Workshop

Upscaling energy renovation to the district level

TU Delft, 25 September 2019

Upscaling energy renovation to the district level

Workshop goals

Moderator: Zeno Winkels, Climate-KIC/ TU Delft, The Netherlands

12:45 **The IEA EBC Programme: supporting policy and business development**
Daniel Van Rijn, The Netherlands Enterprise Agency (RVO), The Netherlands

13:00 **The Annex 75 project: objectives on policy and business development**
Manuela Almeida, University of Minho, Portugal

Experiences regarding building renovation at district scale

Moderator: Zeno Winkels, Climate-KIC/ TU Delft, The Netherlands

13:15 **Local policy action for neighbourhood renovation**
How to operate Amsterdam on clean energy?, *Tess Blom, TU Delft, The Netherlands*
Experiences from the development of sustainable neighbourhoods in Rotterdam *André De Groot, City of Rotterdam, The Netherlands*
Group renovation of owner-occupant's houses in Mechelen, *Ighor Van de Vyver, City of Mechelen, Belgium*

14:00 **Frontrunner market approaches for neighbourhood renovation**
The role of ESCO's in large scale renovation, *Johan Coolen, Factor4, Belgium*
Climate Mission initiative, *Rene Pie, Klimaatmissie, The Netherlands*
Challenges of revolving funds, *Patrick Lüftenegger, City of Salzburg*

14:45 **Q&A**

15:00 **Coffee break**

Upscaling energy renovation to the district level

EBC
Energy in Buildings and Communities Programme

Policy instruments - Mentimeter

mentimeter.com/s/651d8c6a77abf7187fd4d06c659d491d/49e9aa1750c6

Go to **www.menti.com** and use the code **44 76 91**

What do you think is the most effective way to move an unwilling donkey?

Mentimeter

Interreg
2 Seas Mers Zeeën
Triple-A

A. hitting the donkey with a whip	B. holding a carrot in front of the donkey	C. a dog barking at the donkey	D. turn the donkey's head to make it see other donkeys are moving
0	0	0	0

0

ENG 16:00 24/09/2019

Upscaling energy renovation to the district level

EBC
Energy in Buildings and Communities Programme

Stakeholders - Mentimeter

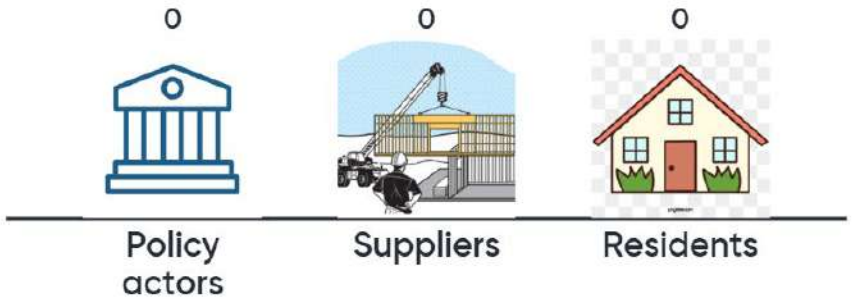
mentimeter.com/s/0f81f51f9d265749f42b4656aa5f9a54/b0fc44b55c8f

Go to **www.menti.com** and use the code **66 67 71**

What do you think are the most important stakeholders we need to activate to achieve district energy renovation?

Mentimeter

Interreg
2 Seas Mers Zeeën
Triple-A



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ENG 15:58 24/09/2019

Upscaling energy renovation to the district level

15:30 **Break-out Sessions: Policy instruments & Business Models**

17:00 **Conclusions**

Findings Policy Instruments, *Jens Freudenberg, TU Delft, The Netherlands*

Findings Business Models, *Thaleia Konstantinou, TU Delft, The Netherlands*

Lessons for the IEA EBC Annex 75, *Zeno Winkels, Climate-KIC/ TU Delft, The Netherlands*

Lessons for the Netherlands Enterprise Agency, *Daniel Van Rijn, RVO, The Netherlands*

17:30 **Closure**

More information?

http://www.triple-a-interreg.eu/

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E.mlecnik(at)tudelft.nl

TU Delft, P.O. Box 5043, 2600 GA Delft, Nederland

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Rijksdienst voor Ondernemend Nederland

The IEA-EBC programma

Importance for the Netherlands

Daniël van Rijn

Netherlands Enterprise Agency

EBC

Energy in Buildings and Communities Programme

International Energy Agency

Founded in 1974

Originally

To help countries co-ordinate a collective response to major disruptions in the supply of oil.

Nowadays

- Environmental Awareness
- Energy Security
- Economic Development
- Engagement Worldwide

IEA Technological Collaboration Programmes (TCP's)

Independed bodies within the framework of the IEA

TCP's relevant for the Build environment:

- Energy Buildings and Communities (EBC)
- Solar Heating and Cooling (SHC)
- Heat Pump Technology (HPT)
- Demand Site Management (DSM)
- Smart Energy systems (ISGAN)
- Photovoltaic power systems
- Energy Storage (ECES)
- ….

Energy Buildings and communities (EBC)

- Founded in 1977
- 24 member countries
- 16 ongoing annexes
- 2 working groups
- Last meeting: annex nr. 80!

EBC Strategic plan

High Priority Research Themes

- Integrated planning and building design
- Building energy systems
- Building envelope
- Community scale methods
- Real building energy use

www.iea-ebc.org

Dutch Built environment

Building stock

- 570 million m2 utility buildings
- 7,7 million houses

- 40% rowhouses
- 32% multi storage buildings
- 60% build between 1946 - 1992
- 30% social housing

93% of Dutch households have an individual heating system (gas boilers)

Dutch Climate agreement

- Over 100 organizations involved to set agenda for policies to reduce CO2 emissions by 49% in 2030
- Heat in built environment:
  - Reduce use of natural gas
  - Energy efficiency
  - Heat pumps
  - District heating (geothermal, biomass, surface water etc.)
- 2030: 1,5 million houses free of natural gas
- 2050: build environment is CO2-neutral

Stimulation knowledge, innovation and market conditions

- Cheaper
- More quality
- Much higher labour productivity

Integrated approach on building and neigbourhood level (technical and proces)

Industrialisation and use of ICT

It's about people in there homes

Programmes

- Mission Oriented Knowledge and Innovation agenda
- Pilots and demonstrations
- Programme for neighbourhoods ‘free of natural gas’
- Activities to create better market conditions

Thank you

Ir. Daniël van Rijn
Netherlands Enterprise Agency
daniel.vanrijn@rvo.nl

IEA EBC Annex 75

Cost-Effective Building Renovation at District Level Combining Energy Efficiency & Renewables

13 countries are involved in the project:
AT, BE, CH, CN, CZ, DK, ES, GE, IT, NL, NO, PT, SE

January 2018 – June 2022

Manuela Almeida (Operating Agent)
University of Minho
Portugal

Workshop on Upscaling energy renovation to the district level

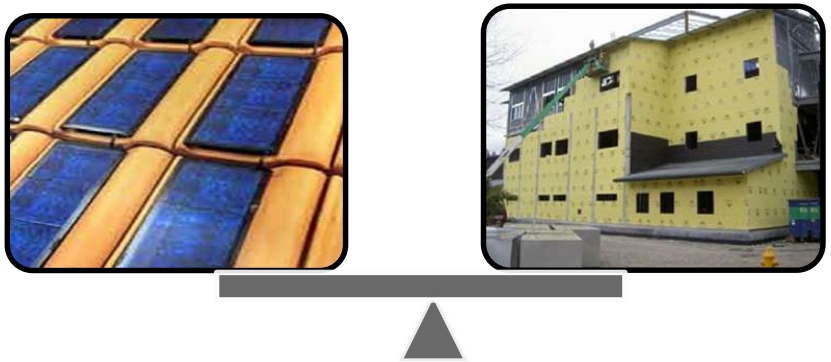
Delft, The Netherlands
25th September 2019

EBC
Energy in Buildings and Communities Programme

IEA EBC Annex 75| Background

In existing buildings, the most cost-effective renovation solution is often a combination of energy efficiency measures and carbon emissions reduction measures.

So, it is relevant to investigate where is the balance point between these two types of measures in a cost/benefit perspective.



Questions?

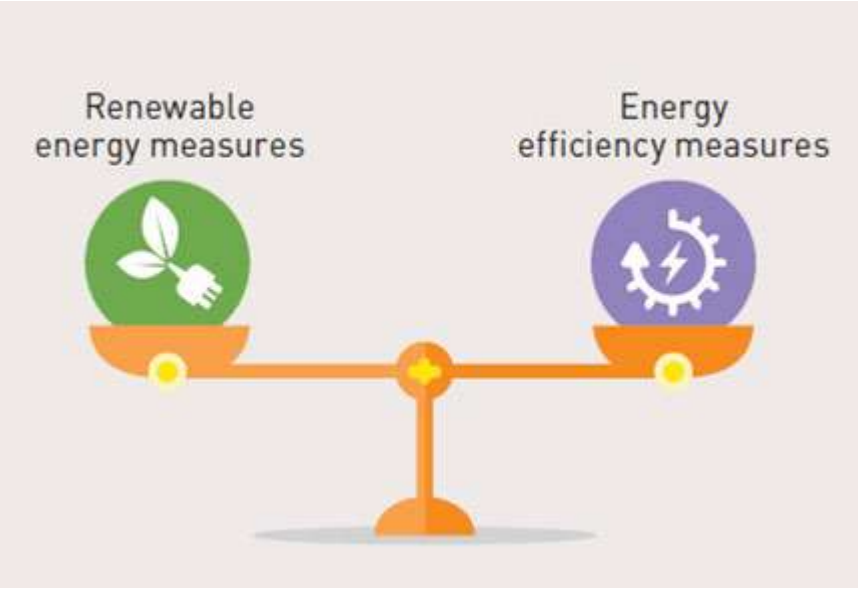
- **How to achieve the best performance with minimal effort?**
- **How far is possible to go with energy efficiency measures (initially often less expensive measures)**
- **From which point the carbon emissions reduction measures become more economical**

2. Project Idea

Key question: Where is the balance point between energy efficiency measures and measures that promote the use of renewable energy?

Annex 56: At the building level

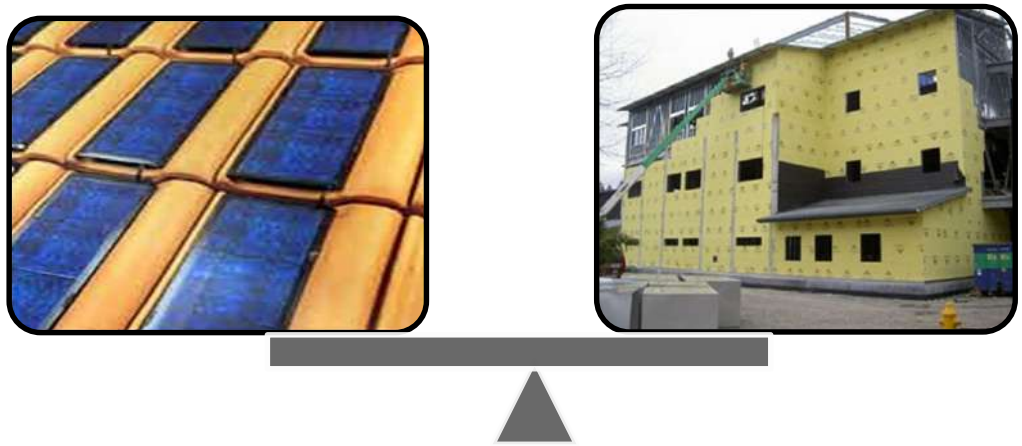
Annex 75: At the level of groups of buildings / urban districts



2. Project Idea

- At district level there are specific opportunities as well as specific challenges when compared to building level

- Finding the balance between renewable energy supplies and energy efficiency measures for the renovation of the existing stock is more complex at district level than for individual buildings, but may also bring larger benefits



2. Project Idea

EBC
Energy in Buildings and Communities Programme

There are several options available that need to be explored:
Exemples:

- **We can benefit from significant economies of scale for energy efficiency measures due to aggregated demands and synergies in construction procurement, processes and planning;**
  The provision of low-temperature district heating systems to groups of buildings may benefit from synergies when combined with energy efficiency measures applied to the buildings envelopes.

- **There is also an opportunity to benefit from centralized renewable energy approaches;**
  The availability of heat storage facilities that in a single building intervention is limited to the building floor space, at district level the options are wider

2. Project Idea

However, there are also some challenges:

- **At the level of individual buildings, synergies between energy efficiency measures and installation of renewable energy systems can be easily achieved but, at district level such synergies are not necessarily available as they depend on the existing heating systems and on the synchronization of the buildings´ renovation cycles**

In this context, it is important to explore the potential of cost-effective renovation interventions at district level to accelerate the necessary transition towards low-emissions and low-energy districts

3. Annex 75 Objectives

EBC
Energy in Buildings and Communities Programme

In Annex 75:

- A flexible methodology will be created, supported by efficient tools, to identify cost-effective strategies for renovating urban districts to significantly reduce carbon emissions and energy use.

- The methodology is being supplemented by the identification and documentation of good practice examples showing strategies for transforming existing urban districts into low-energy and low-emissions districts.

- Guidelines for policy makers and energy-related companies on how to encourage the market uptake of cost-effective strategies combining energy efficiency measures and renewable energy measures will be produced.

- Guidelines for building owners and investors about cost-effective district-level solutions are also going to be produced.

http://annex75.iea-ebc.org/

4. Annex 75 Scope

Annex 75 Scope:

- **Residential buildings**
  Single-family houses and multi-family buildings

- **Non residential buildings**
  without complex technical systems

5. Target Audience

- **Policy makers and staff from city administrations** (energy, urban planning, utilities)

- **Local and regional energy companies, utilities, construction** and **installing companies** and contractors, architects, engineers, multipliers and promoters

- **Building owners**, in particular **building owner associations** and professional building owners

6. Research Structure

Annex 75 Structure:

The project is organized in four Subtasks as follows:

- **Subtask A: Technology Overview**
- **Subtask B: Optimization Methodology and Strategy Development**
- **Subtask C: Case Studies**
- **Subtask D: Policy Instruments, Business Models, Stakeholder Dialogue, and Dissemination**

7. Annex 75 Reports

- Report on Technology Overview
- Methodology Report on cost-efficient building renovation at district level
- Assessment tools
- Report on the application of the methodology in generic districts
- Report on strategy development
- Report on parametric assessments of case studies
- Online documentation of good practice examples
- Report on enabling factors and obstacles to replicate successful case studies
- Good practice guidance: Guidance for transforming existing districts into low-energy and low-emission districts
- Report on policy instruments, including recommendations for subsidy programmes and for encouraging market take-up
- Report on business models and models for stakeholder dialogue
- Guidelines for policy makers and energy related companies on how to encourage the market take-up of cost-effective strategies combining energy efficiency measures and renewable energy measures
- Guidelines for building owners/investors about cost-effective renovation strategies, including district-based solutions

8. Work Developed

Technology Overview

Identification of Technologies	Characterization of Technologies	Identification of obstacles, interdependencies and success factors	Future Developments

IEA EBC ANNEX 75

WORK IN PROGRESS: November 2018

Technology Overview

Subtask A – Work Package A1

Summary

The objective of Work Package A1 is the identification of existing and emerging technology options (both envelope and systems and at both building and urban scale). The document reports on work developed through collection of technologies with the potential to be included in the methodology for the participants of the research project.

Work in Progress consists of a series of documents presenting on-going work being developed in the context of the Annex 75 research project.

Prepared by Jørgen Rose, Kirsten Engelund Thomsen, Ove C. Mørck

Energy system - Storage

Solar district heating

Jørgen Rose, jro@sbi.aau.dk, Denmark

Description	Large-scale solar panel arrays connected to an insulated water basin. During summer, the solar panels heat the water in the basin to approximately 90 °C and during winter, the stored energy supplies the district heating. Systems will have additional heat generating capacity to ensure that all of the consumers' heating needs are met, when there is insufficient sunshine.

Figure 16 - Tottlund District Heating. 27,000 m² solar panels and 70,000 m³ water. The facility will cover approximately 45 % of the total heating needs of the 1,033 individual customers.

Main characteristics	Solar collectors combined with a large water storage basin.
Power range	N/A
Technology interdependencies	If solar heat is used in combination with combined heat and power production (CHP), the flexibility value of the storage for electricity production in a system dominated by wind power could be included.
Advantages and disadvantages	The solution is relevant in climates dominated by heating with a seasonal variation in sunshine levels and temperatures.
References	"Solar Water Heating Project Analysis", RETScreen International (www.retscreen.net), 2004.

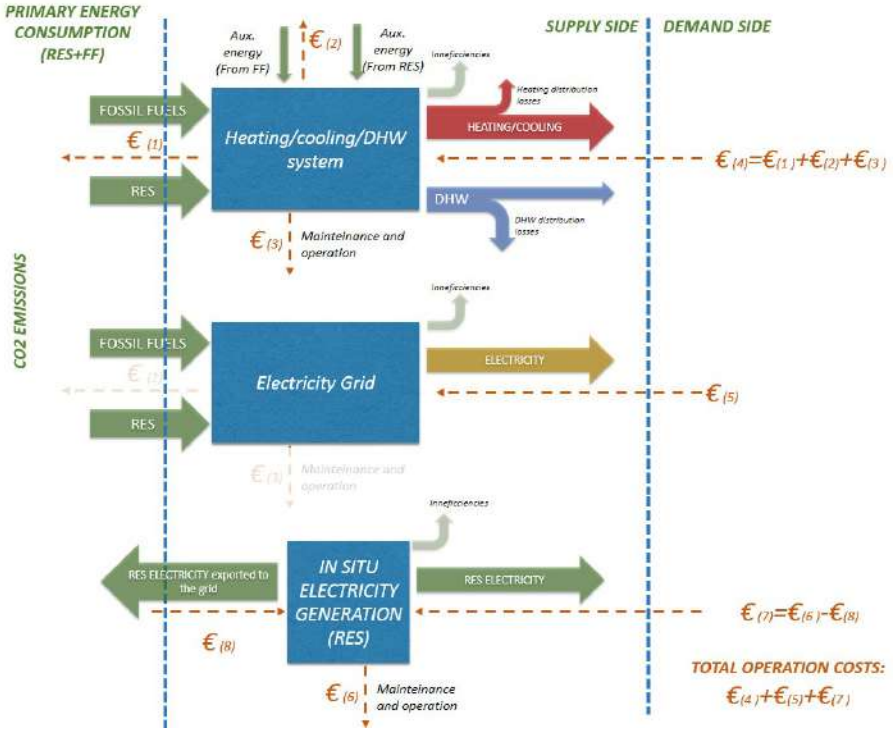
Figure 15 - A 50 kW LT-PEMFC CHP hydrogen unit from Dantherm Power.

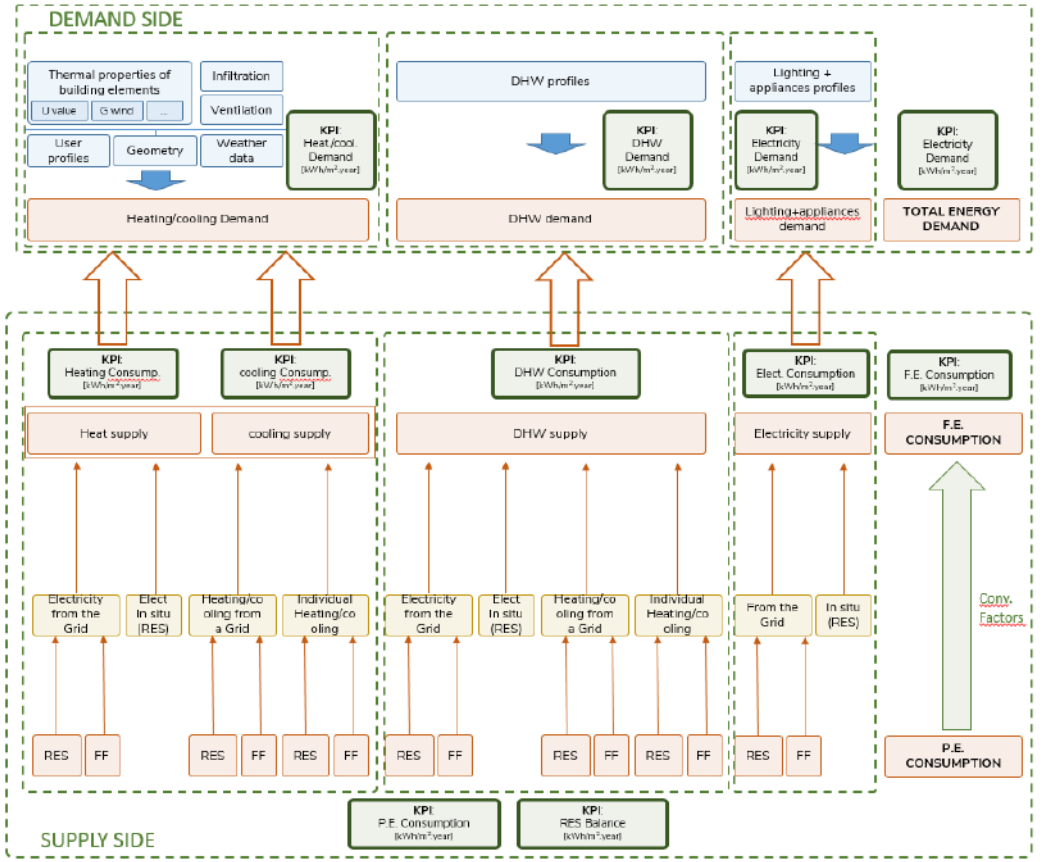
Main characteristics	PEM fuel cells can usually work as both a fuel cell and a water electrolysis cell, i.e. converting hydrogen into electricity and heat in one process and converting water and electricity into hydrogen in the reverse process. This means that the fuel cell can store excess electricity as hydrogen when production from e.g. wind turbines is high and use this hydrogen as fuel when production is low.
Power range	The larger FC-CHP units are typically around 20 to 1,000 kW of electrical power.
Technology interdependencies	Combining PEM-FC with electricity based on renewable energy sources like wind-turbines or photovoltaics means that it is possible to store excess production as hydrogen which can be used as fuel in the PEM-FC at a time where there is a shortage of electricity production. Stored hydrogen could also be used for transportation purposes in e.g. cars. The fuel cells produce both electricity and heat and in order to obtain maximum efficiency the heat should be utilized as well, e.g. by heat pumps connected to a district heating system.
Advantages and disadvantages	The main advantages include: • The PEM-FC utilizes the scalability of the fuel cell technology to produce electricity locally with efficiencies equal to or higher than for conventional power plants. • Larger FC-CHP units in the grid can support the grid companies in balancing the grid. • The grid balancing property of the PEM-FC contributes to reduced additional investments in infrastructure e.g. cables. • Hydrogen produced from excess electricity based on renewable sources can be stored in hydrogen storages and utilised in the PEM-FC in situations, where wind turbines, solar PV and other renewable technologies are not available. The main disadvantages include: • Relatively high production costs today due to expensive materials (platinum). • The lifetime of the current technology needs to be improved.

