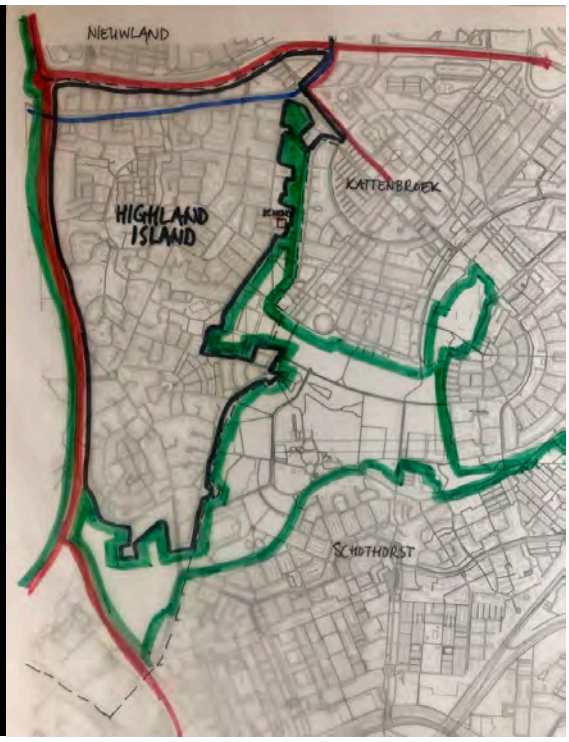

Sustainability Opportunities

Sustainability Opportunities



Spatial planning 2300 [Universiteit Utrecht]

Surrounded by barriers



Main choices for the heat transition

2: **HT/MT district heating**
→ Sustainable heat supply for old districts that are hard to renovate

1|2: **Heat pump system with HT/MT district heating for hot water**
→ For districts that are well insulated but with little potential for PV thermal

1: **All-electric, with heat pump system**
→ For buildings that can be renovated (insulation, windows, services) to a LT system

1|3: **Hybrid heat pumps, with green gas as backup**
→ For buildings that can be renovated, but LT heating in winter is not enough

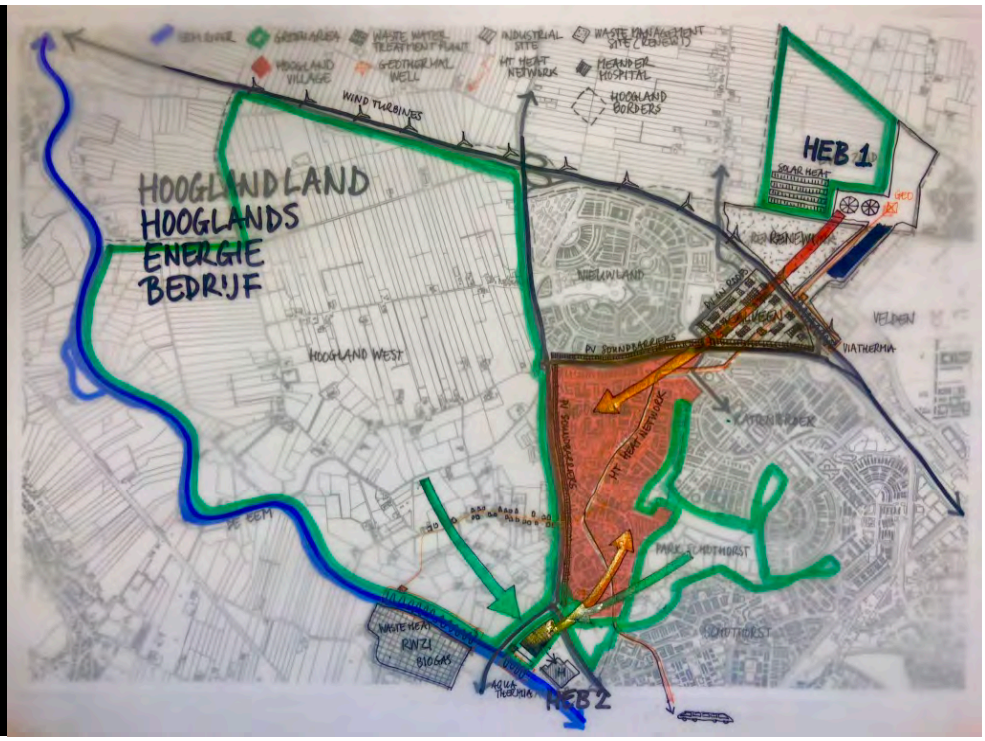
3: **Green gas** (bio, H_2, CH_4) **in the current gas grid**
→ For old districts that are hard to renovate and when district heating is impossible

Strategy at the village scale

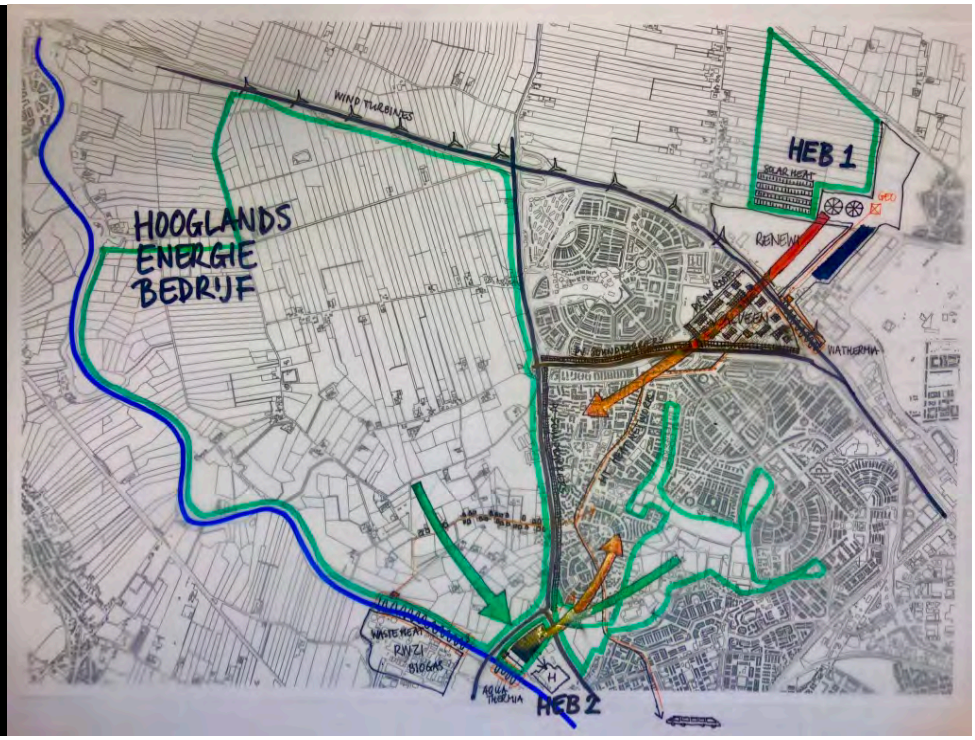
Hooglands EnergieBedrijf

Hoogland is huge!

HEB
Hooglands
Energie
Bedrijf



HEB
Hooglands
Energie
Bedrijf

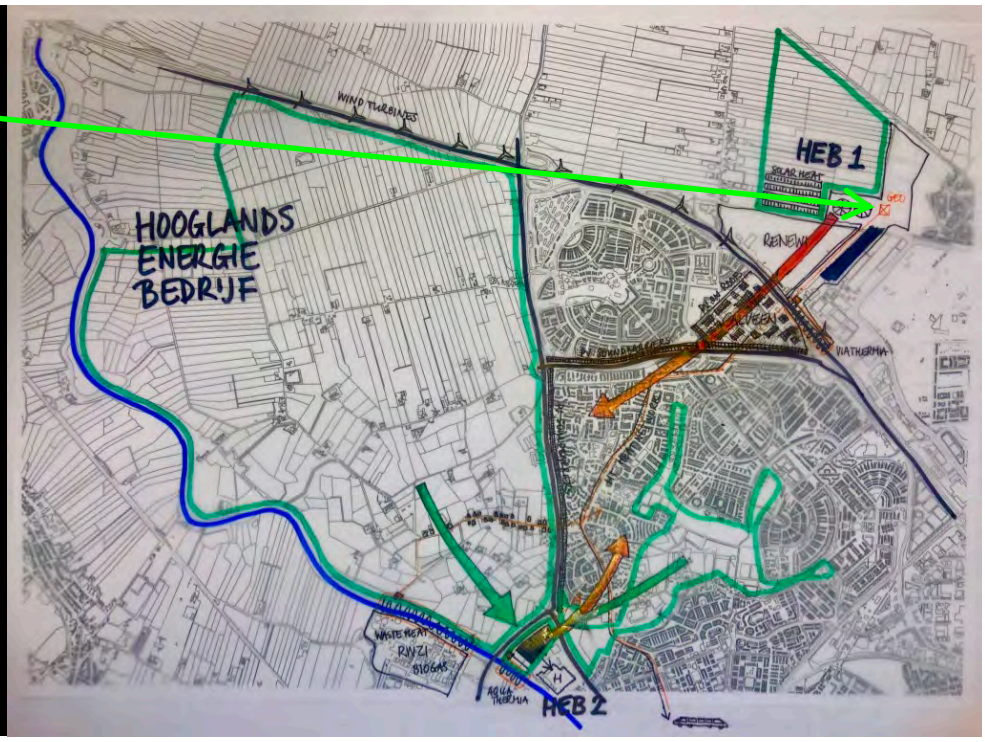


Heat demands

The most difficult street in the village

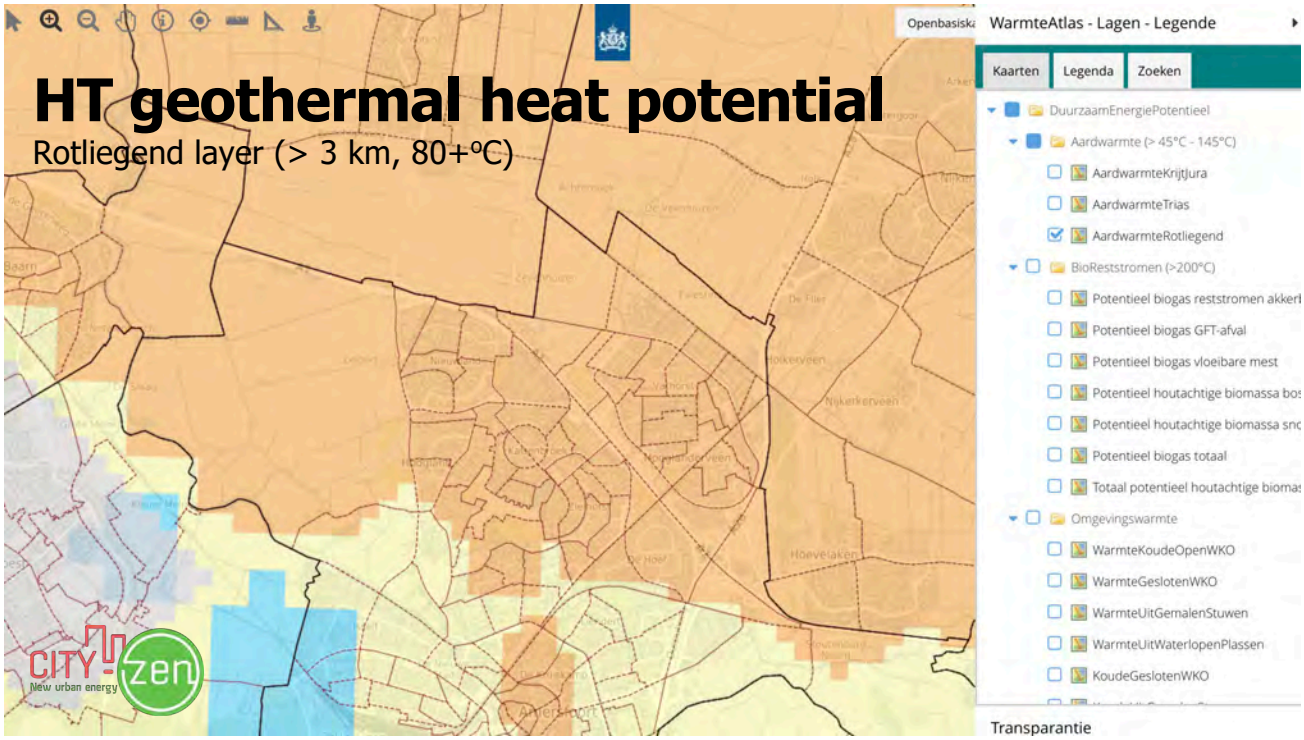
HEB

Geothermal heat



HT geothermal heat potential

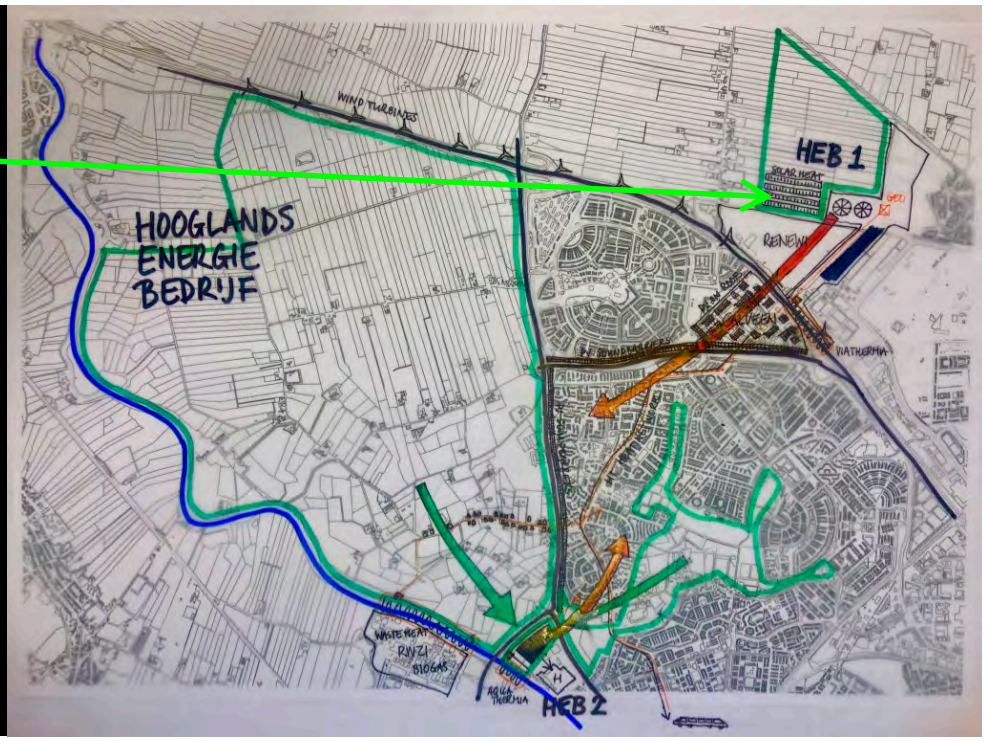
Rotliegend layer (> 3 km, 80+°C)