8. Work Developed

Methodology

Methodological guidelines and framework conditions





8. Work Developed

Cases Studies and Success Stories

Case Study - Santa Tecla neighbourhood, Braga

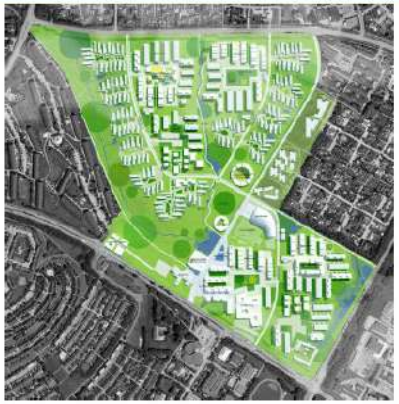
- no. of buildings: 8
- total heated floor area: 3925 m²
- building typology:
- year
- reno
  no
- impl

Furuset, Oslo

- no. of buildings:
- total heated floor area: 260 0
- building typology:

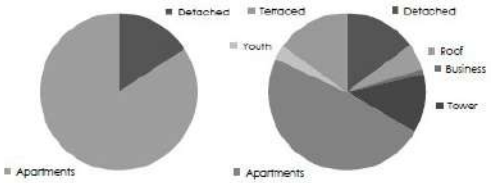
other

Kildeparken, Aalborg

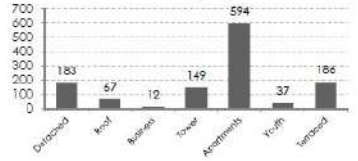


	Before	After
- no. of dwellings [-]	942	1,228
- total heated floor area [m²]	96,000	120,000

- building typology (no. of dwellings):



- number of dwellings (after renovation):



- renovation measures already carried out: renovation in progress
- implementation period: 2014 - 2020

8. Work Developed

Dissemination

Published articles

http://annex75.iea-ebc.org/

Workshops

Periodical
Annex 75 Newsletters

8. Work Developed

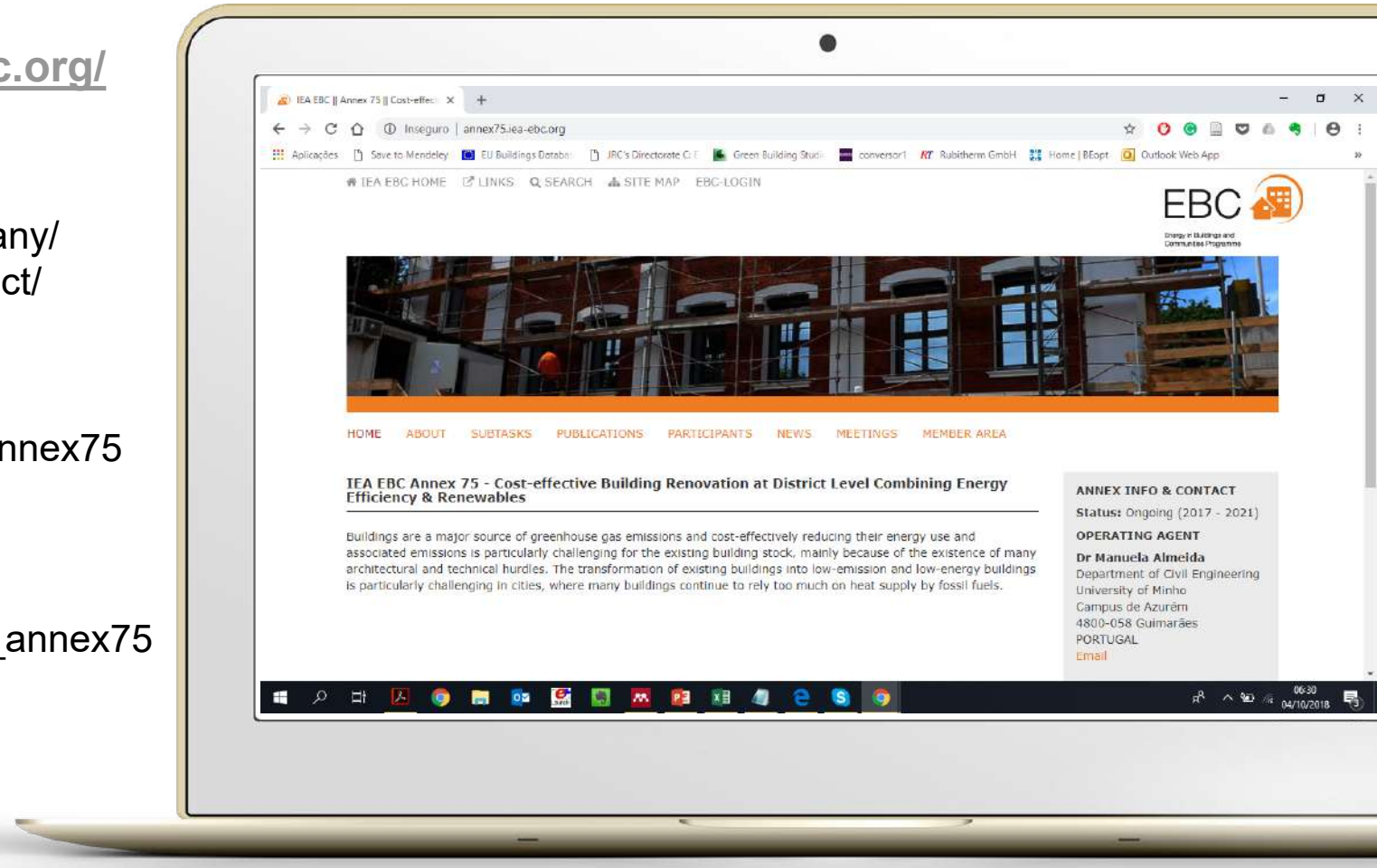
Dissemination

http://annex75.iea-ebc.org/

linkedin.com/company/
ebc-annex-75-project/

facebook.com/ebcannex75

twitter.com/iea_ebc_annex75



Thank you for your attention!

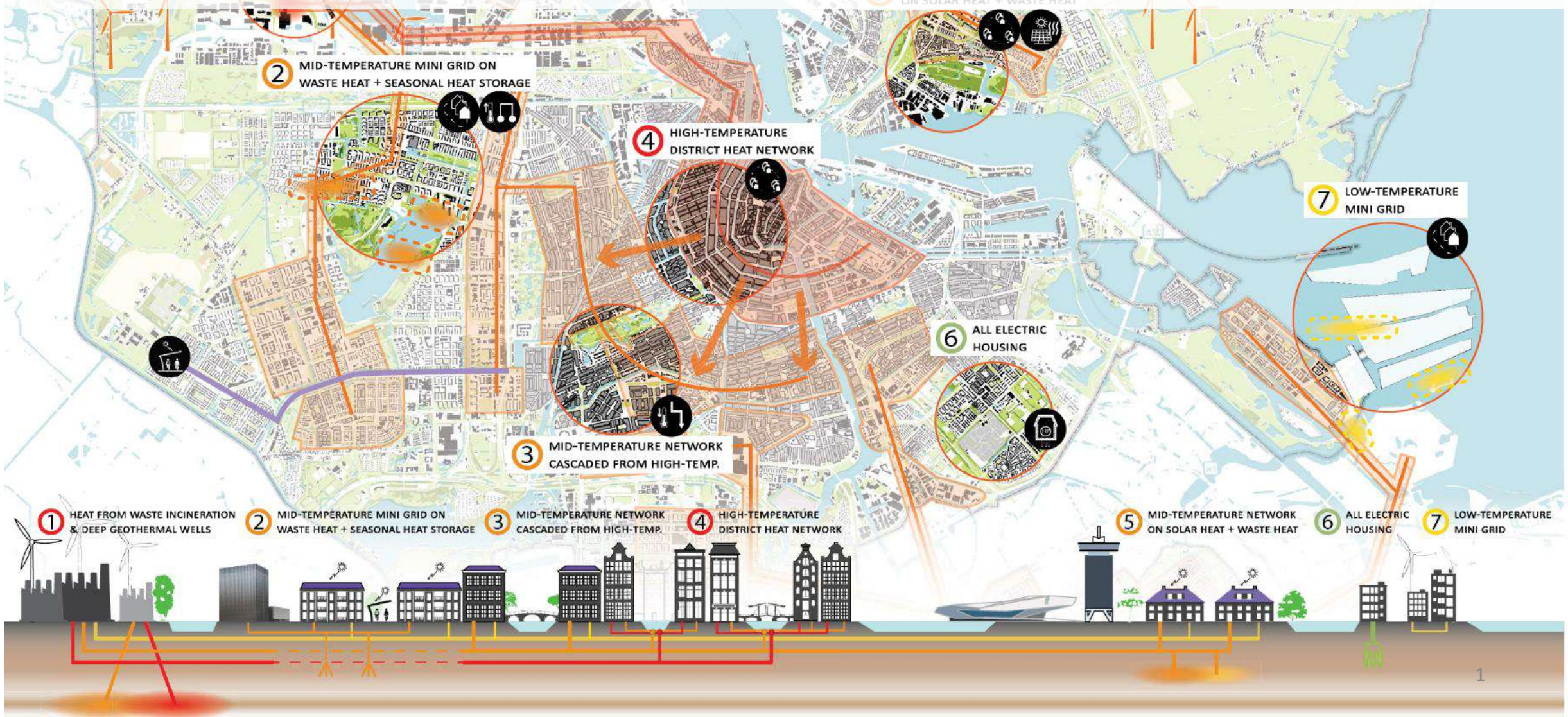
Manuela Almeida

malmeida@civil.uminho.pt

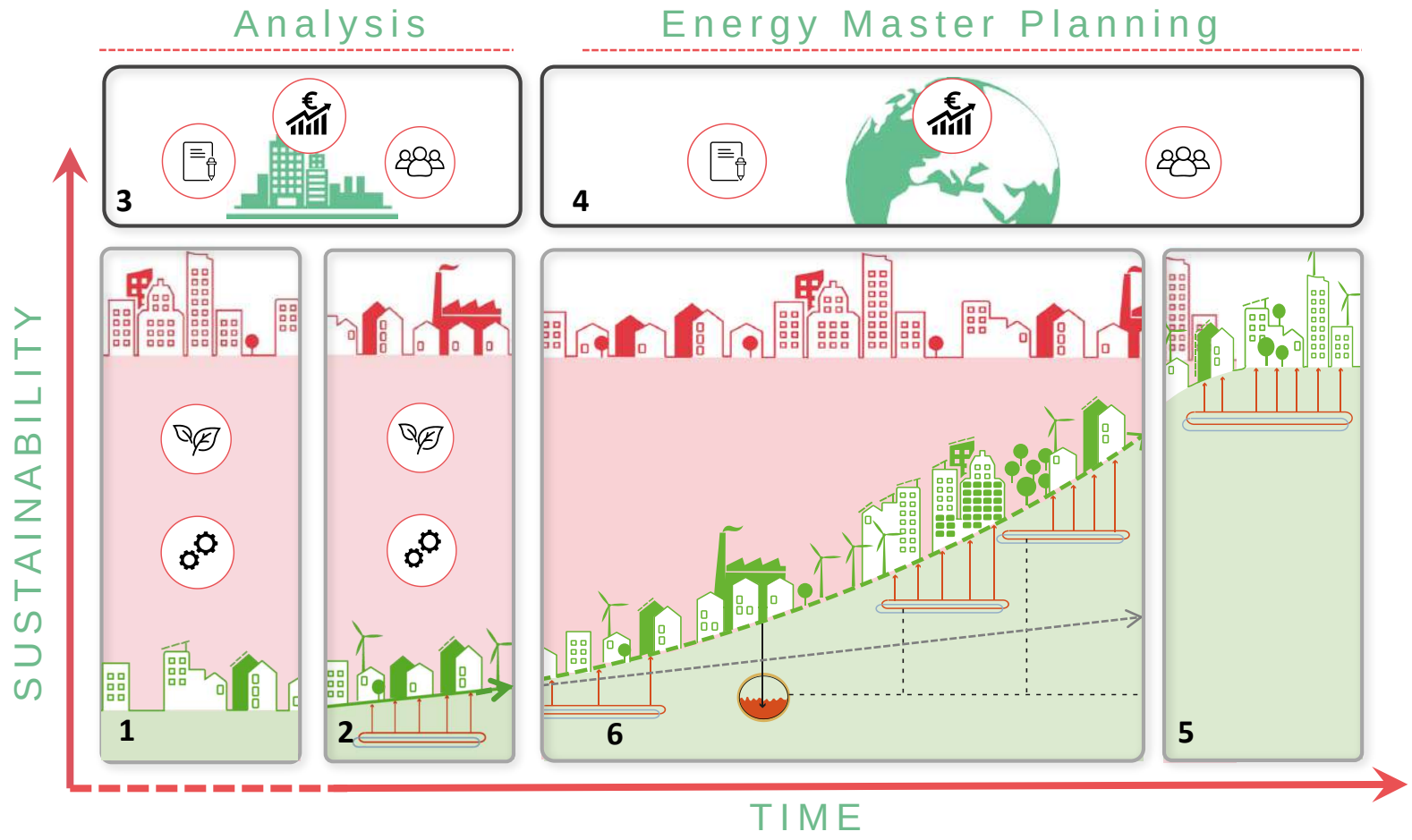
University of Minho, Civil Engineering Department, Portugal

HOW TO OPERATE AMSTERDAM ON CLEAN ENERGY?

Tess Blom - 25.09.19



THE CITY-ZEN APPROACH for urban energy transitions



Step 1: Energy Analysis (mapping the technical geographical present)

Step 2: Present planning and trend (mapping the near future for energy plans)

Step 3: Society & stakeholder analysis (mapping the political-legal-social-economic climate)

Step 4: Scenarios for the future (defining external influencing variables)

Step 5: Energy vision with targets and guiding principles (from book of inspiration & catalogue of measures)

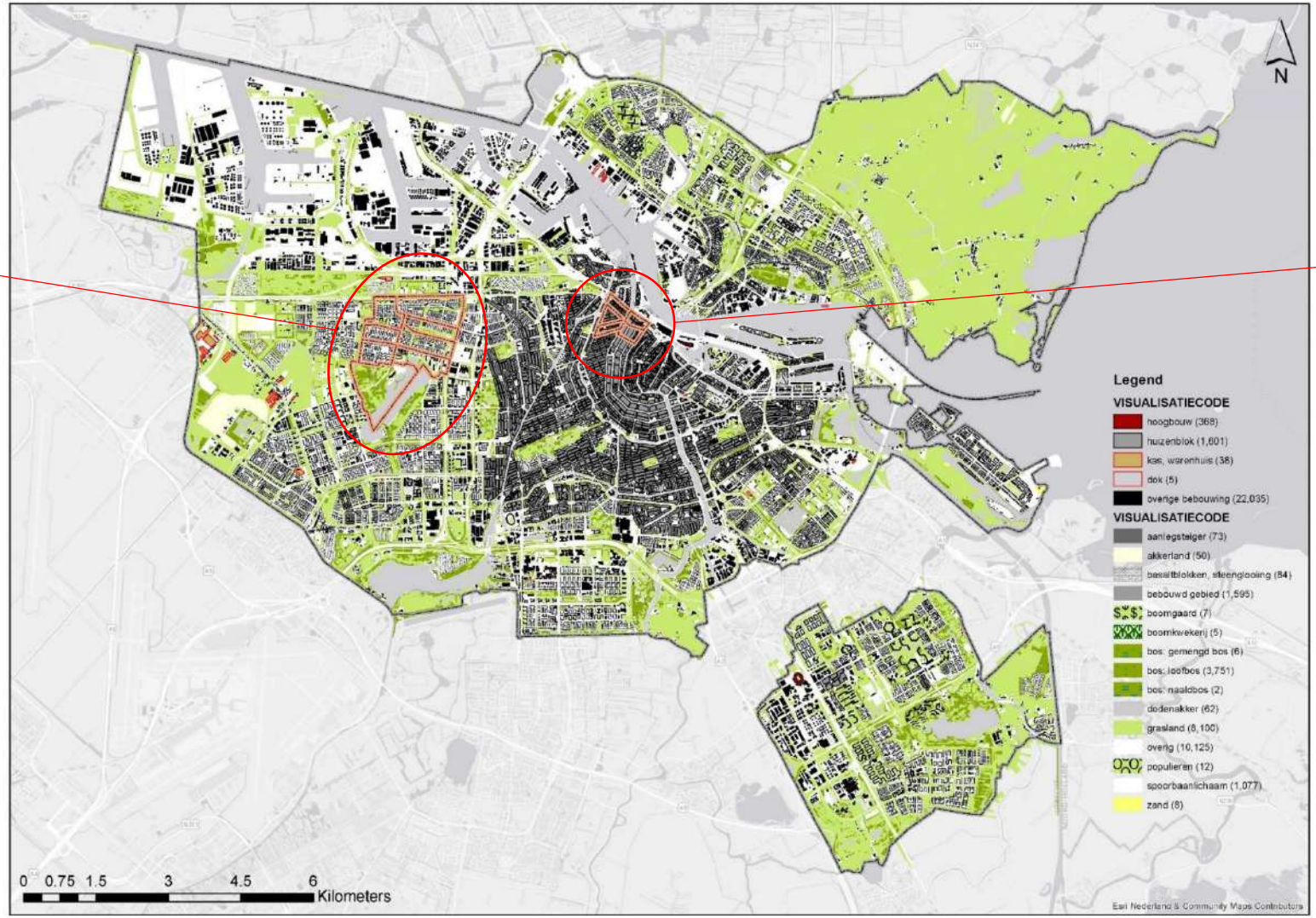
Step 6: Roadmap with energy strategies and actions (by means of the Catalogue of Measures)

CITY-zen
New urban energy

ENERGY TRANSITION ROADMAP AMSTERDAM

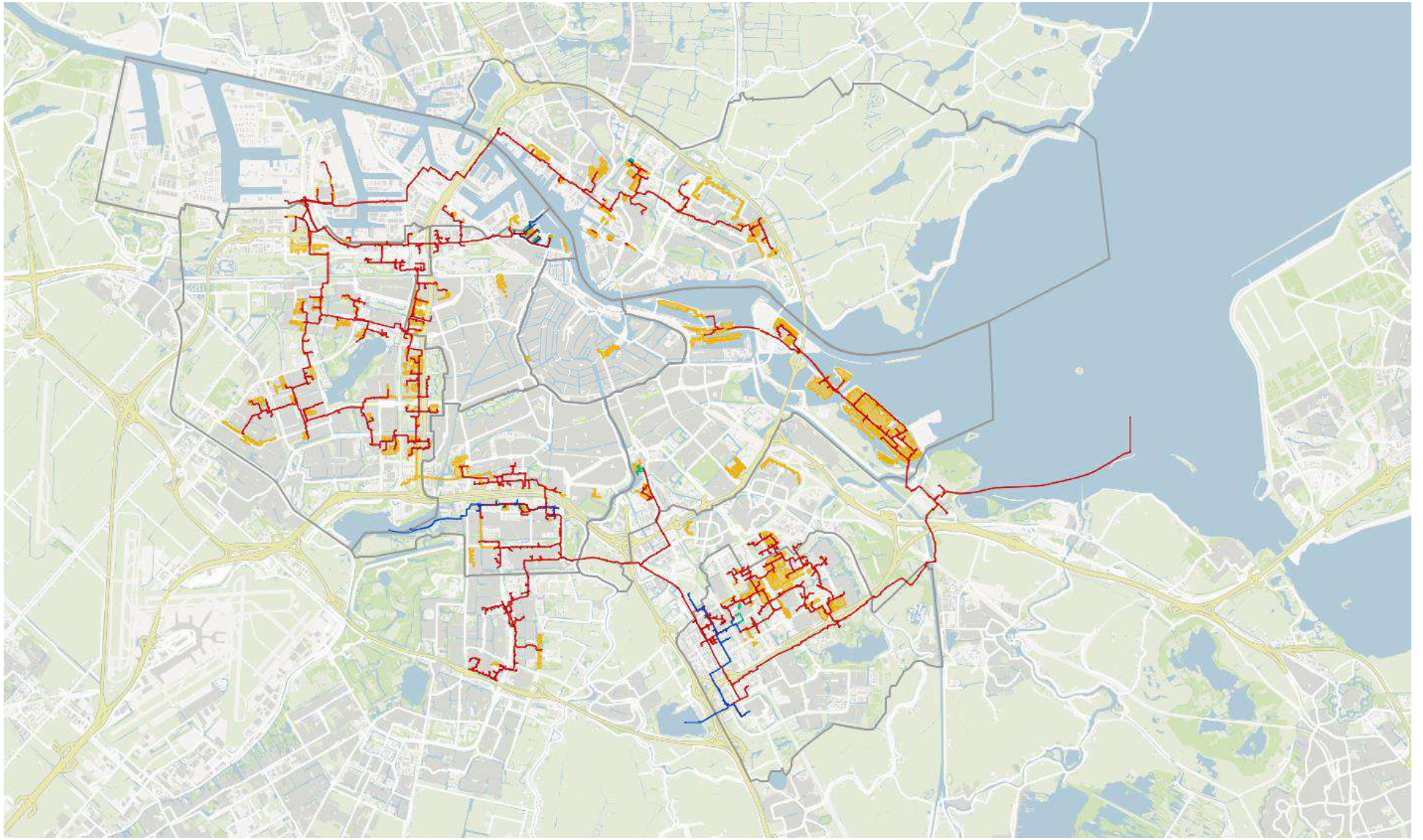
Gemeente Amsterdam + 2 voorbeeld wijken

Slotermeer



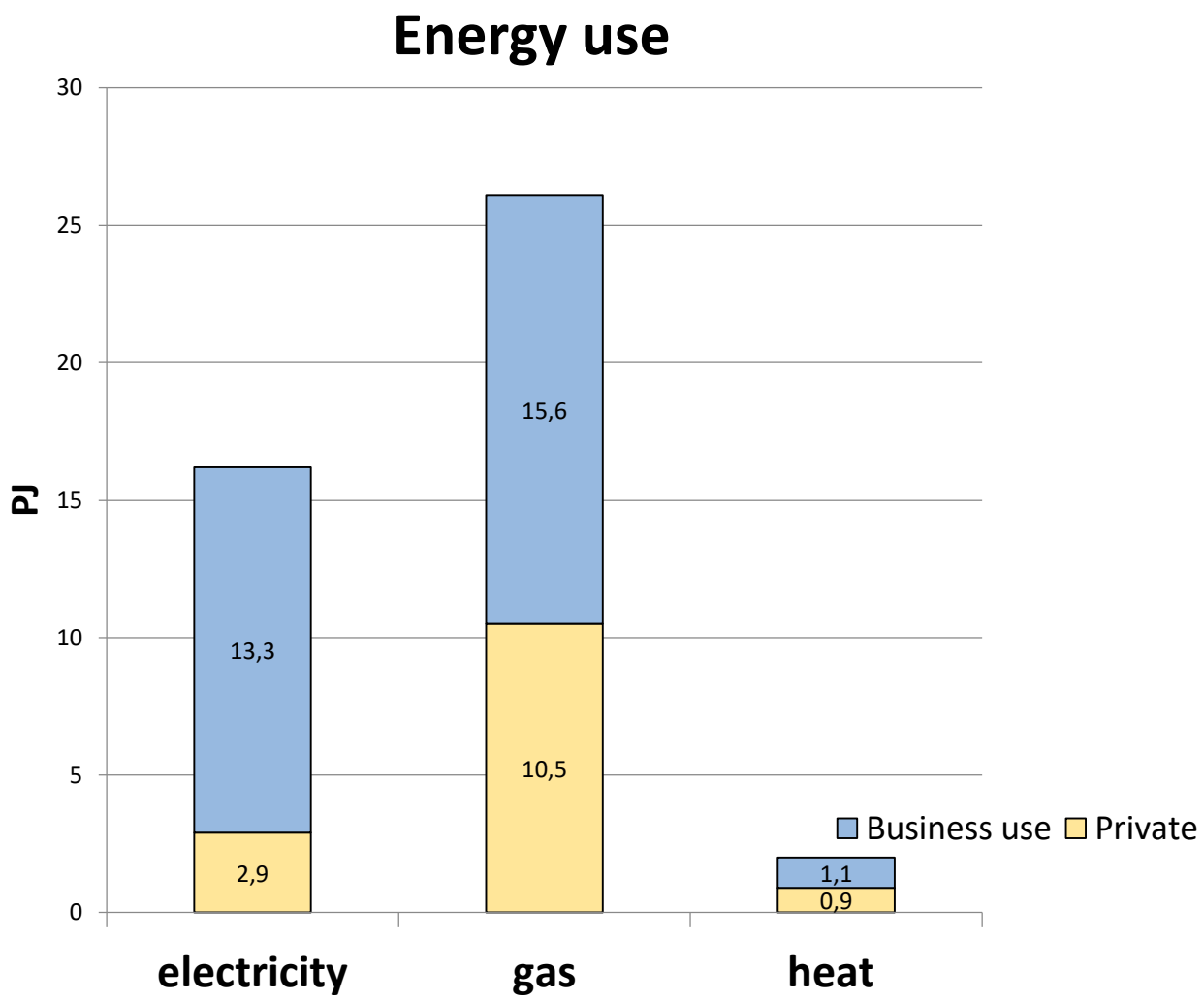
Brouwerskruis (city Centre)

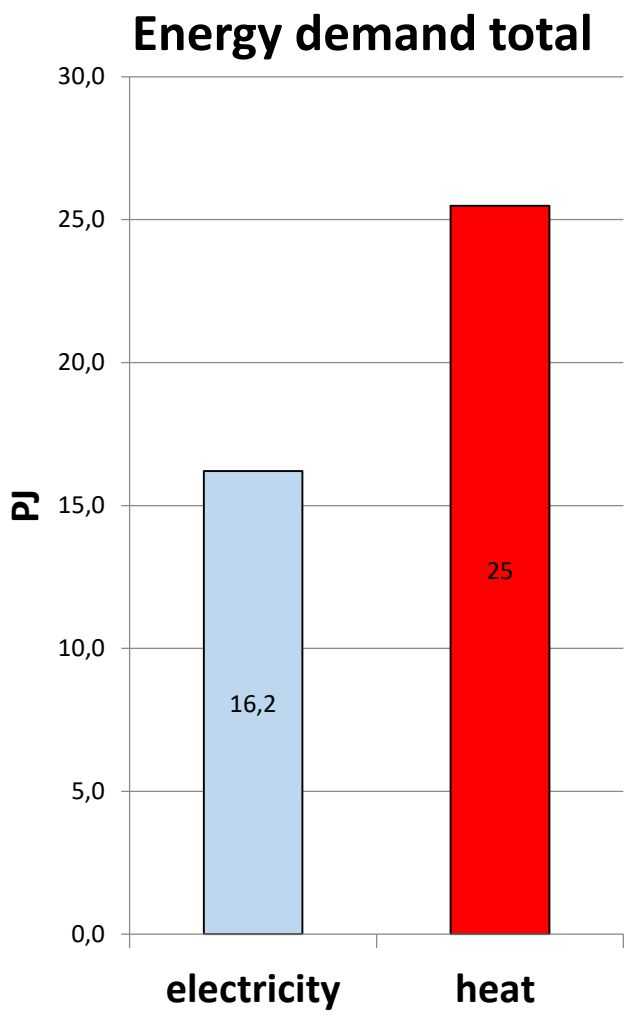
CURRENT DHN



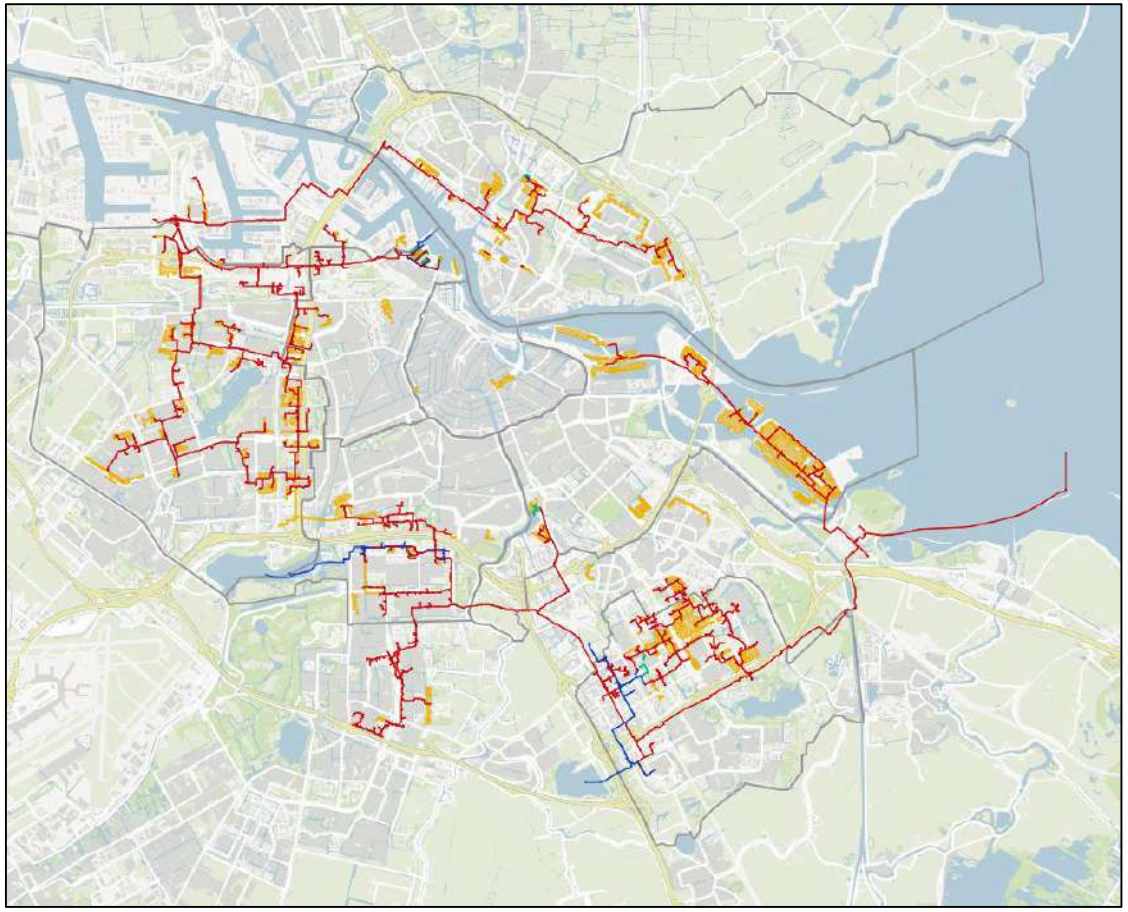
[City of Amsterdam, 2017]

ENERGY DEMAND AND ENERGY USE

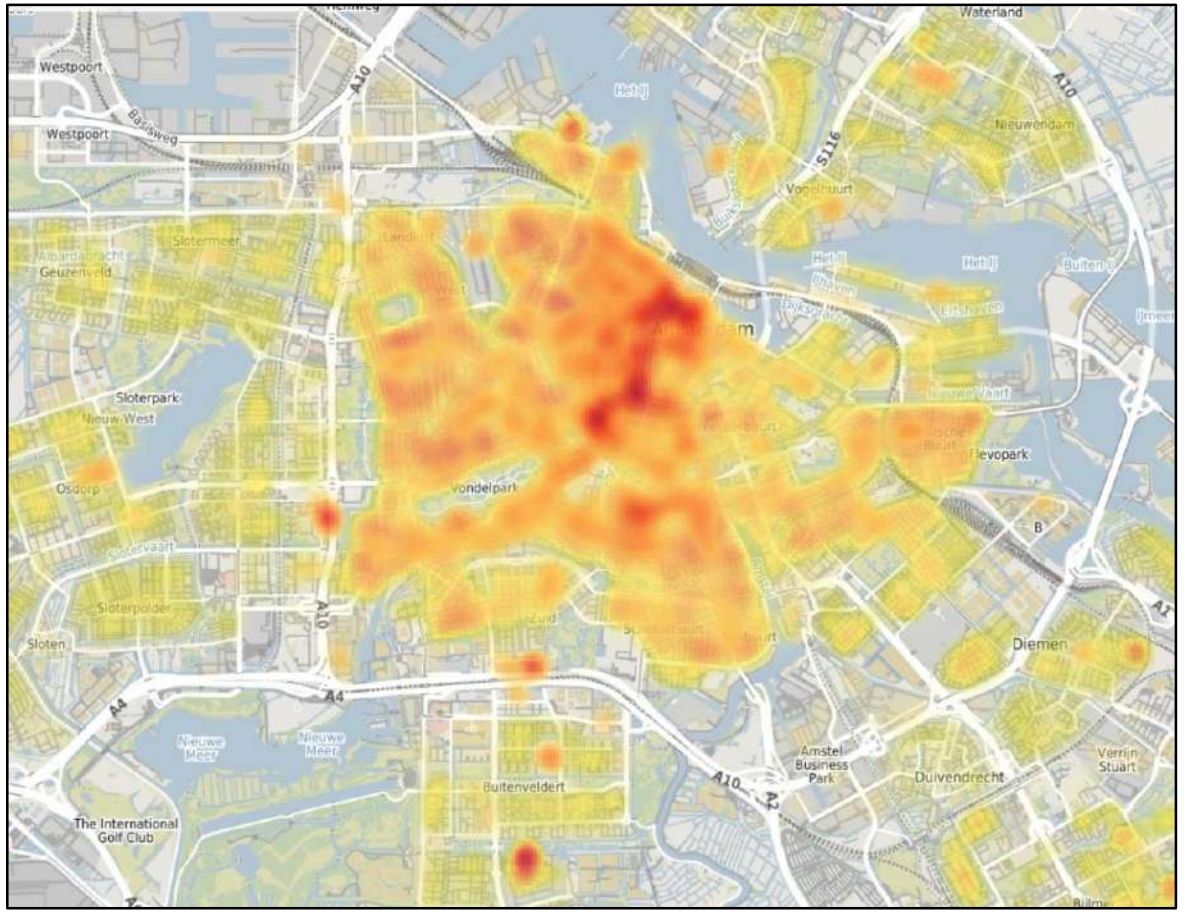




ENERGY DEMAND AND ENERGY USE



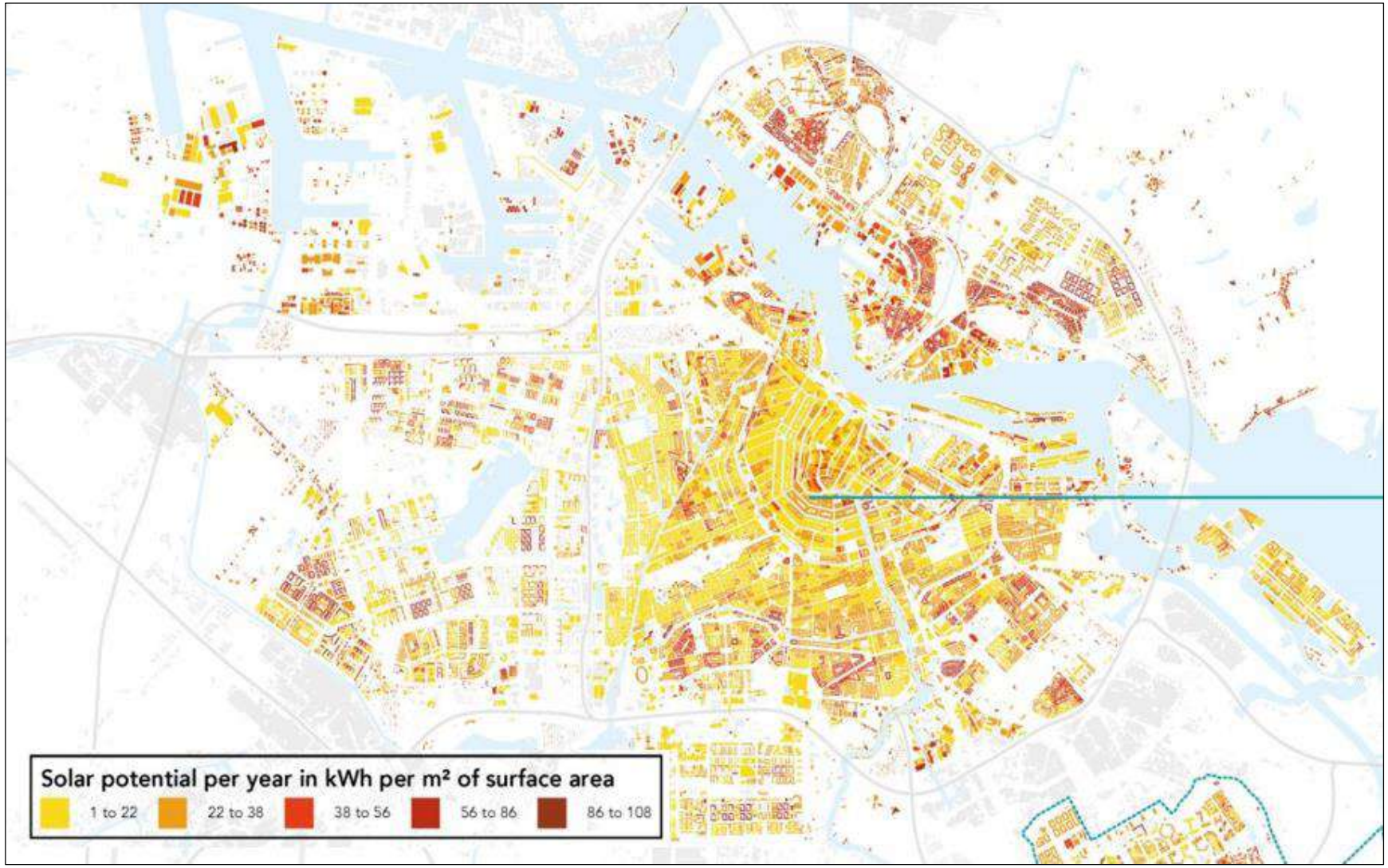
[City of Amsterdam, 2017]



[www.pico.geodan.nl]

ENERGY POTENTIAL MAPPING

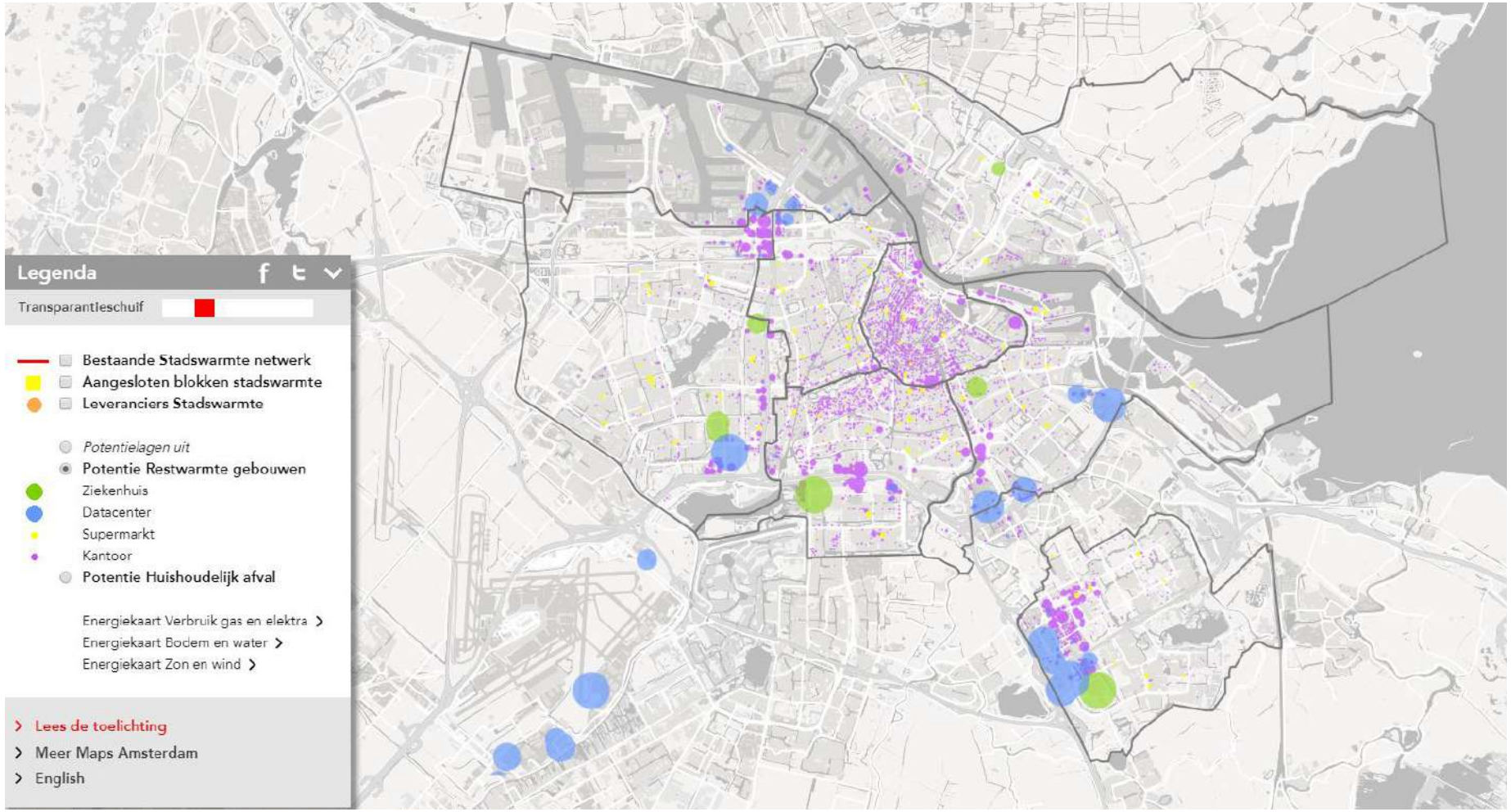
electricity potential ROOFS (PV)



[Boogert, et al., 2014]

ENERGY POTENTIAL MAPPING

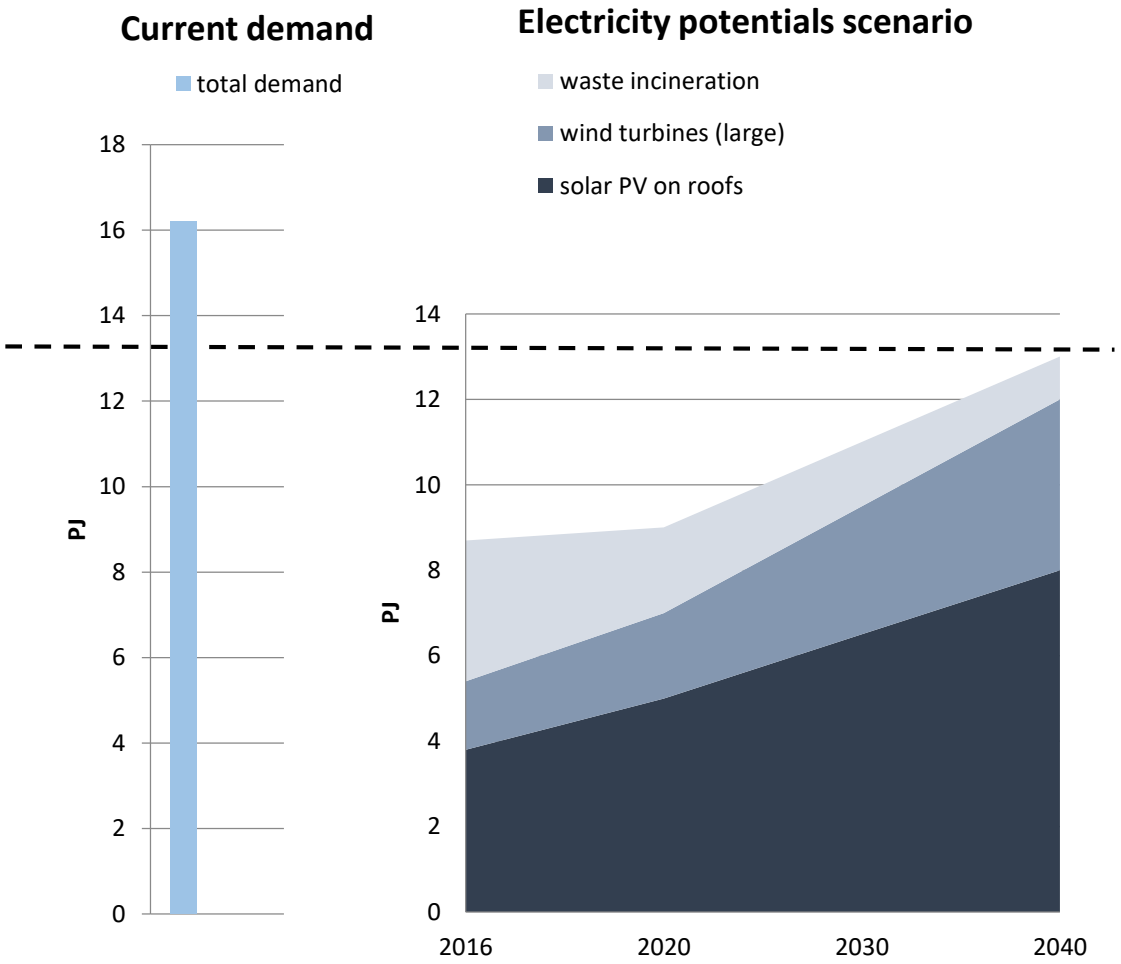
waste heat from buildings: datacenters, hospitals etc.