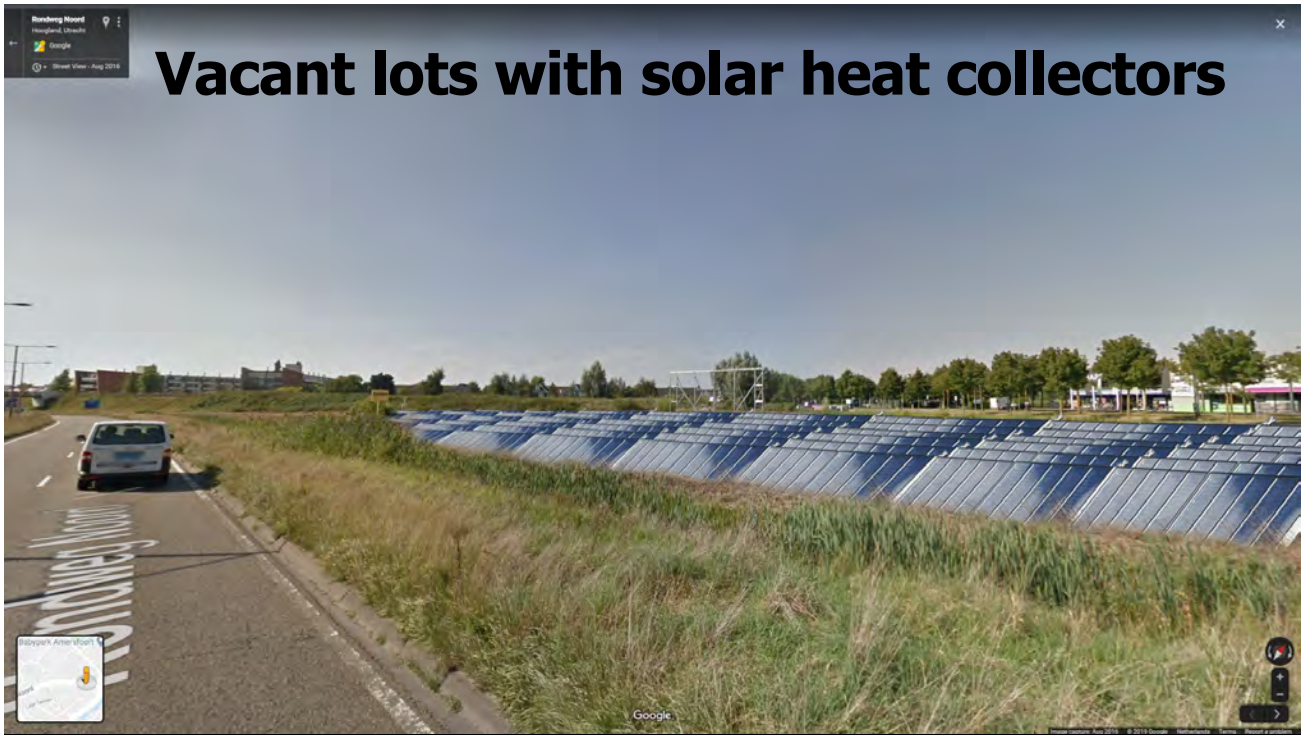
HEB

Geothermal heat

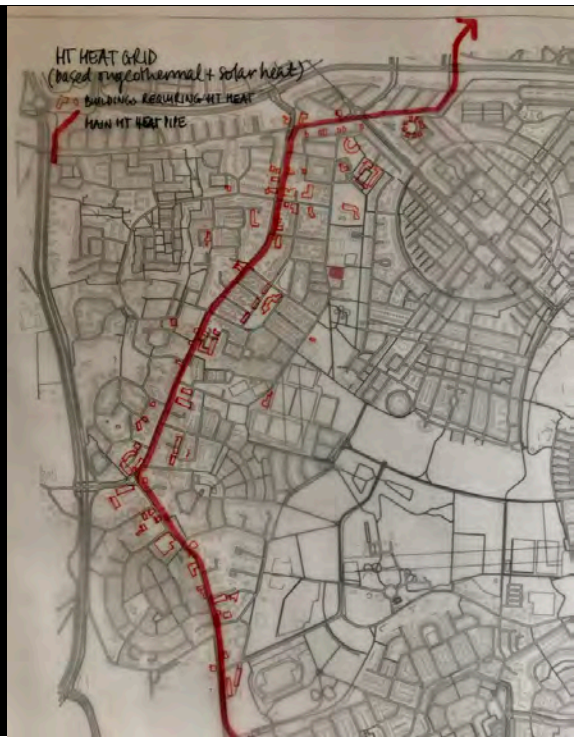
Solar heat




Vacant lots


Vacant lots with solar heat collectors

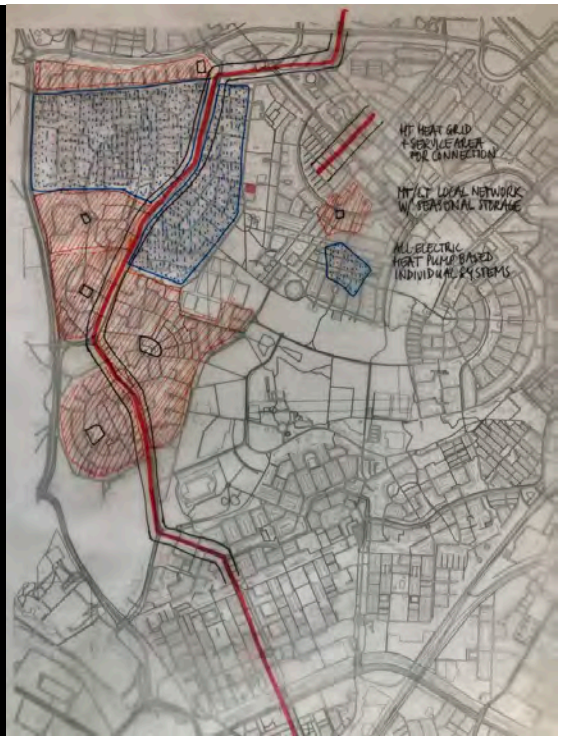
HT heat network
powered by geothermal



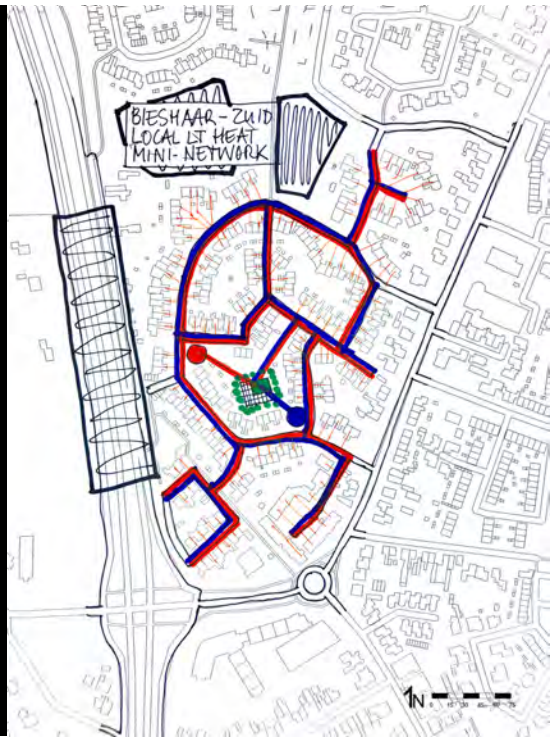
HT heat pipe

Local LT heat networks

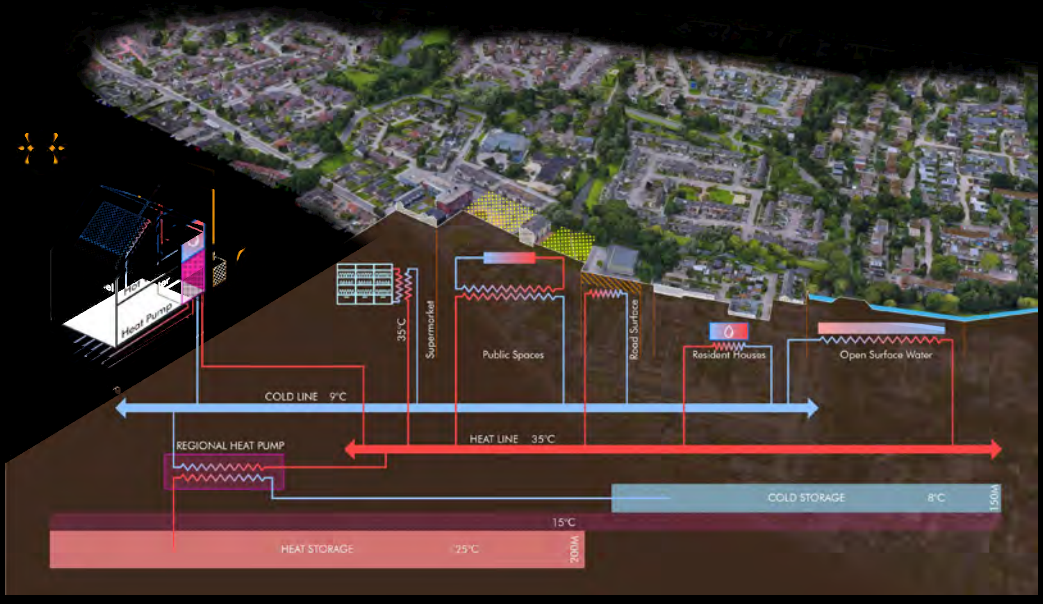
Individual heat pumps



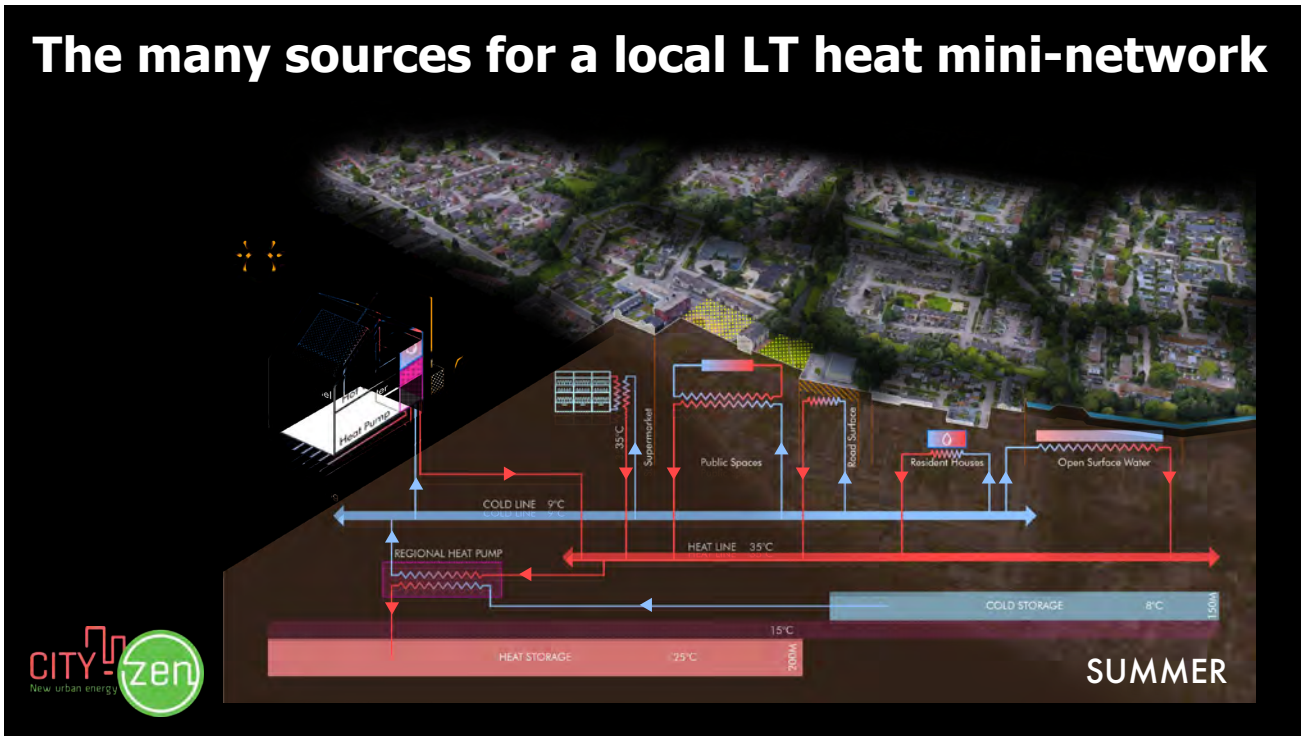
Bieshaar South
Local LT mini-network



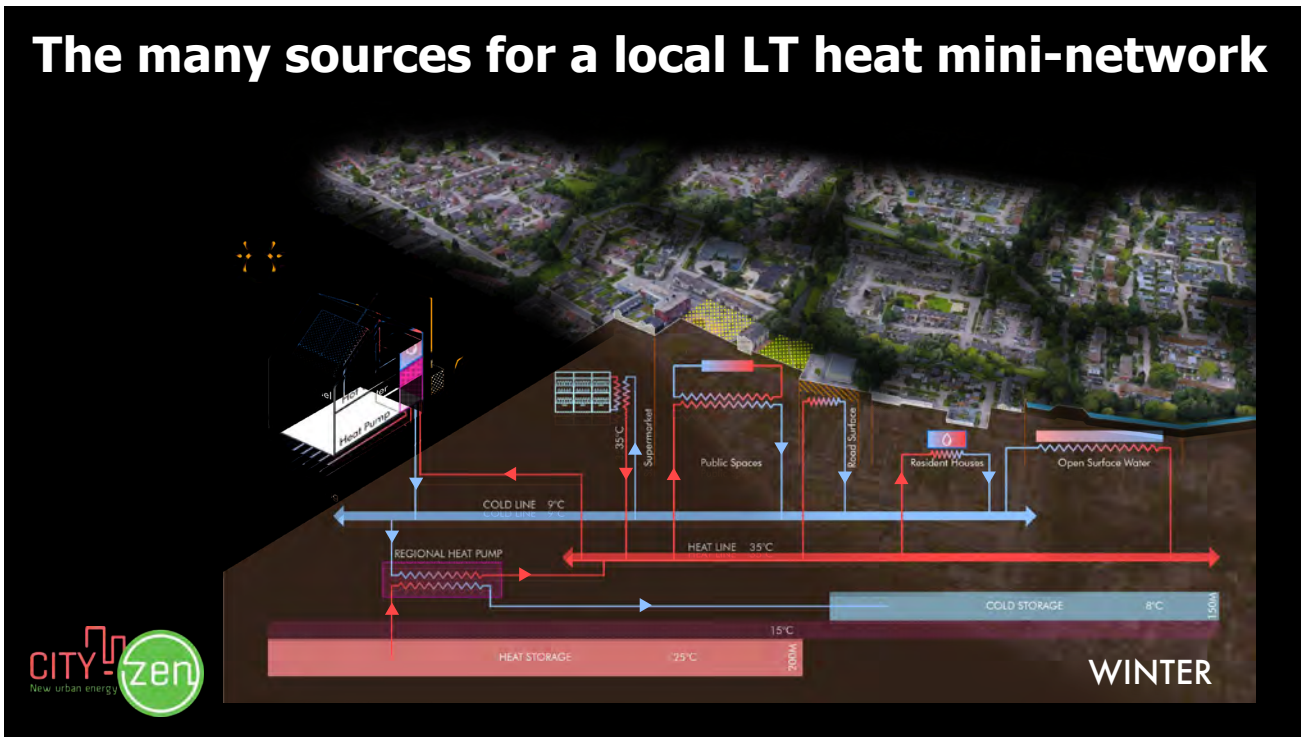
The many sources for a local LT heat mini-network



The many sources for a local LT heat mini-network

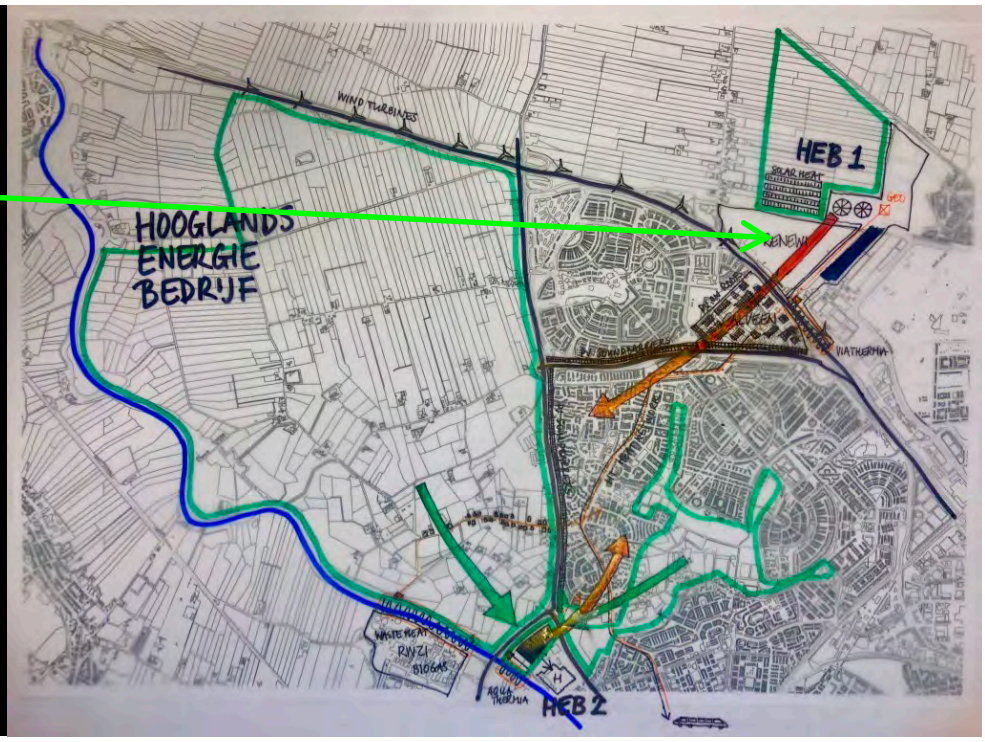


The many sources for a local LT heat mini-network



HEB

Geothermal heat
Solar heat
Biogas from waste

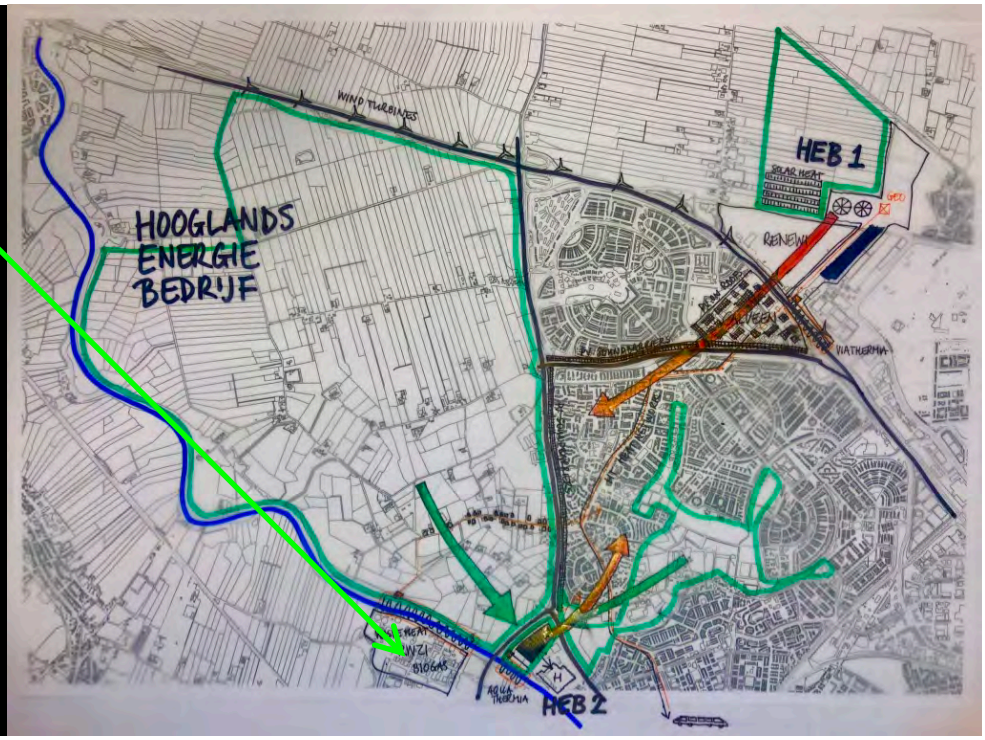


The highest mountain in the village

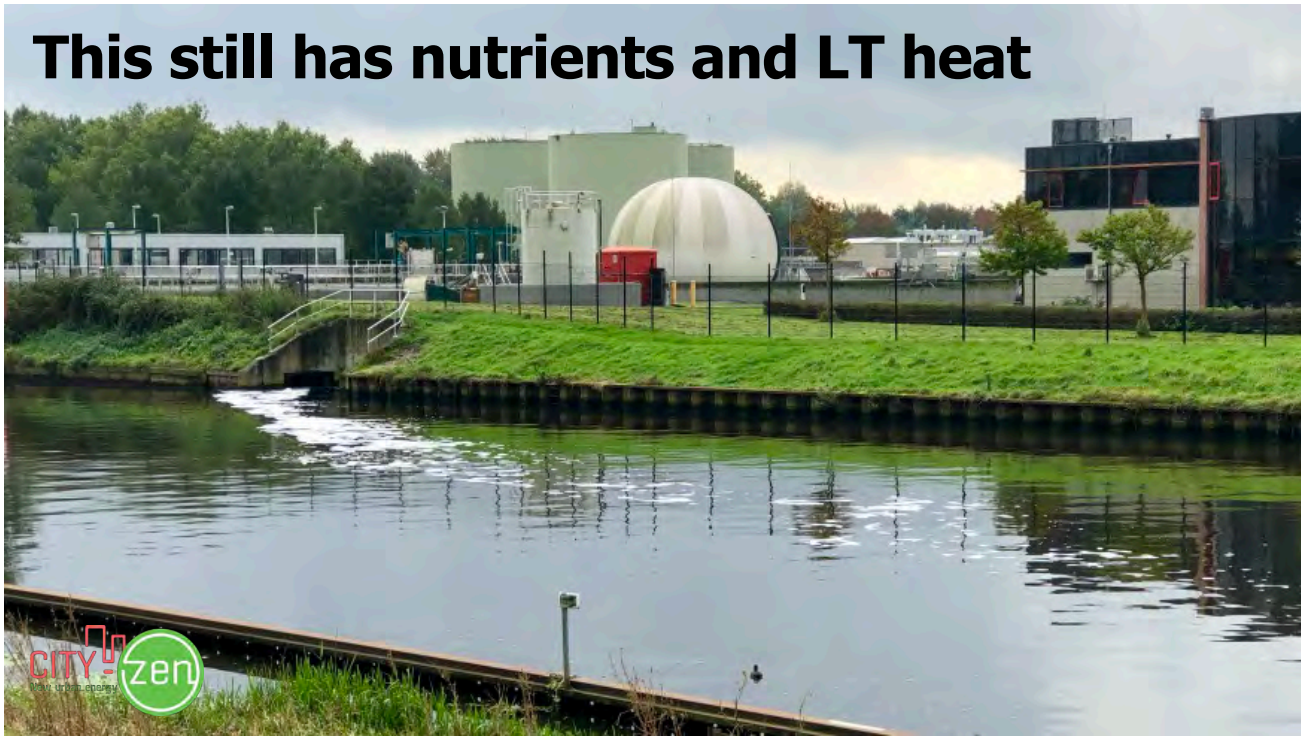
Kantel! Make waste useful

HEB

Geothermal heat
Solar heat
Biogas from waste
Waste water heat

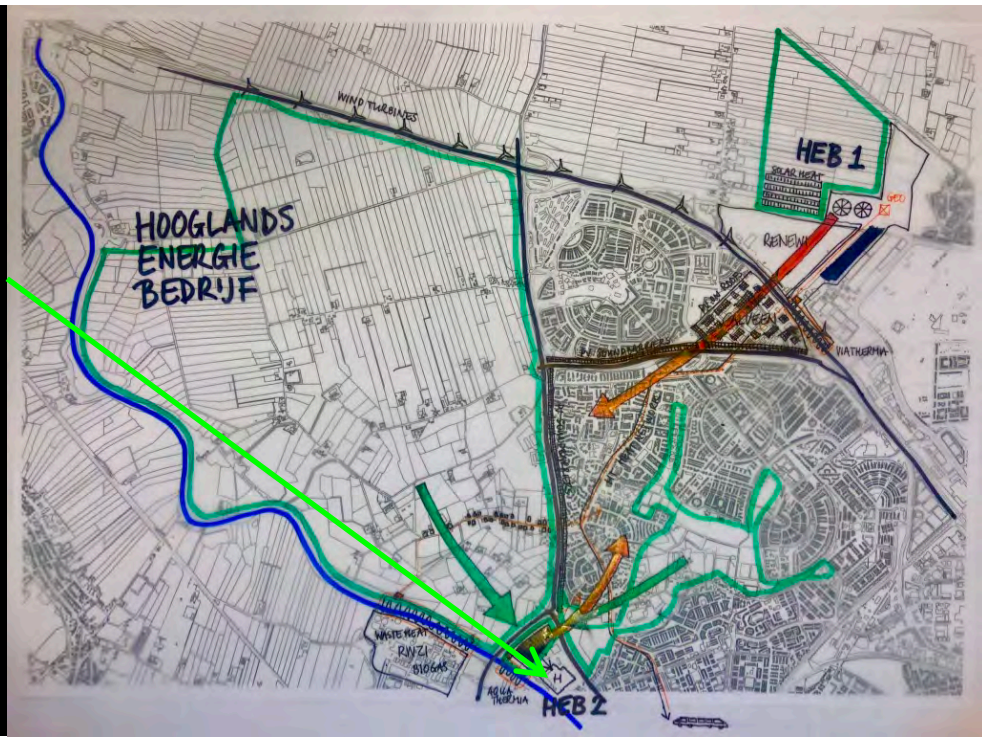



Energy from waste water treatment


This still has nutrients and LT heat

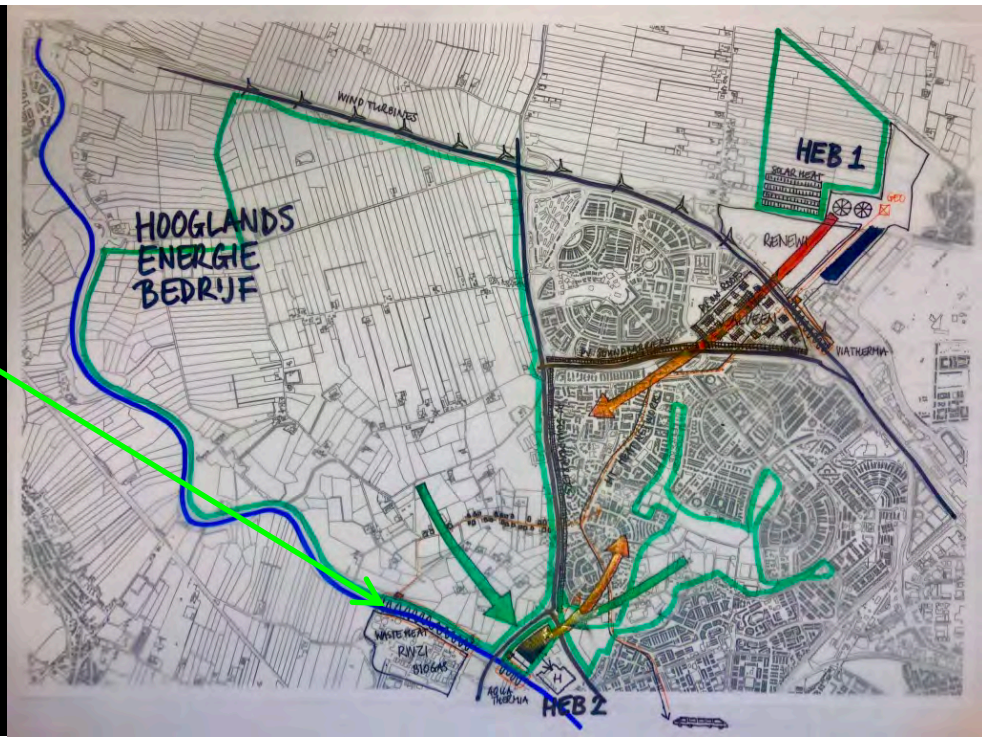
HEB

Geothermal heat
Solar heat
Biogas from waste
Waste water heat
Hospital waste heat



HEB

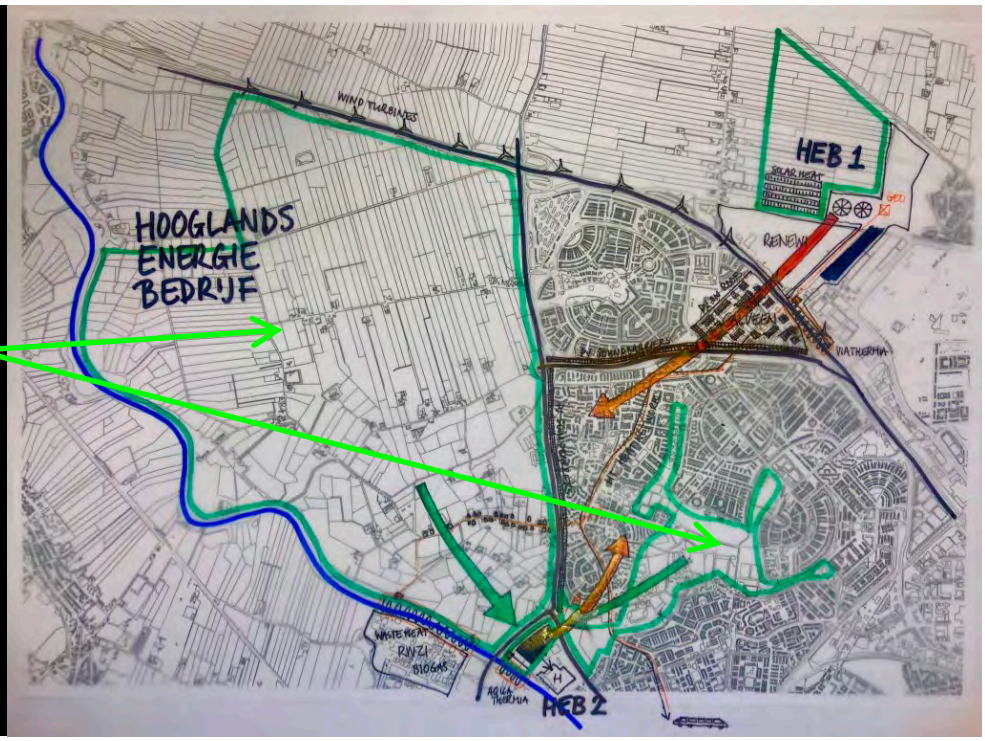
Geothermal heat
Solar heat
Biogas from waste
Waste water heat
Hospital waste heat
Aquathermia



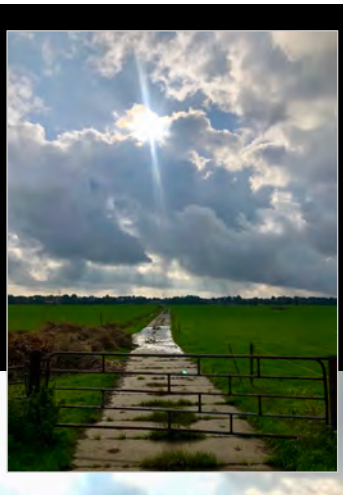
Aquathermia

HEB

Geothermal heat
Solar heat
Biogas from waste
Waste water heat
Hospital waste heat
Aquathermia
Bio-organic waste



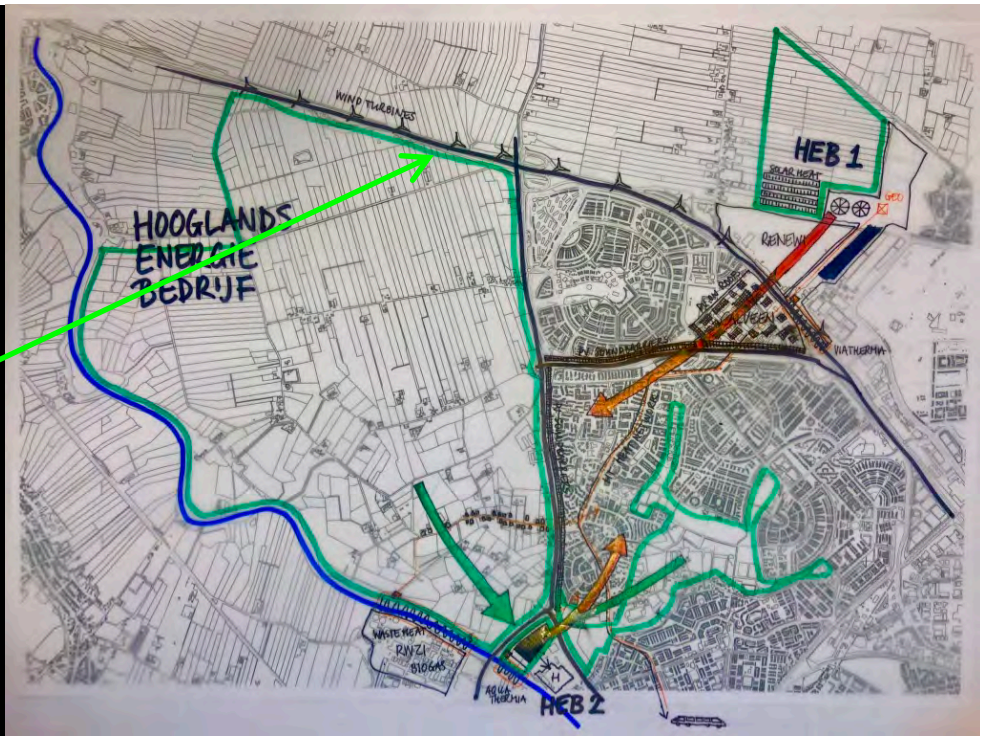
Beautiful Hoogland West



Organic waste from Schothorst Park

HEB

Geothermal heat
Solar heat
Biogas from waste
Waste water heat
Hospital waste heat
Aquathermia
Bio-organic waste
Wind turbines

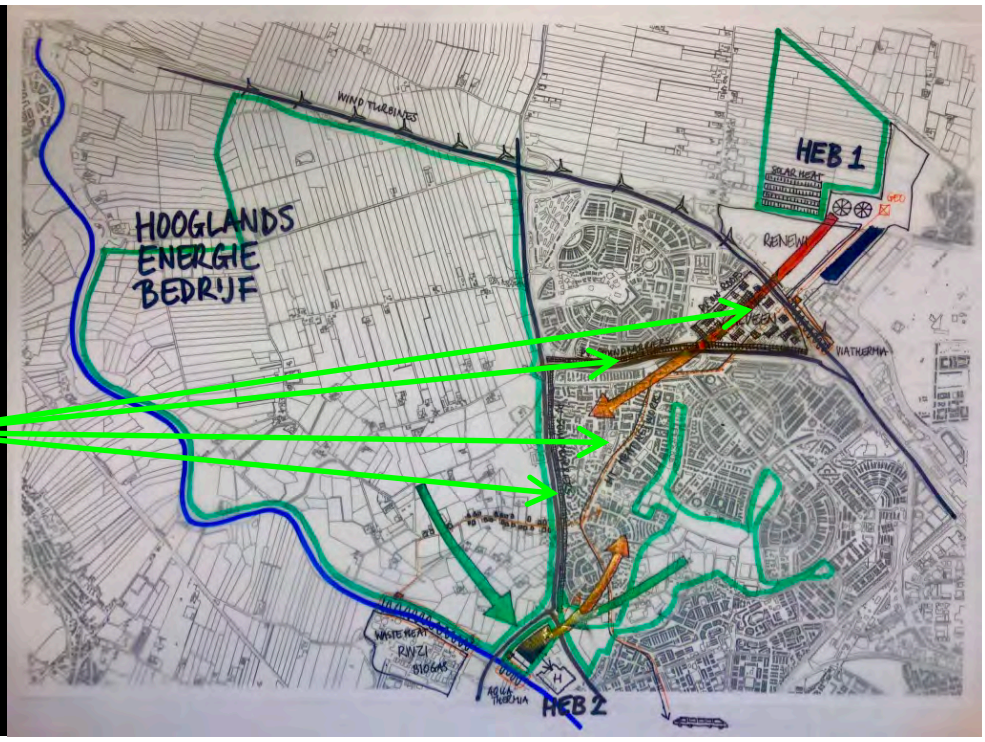



Highland highway wind


From nuisance to pride
CITY-zen

HEB

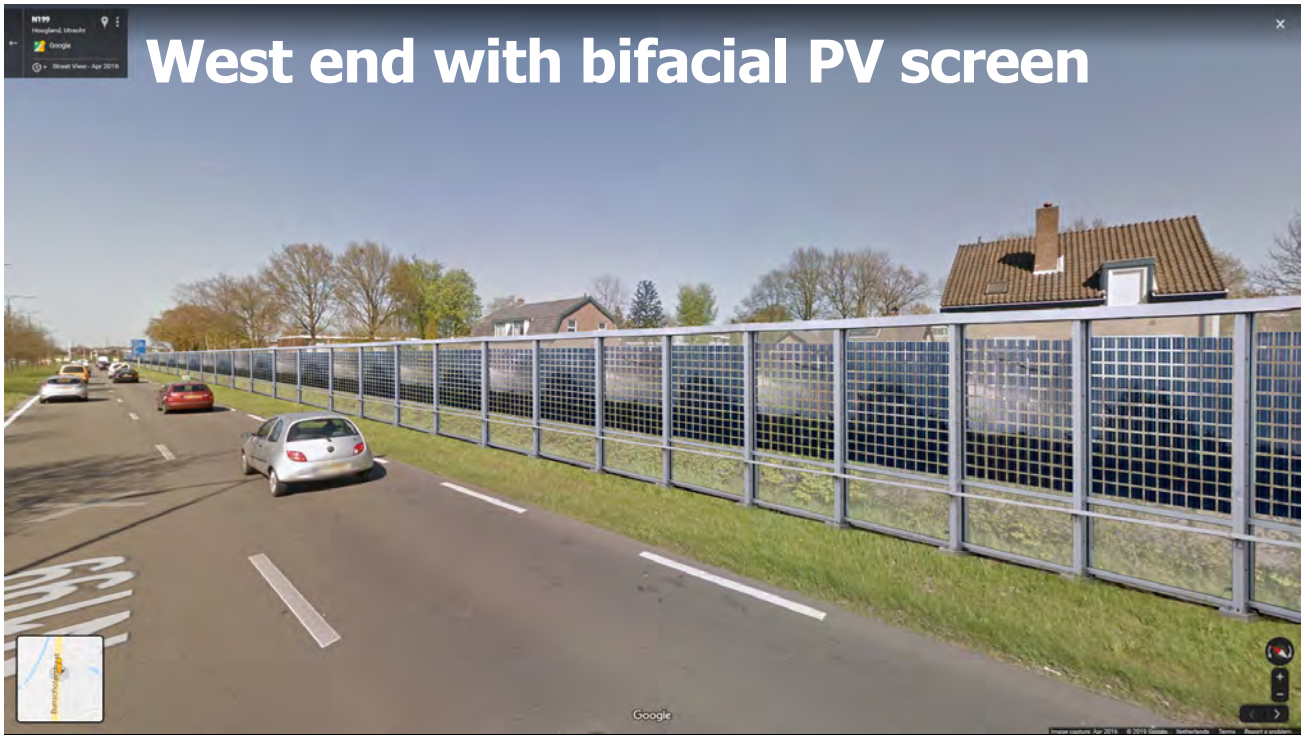
Geothermal heat
Solar heat
Biogas from waste
Waste water heat
Hospital waste heat
Aquathermia
Bio-organic waste
Wind turbines
Photovoltaics

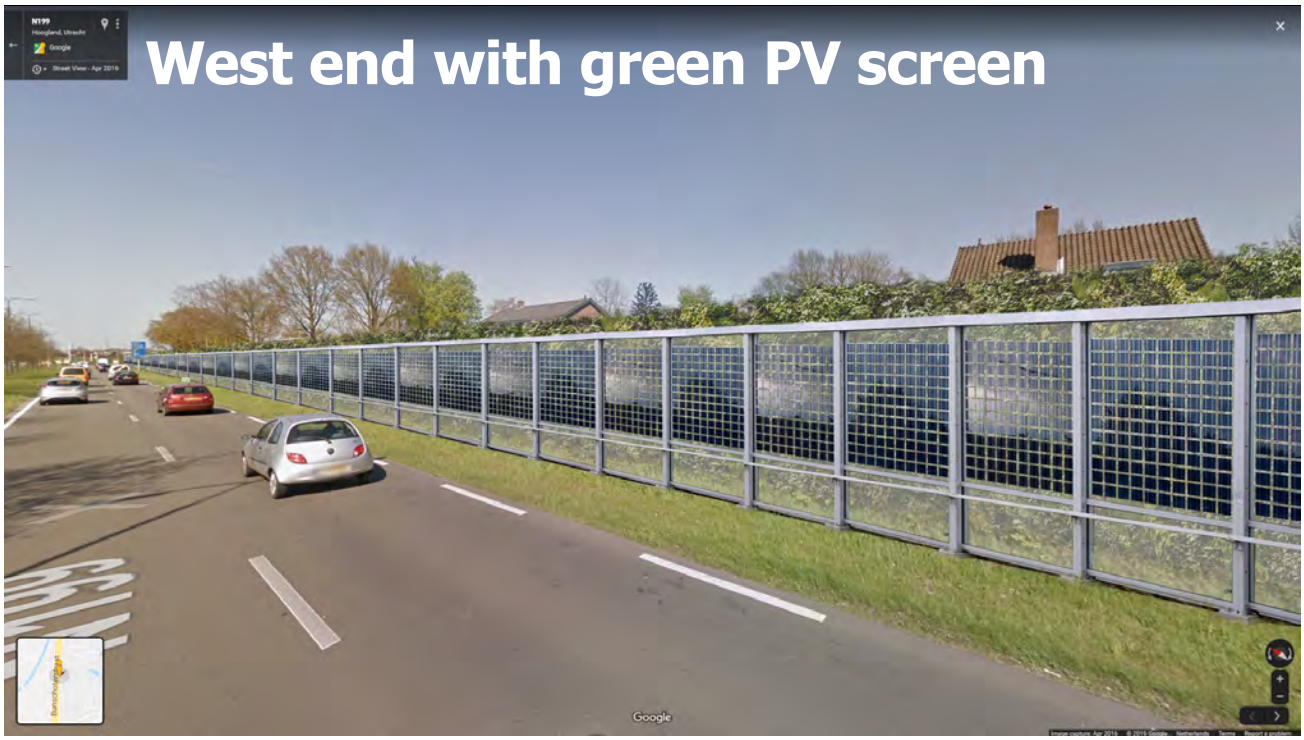



Sound barrier with photovoltaics
Google


Sound barrier with solar collectors
Google


West end
Google


West end with bifacial PV screen
Google



Solar potential


Buildings with PV

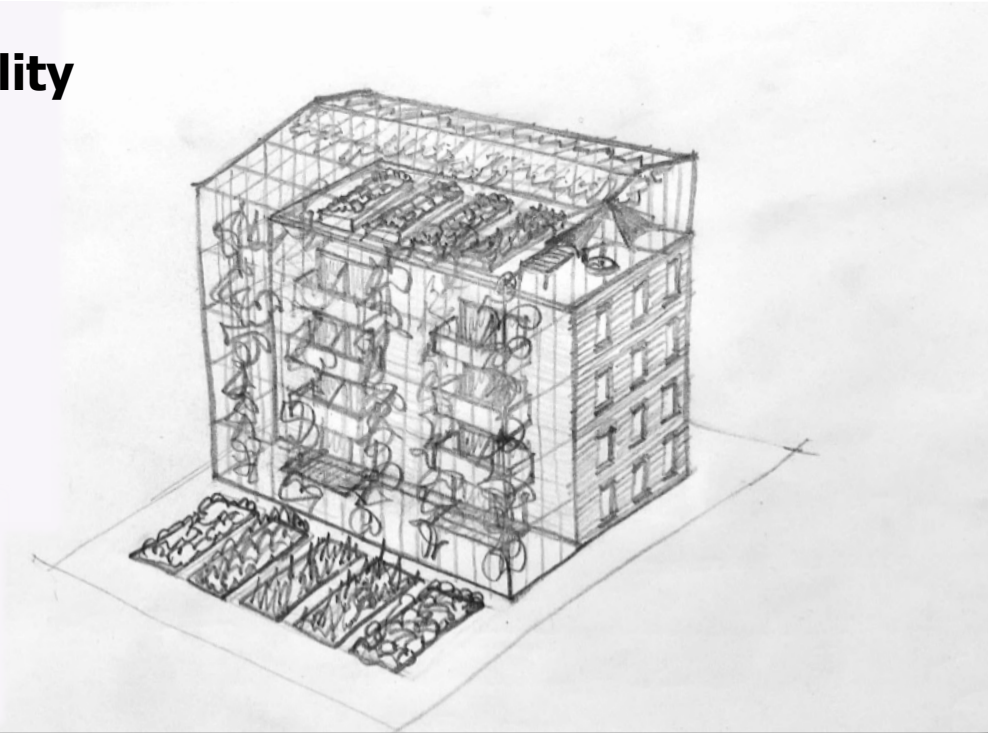

Even nicer

Solutions at the building scale

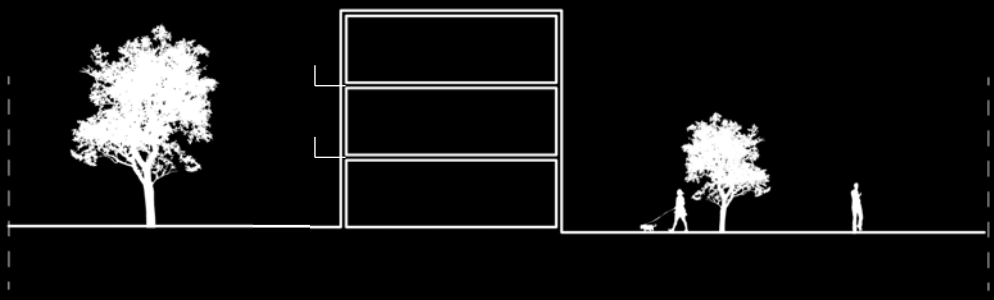
Energy retrofit

Energy labels

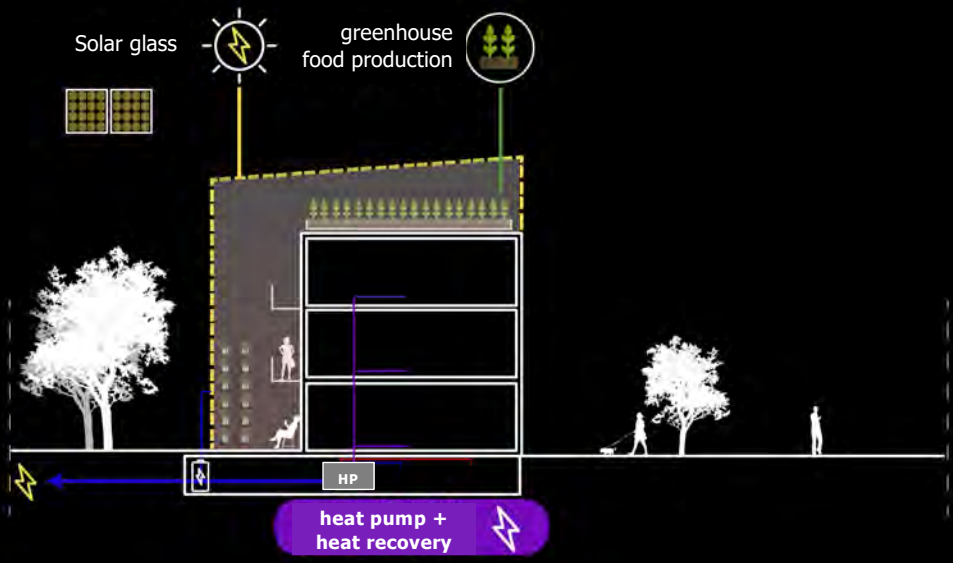
A new quality



Original situation



Solution



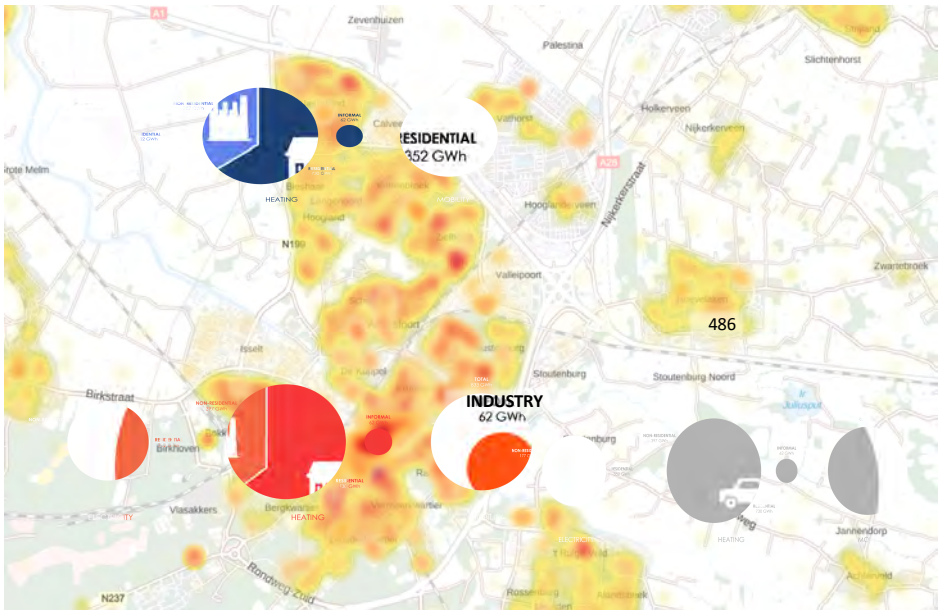

Transformation


Transformation


Transformation


Transformation

Energy demand Amersfoort 2017



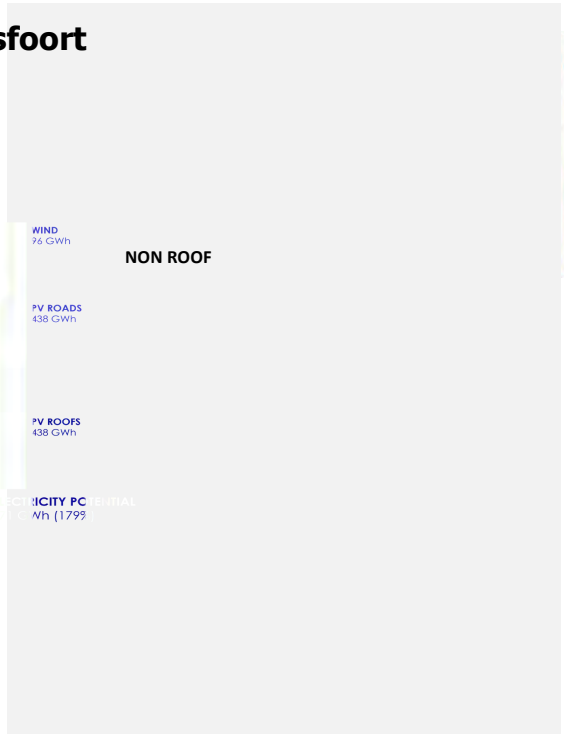
Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Heat demand
1127 GWh_{th} in 2017
+
62 GWh_{pr} in 2017

Electricity demand
529 GWh_e in 2017

Energy for mobility
486 GWh_e in 2017

Electricity potentials Amersfoort



Space for production

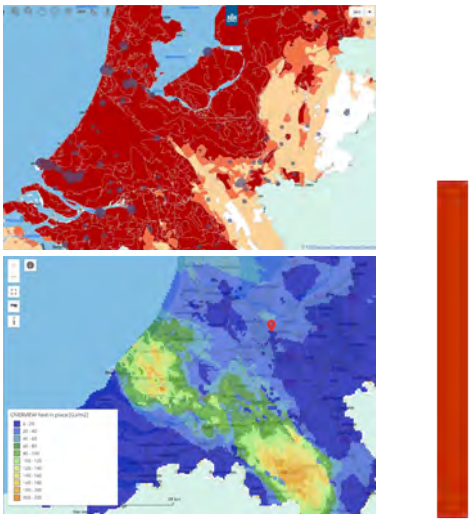
12 wind turbines

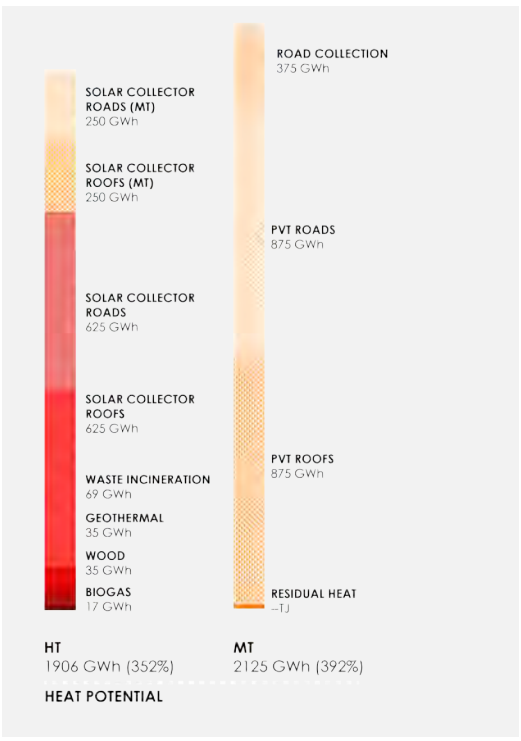
25% of all roofs (250 ha)

250 ha non-roof

Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Heat potentials Amersfoort





HEAT DEMAND
1190 GWh (100%)

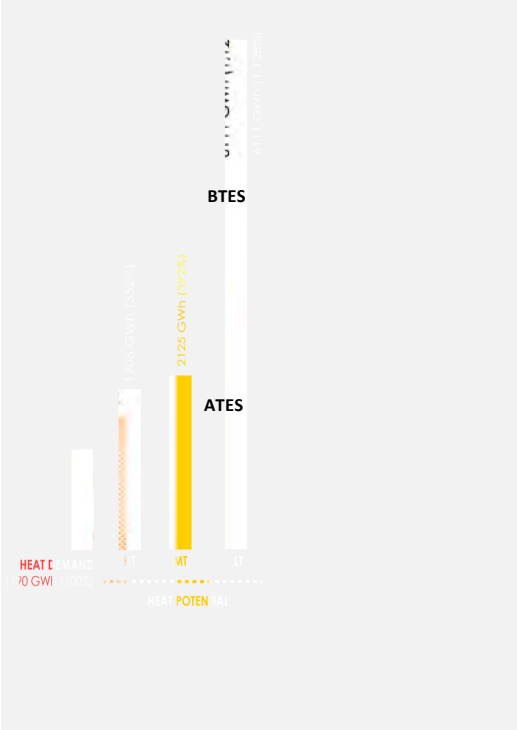
Temperature levels

High-T for district heat network (DHN)

Mid-T often energy renovation is needed

Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Heat potentials Amersfoort

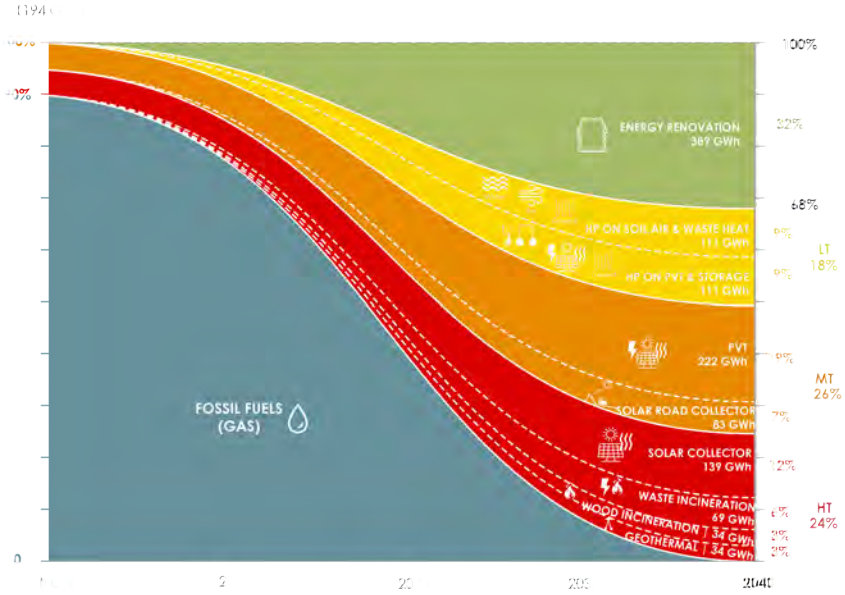


Temperature levels

Low-temperature
Often in combination with heat pumps

Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Heat balance scenario 2040



Temperature levels

32% reduction

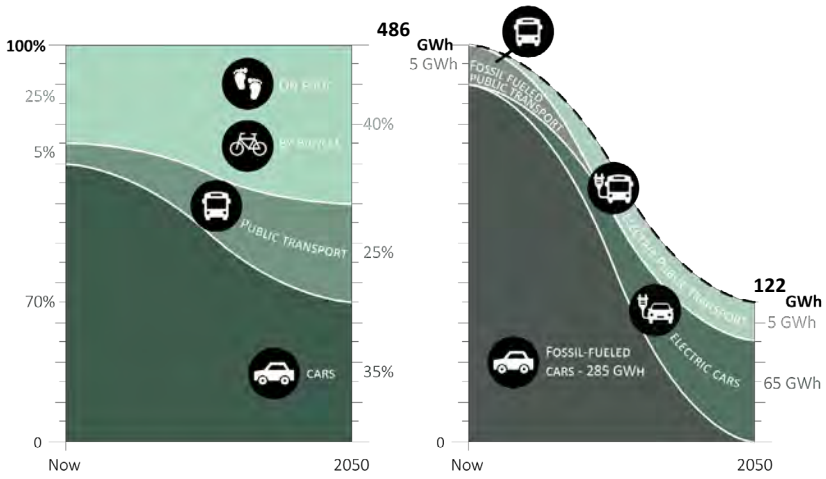
24% High-T for DHN

26% Mid-T

18% Low-T

Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Sustainable transport scenario



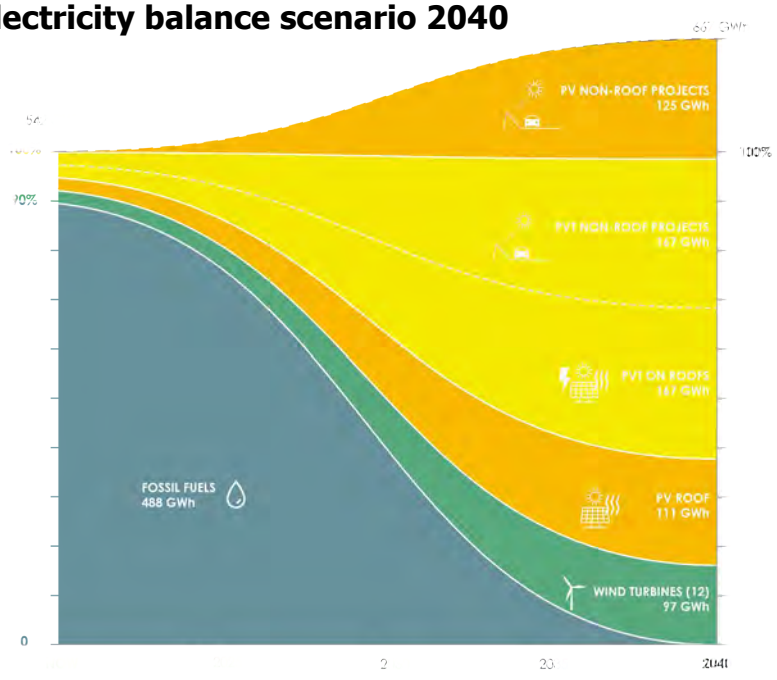
Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Main directions

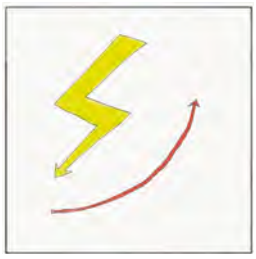
Modal shift

Electrification

Electricity balance scenario 2040



Energy strategy: Siebe Broersma MSc, Technical University, Delft.