[City of Amsterdam, 2018]

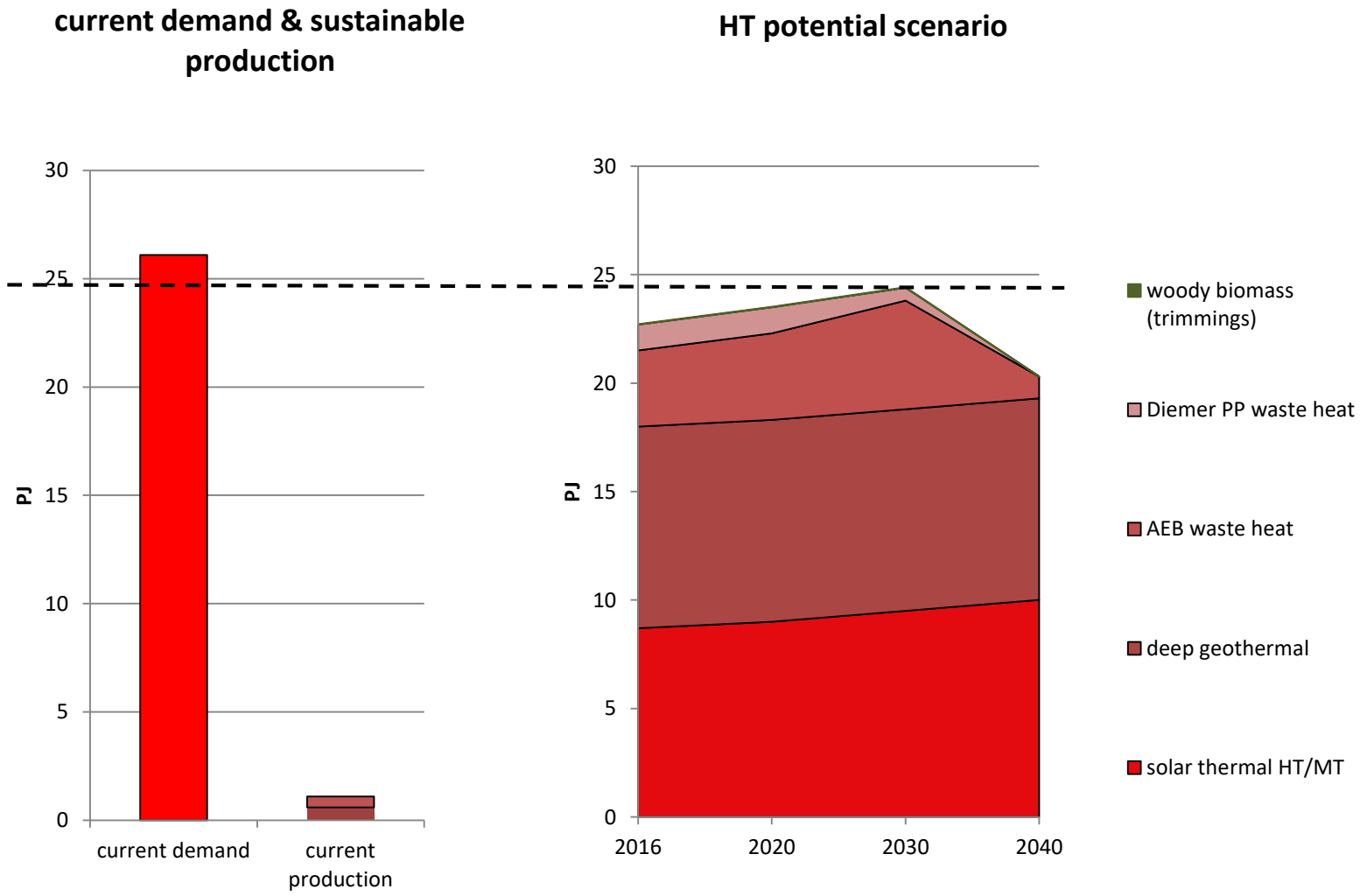
ENERGY POTENTIAL MAPPING

sustainable electricity



ENERGY POTENTIAL MAPPING

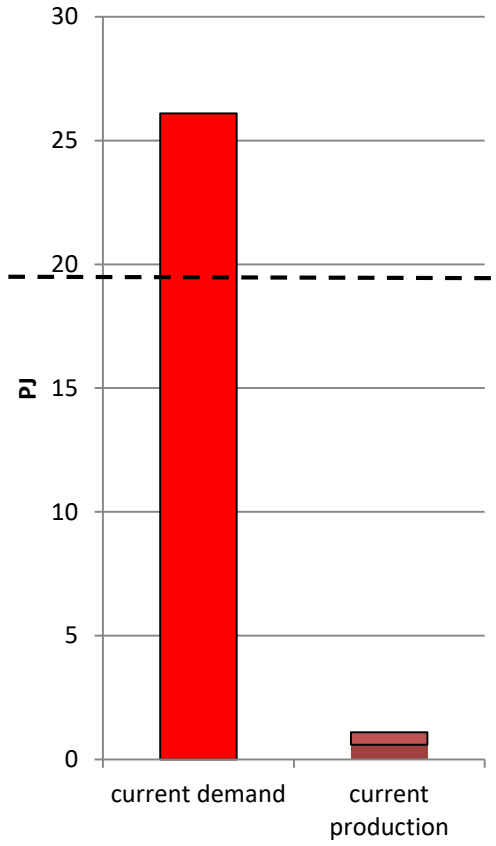
sustainable high temperature heat (>70°C)



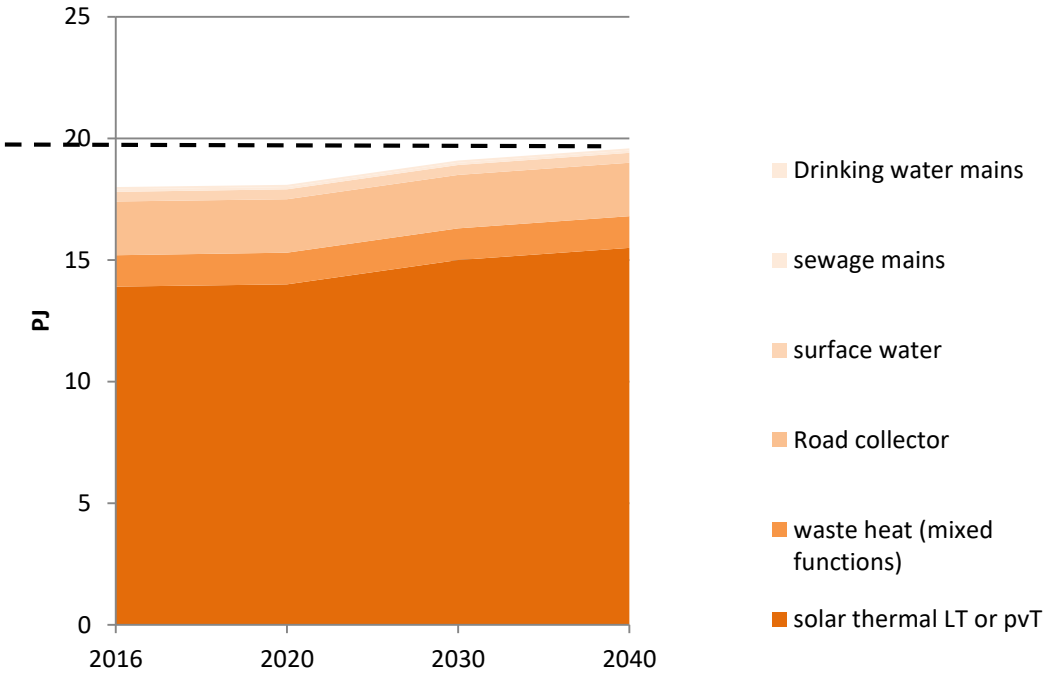
ENERGY POTENTIAL MAPPING

sustainable low temperature heat (<40°C)

current demand & sustainable production



Low & mid-temperature potentials



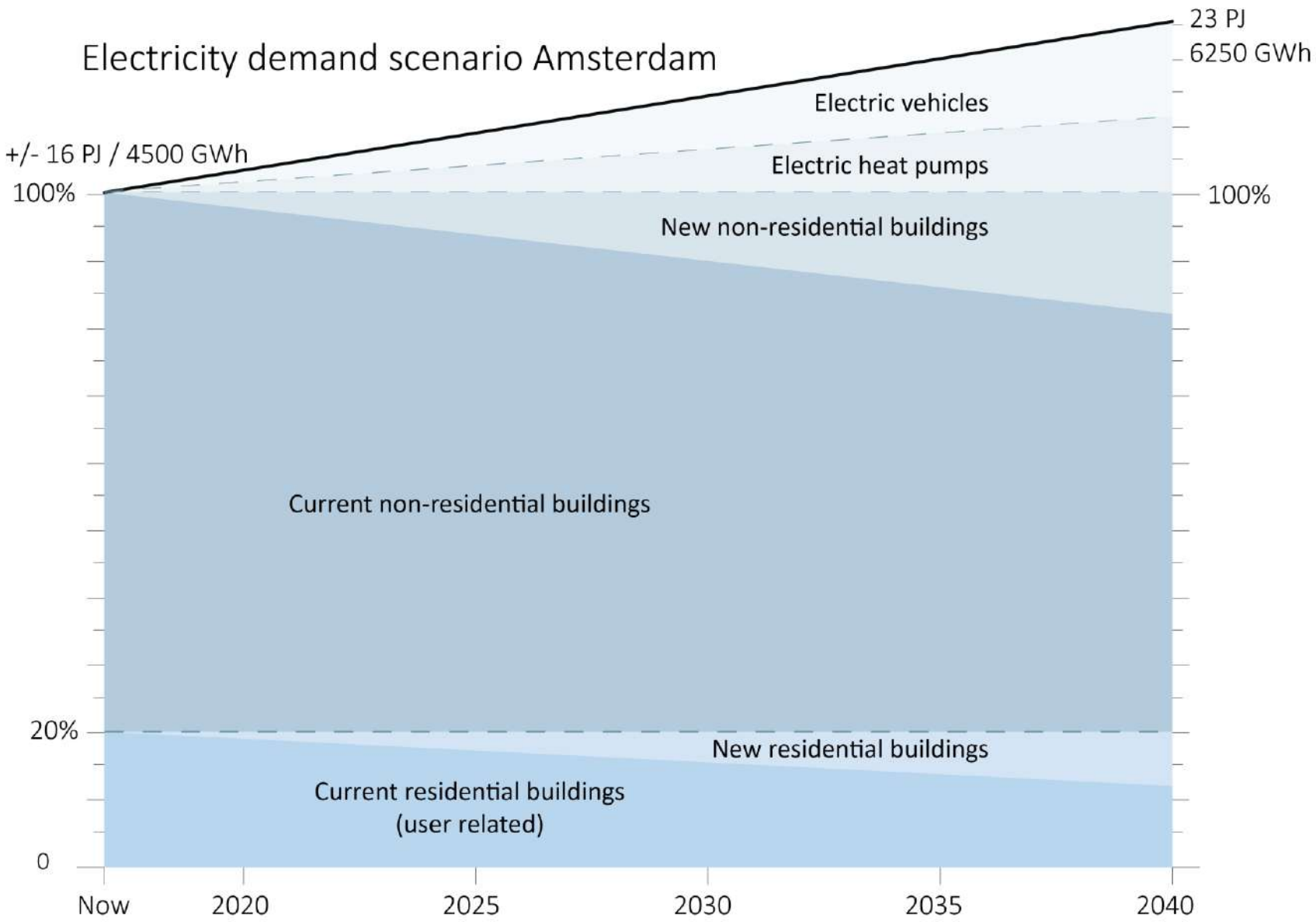
LIMITATIONS & CONCLUSIONS

- Not enough potential for **sustainable electricity** → reduce demands
- **Waste combustion** not sustainable, circulair economy → limited potential
- **Deep geothermal** can only replace natural gas and waste partially
- There is **too little biogas** potential to replace natural gas completely

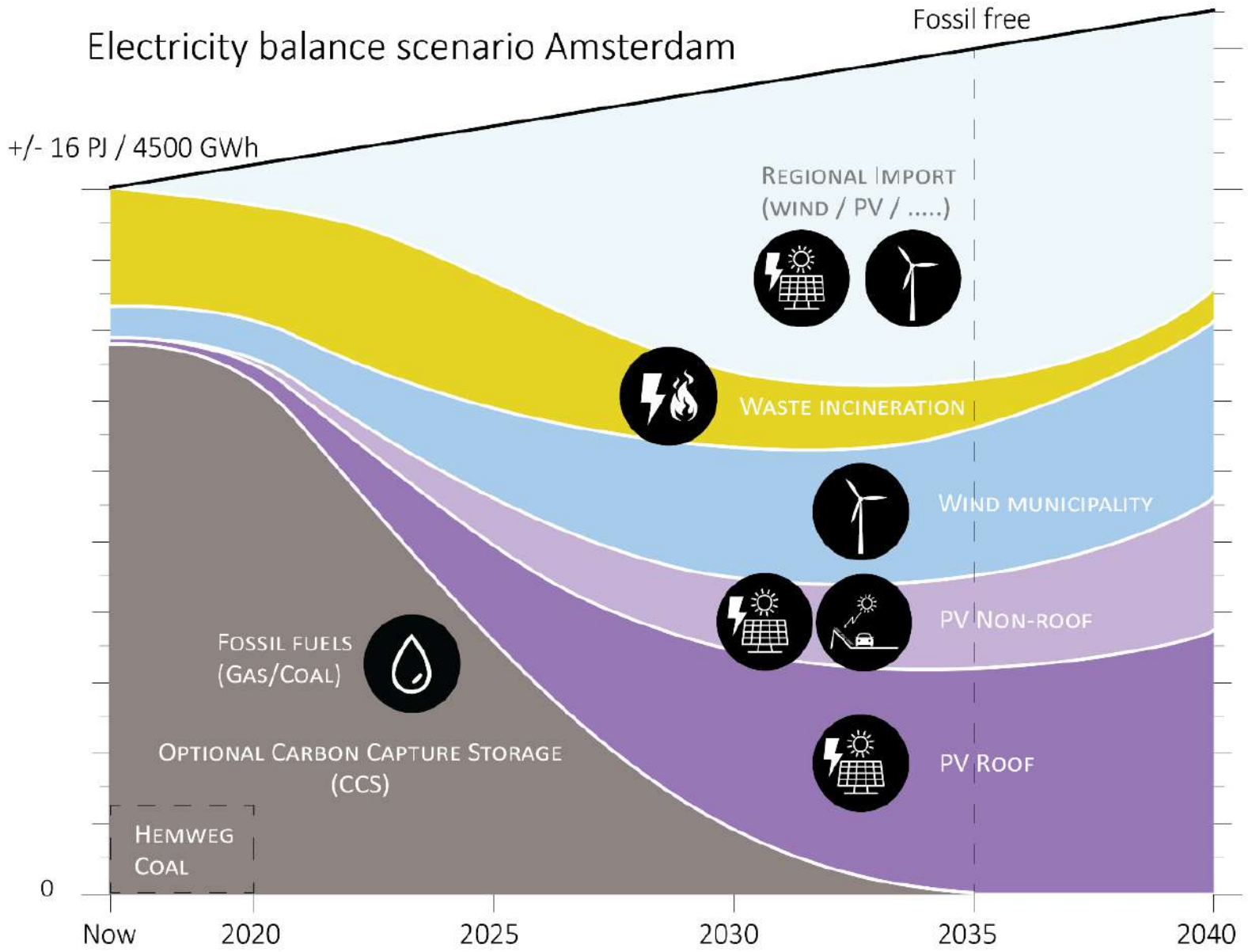
→ Only use high temperature sources, where low temperature is no option