Production of power

12 4MW Wind Turbines

20% of roof use

250 ha non-roof projects

Also co-generation (biomass + waste incineration)

Greg Keeffe CityZEN Strategy Binnenstad

Greg Keeffe
Professor of
Architecture + Urbanism

Head of School,
Natural and
Built Environment

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: City team

Queens University Belfast
Greg Keeffe — Professor of Architecture + Urbanism
Dr Andy Jenkins. — Research Fellow

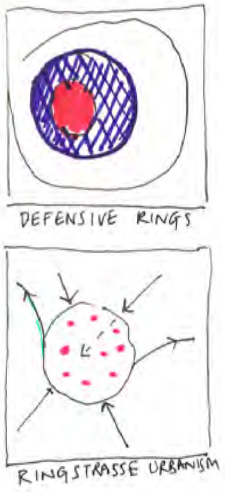
TU Delft
Siebe Boersma — Research Fellow
Javier Montemayor — Masters Student

Think E
Anneleen Vanderlinden
Achille Hannoset

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

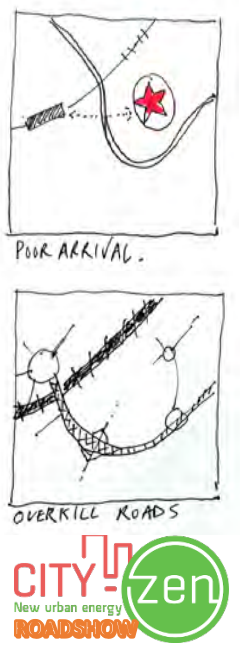
Urban Design: Macro Context: city form



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

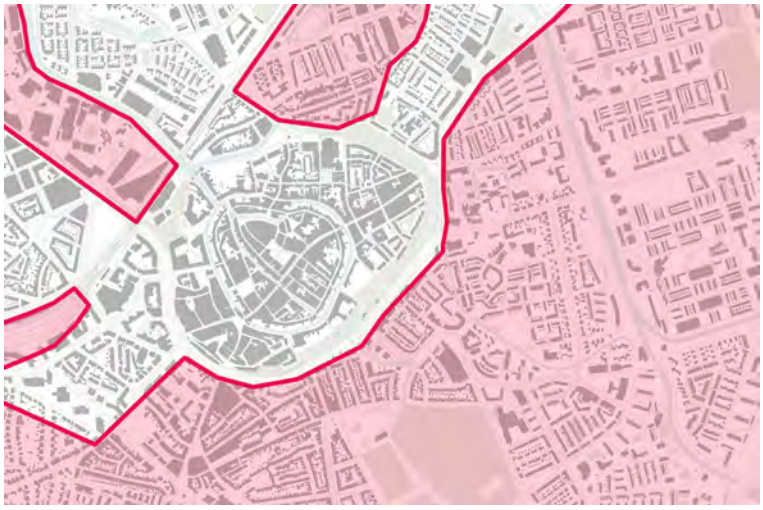
Urban Design: Macro Context

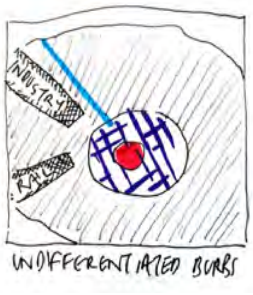


Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Macro Context





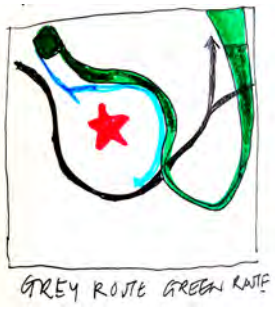
Undifferentiated suburbs

Low density

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Macro Context



Two half loops

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

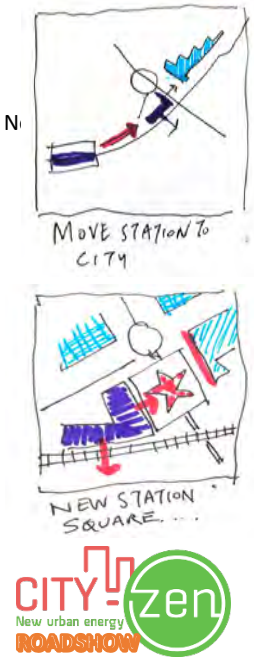
Amersfoort, NL October 2019

Urban Design: Macro solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Macro solutions

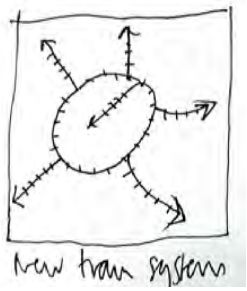


Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Macro solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Electric public mobility loop

Amersfoort, NL October 2019

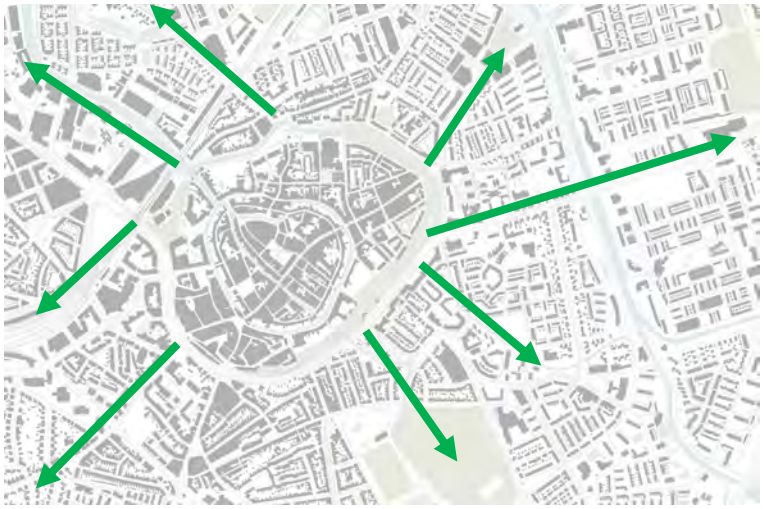
Urban Design: Macro solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Reinstate the canal loop

Amersfoort, NL October 2019

Urban Design: Macro solutions



Contiguous green infrastructure

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Urban Design: Macro solutions

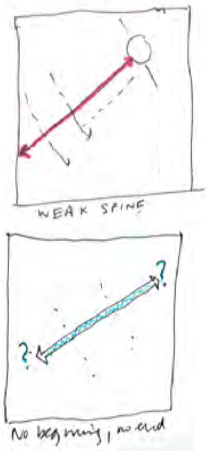
New super neighbourhoods

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Neighbourhood Context, Binnenstad

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



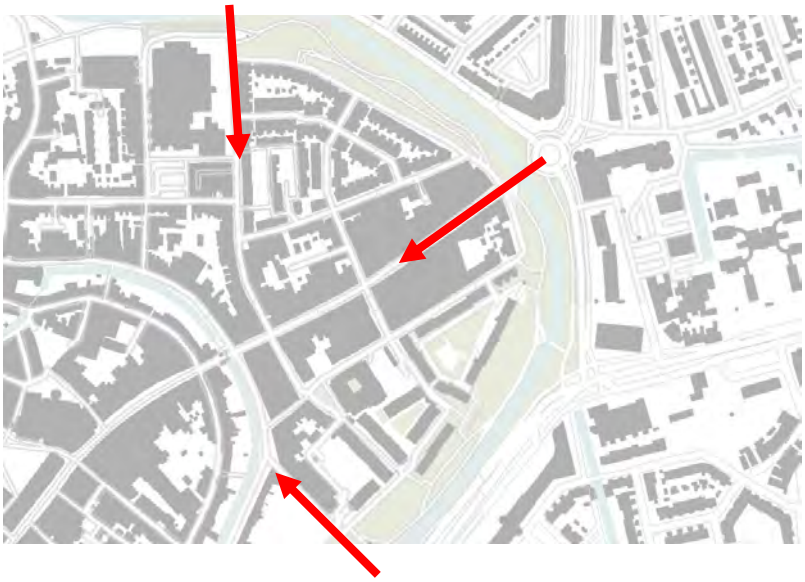
No distinctiveness

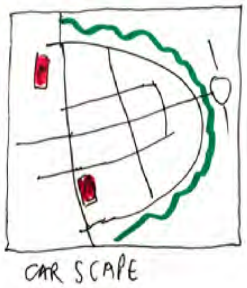
Urban Design: Neighbourhood Context

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Little public space

Urban Design: Neighbourhood Context





Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Context

Few landmarks

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Issues

Issues

Historic stock
Difficult to change
Eighties housing has engagement issues

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Issues

Dislocated greenspace

No local sports facilities

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Issues

Hard landscape

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Solutions

Solutions

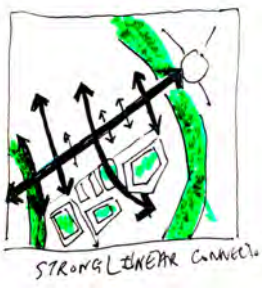
New spine
Linear public space

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Solutions

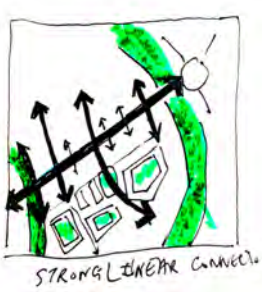
New spine
Linear public space

CITY-zen New urban energy ROADSHOW

Amersfoort, NL October 2019

Urban Design: Solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Solutions

New spine
Linear public space

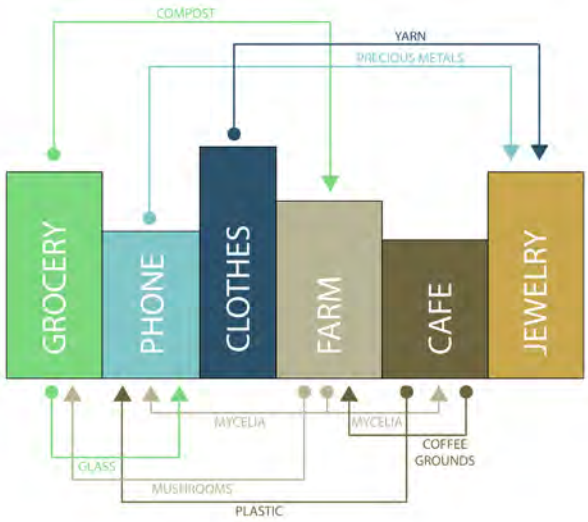
CITY-zen New urban energy ROADSHOW

Amersfoort, NL October 2019

Urban Design: Solutions

New circular high street

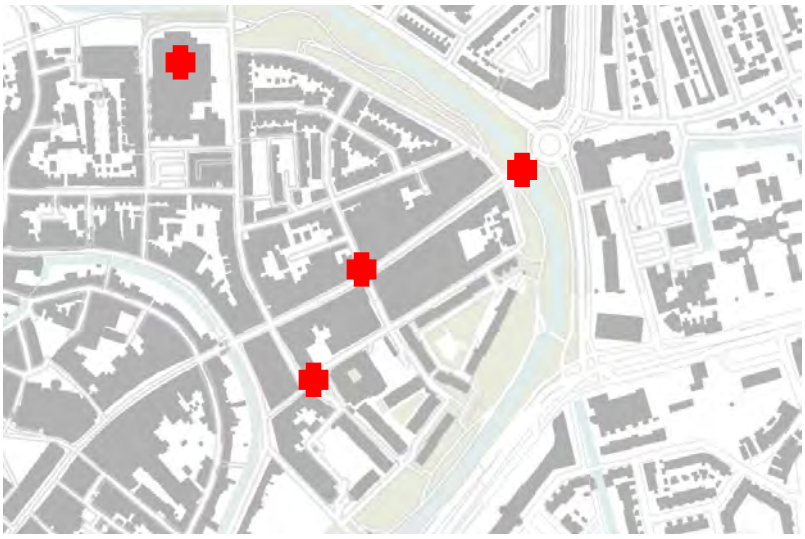
market



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Solutions



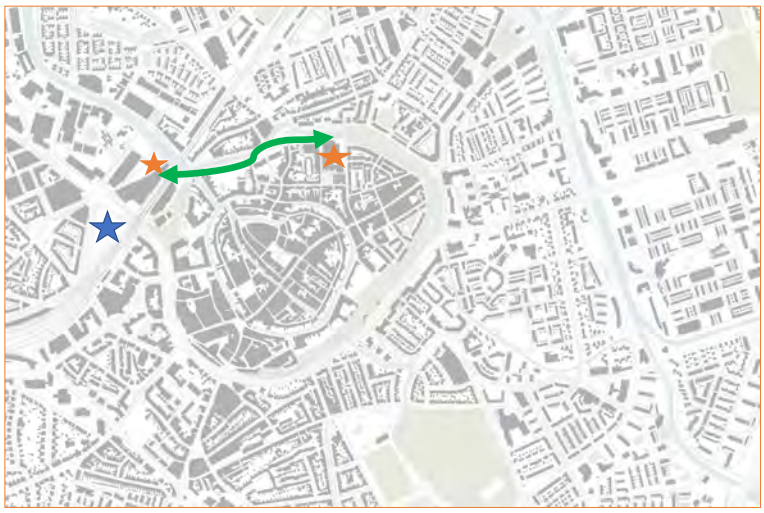
Connect….

To the theatre
To the greenspace

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Macro Context



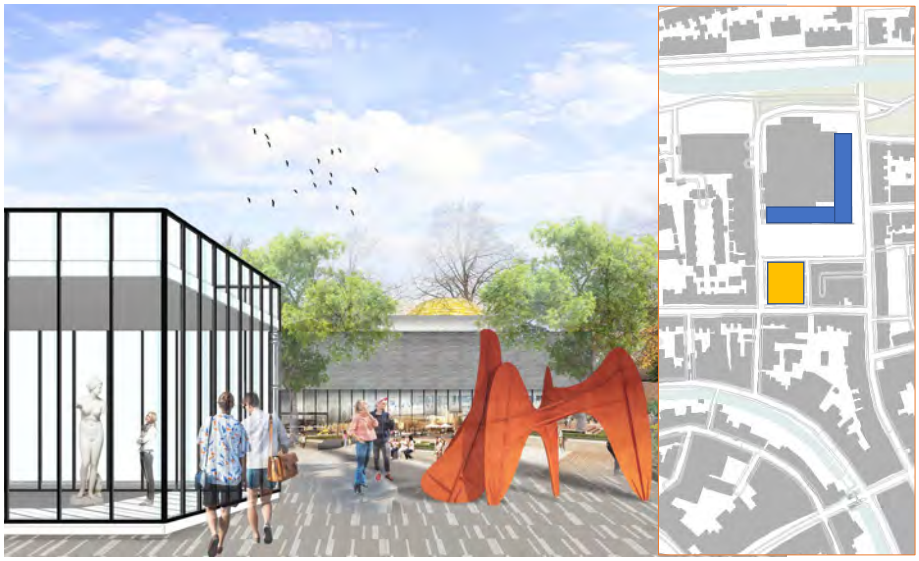
New link

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Urban Design: Macro solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

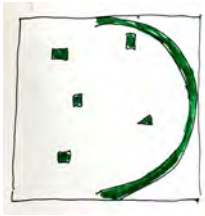
Urban Design: Macro solutions



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Solutions

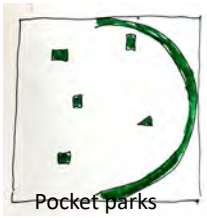


Pocket parks

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Solutions

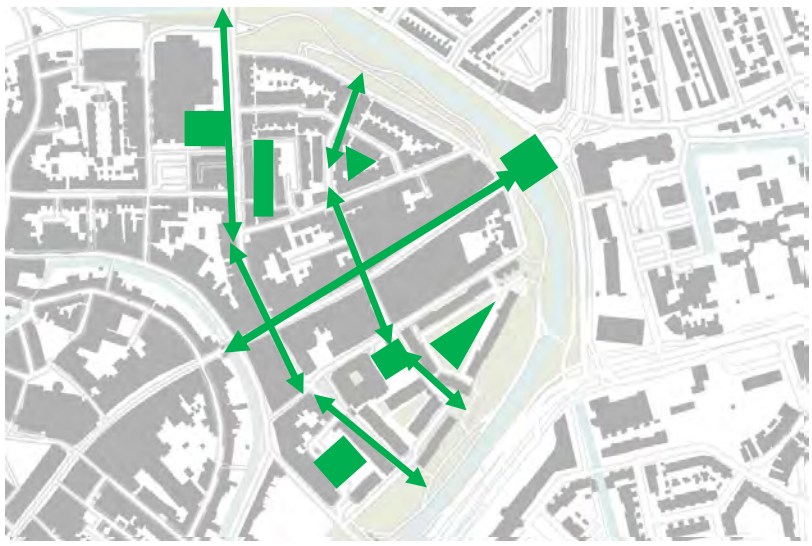


Pocket parks

Connect with green streets

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Urban Design: Solutions



Connect with

new green grids

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Urban Design: Solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

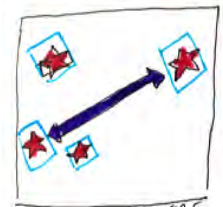
Connect green streets to wider green network

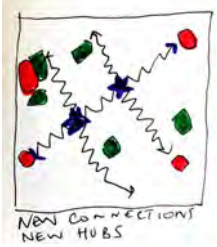
CITY zen
New urban energy
ROADSHOW

Amersfoort, NL October 2019

Urban Design: Solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



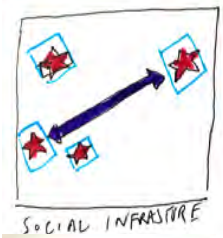


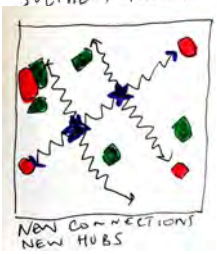
Connect
New public spaces

CITY zen
New urban energy
ROADSHOW

Amersfoort, NL October 2019

Urban Design: Solutions





Connect
New public spaces

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

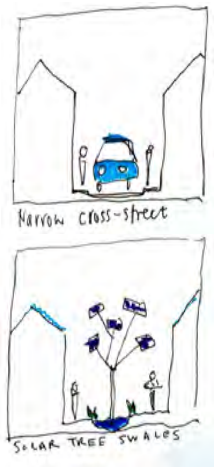
Urban Design: Solutions

Connection streets

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Solutions



Connection streets

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Solutions

New car scape

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

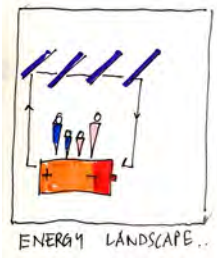
Amersfoort, NL October 2019

Urban Design: Solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

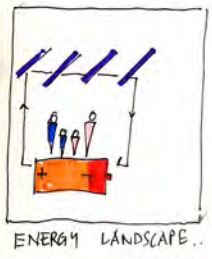
Urban Design: Solutions



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Urban Design: Solutions



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Housing Design: Solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Housing Design: Solutions

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Housing Design: Solutions

Heat
Electricity
Water
Waste
Mobility
Food

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Housing Design: Solutions

Heat
Electricity
Water
Waste
Mobility
Food

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

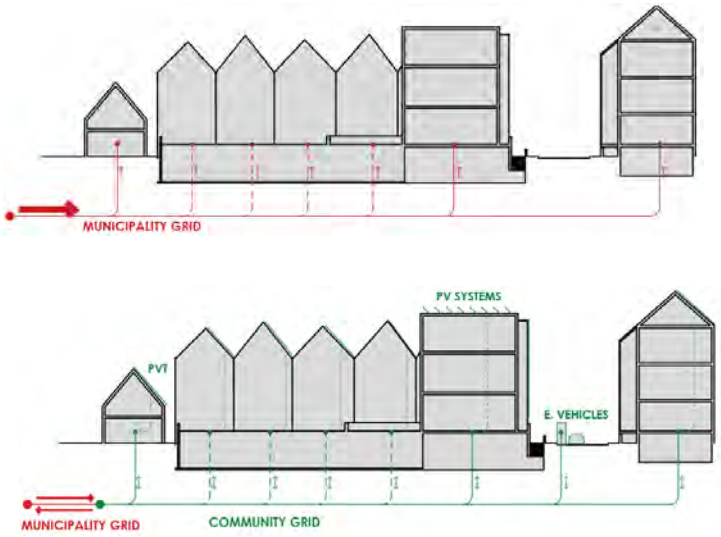
Housing Design: Solutions

Heat
Electricity
Water
Waste
Mobility
Food

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

Energy community: sharing the ups and downs



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

New Lifestyles: Solutions

'Hi, I'm Jo.

I live in the new energy community. Things have really changed because of it.

Firstly I have hardly an fuel bills, our roof mounted PV-T panels provide electricity and heat.

Our whole building share the electricity, and this equalizes our electricity consumption, so we hardly need any from the grid. Our houses are known as the tulip houses as they store the heat energy in summer in giant tanks in the old garages.

I got rid of my car too, the community have a range of shared E-vehicles – you can even go camping – in an e-camper, but there's no smoking allowed!

The new first-floor courtyard connects us all to community growing and we share produce with the other housing blocks.

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

New Lifestyles: Solutions

Hi I'm Leen,

I run a shop selling hand roasted coffee and hand blended tea.

The new high street has really increased the number of people visiting me, and the weekends when the whole street is a local market is crazy!

The new circular infrastructure means that I buy cups and bags made of mushroom waste from the urban farm next door. These are compostable as well as disposable, so I don't feel bad giving them out.

I reciprocate with the farm by giving them my coffee grounds, they use them to produce mushrooms. It's great being waste free.

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

New Lifestyles: Solutions

"Hi I'm Machiel

I'm a Theatre goer and I'm keen on art.

I live in the 'burbs, and usually come in by car in the evening.

The reallocation of the station and the new cultural connection between the library and Flint has really changed my experience. I can now get the train in and walk along the canal to the theatre. Afterwards I can go for a beer in the new public square and chat about the play, before leisurely ambling back to the station. I realise that not having to drive in has made my engagement with the city so much more rewarding."

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

New Lifestyles: Solutions

"Hi I'm Mariette

People call me a hipster, but really I just know what I like.

I like quality stuff: the best of local, and the best of global.

I suppose I'm searching for the goodlife, and I've found it in Amersfoort: I live in Binnenstad, with all its new organic food shops and craft bakeries. You can live zero-carbon and eat hyper-locally.

However, I also need to have a global connection: The new station means I'm less than an hour from Schiphol and Amsterdam. One minute I'm supping organic coffee with friends, and then in AMS discussing my new startup with investors or I'm off the see the latest Keith Haring exhibition in NYC.. "

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Amersfoort, NL October 2019

New Lifestyles: Solutions

"Hi I'm Andy,

I'm a Brexit escapee from Britain.

I moved to Amersfoort to escape the right-wing coup that's happening in the UK right now.

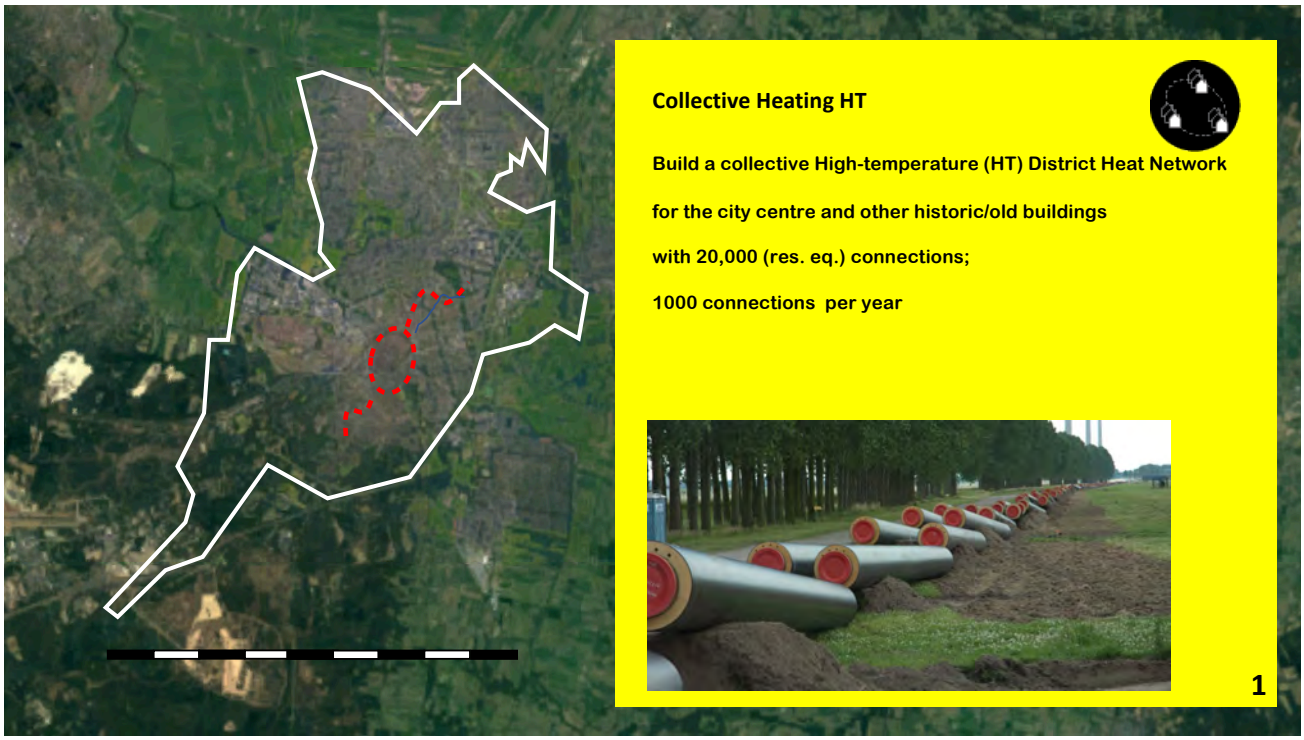
I live with my partner Tillie and our two young kids. I've set up an urban farm selling edible flowers to restaurants, but I have to be a full-time parent too. Binnenstad gives me the best of both worlds, I can walk to work off Kamp street, and drop the kids off at School. At the weekend we can cycle out to the forest or go to a museum in Amsterdam without using a car. The energy community has been a great way to meet people and the new first-floor garden means the kids can play out without supervision.

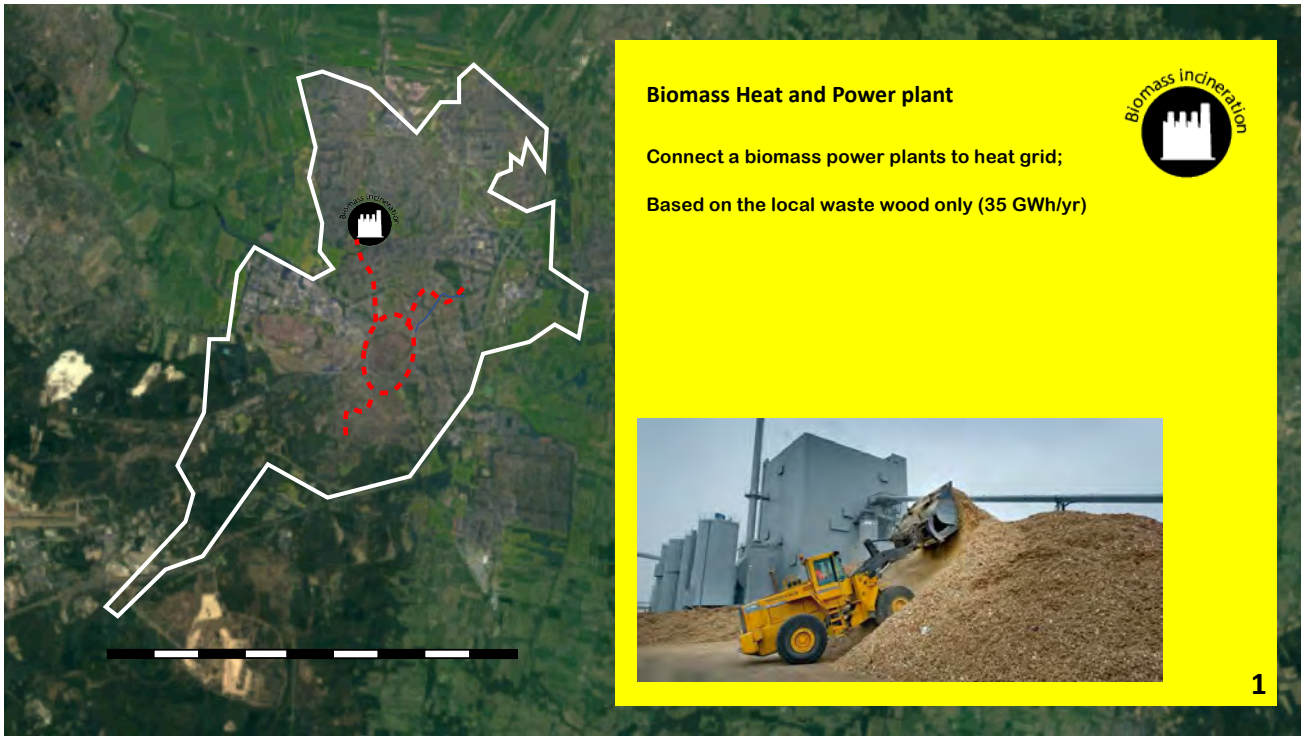
If I actually need a car, I just click on an app.

It certainly beats hanging out with the EDL in Doncaster."

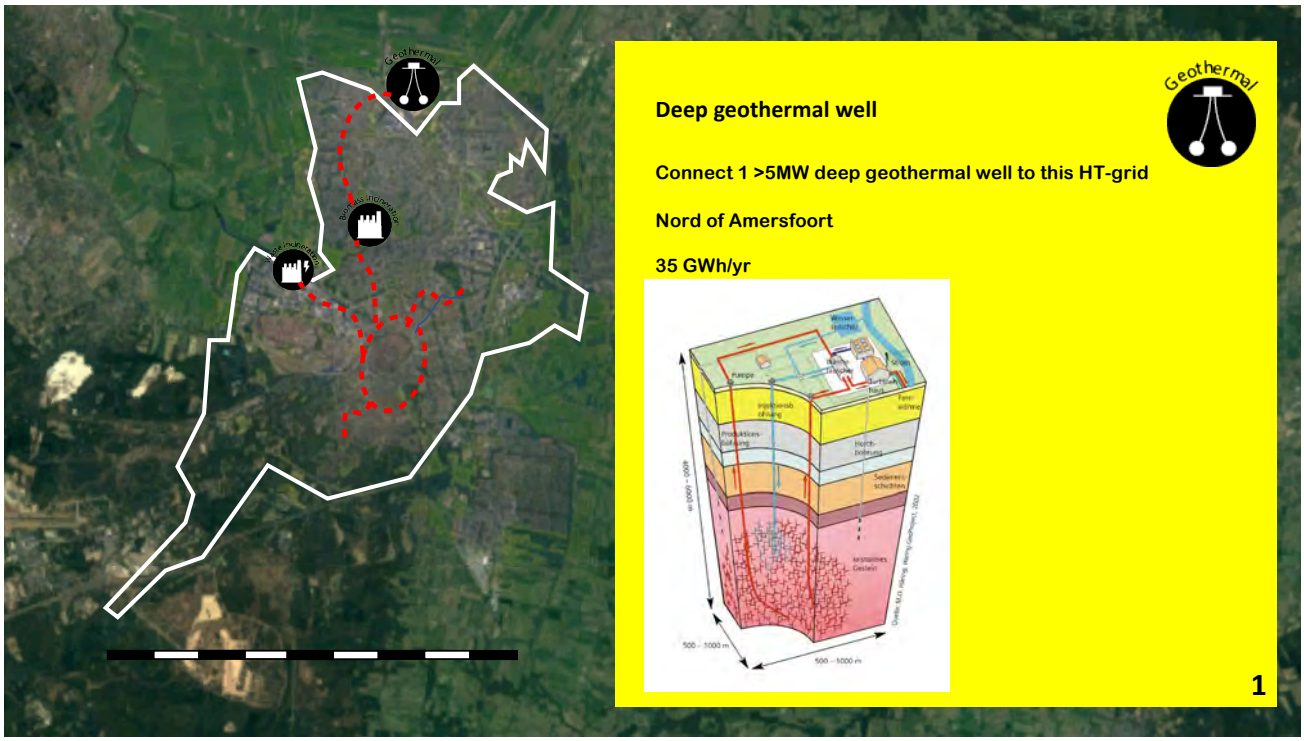
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

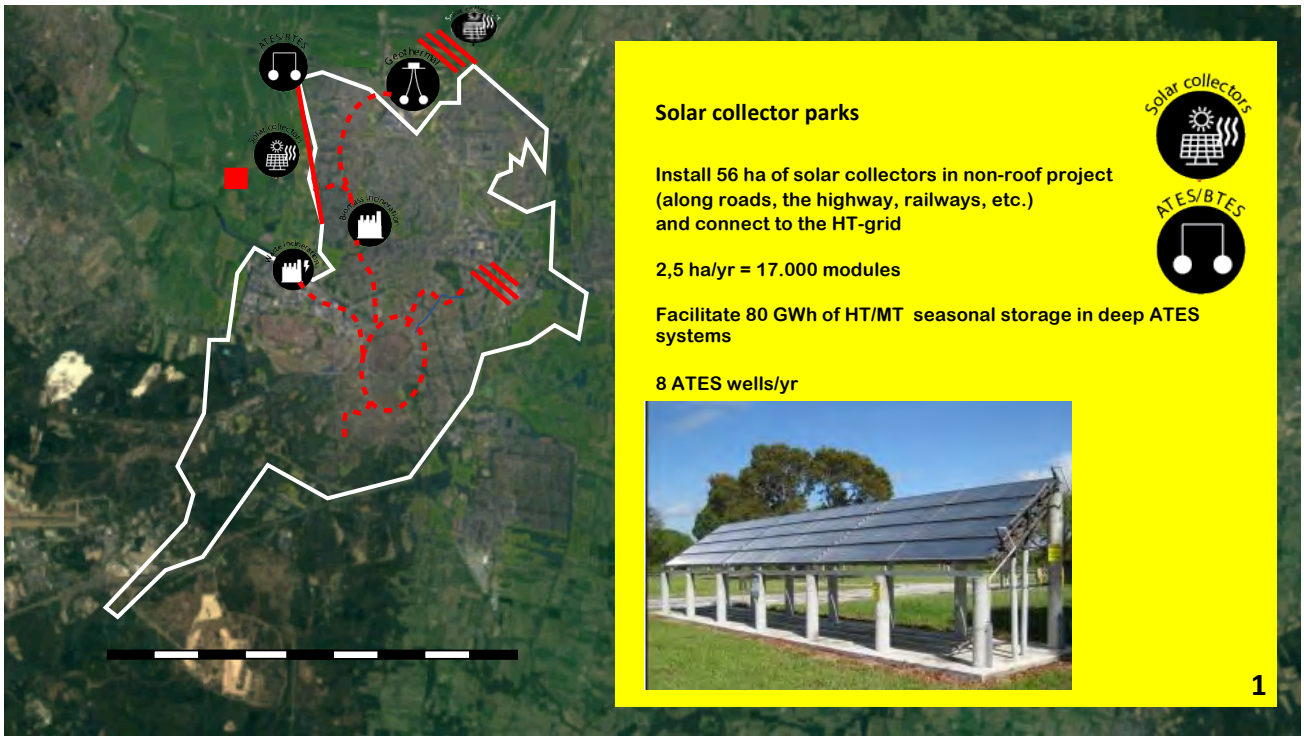
Amersfoort, NL October 2019

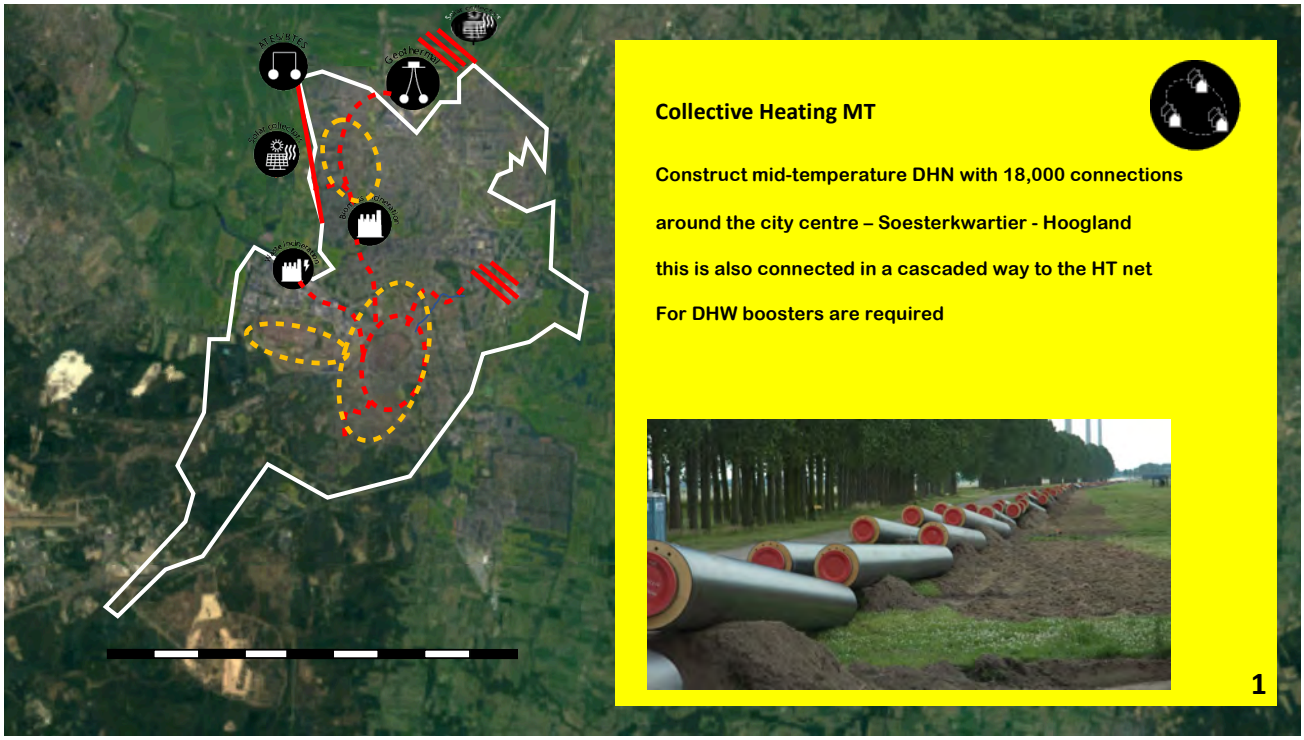

Collective Heating HT
Build a collective High-temperature (HT) District Heat Network
for the city centre and other historic/old buildings
with 20,000 (res. eq.) connections;
1000 connections per year
1

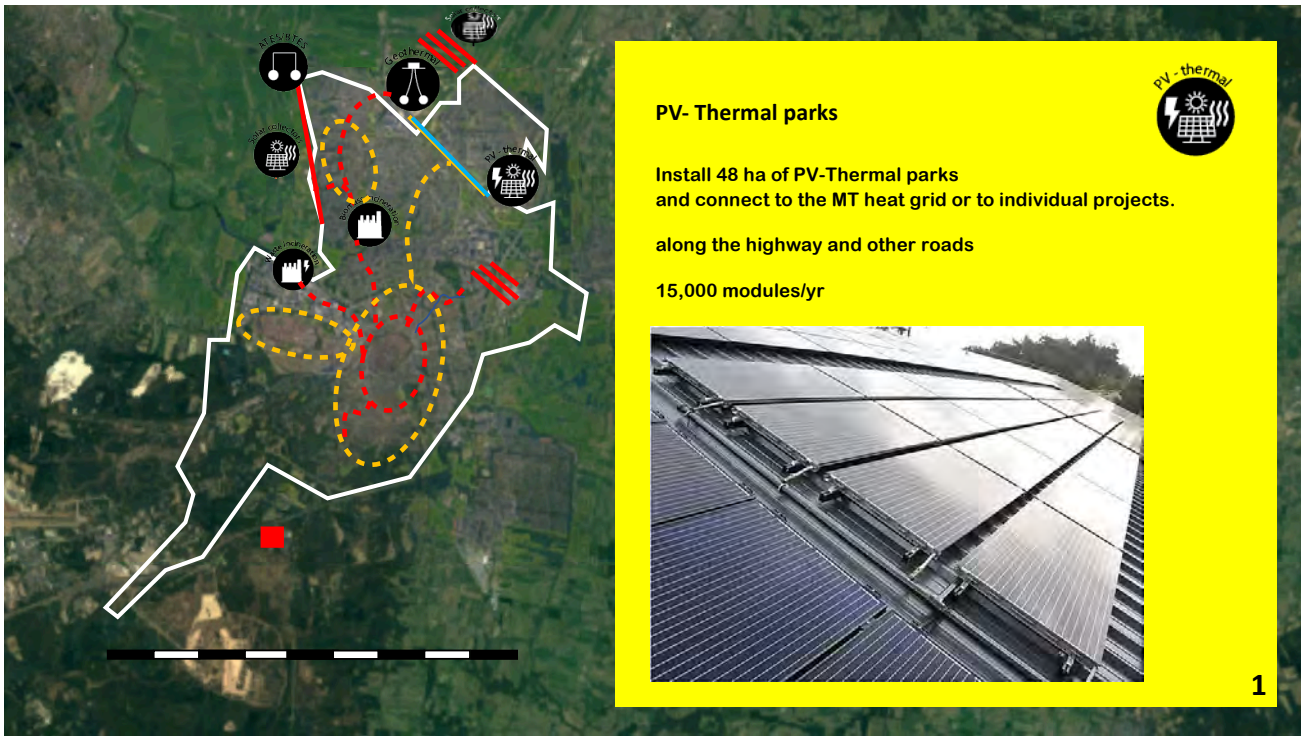

Biomass Heat and Power plant
Biomass incineration
Connect a biomass power plants to heat grid;
Based on the local waste wood only (35 GWh/yr)
1


Waste incineration plant
Waste incineration
Connect 1 (small) waste incineration plant to this grid
Based on the 10% of local non-recyclable waste
70 GWh/yr
1


Deep geothermal well
Geothermal
Connect 1 >5MW deep geothermal well to this HT-grid
Nord of Amersfoort
35 GWh/yr
1


Geothermal
Solar collectors
ATES/BTES
Solar collector parks
Install 56 ha of solar collectors in non-roof project
(along roads, the highway, railways, etc.)
and connect to the HT-grid
2,5 ha/yr = 17.000 modules
Facilitate 80 GWh of HT/MT seasonal storage in deep ATES systems
8 ATES wells/yr
1


Geothermal
Collective Heating MT
Construct mid-temperature DHN with 18,000 connections
around the city centre – Soesterkwartier - Hoogland
this is also connected in a cascaded way to the HT net
For DHW boosters are required
1



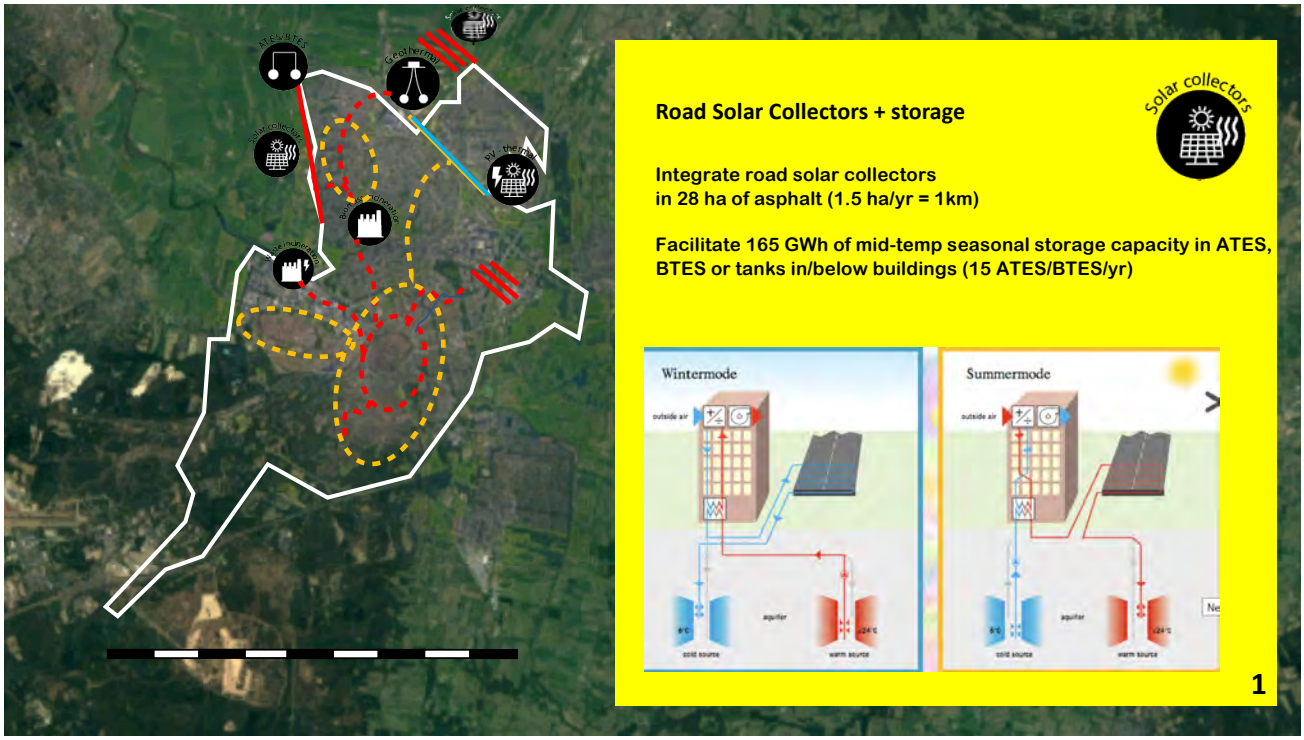
PV- Thermal parks

Install 48 ha of PV-Thermal parks
and connect to the MT heat grid or to individual projects.

along the highway and other roads

15,000 modules/yr

1

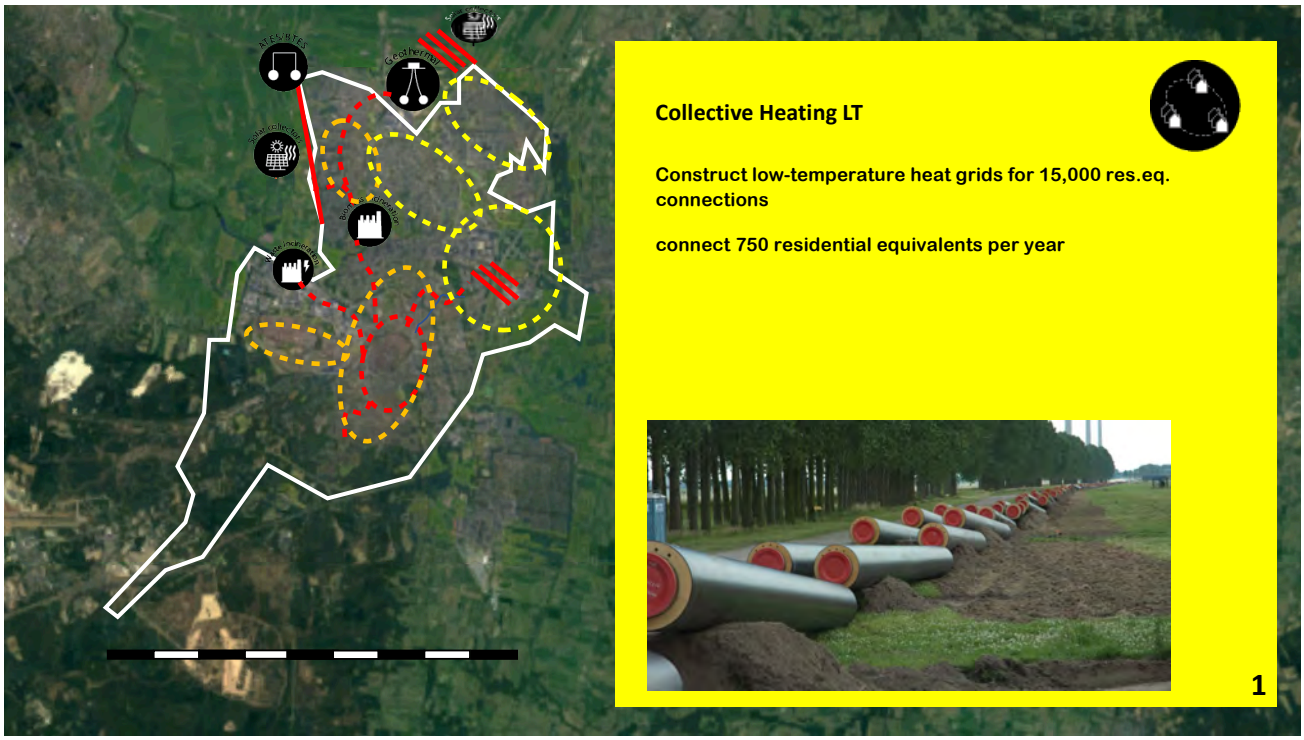


Road Solar Collectors + storage

Integrate road solar collectors
in 28 ha of asphalt (1.5 ha/yr = 1km)

Facilitate 165 GWh of mid-temp seasonal storage capacity in ATES, BTES or tanks in/below buildings (15 ATES/BTES/yr)