→ All new buildings energy neutral

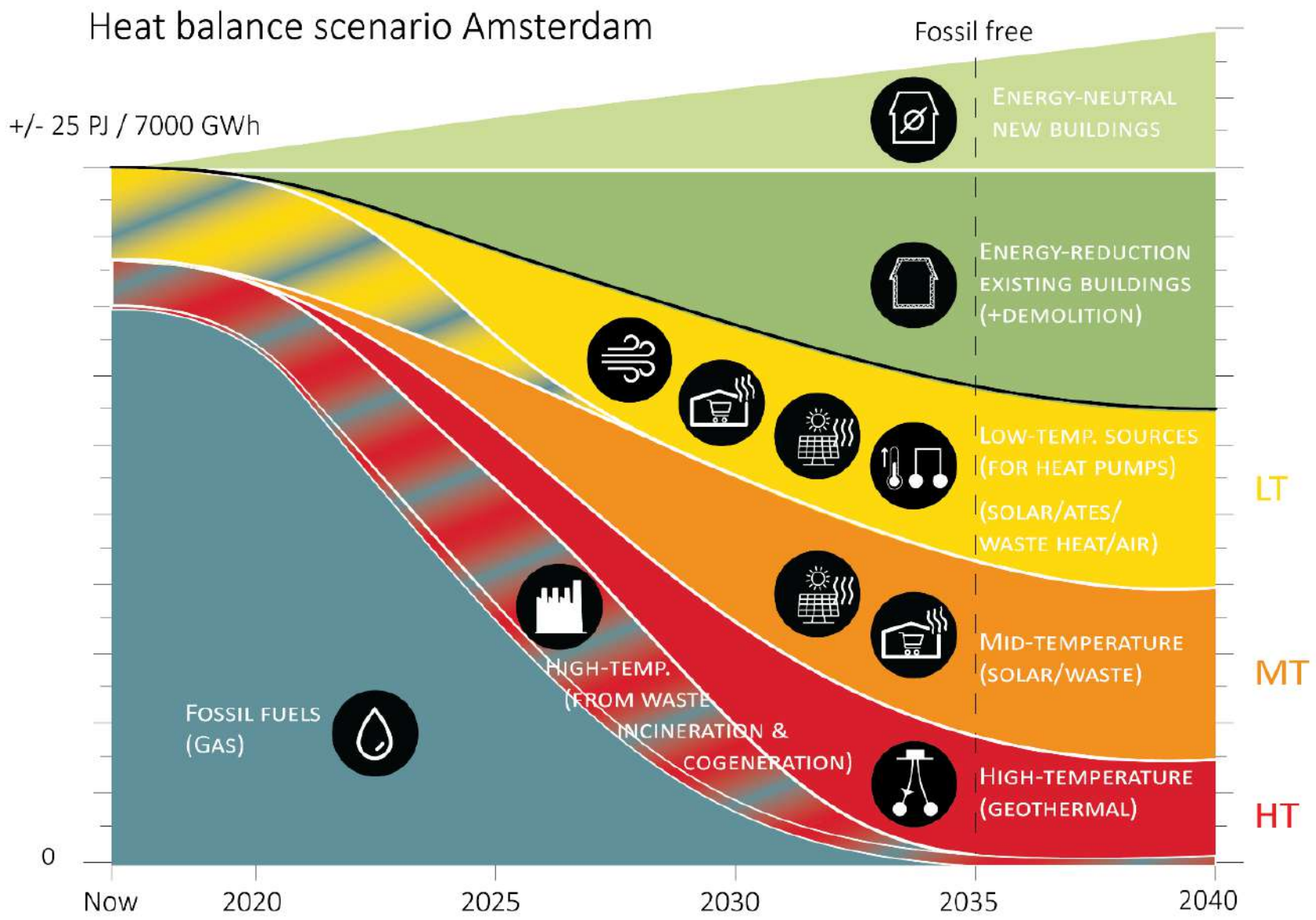
ELECTRICITY DEMAND-SCENARIO AMSTERDAM



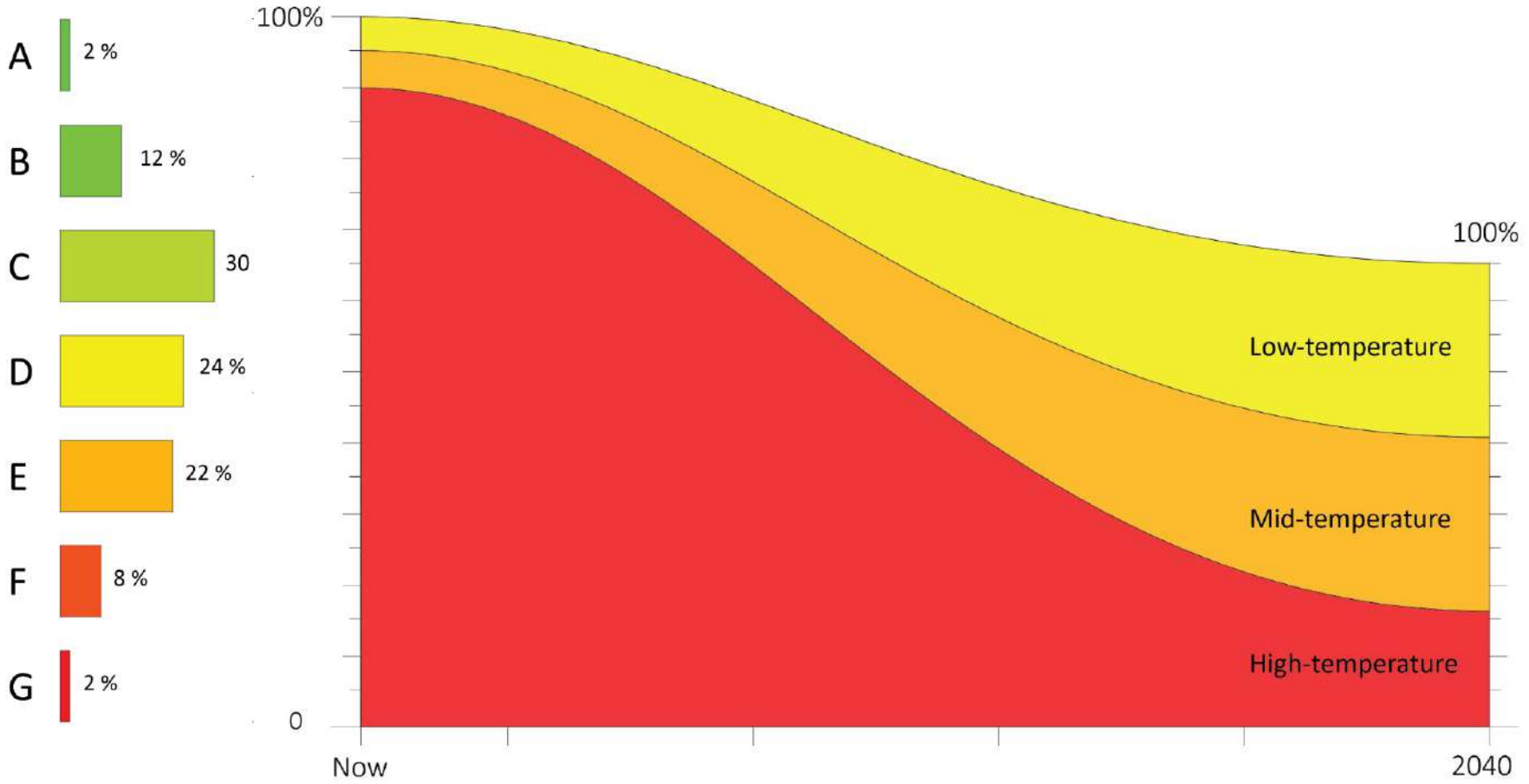
ELECTRICITY BALANCE SCENARIO AMSTERDAM



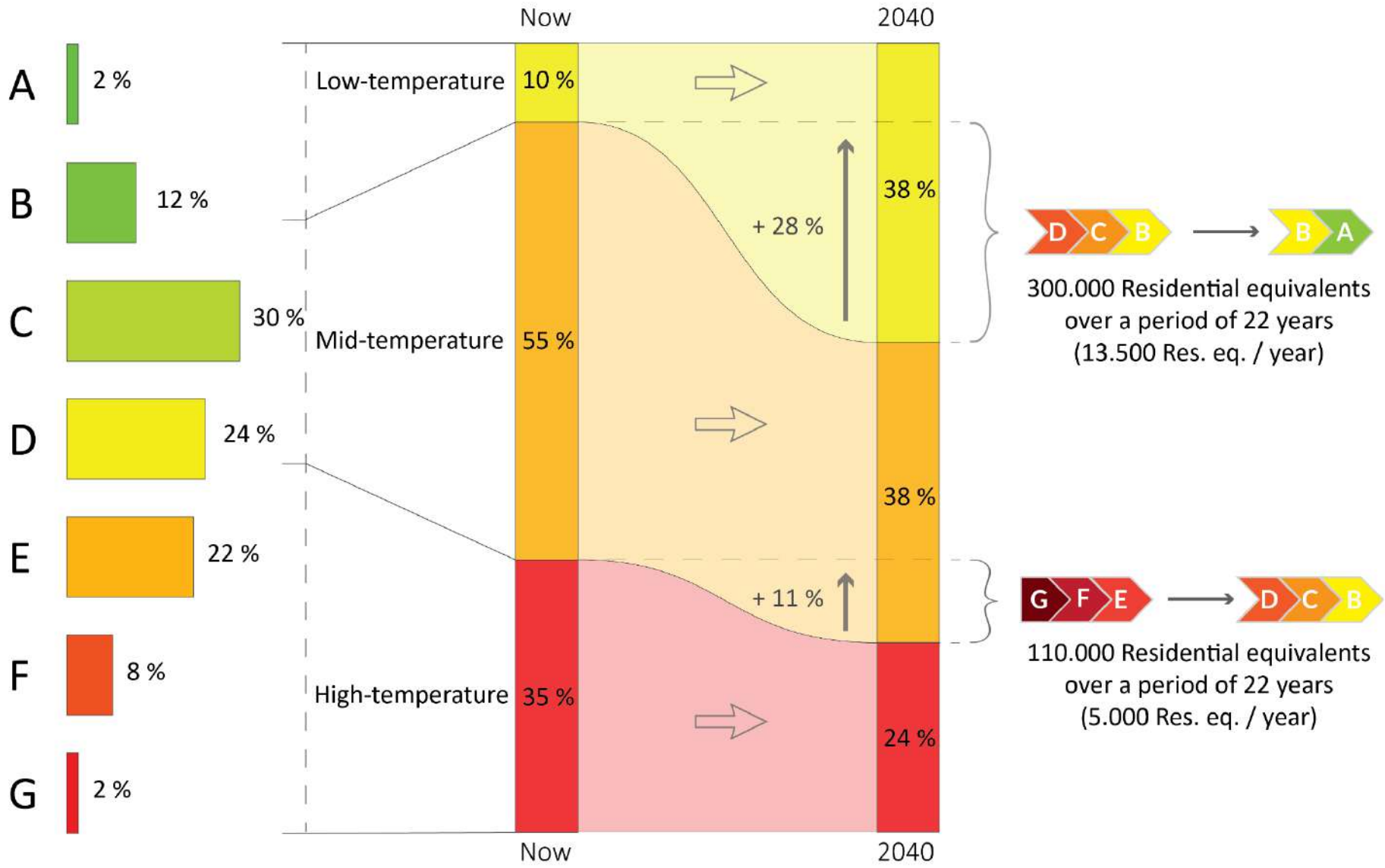
HEAT BALANCE-SCENARIO AMSTERDAM



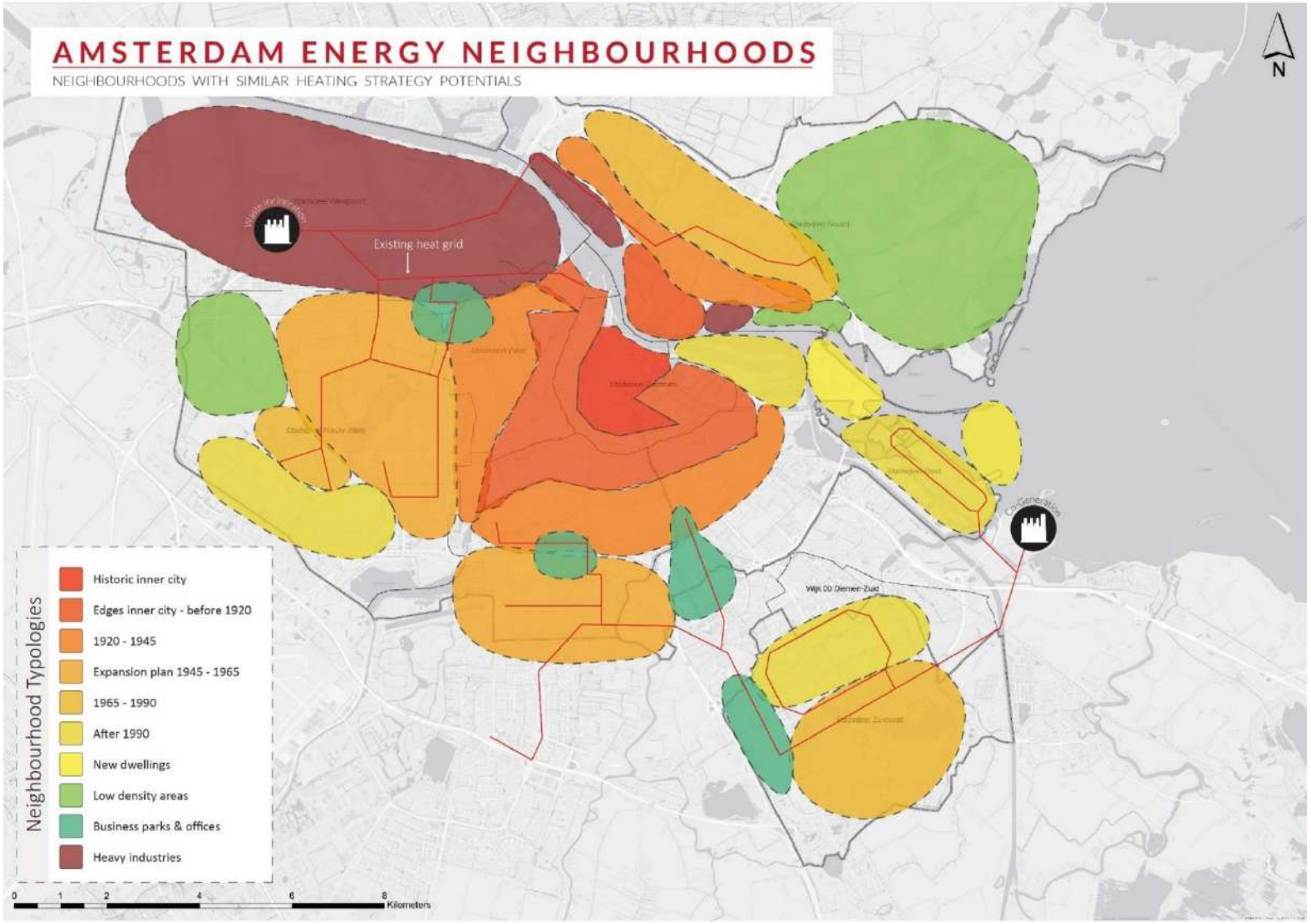
% HEATING TEMPERATURE LEVELS



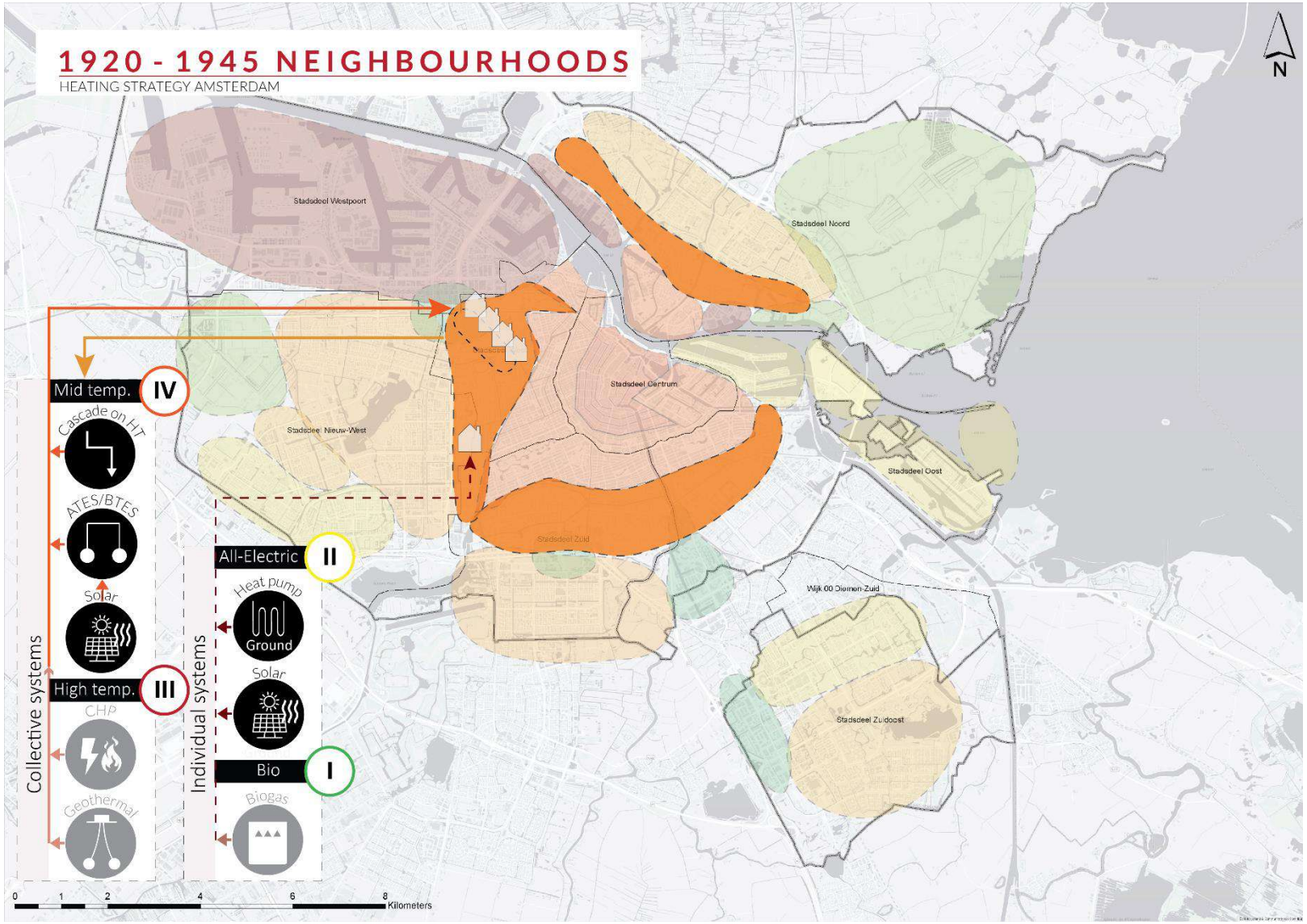
SHIFT IN ENERGY LABELS AND TEMPERATURE LEVELS



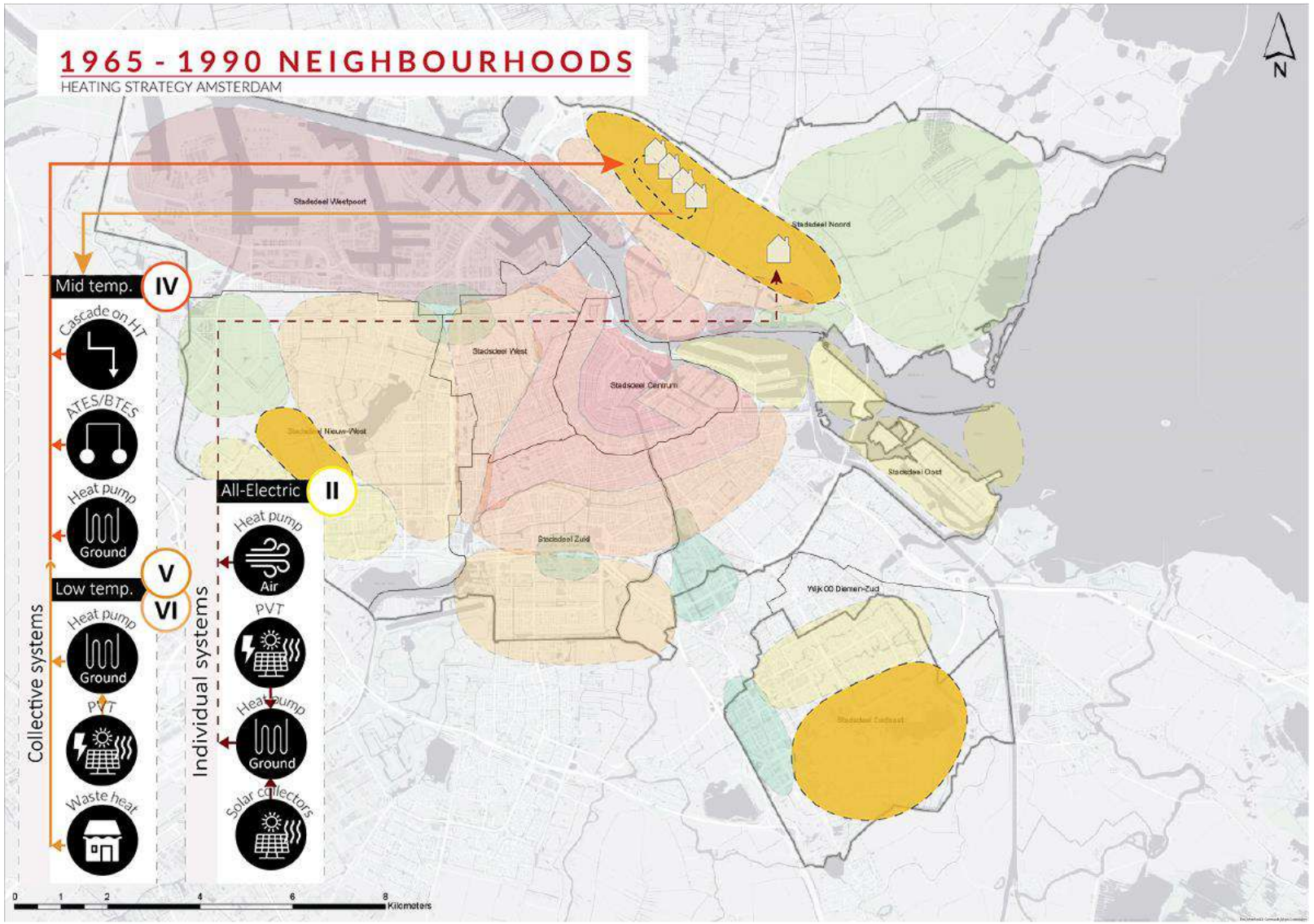
TYPOLOGIES NEIGHBOURHOODS



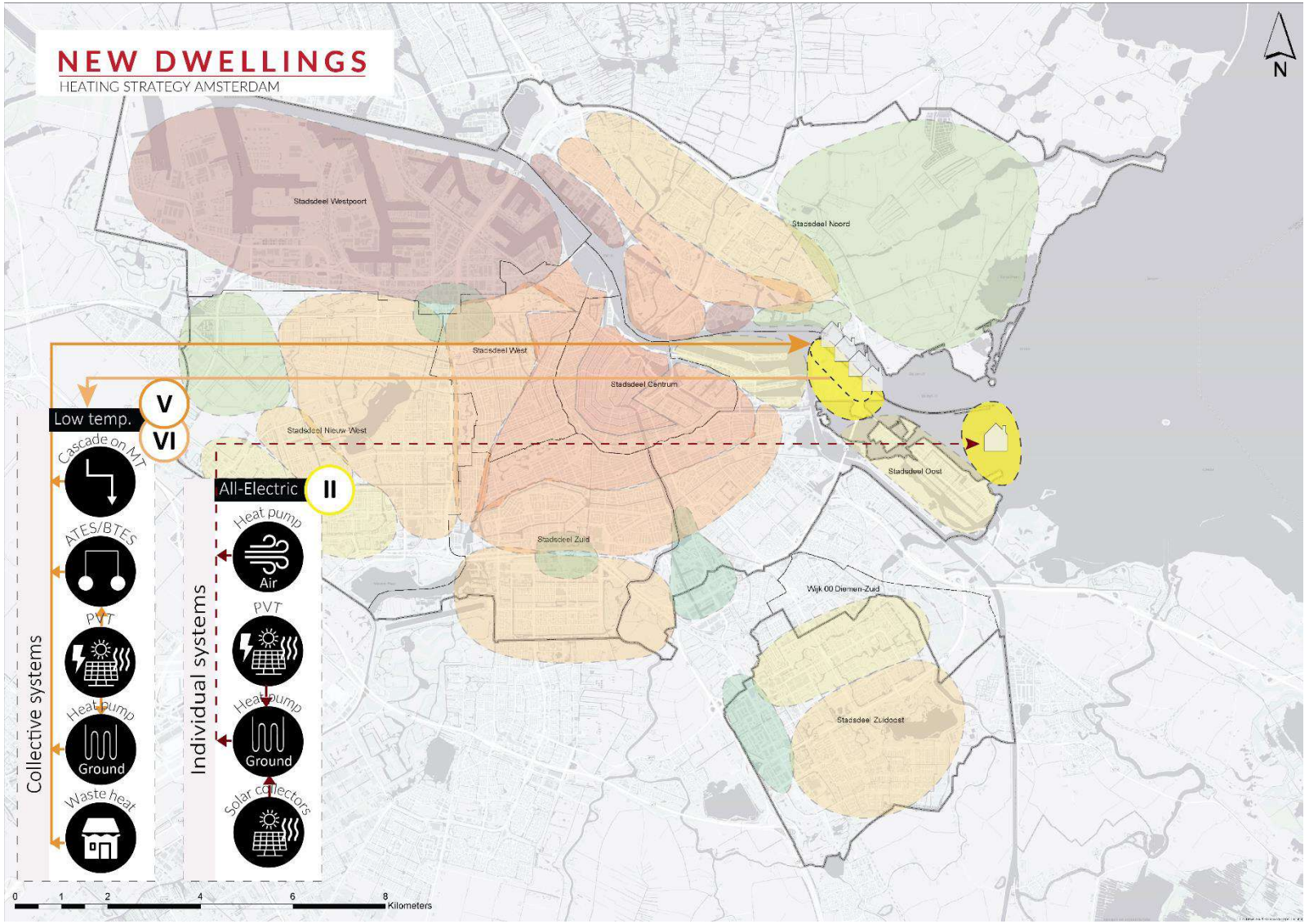
TYPOLOGIES NEIGHBOURHOODS