1

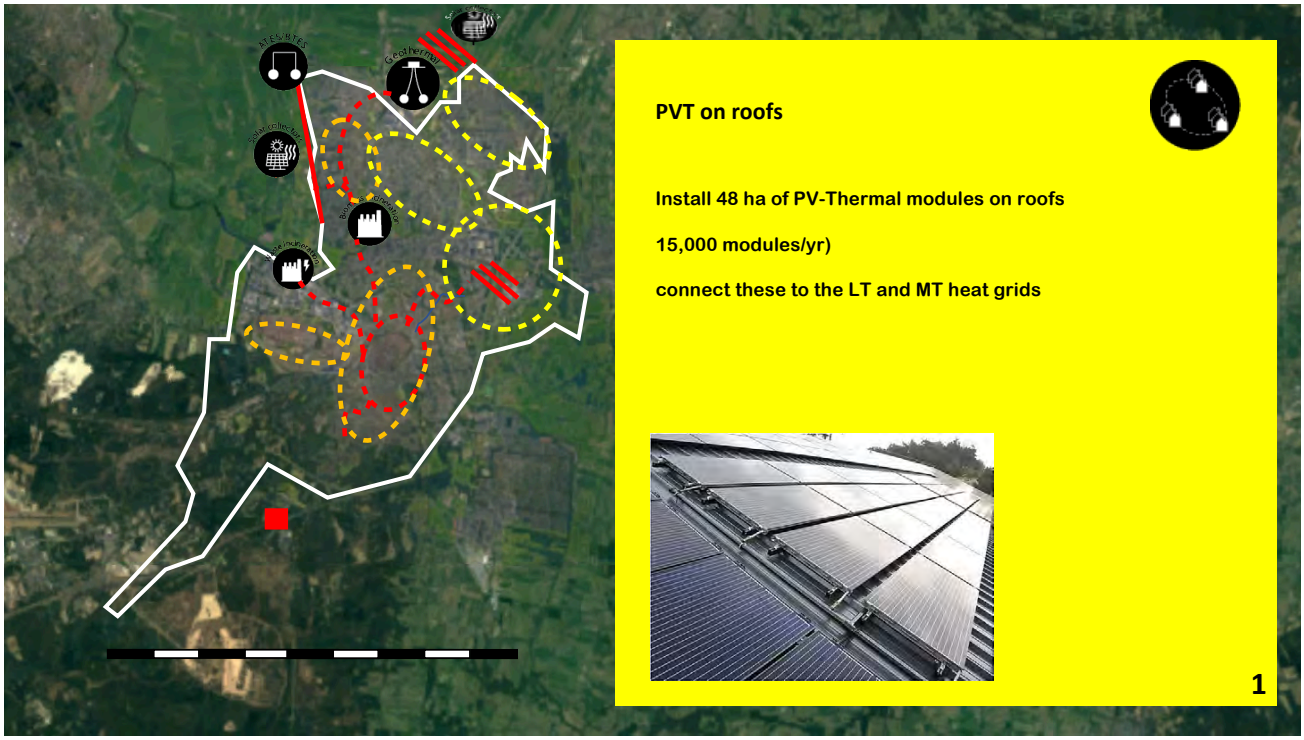


Collective Heating LT

Construct low-temperature heat grids for 15,000 res.eq. connections

connect 750 residential equivalents per year

1



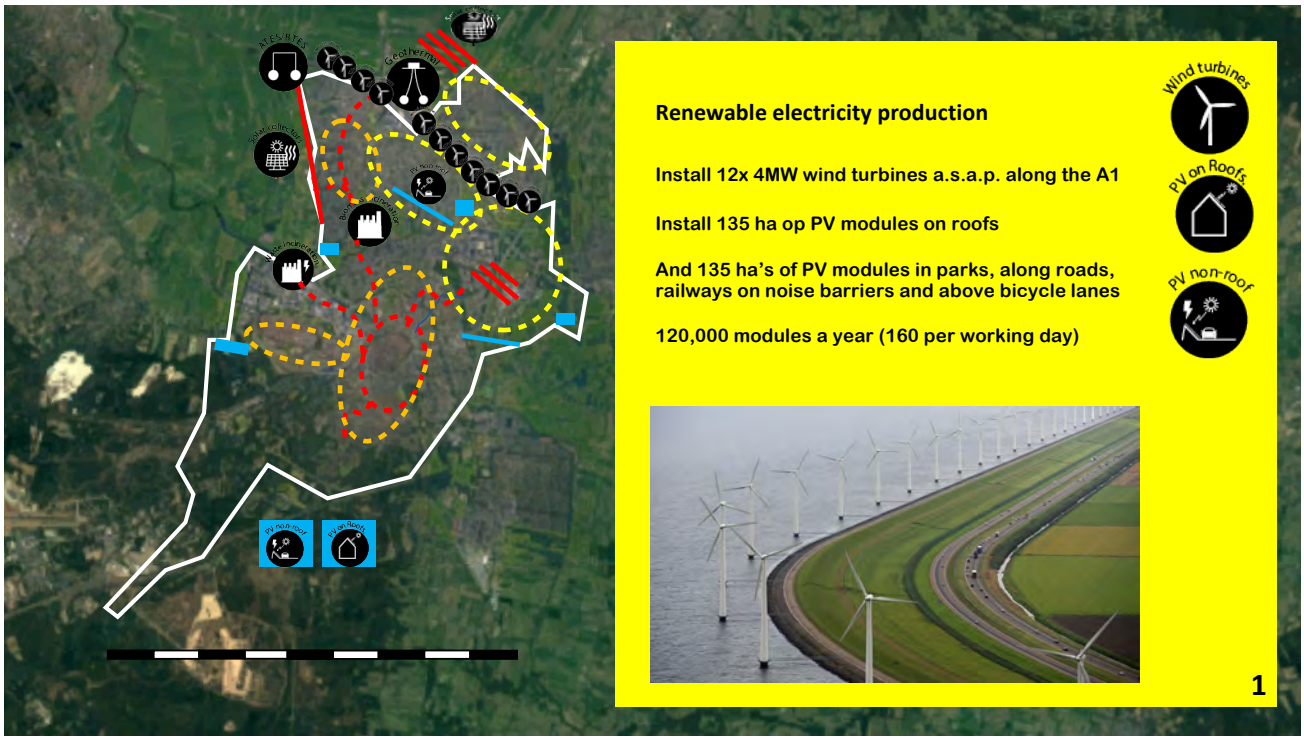
PVT on roofs

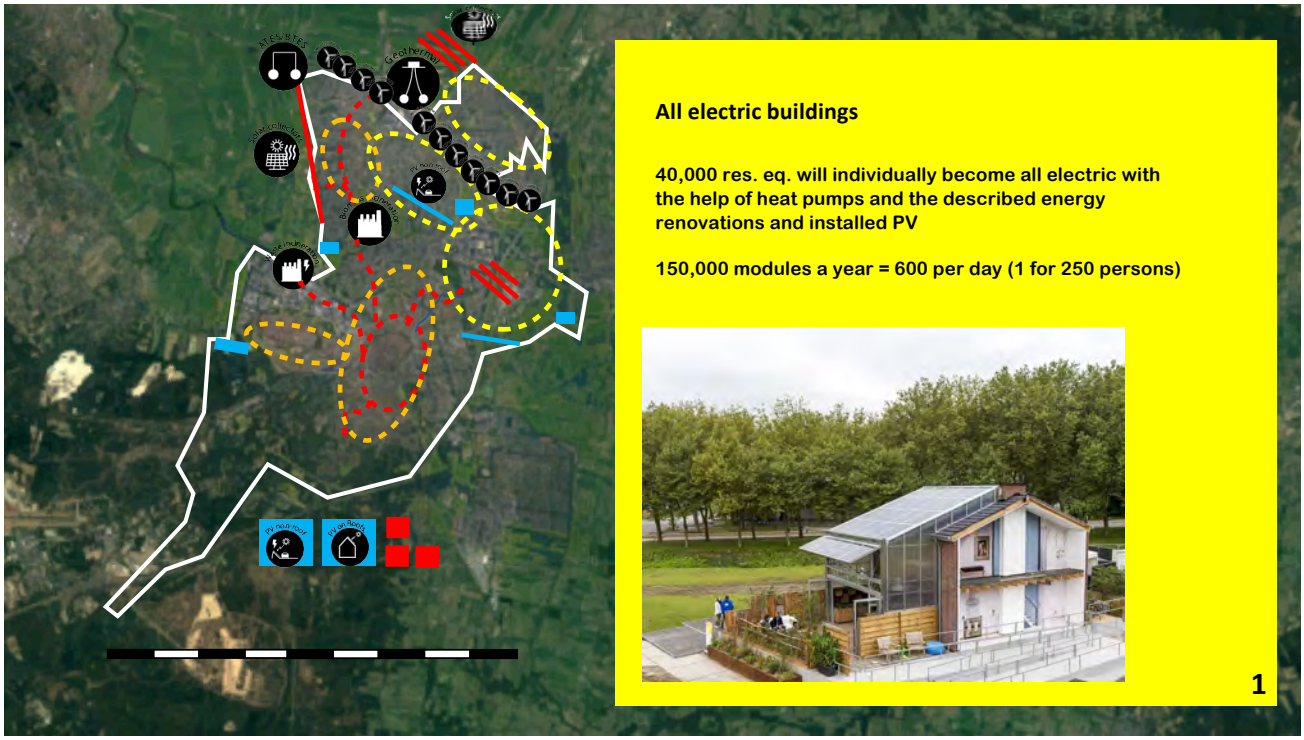
Install 48 ha of PV-Thermal modules on roofs

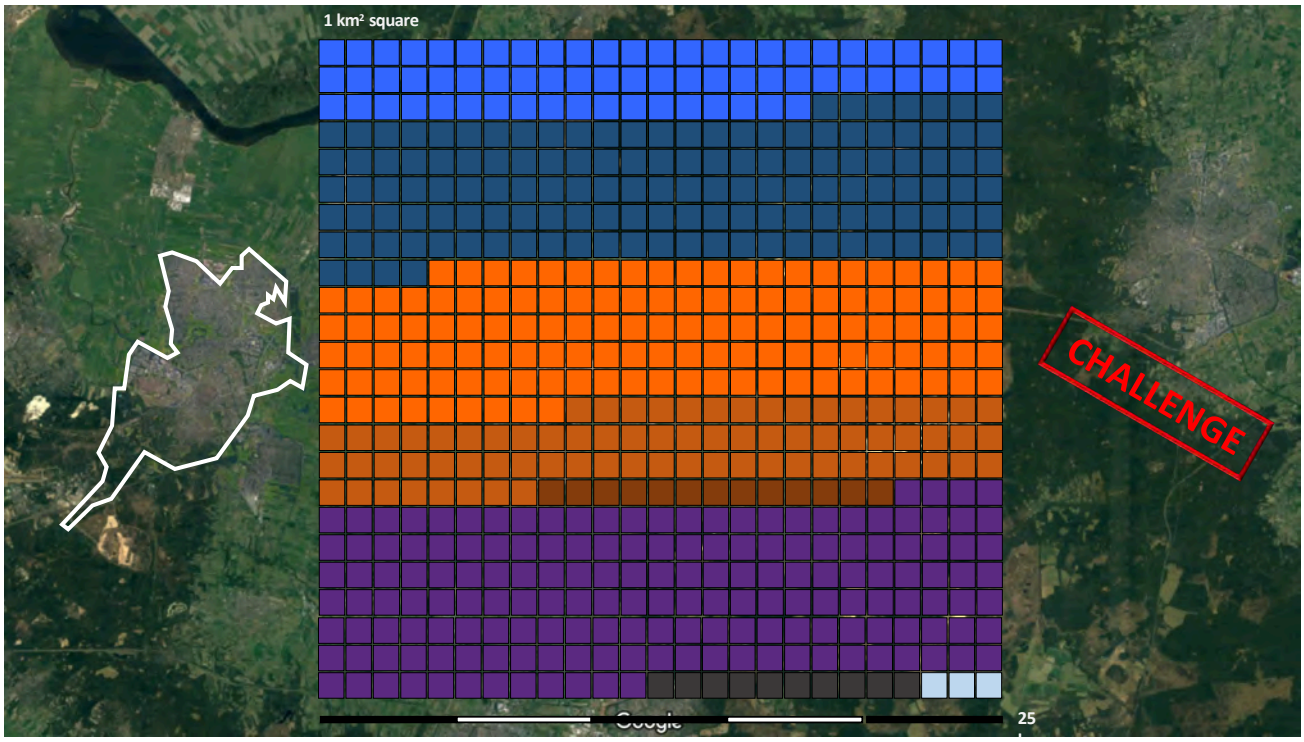
15,000 modules/yr)

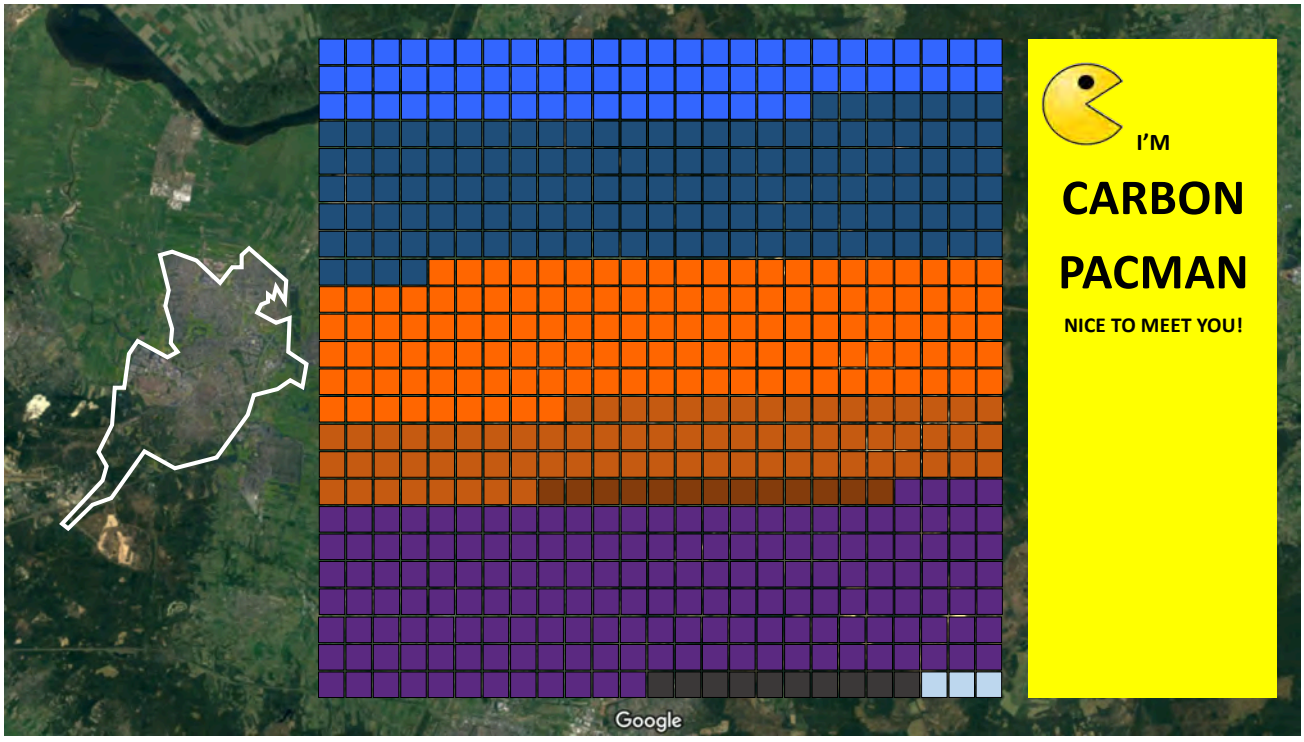
connect these to the LT and MT heat grids

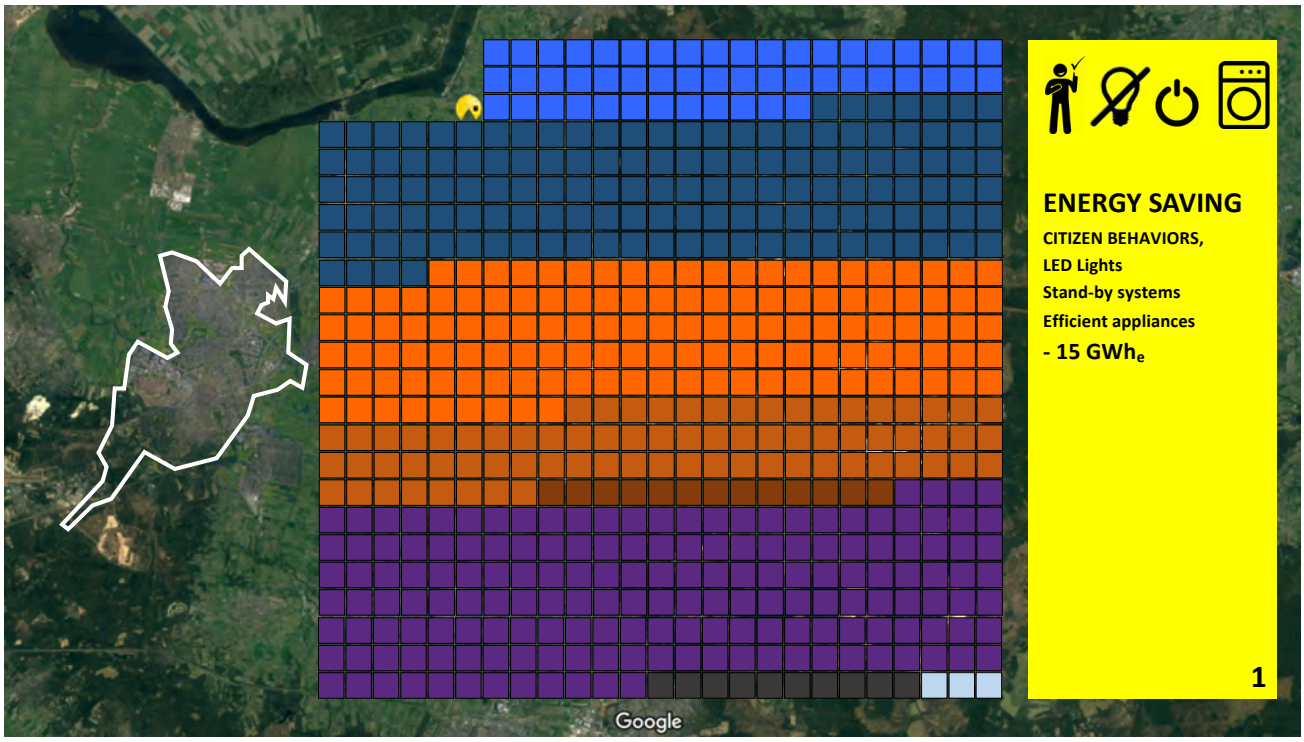
1

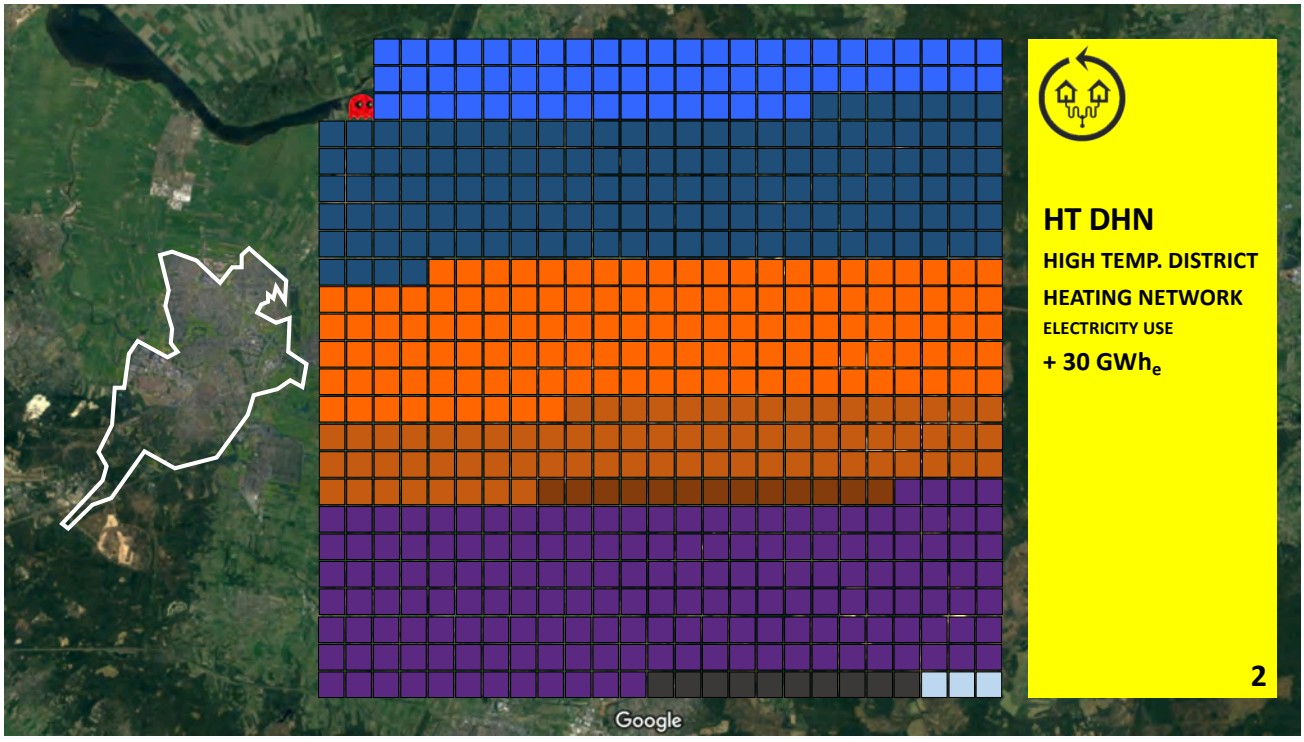

Renewable electricity production
Install 12x 4MW wind turbines a.s.a.p. along the A1
Install 135 ha op PV modules on roofs
And 135 ha's of PV modules in parks, along roads, railways on noise barriers and above bicycle lanes
120,000 modules a year (160 per working day)
Wind turbines
PV on Roofs
PV non-roof
1

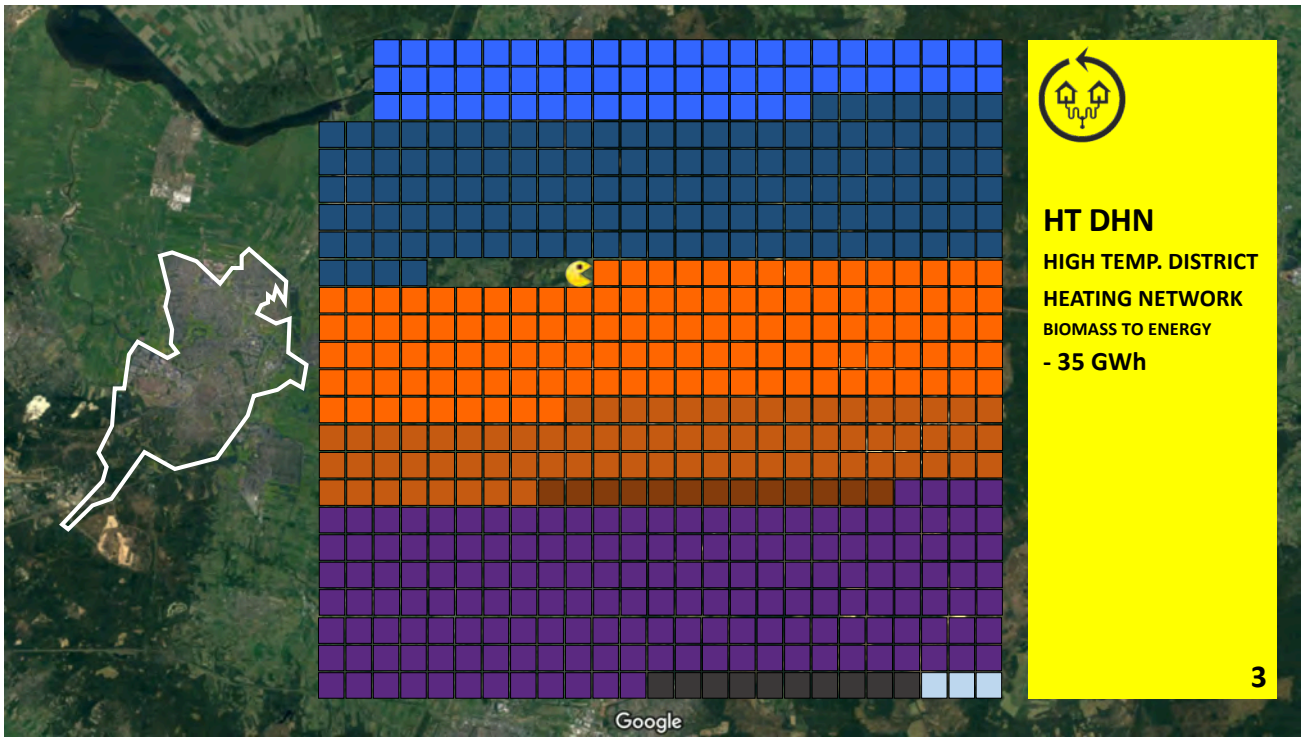

All electric buildings
40,000 res. eq. will individually become all electric with the help of heat pumps and the described energy renovations and installed PV
150,000 modules a year = 600 per day (1 for 250 persons)
1

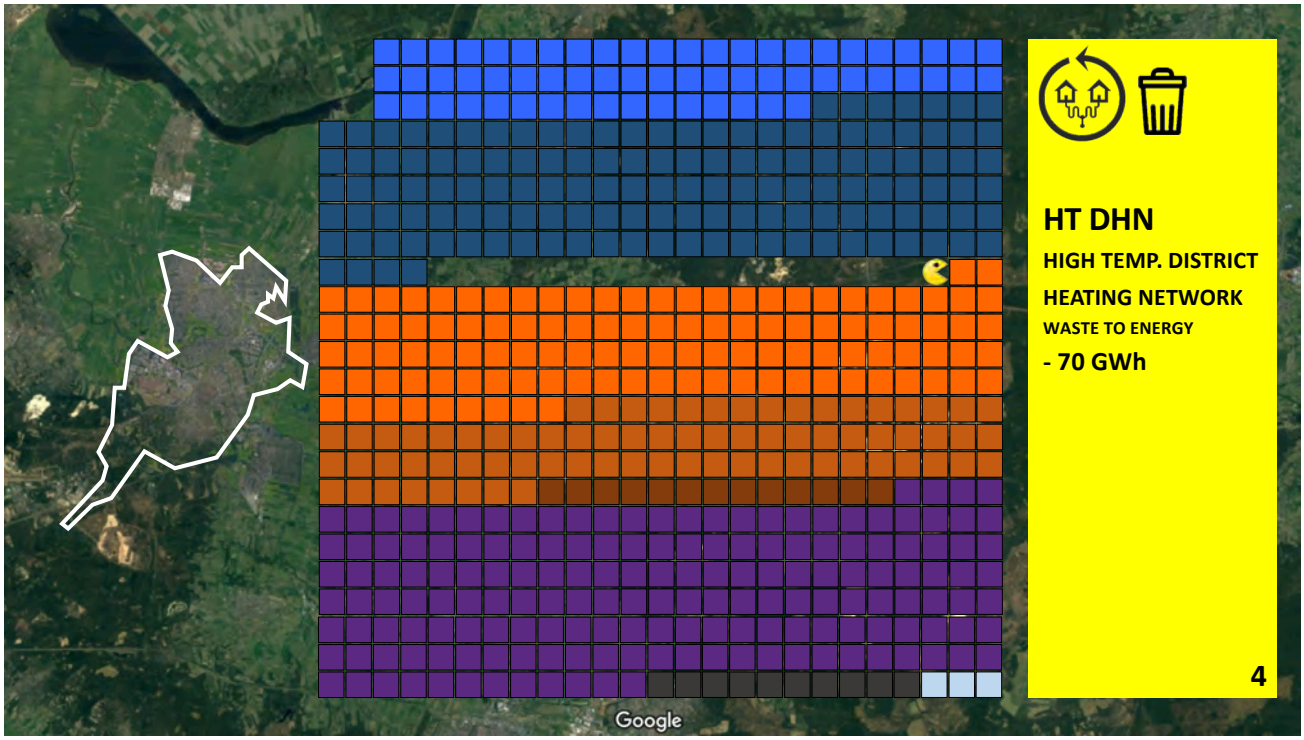

1 km² square
CHALLENGE
25

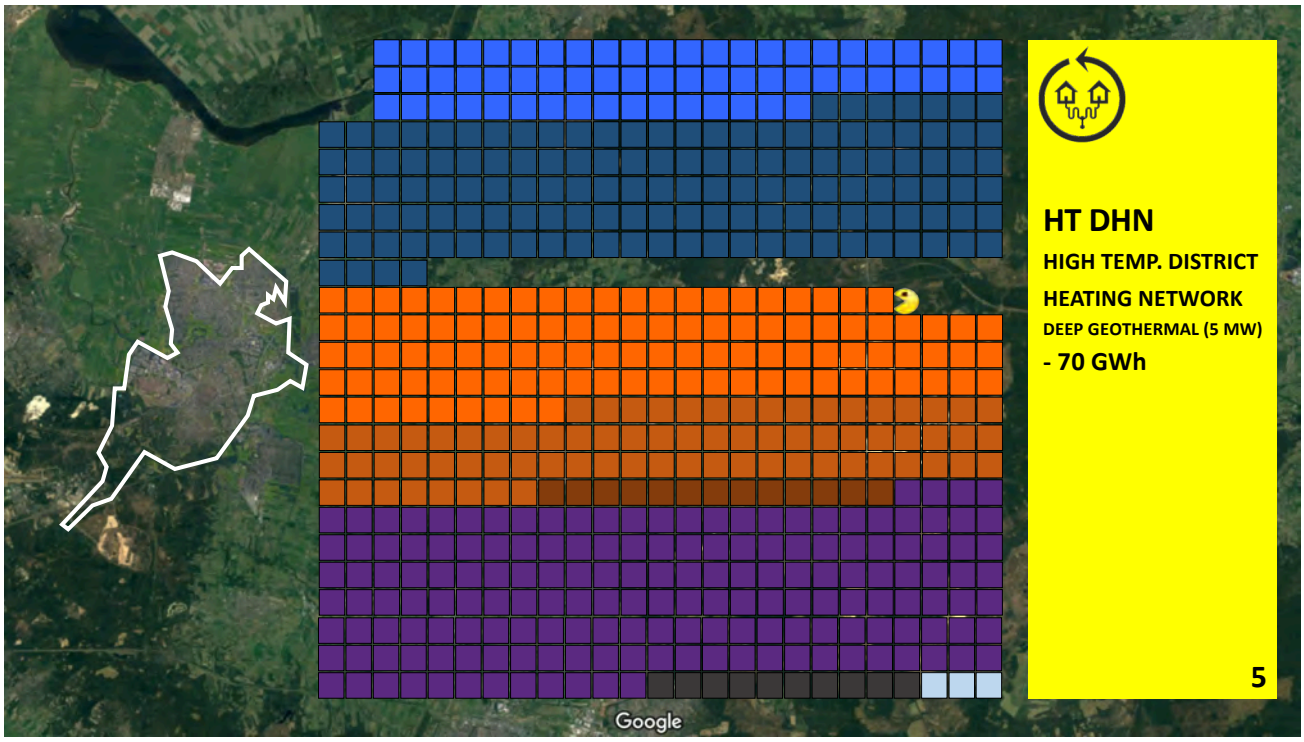

I'M
CARBON
PACMAN
NICE TO MEET YOU!
Google

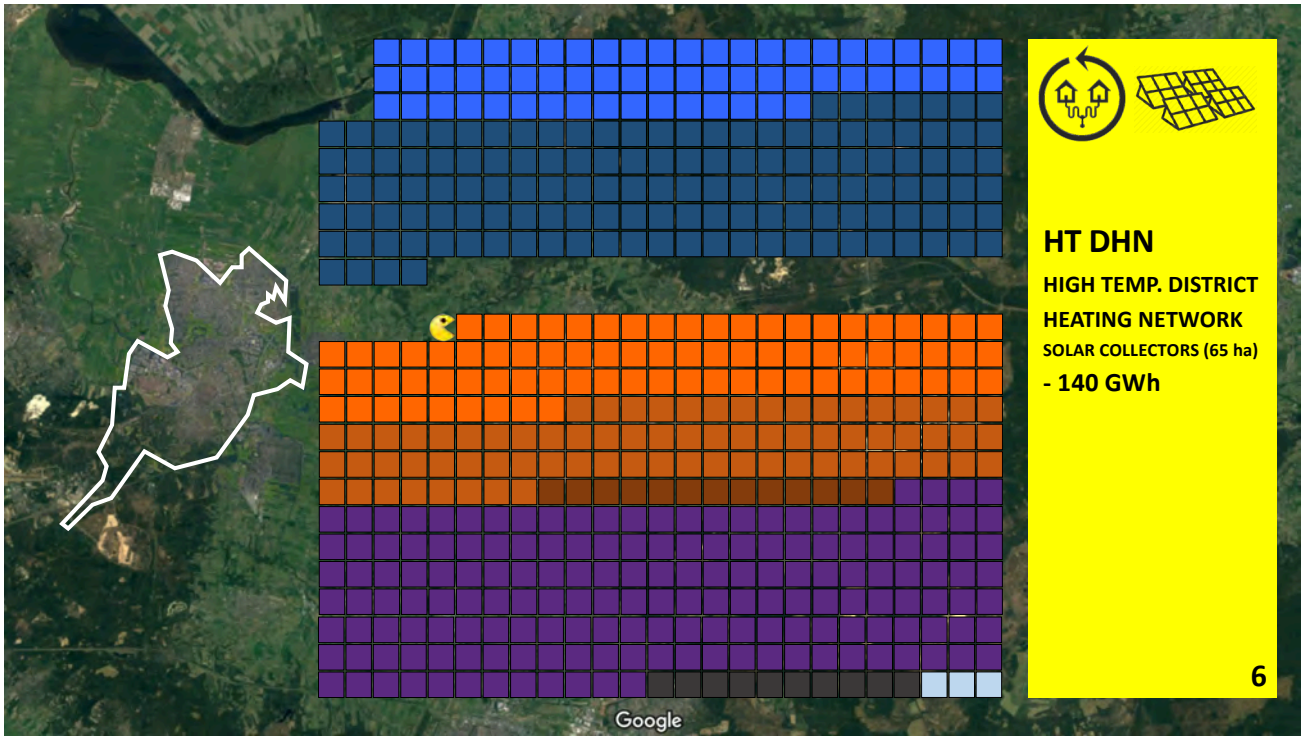

ENERGY SAVING
CITIZEN BEHAVIORS,
LED Lights
Stand-by systems
Efficient appliances
- 15 GWh$_e$
1
Google