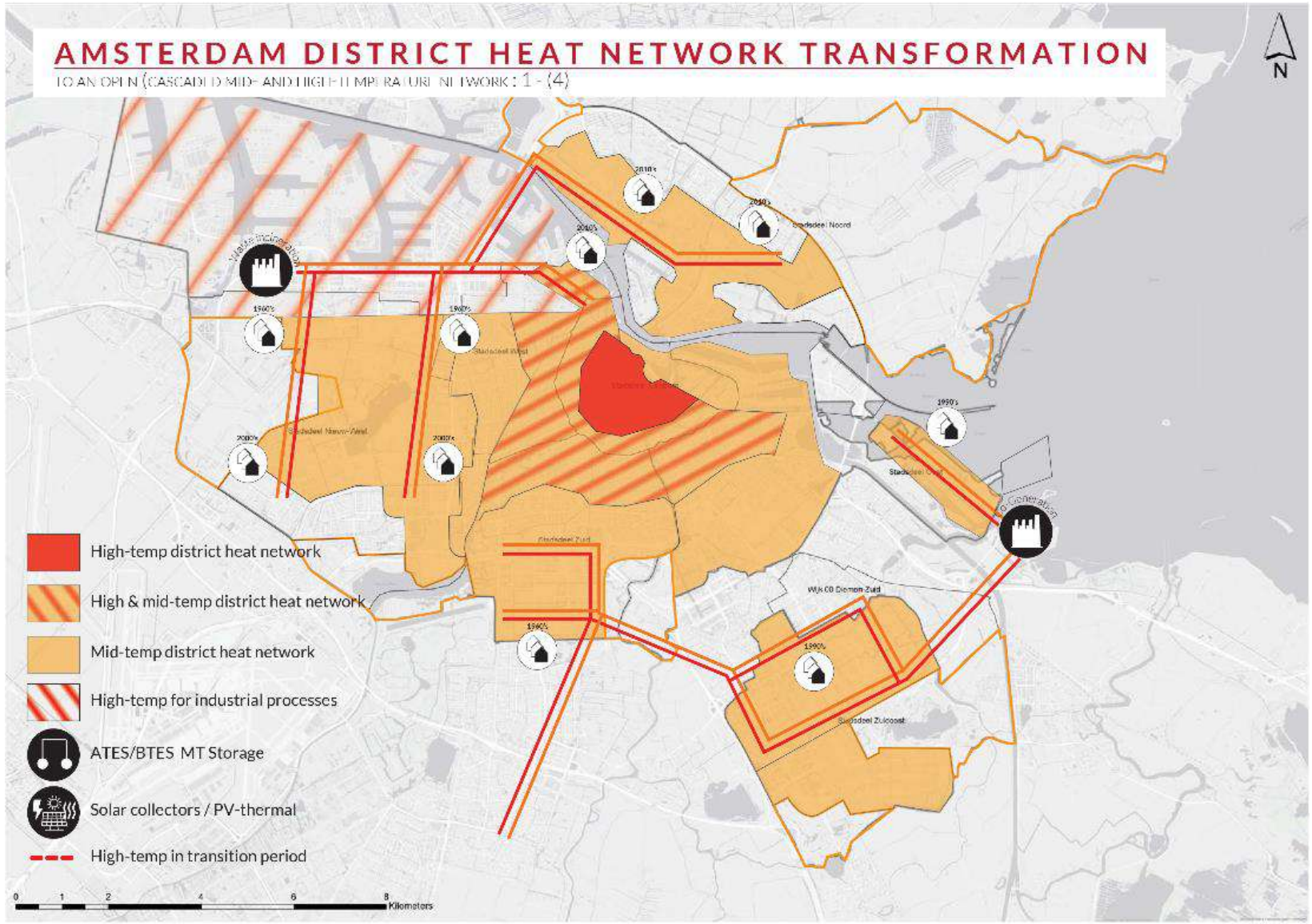
TYPOLOGIES NEIGHBOURHOODS



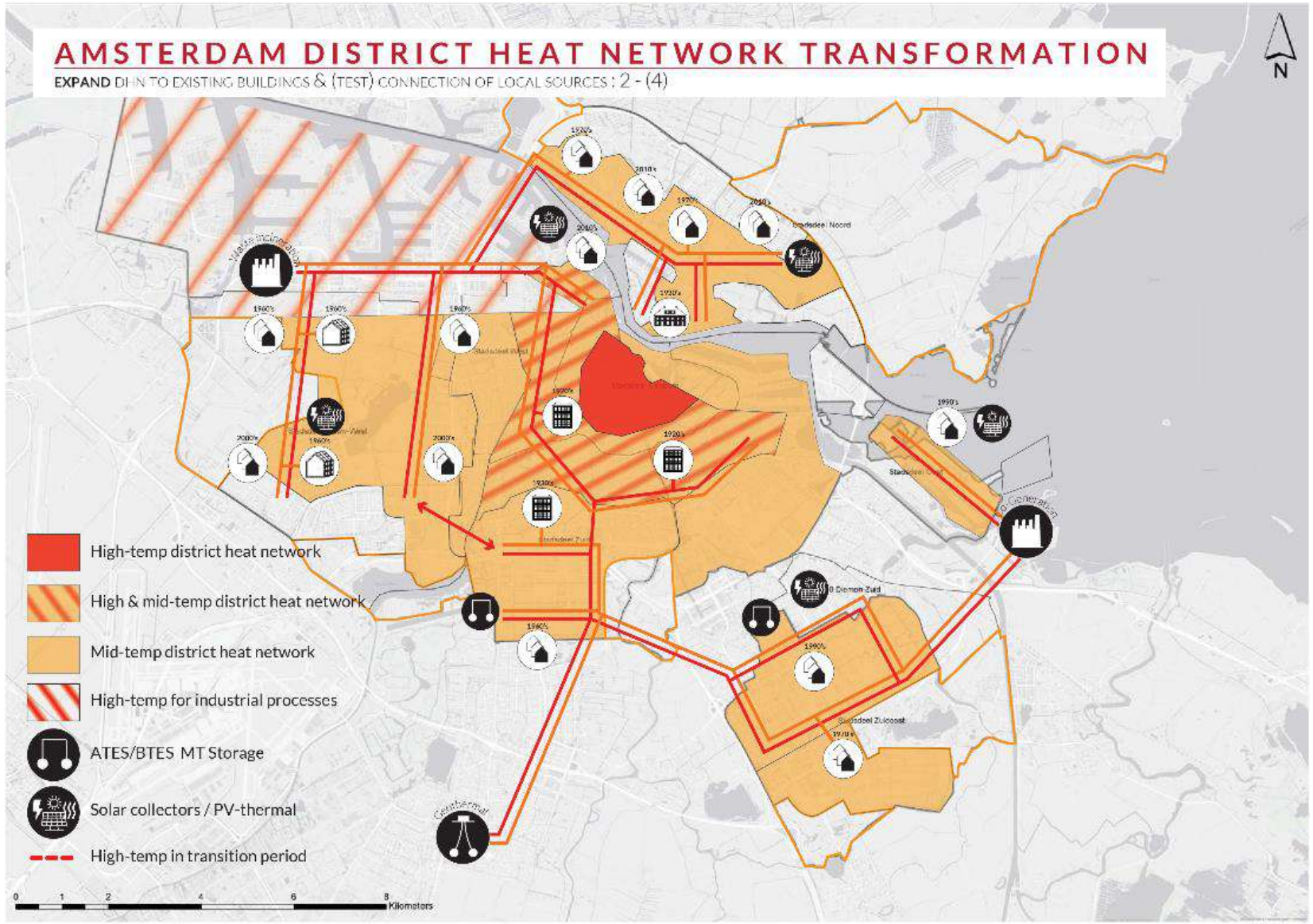
TYPOLOGIES NEIGHBOURHOODS



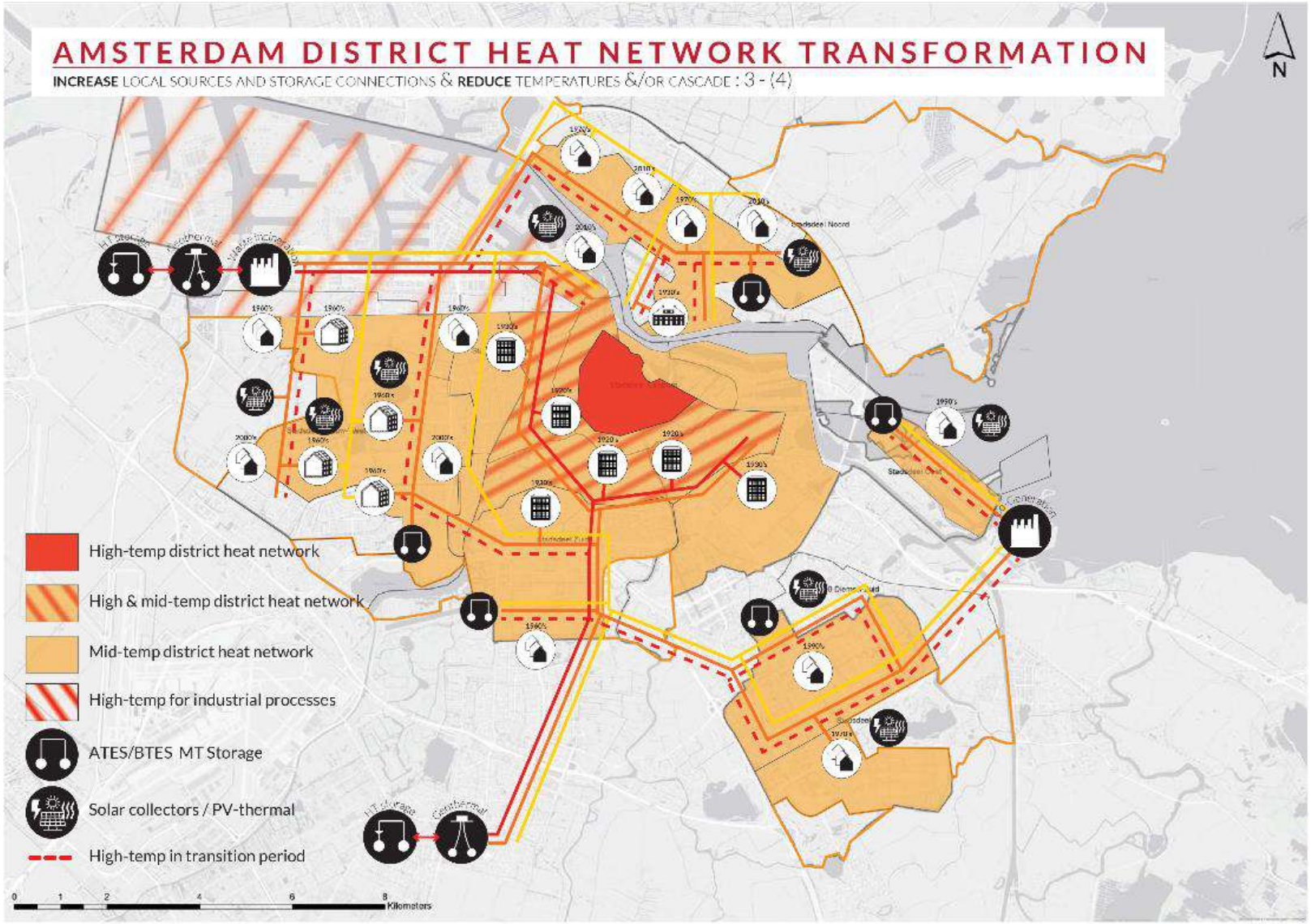
TRANSFORMATION DHN



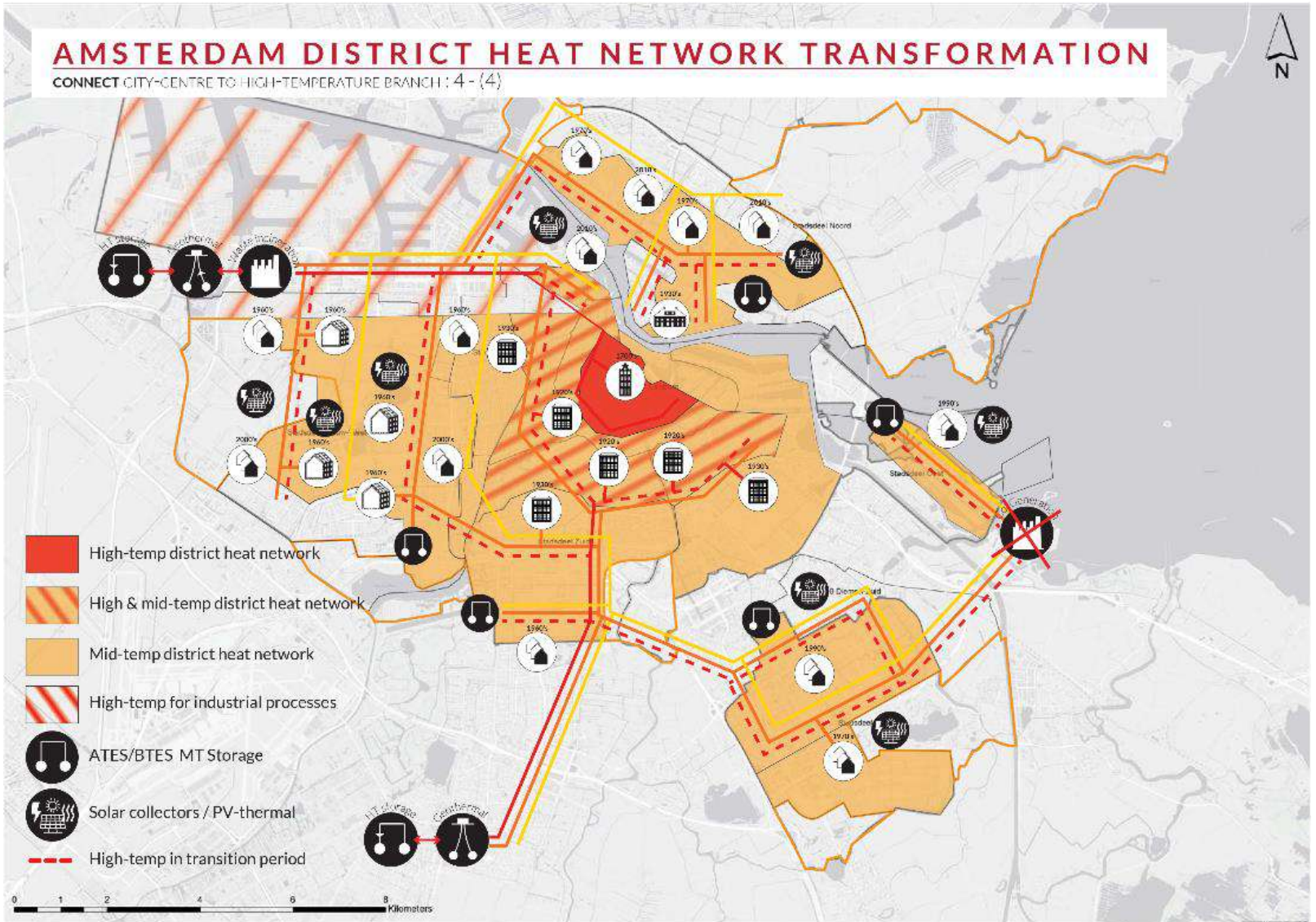
TRANSFORMATION DHN



TRANSFORMATION DHN

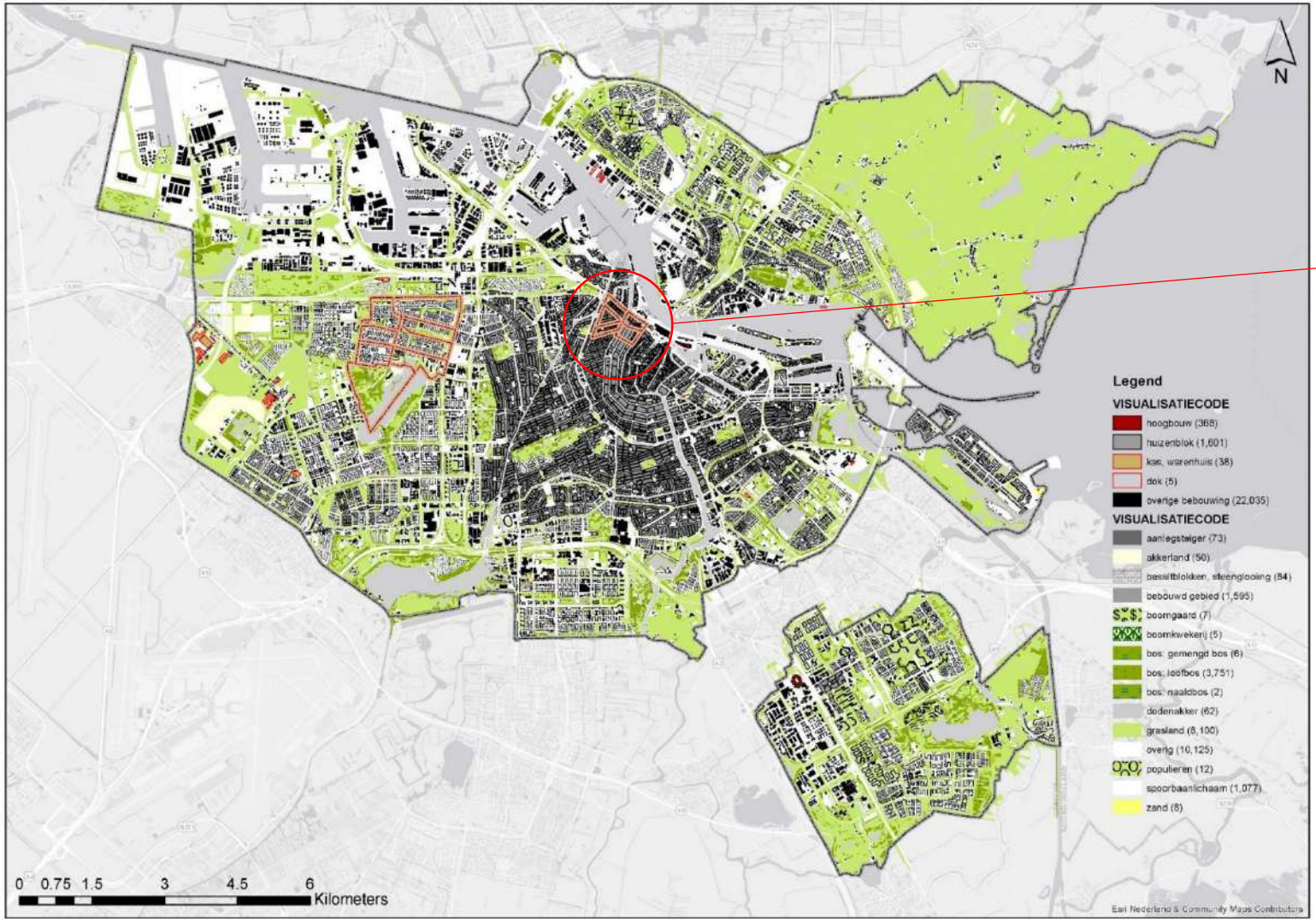


TRANSFORMATION DHN



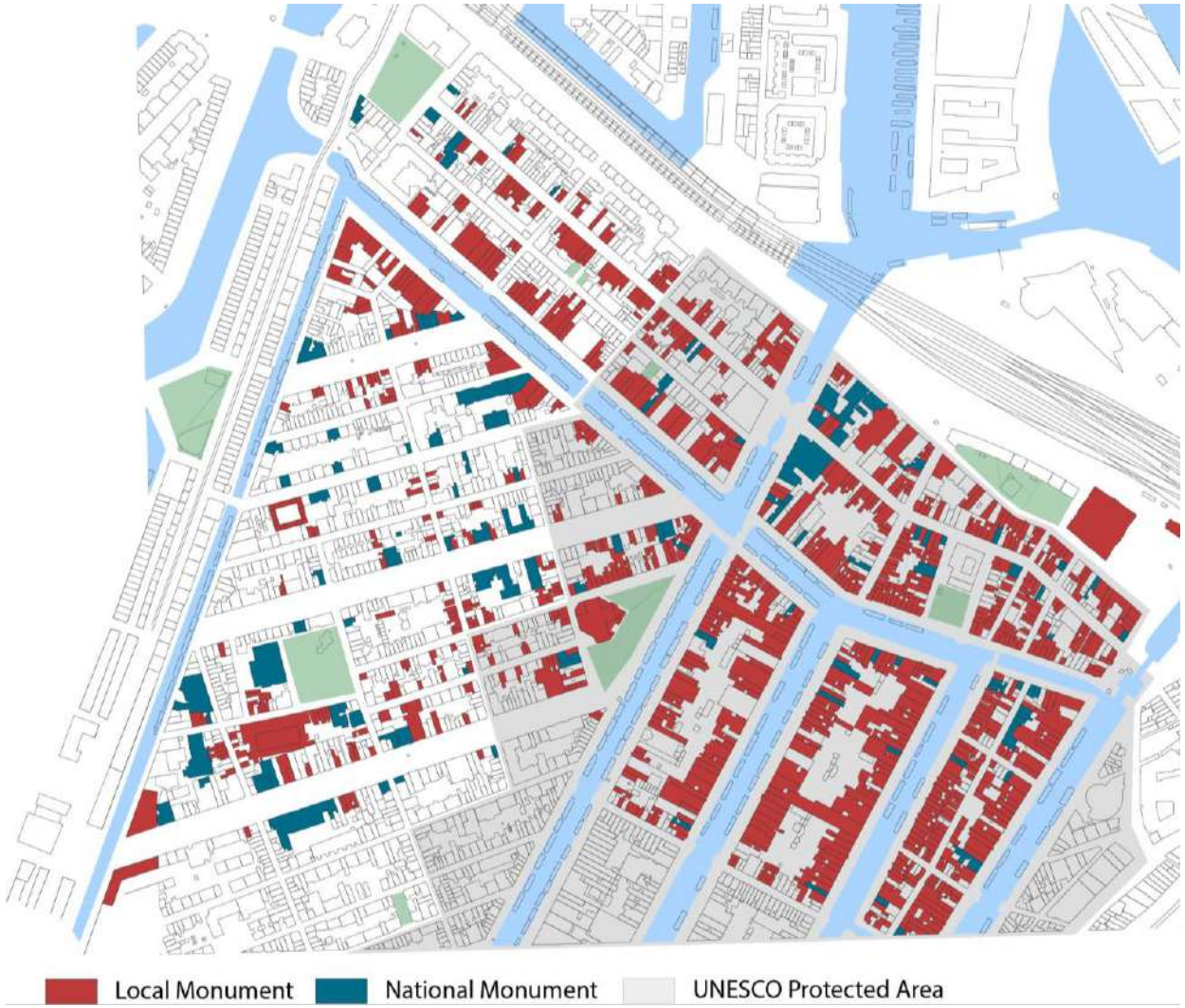
ENERGY TRANSITION ROADMAP AMSTERDAM

Centrum



Brouwerskruis
(City Centre)

ENERGY TRANSITION CITY CENTRE



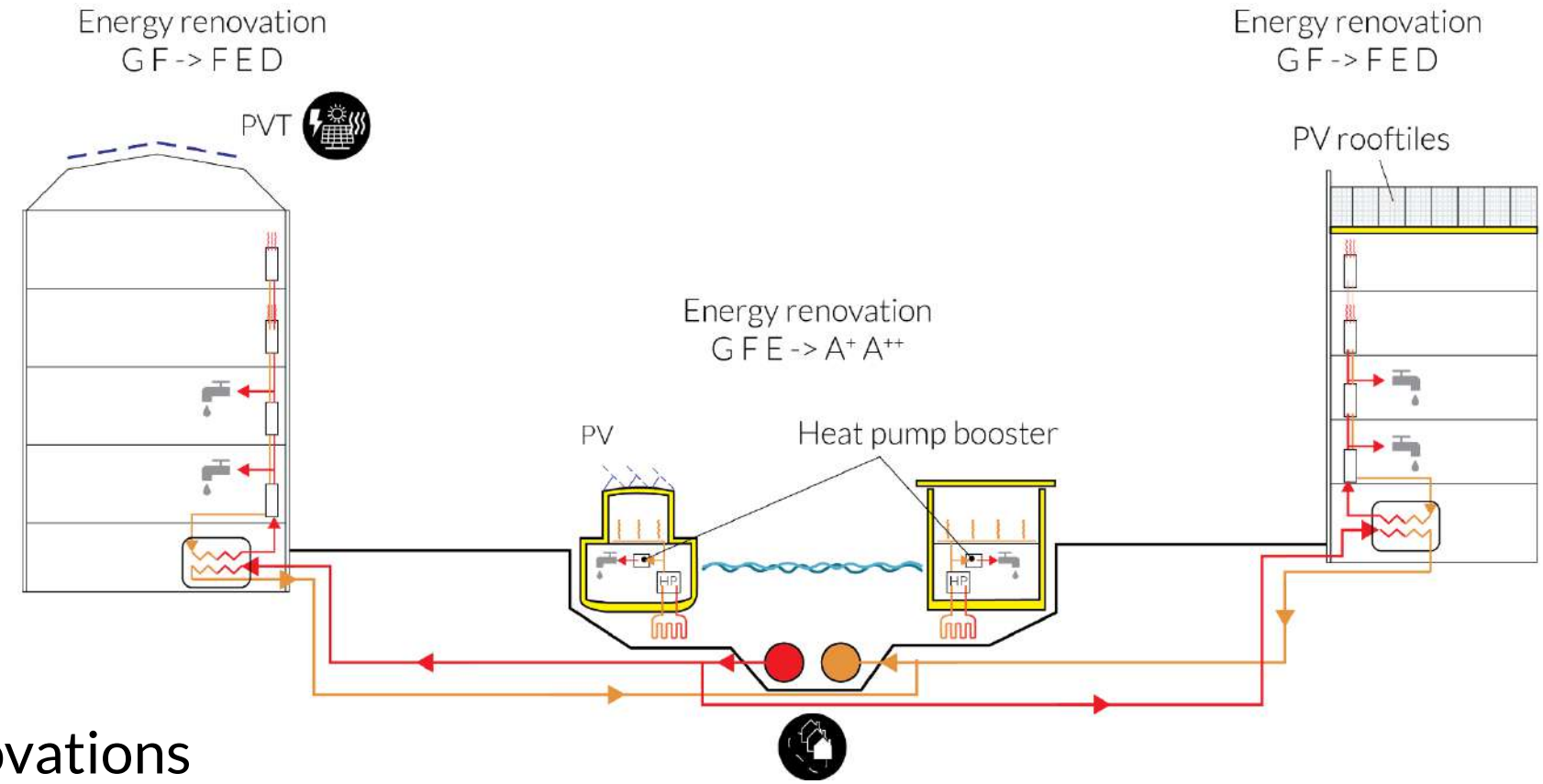
3 strategies:

1. Radical renovation to LT
2. HT/MT heat network
3. Green gas

ENERGY TRANSITION CITY CENTRE

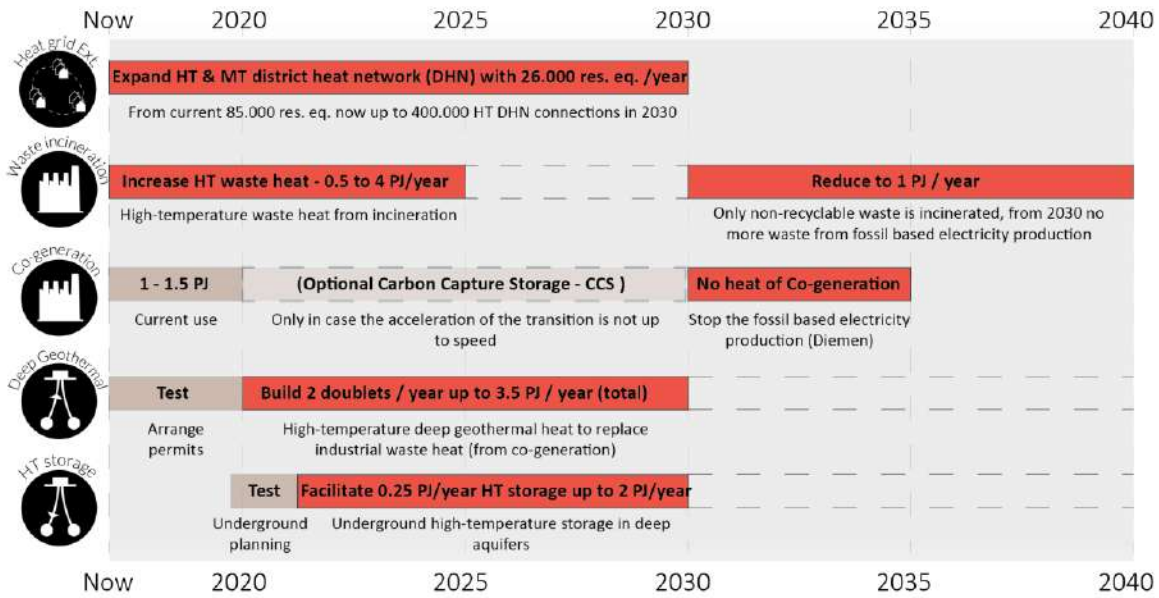
ENERGY TRANSITION CITY CENTRE

warmtenet (HT) + E-neutral house boats

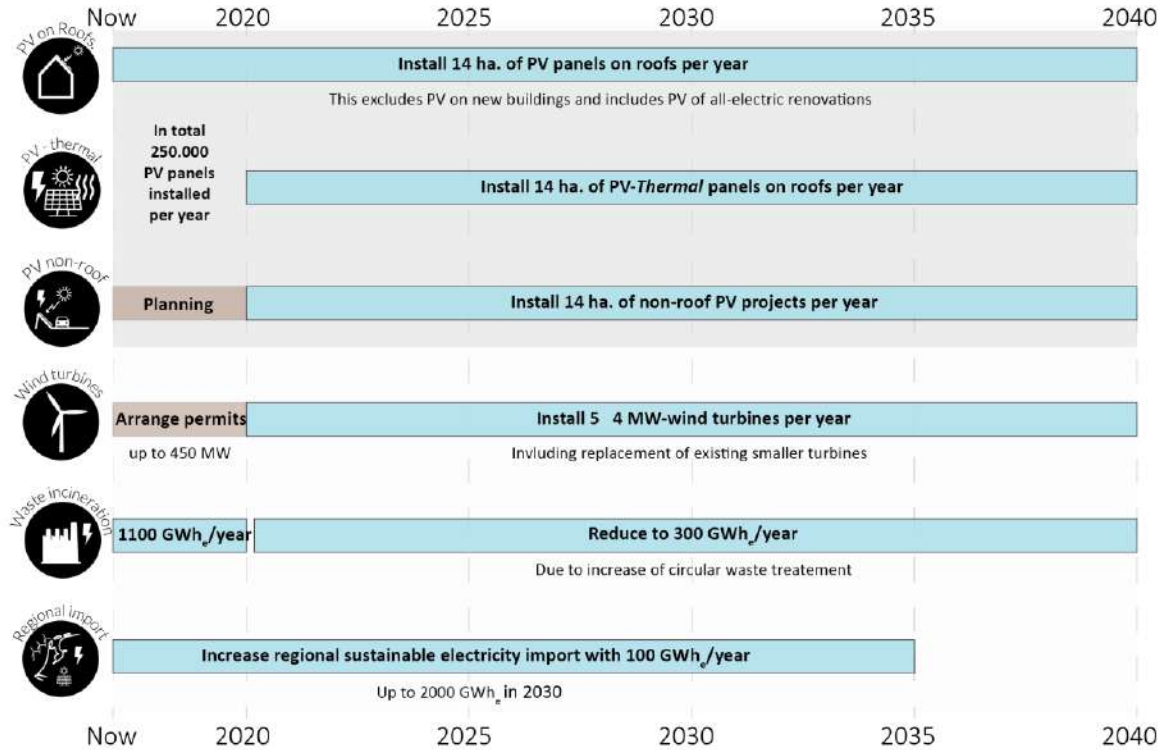


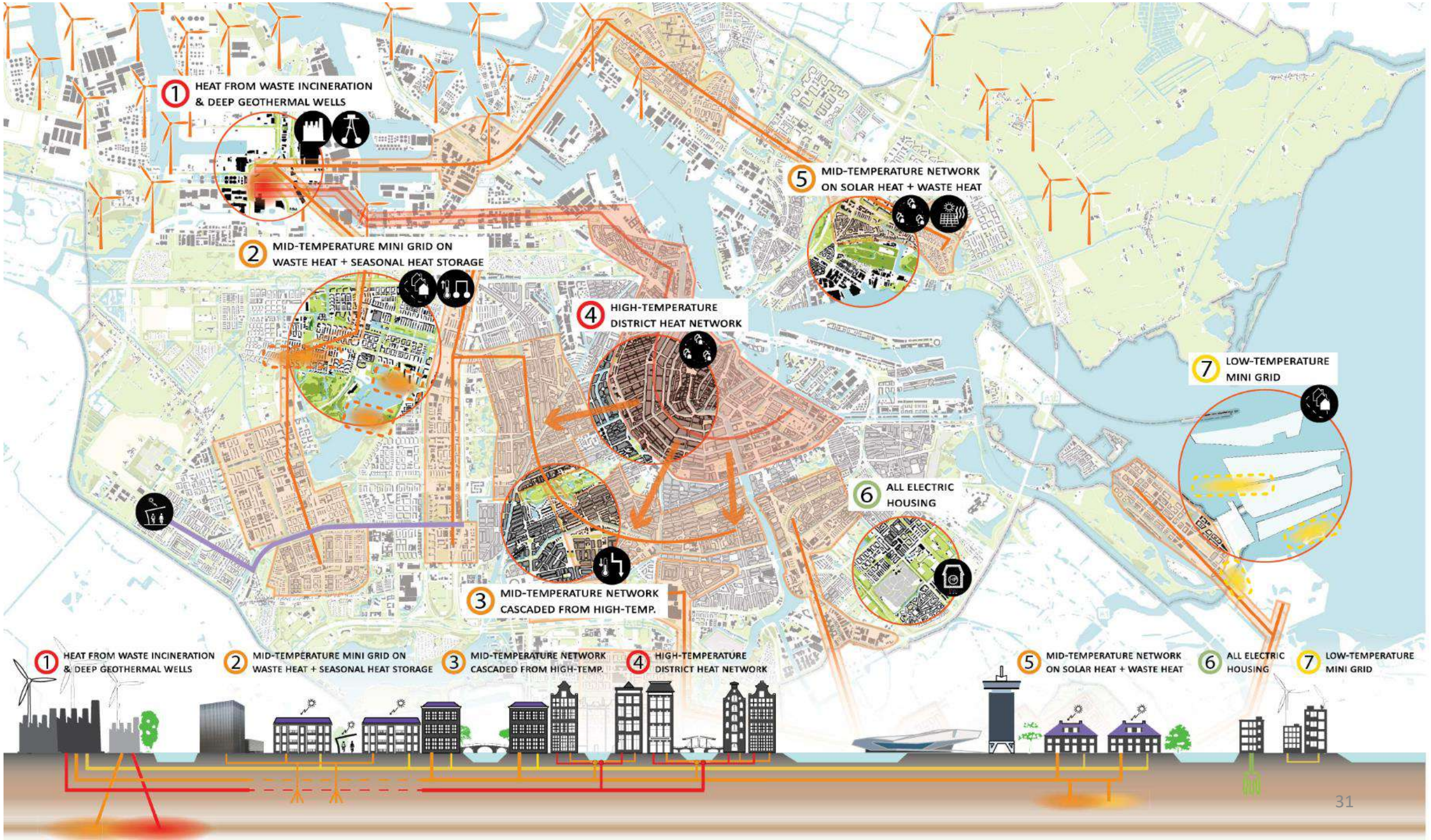
- Small renovations
- PV panels + PV tiles where possible
- HT DHN geothermal/residual heat
- Houseboats all-electric HP canal water

ROADMAP FOR SUSTAINABLE HEATING OF AMSTERDAM's EXISTING BUILT ENVIRONMENT



ROADMAP FOR SUSTAINABLE ELECTRICITY OF AMSTERDAM's EXISTING BUILT ENVIRONMENT




1 HEAT FROM WASTE INCINERATION & DEEP GEOTHERMAL WELLS
2 MID-TEMPERATURE MINI GRID ON WASTE HEAT + SEASONAL HEAT STORAGE
3 MID-TEMPERATURE NETWORK CASCADED FROM HIGH-TEMP.
4 HIGH-TEMPERATURE DISTRICT HEAT NETWORK
5 MID-TEMPERATURE NETWORK ON SOLAR HEAT + WASTE HEAT
6 ALL ELECTRIC HOUSING
7 LOW-TEMPERATURE MINI GRID
1 HEAT FROM WASTE INCINERATION & DEEP GEOTHERMAL WELLS
2 MID-TEMPERATURE MINI GRID ON WASTE HEAT + SEASONAL HEAT STORAGE
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5 MID-TEMPERATURE NETWORK ON SOLAR HEAT + WASTE HEAT
6 ALL ELECTRIC HOUSING
7 LOW-TEMPERATURE MINI GRID

Gemeente Rotterdam

IEA / Triple-A:
District heat roll out and neigbourhood approach pilot Prinsenland / Het Lage Land

André de Groot, City of Rotterdam,
Projectmanager City Development
aj.degroot@rotterdam.nl
+31(0)653331432

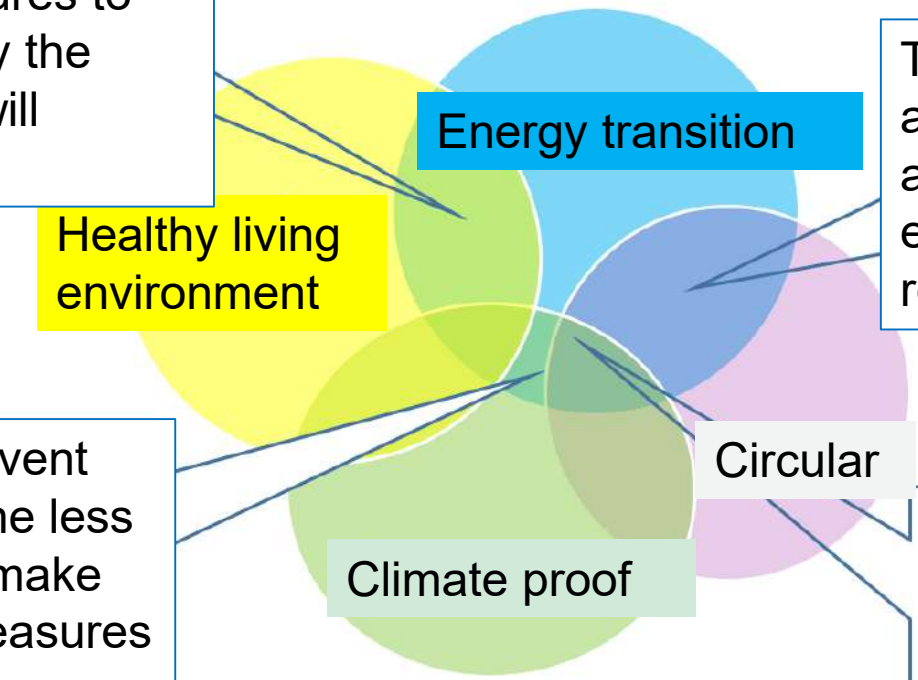
But first the context: Positioning the energy transition of Rotterdam for the built environment

ROTTERDAM.
MAKE IT
HAPPEN.

Gemeente Rotterdam

1. Sustainability Compass: guidance and cross overs

By making smarter choises for measures to improve air quality the CO2 emissions will diminish



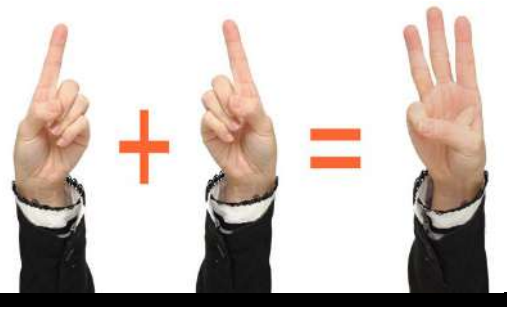
The energytransition is an important issue that also aims at more efficient use of natural resources

The more we prevent Climatechange the less cost we need to make for adaptation measures on the long run

Preventing heatstress deminishes the use of electricity for airco's in summer

2. Goal regarding future energy supply system

Clean, safe, reliable and affordable energy supply for everyone

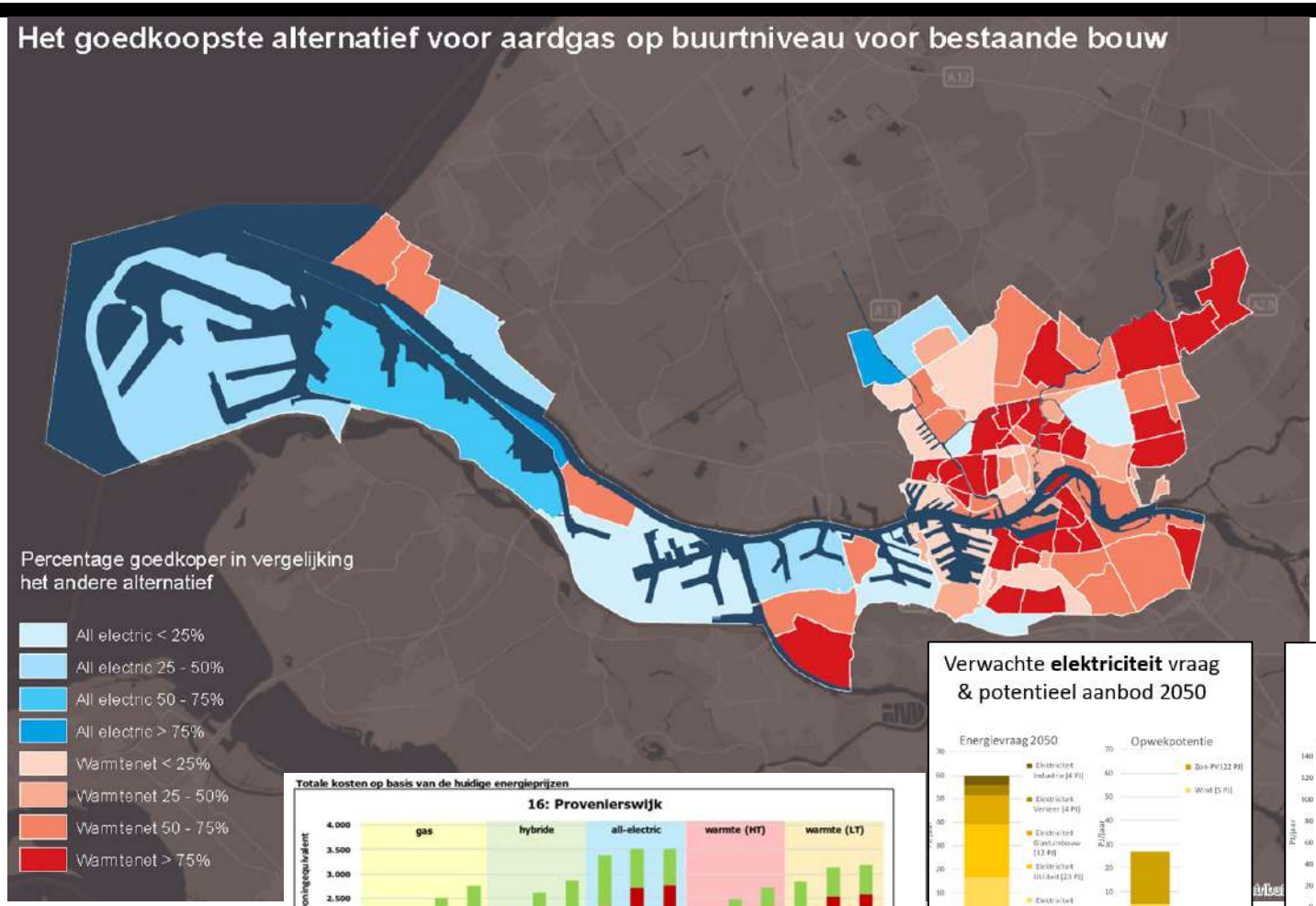


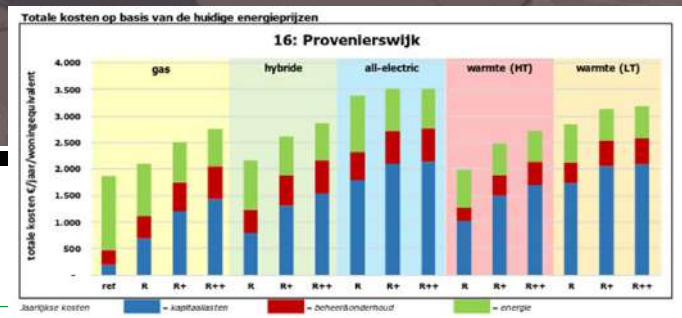
3. District heating the promising source for the region

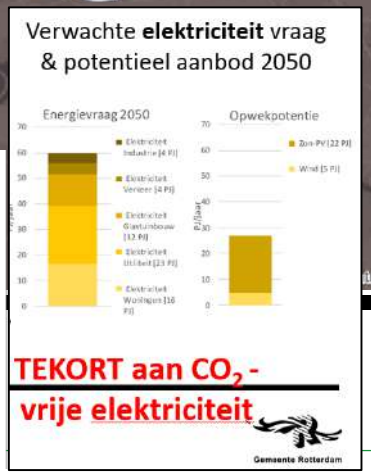
Regional transport to connect supply & demand

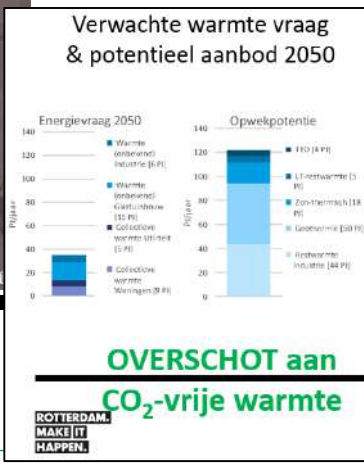
Local distribution to connect end-users

4. Cost efficiency map: district heat vs all electric



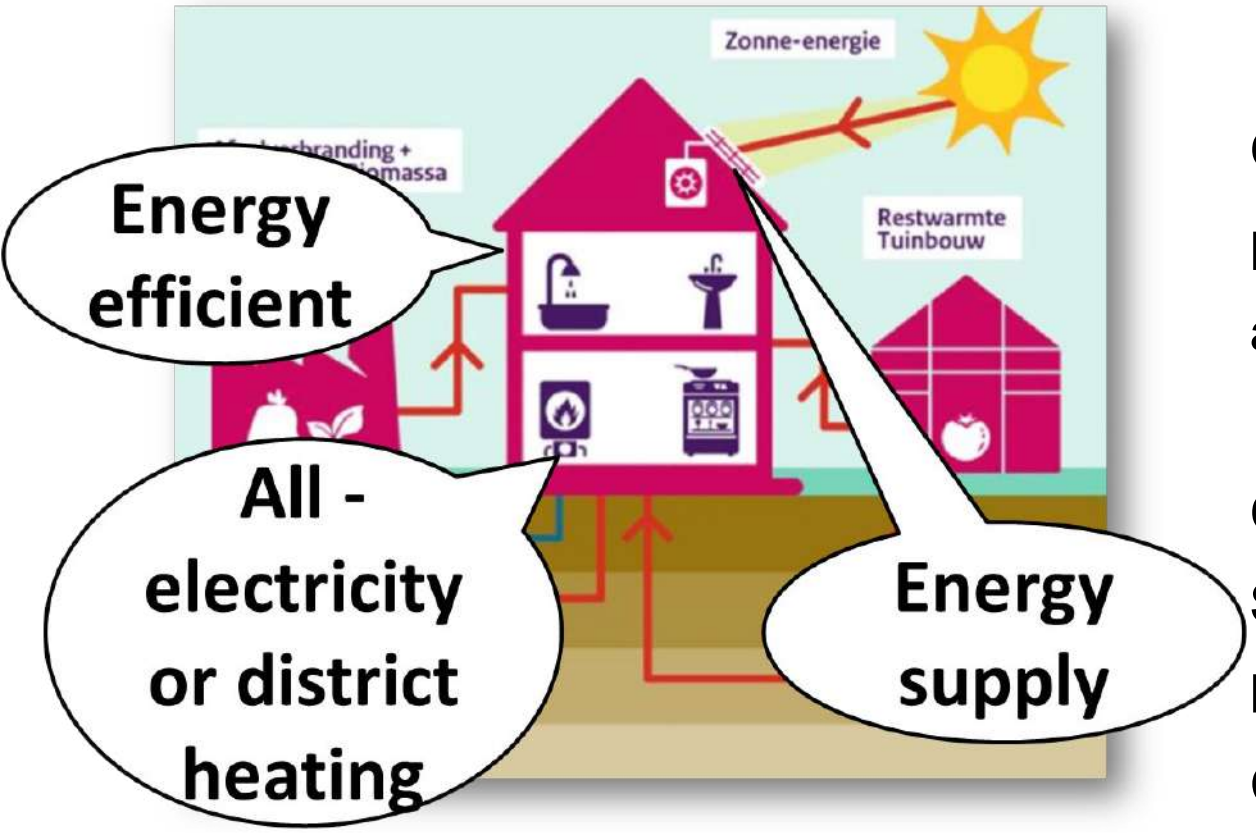






ROTTERDAM. MAKE IT HAPPEN.