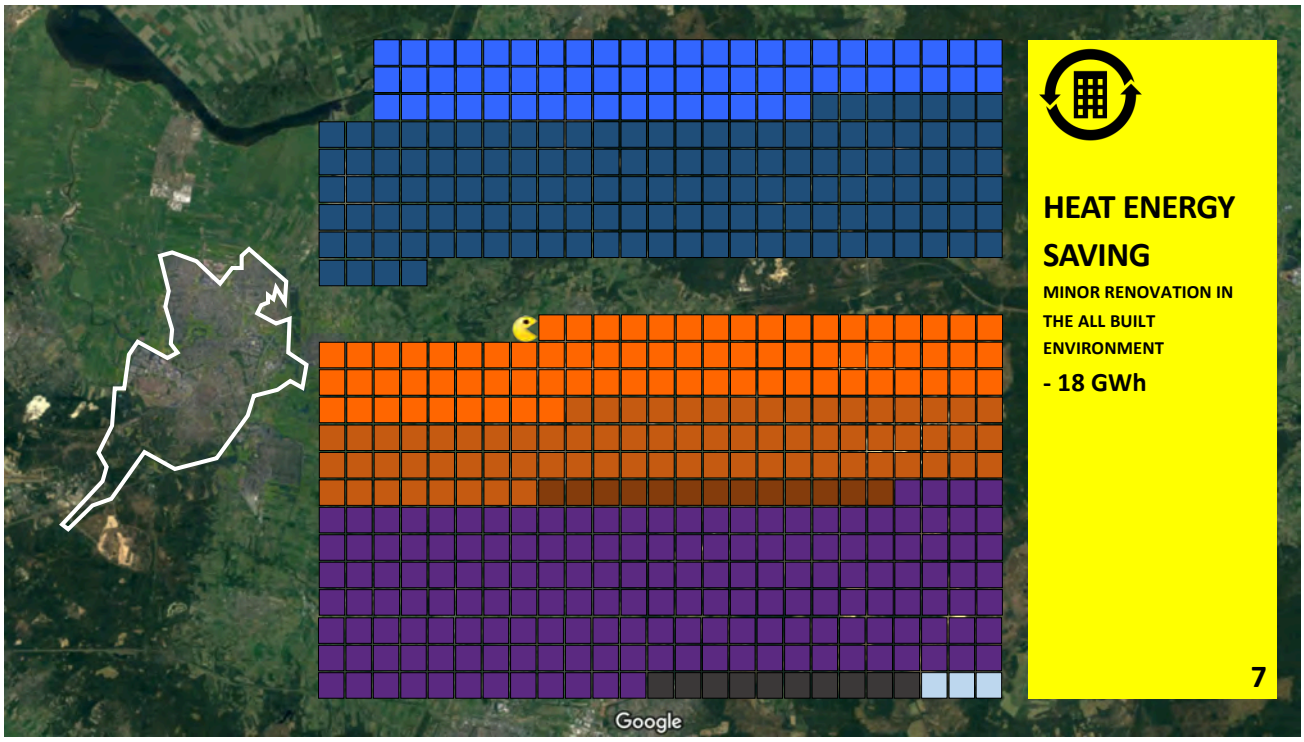

HT DHN
HIGH TEMP. DISTRICT
HEATING NETWORK
ELECTRICITY USE
+ 30 GWh$_e$
2
Google

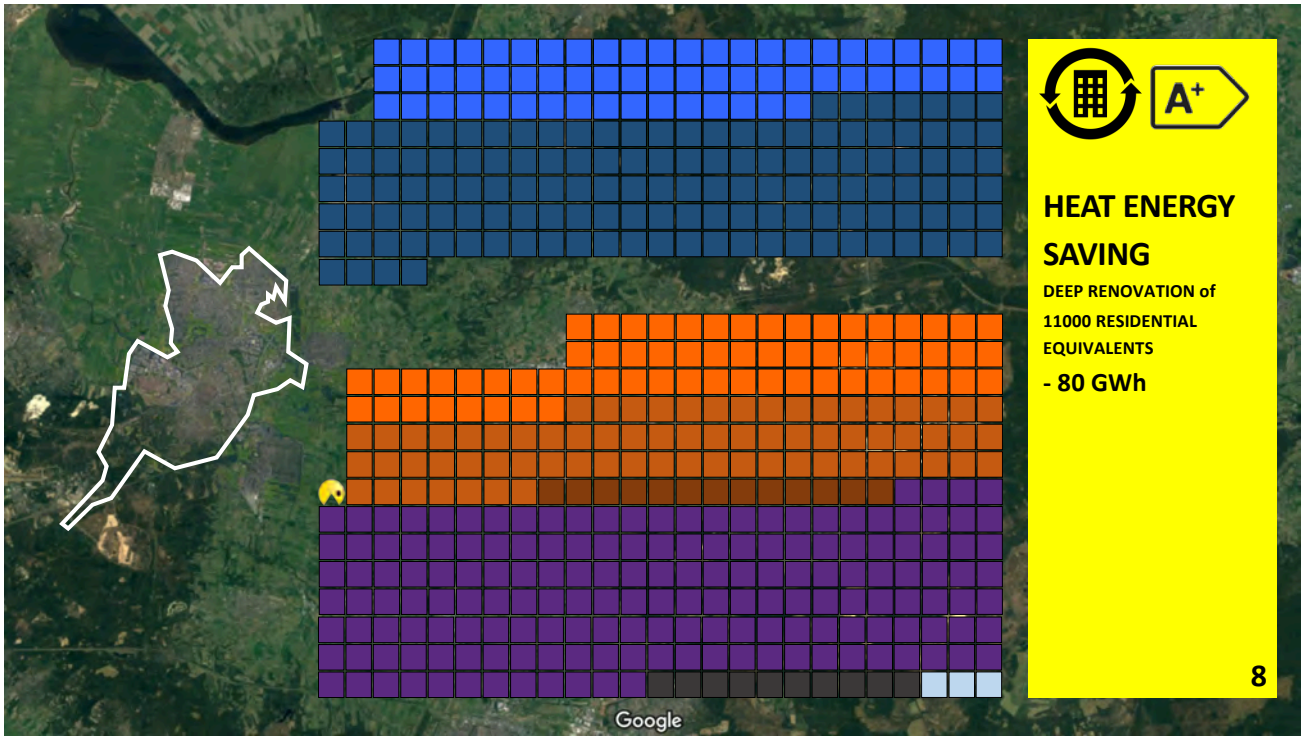

HT DHN
HIGH TEMP. DISTRICT
HEATING NETWORK
BIOMASS TO ENERGY
- 35 GWh
3
Google

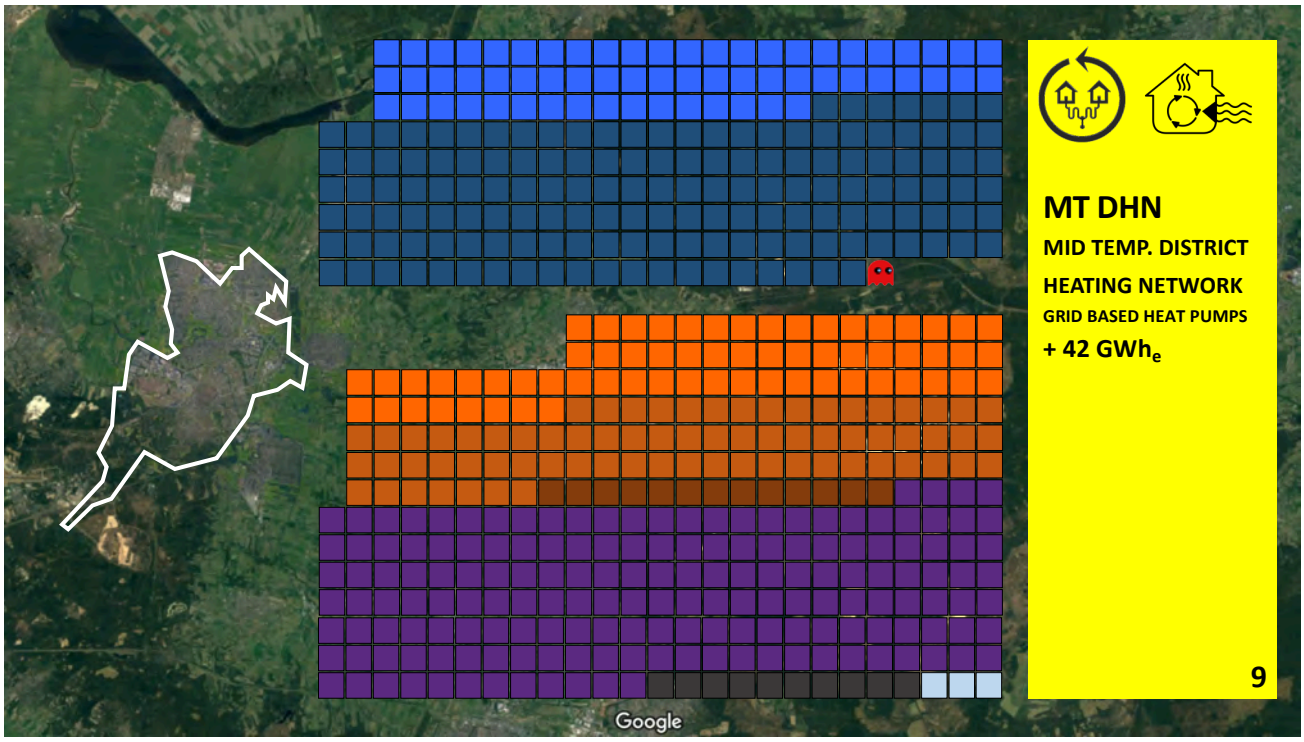

HT DHN
HIGH TEMP. DISTRICT
HEATING NETWORK
WASTE TO ENERGY
- 70 GWh
4
Google

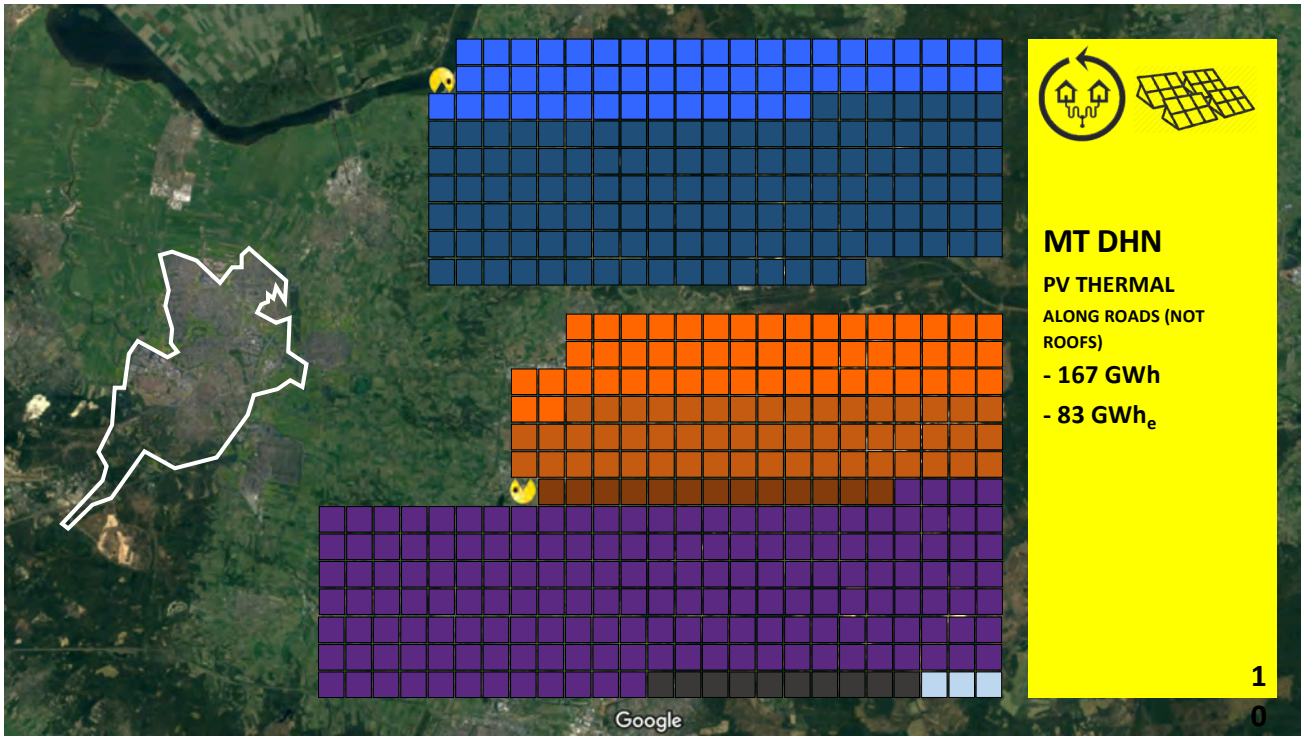

HT DHN
HIGH TEMP. DISTRICT HEATING NETWORK
DEEP GEOTHERMAL (5 MW)
- 70 GWh
5
Google

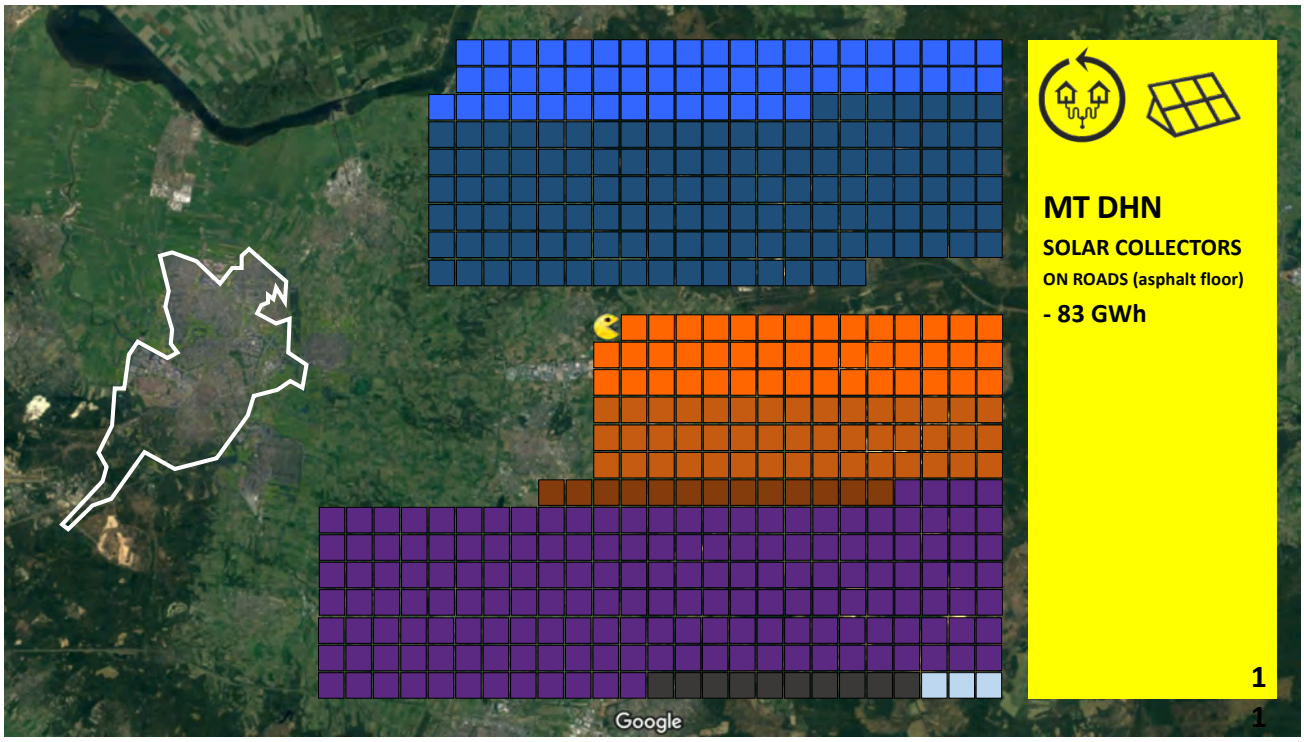

HT DHN
HIGH TEMP. DISTRICT HEATING NETWORK
SOLAR COLLECTORS (65 ha)
- 140 GWh
6
Google

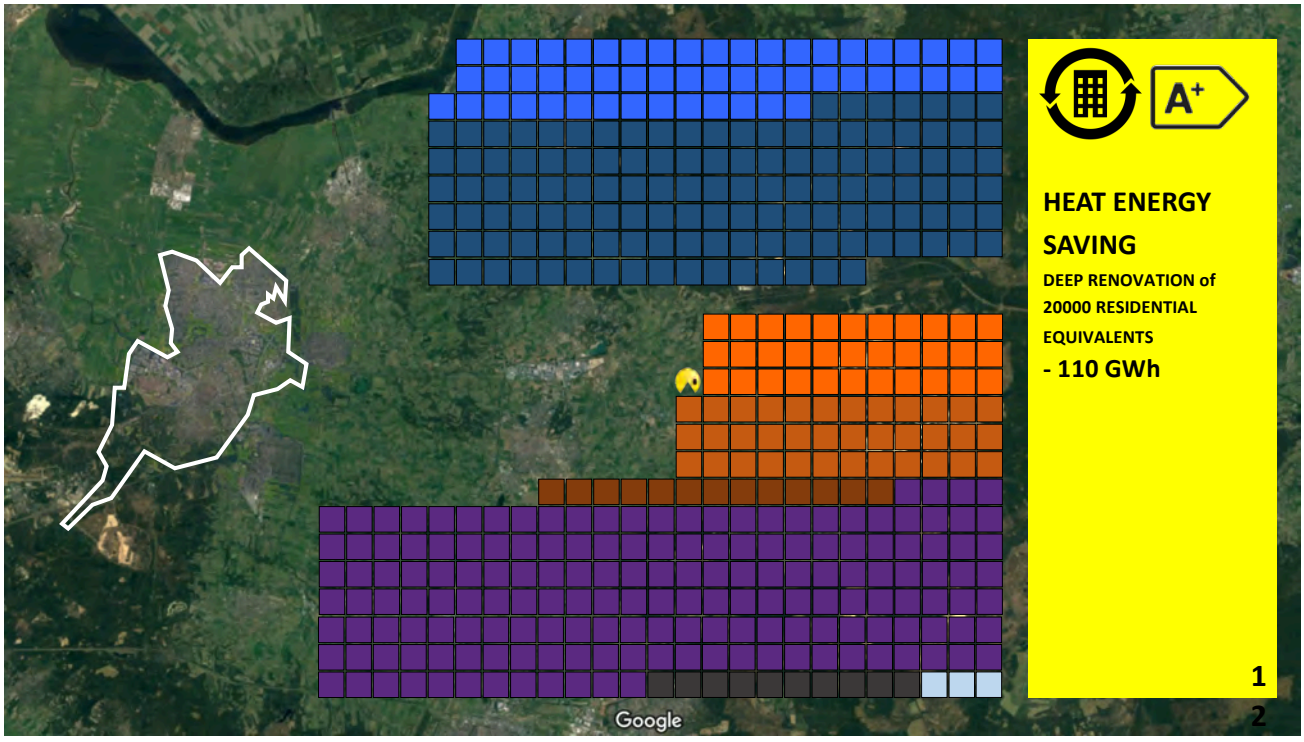

HEAT ENERGY SAVING
MINOR RENOVATION IN THE ALL BUILT ENVIRONMENT
- 18 GWh
7
Google

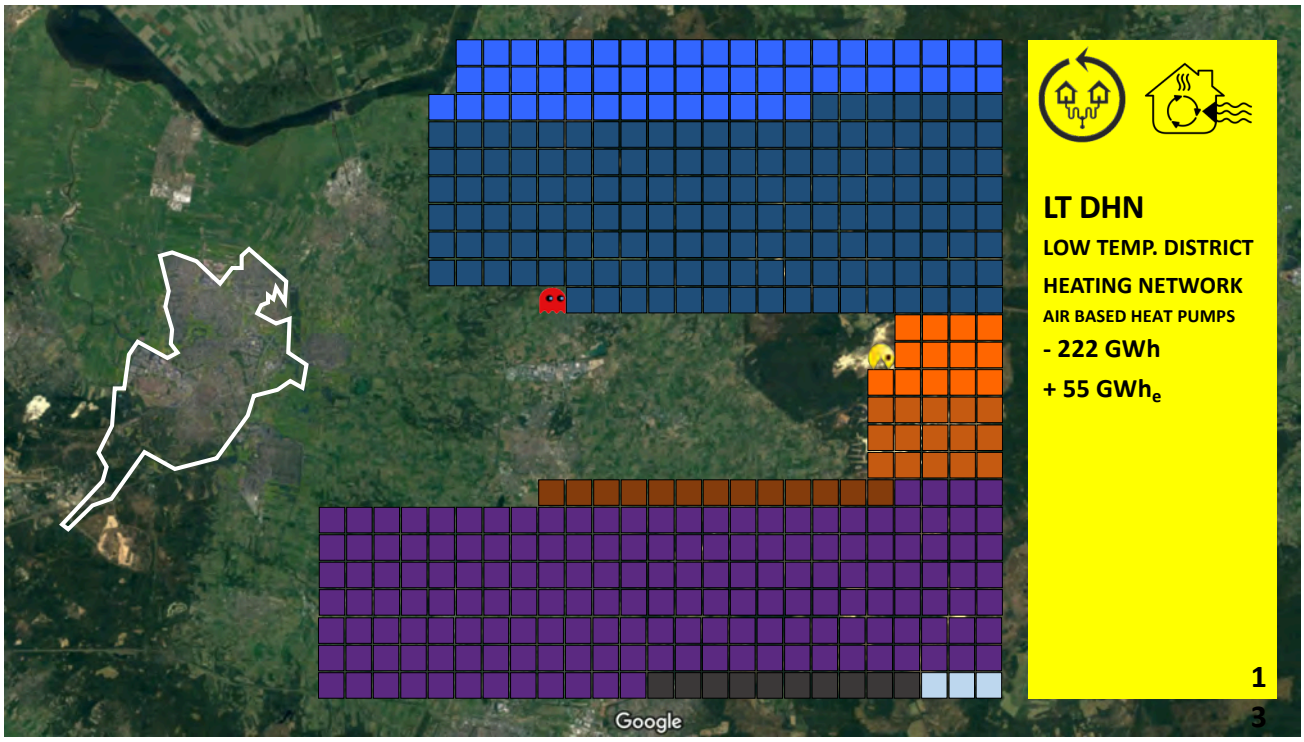

A+
HEAT ENERGY SAVING
DEEP RENOVATION of 11000 RESIDENTIAL EQUIVALENTS
- 80 GWh
8
Google

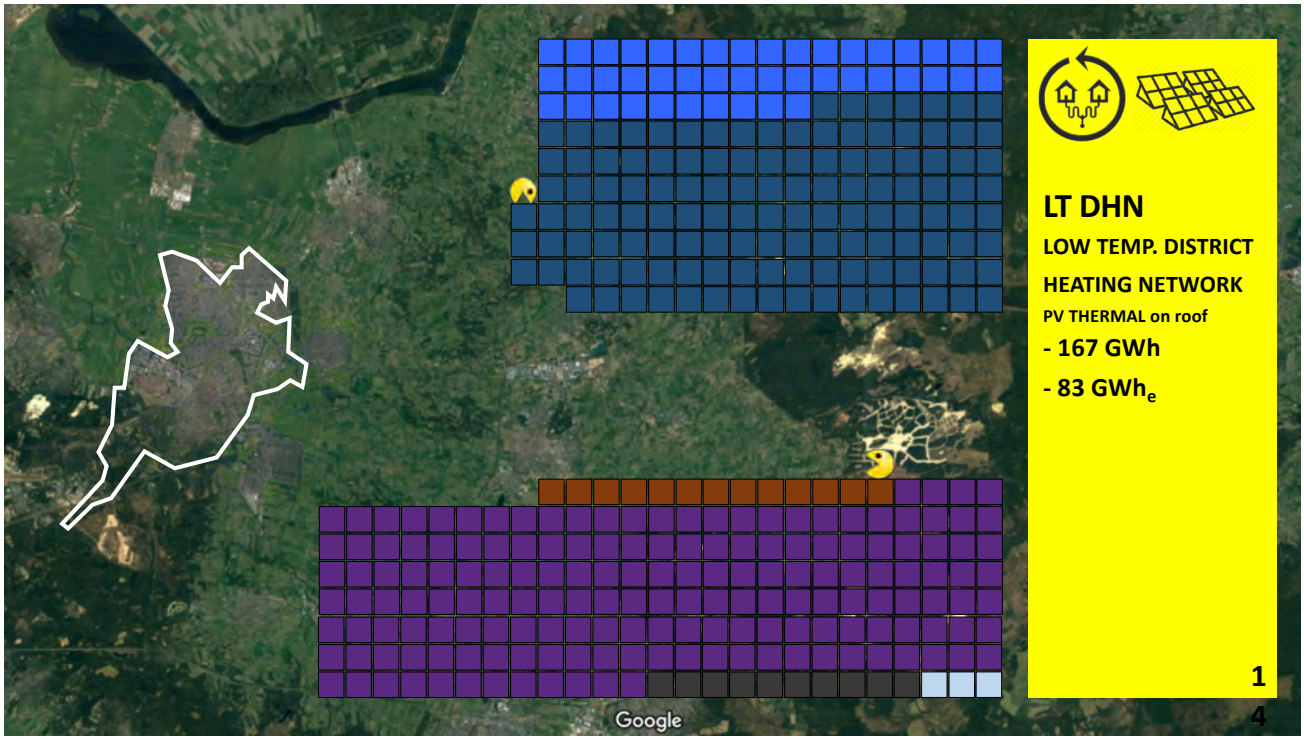

MT DHN
MID TEMP. DISTRICT HEATING NETWORK
GRID BASED HEAT PUMPS
+ 42 GWh$_e$
9
Google

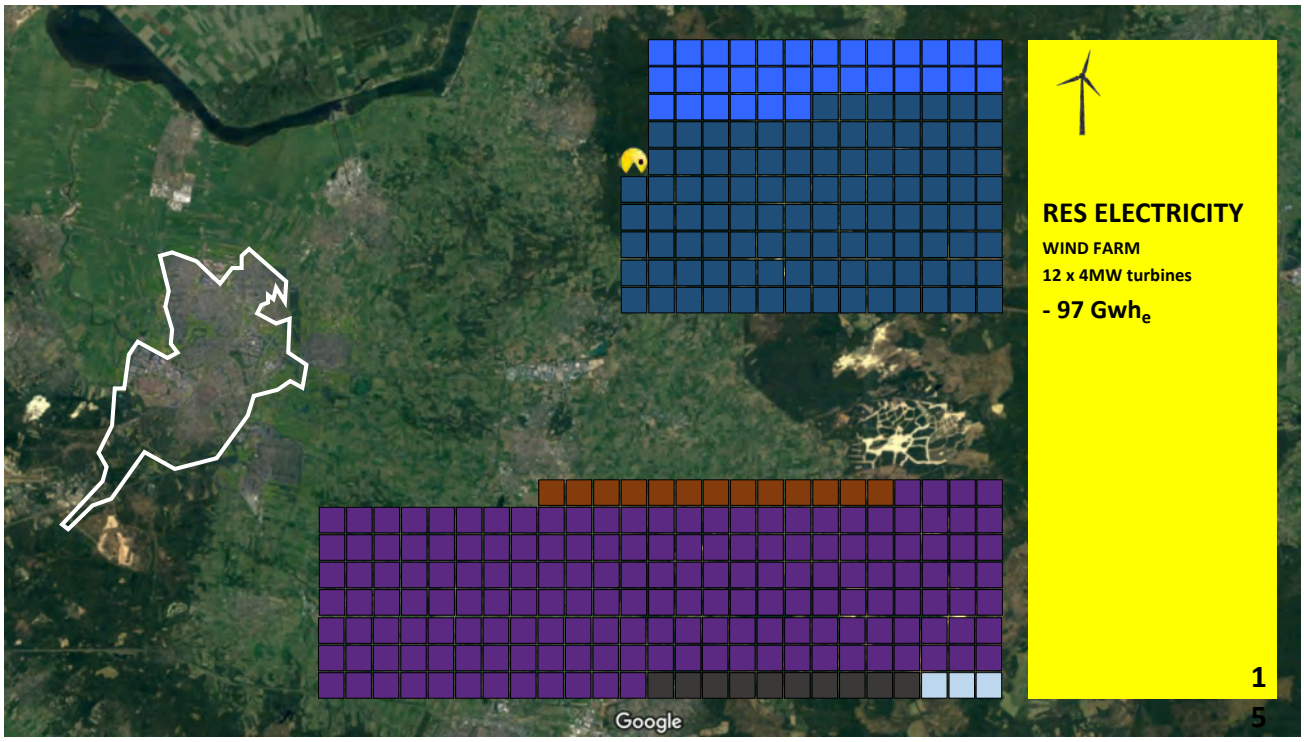

MT DHN
PV THERMAL
ALONG ROADS (NOT ROOFS)
- 167 GWh
- 83 GWh$_e$
10
Google

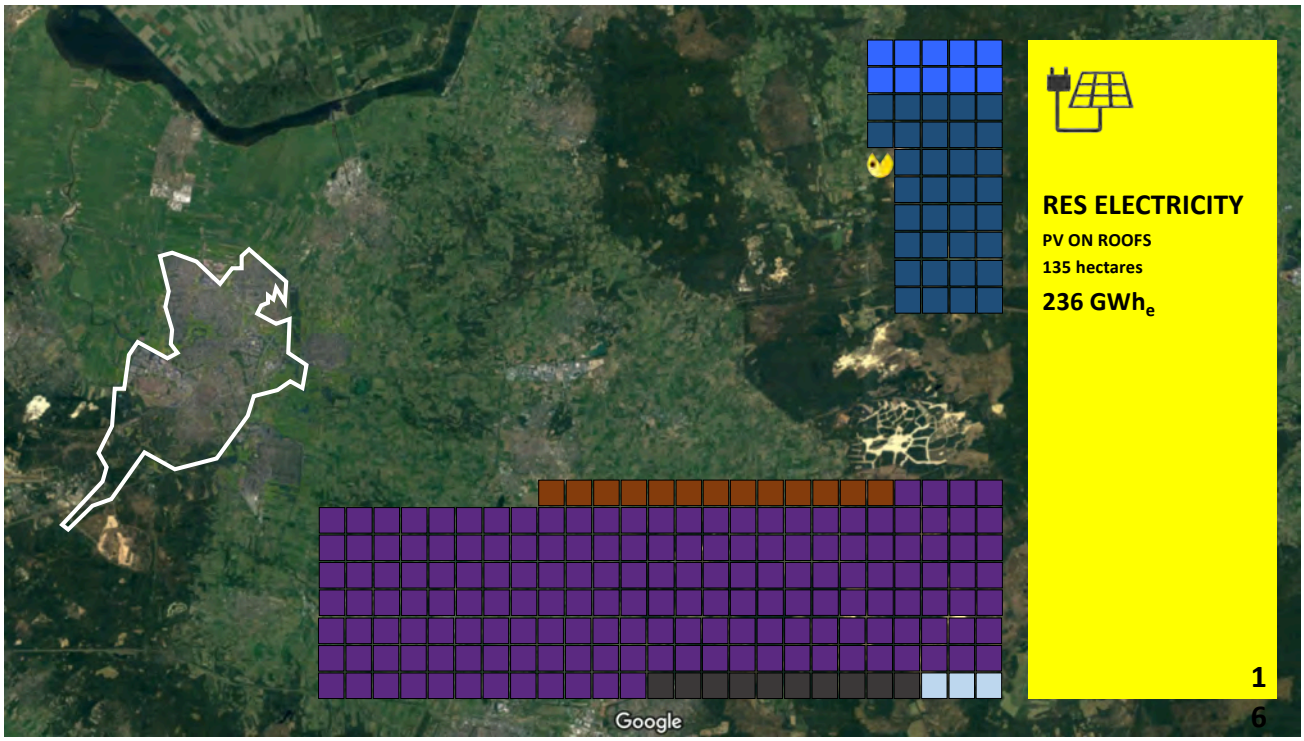

MT DHN
SOLAR COLLECTORS
ON ROADS (asphalt floor)
- 83 GWh
1
1
Google

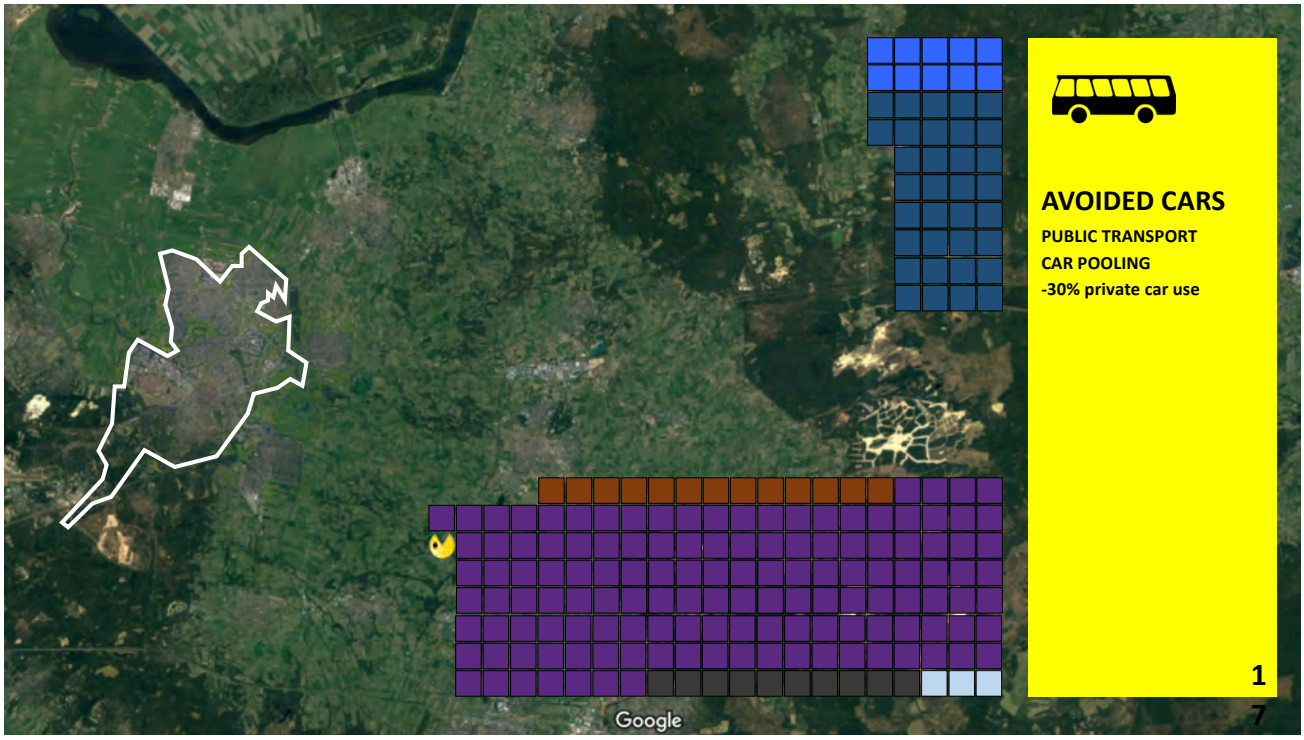

A+
HEAT ENERGY
SAVING
DEEP RENOVATION of
20000 RESIDENTIAL
EQUIVALENTS
- 110 GWh
1
2
Google

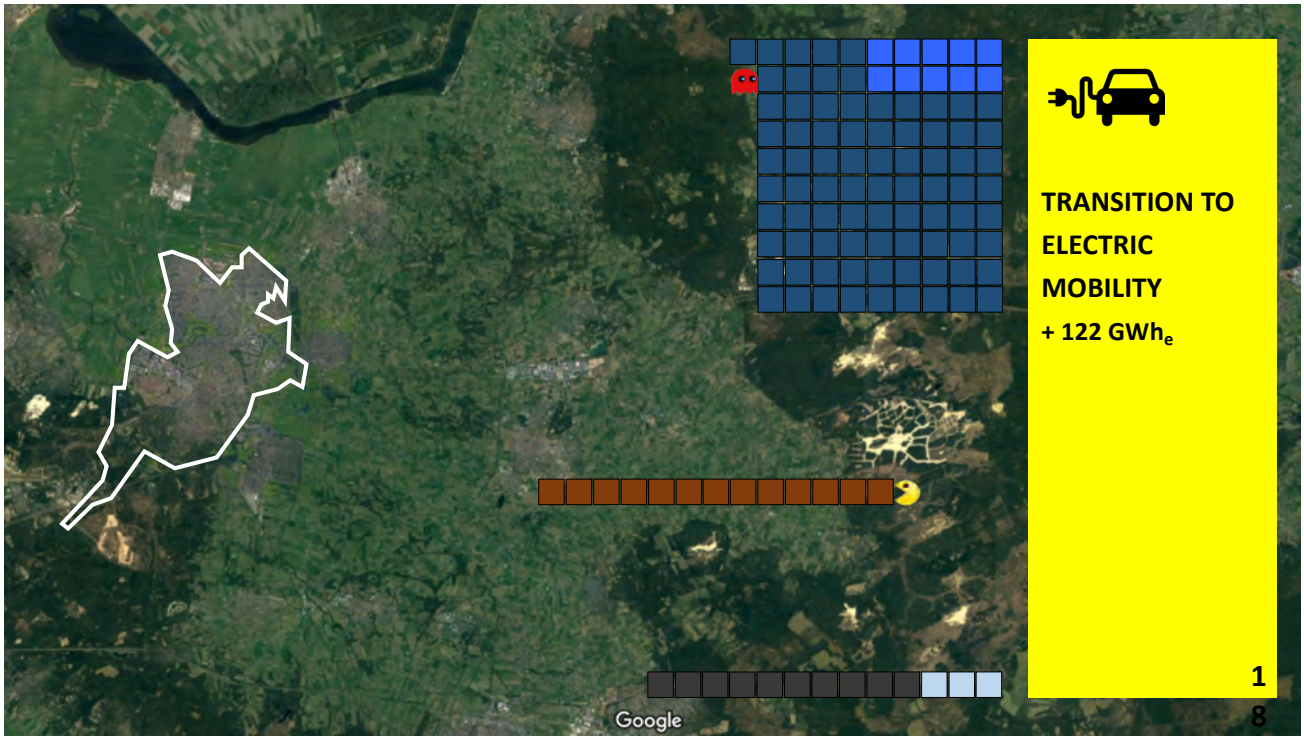

LT DHN
LOW TEMP. DISTRICT
HEATING NETWORK
AIR BASED HEAT PUMPS
- 222 GWh
+ 55 GWhe
1
3
Google


LT DHN
LOW TEMP. DISTRICT
HEATING NETWORK
PV THERMAL on roof
- 167 GWh
- 83 GWhe
1
4
Google

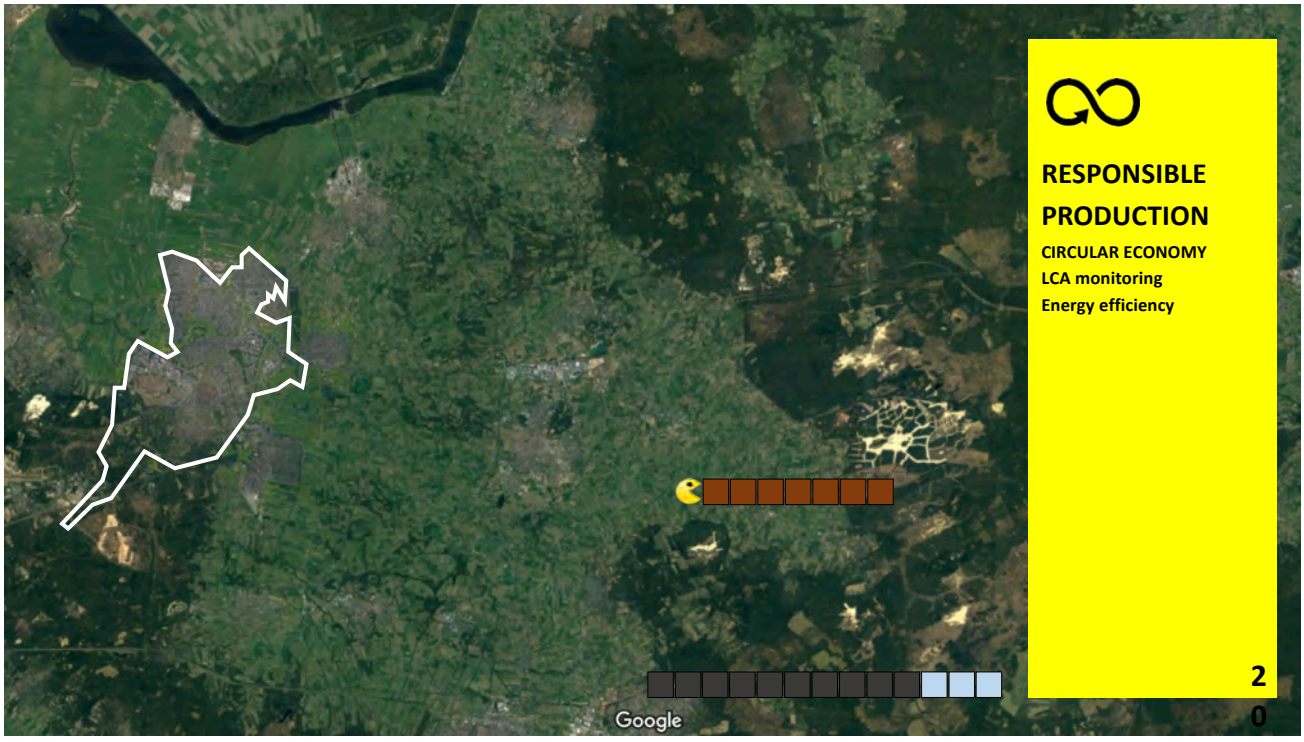

RES ELECTRICITY
WIND FARM
12 x 4MW turbines
- 97 Gwh$_e$
15
Google


RES ELECTRICITY
PV ON ROOFS
135 hectares
236 GWh$_e$
16
Google


AVOIDED CARS
PUBLIC TRANSPORT
CAR POOLING
-30% private car use
17
Google


TRANSITION TO ELECTRIC MOBILITY
+ 122 GWhe
18
Google


RES ELECTRICITY
Shared PV in parks
135 hectares
236 GWh$_e$
19
Google

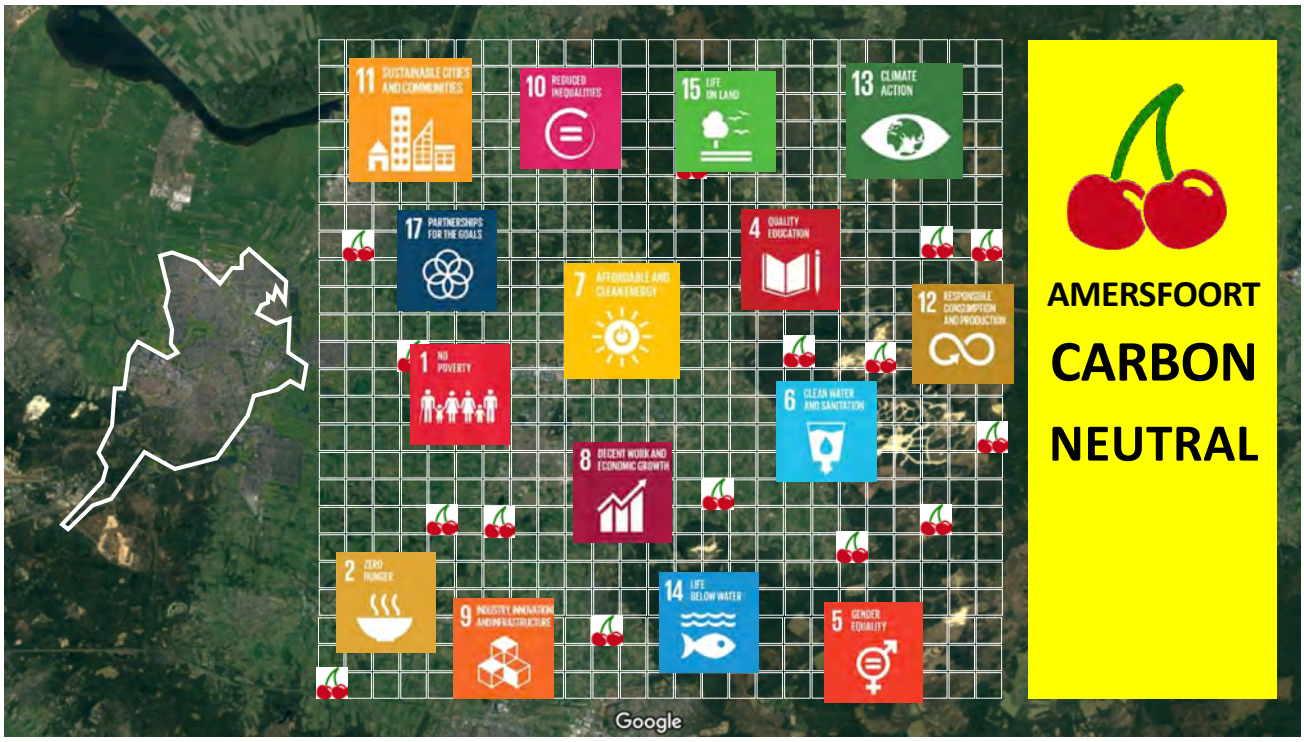

RESPONSIBLE PRODUCTION
CIRCULAR ECONOMY
LCA monitoring
Energy efficiency
20
Google


WASTE & WATER
MANAGEMENT
WASTE REDUCTION
WATER SAVING
2
1
Google


URBAN
FORESTRY
CARBON UPTAKE
1500 hectares forest
2
2
Google


AMERSFOORT
CARBON
NEUTRAL
Google


AMERSFOORT
CARBON
NEUTRAL
Google



City-zen Amersfoort Roadshow

Web: https:// www.cityzen-smartcity.eu/nl/home-nl/

@CityzenRoadshow

@CityzenRoadshow

cityzenroadshow

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