5. Heat transition: impact on housing stock

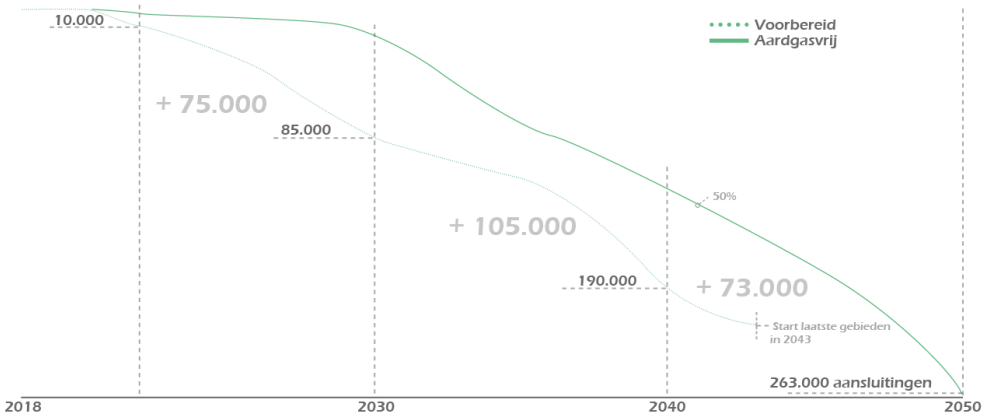


LESS ENERGY USE

CHANGE ENERGY USE to potential CO_2 -free alternatives

CO_2 FREE ENERGY SUPPLY by replacing fossil based energy sources to CO_2 - free alternatives

6. Rotterdam: from 263.000 gas connections to 0 (2050)



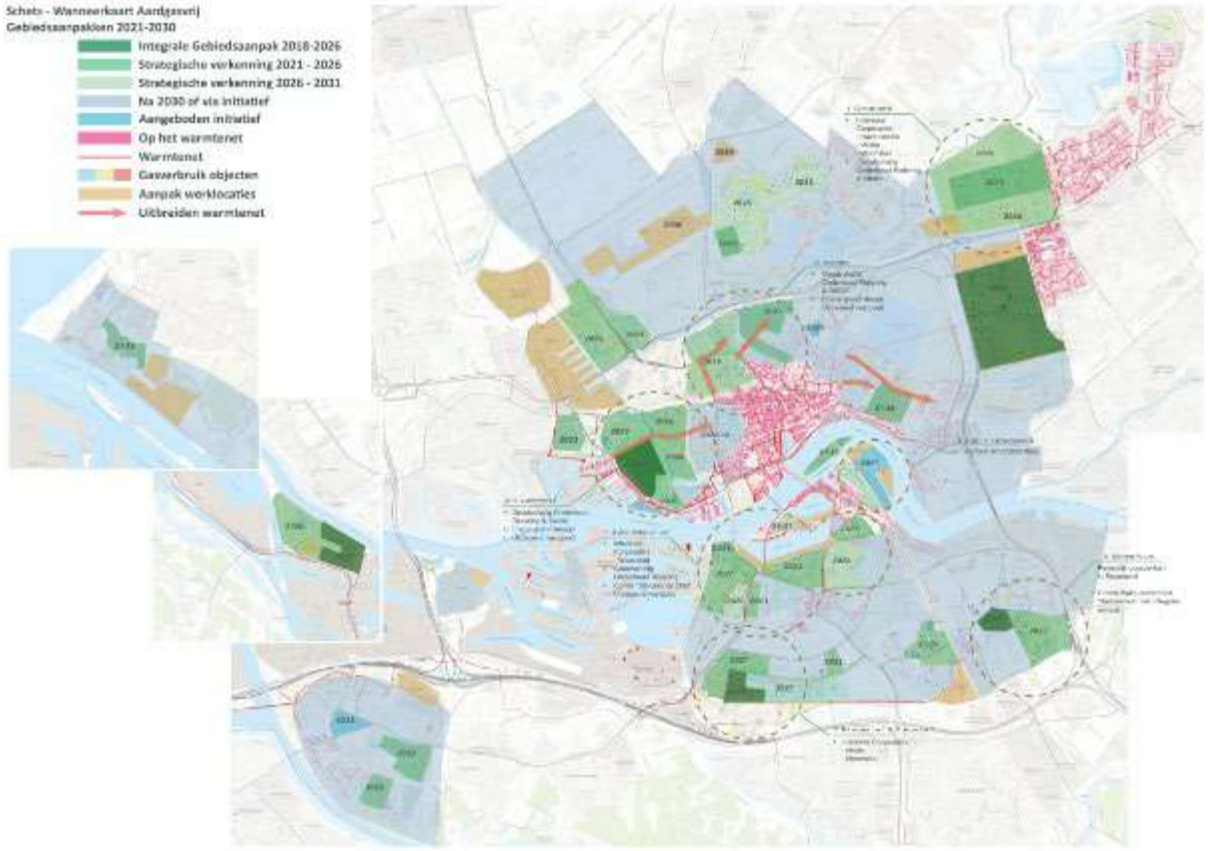
Different groups:

- Housing corporations
- Housing associations
- Privately rented houses
- Private homeowners

Also:

- Shops / business units
- Schools
- Municipal en societal buildings
- Monuments
- Etc.

7. Start 2018: 5 pilot neighbourhoods “to free of gas”



Neighbourhoods:

Reyerdijk/Reyeroord

Rozenburg

Pendrecht

Bospolder-Tussendijken

Prinsenland - Het Lage Land

Investigation:

Overschie

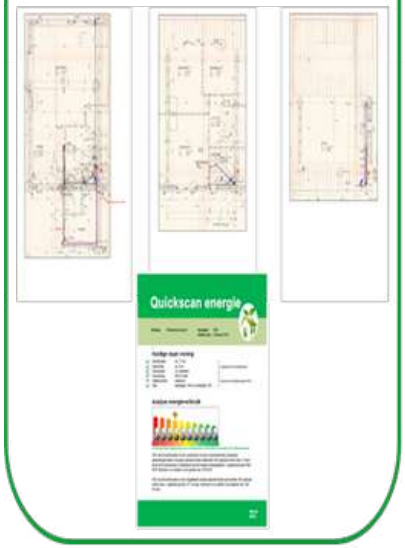
Schiebroek

Plan for / to 2030

7a How to transform to district heating?

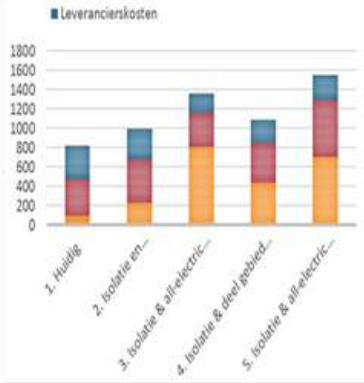
Technique

What is possible? And needed?



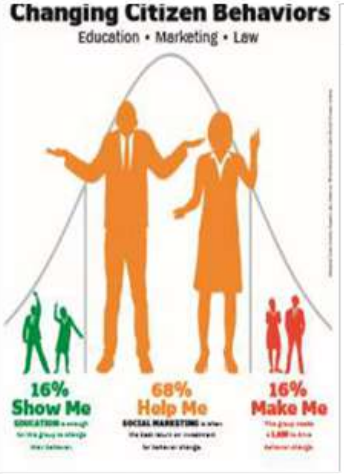
Financial

What are the total costs of the scenarios?



Social

What do people think? What do people want?



Opportunity

How to make transition easier and add value?

7b Understanding the end user and impact for them

Incentive Reward

Temptations & rewards

Bariers & blockades

'Good'

Remove Reduce

Problematic

Incentive Reward

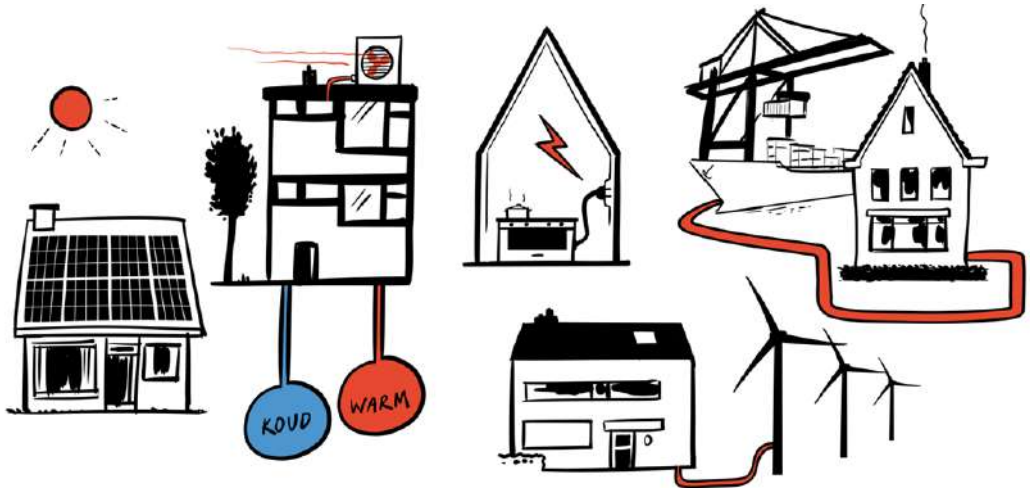
Temptations & rewards

Bariers & blockades

Incentive Reward

8. Challenges

- Upfront costs, long payback period
- High risk at the start
- (innovative) Financing possibilities
- Communication and participation process



9. Road to success

Decision making process & regulation based on:

- Energy potential *(use what is available)*
- System efficiency *(create integrated energy system)*
- Cost efficiency *(look at total cost (building + system))*

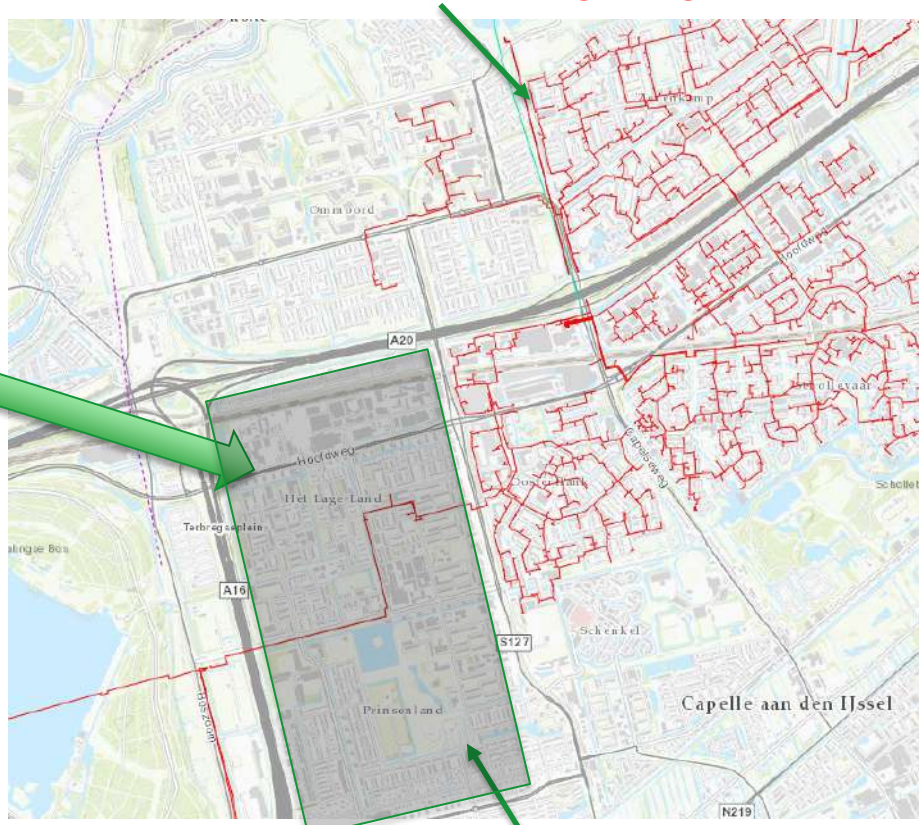
Inclusive transition:

- Housing corporations as launching partners
- Communication and citizen participation
- Transparency
- Share costs and benefits *(including social benefits)*

MAKE IT HAPPEN.

10. The integral approach in Prinsenland / Het Lage Land

Red lines: existing district heating infrastructure in surrounding neighbourhoods



Prinsenland / Het Land: natural gas heated

Characteristics Prinsenland / Het Lage Land

- 20.000 inhabitants
- average Dutch residential areas
- built in ‘60-’70’s
- (high rise) appartment blocks, terraced houses
- ownership by housing corporations, also private home owners
- Unique for the world: area at - 6 m below sea level!

5 urgent reasons to choose Prinsenland / Het Lage Land as a pilot

1. Housing corporation Woonstad plans to deep renovate their high rise appartment blocks (1.740 app.) and connect them district heating (2020 – 2025).

2. Housing corporation Havensteder: plans to deep renovate 518 houses in period 2020 – 2021, chance to anticipate for connection to district heat.

3. Sewenage system needs renewal in several neighbourhoods. Look for win-win to combine with installing pipe system for district heating.

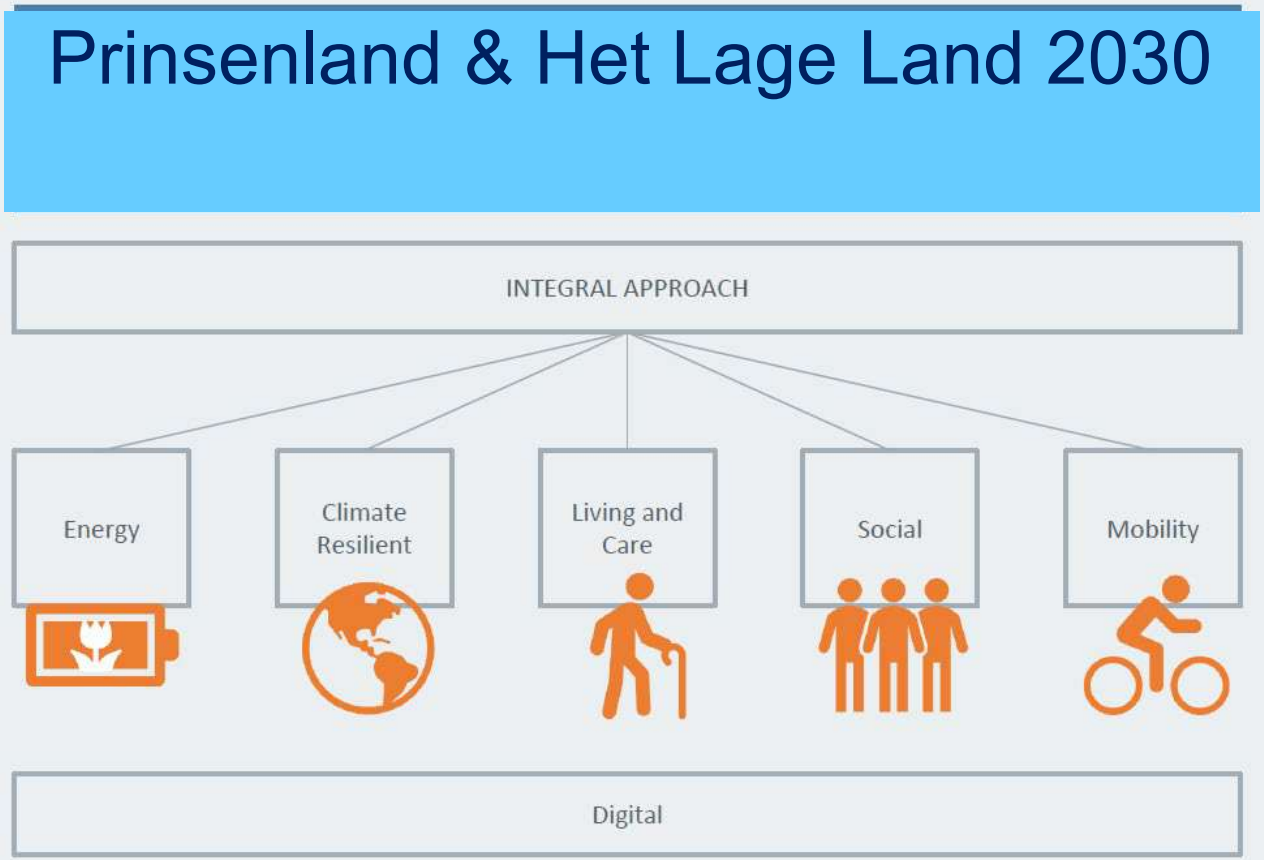
4. Renewal existing pipes for natural gas as at hand in coming years. Installing district heating system in time can possibly prevent large societal costs in new natural gas pipes.

5. Prinsenland / Het Lage Land were already selected by Metropole Rotterdam / The Hague as pilots for an integral approach for transforming them to Next Generation Urban Areas (NGW).

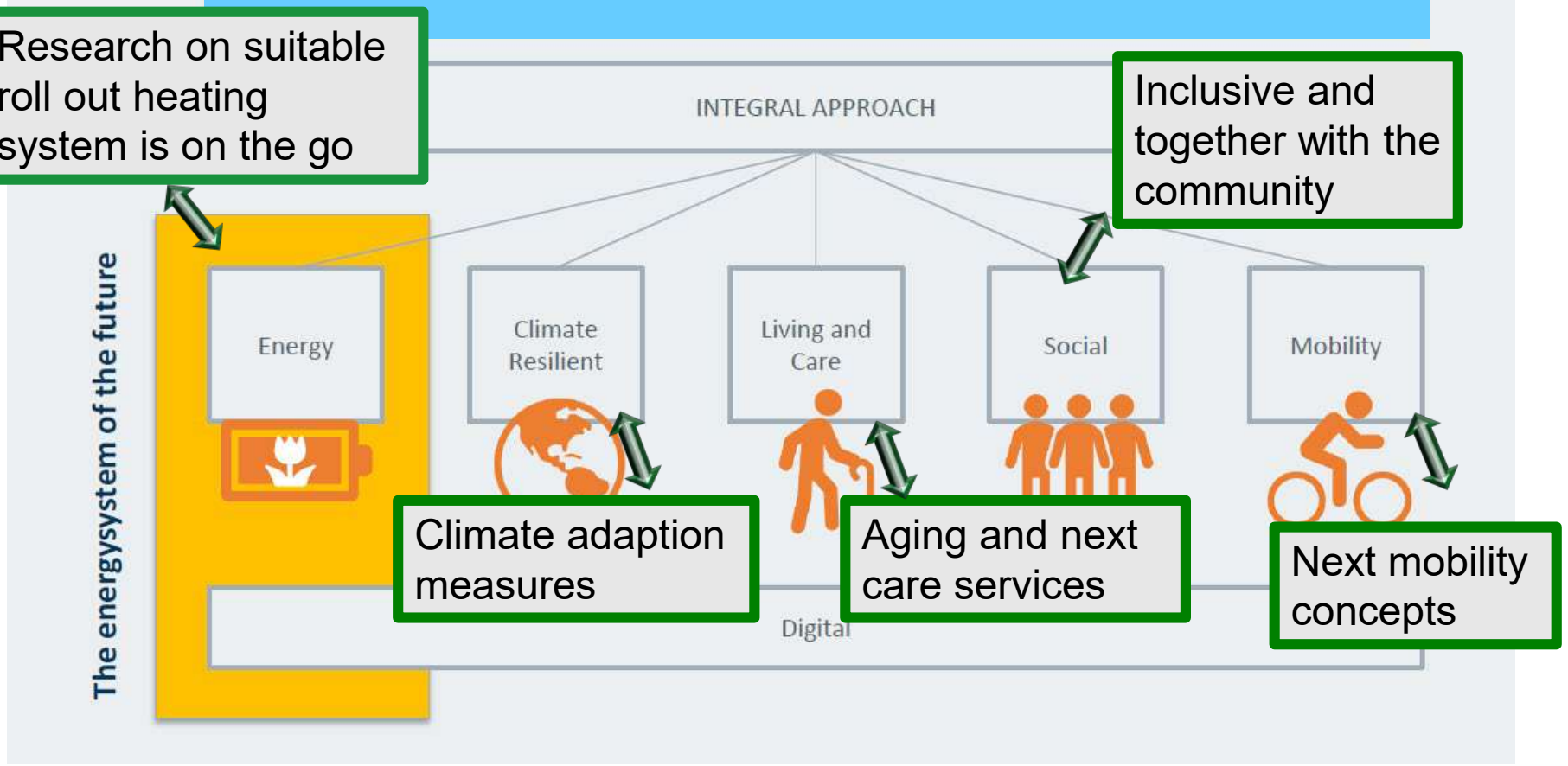
Integral:
Connect Roadmap Next Economy (MRDH) to unleash the potential of selected urban areas for adapting “next solutions and opportunities”

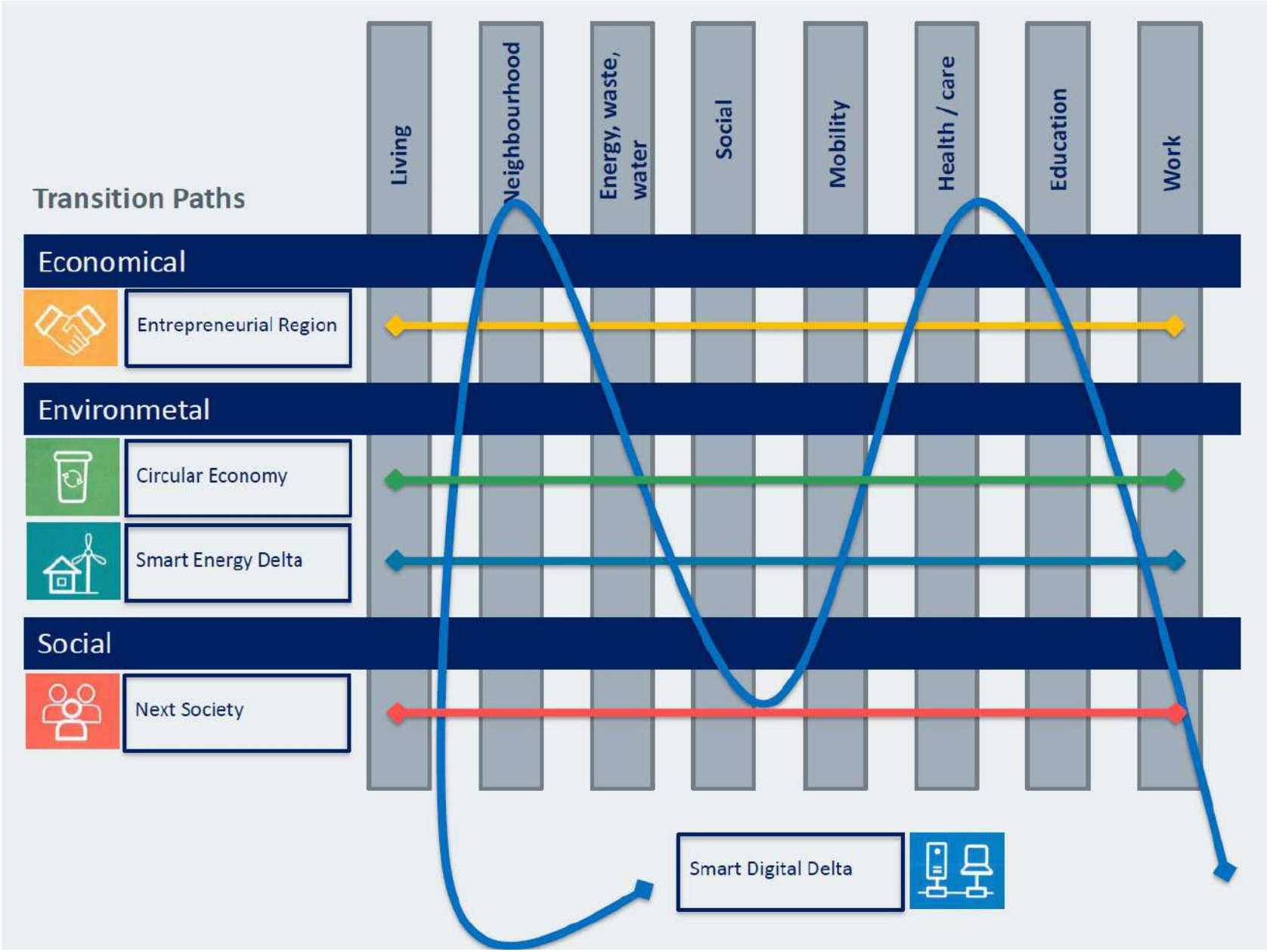
ROADMAP NEXT ECONOMY

Integral means also connected to the specific issues in neighbourhoods and issues of the residents



Prinsenland & Het Lage Land 2030

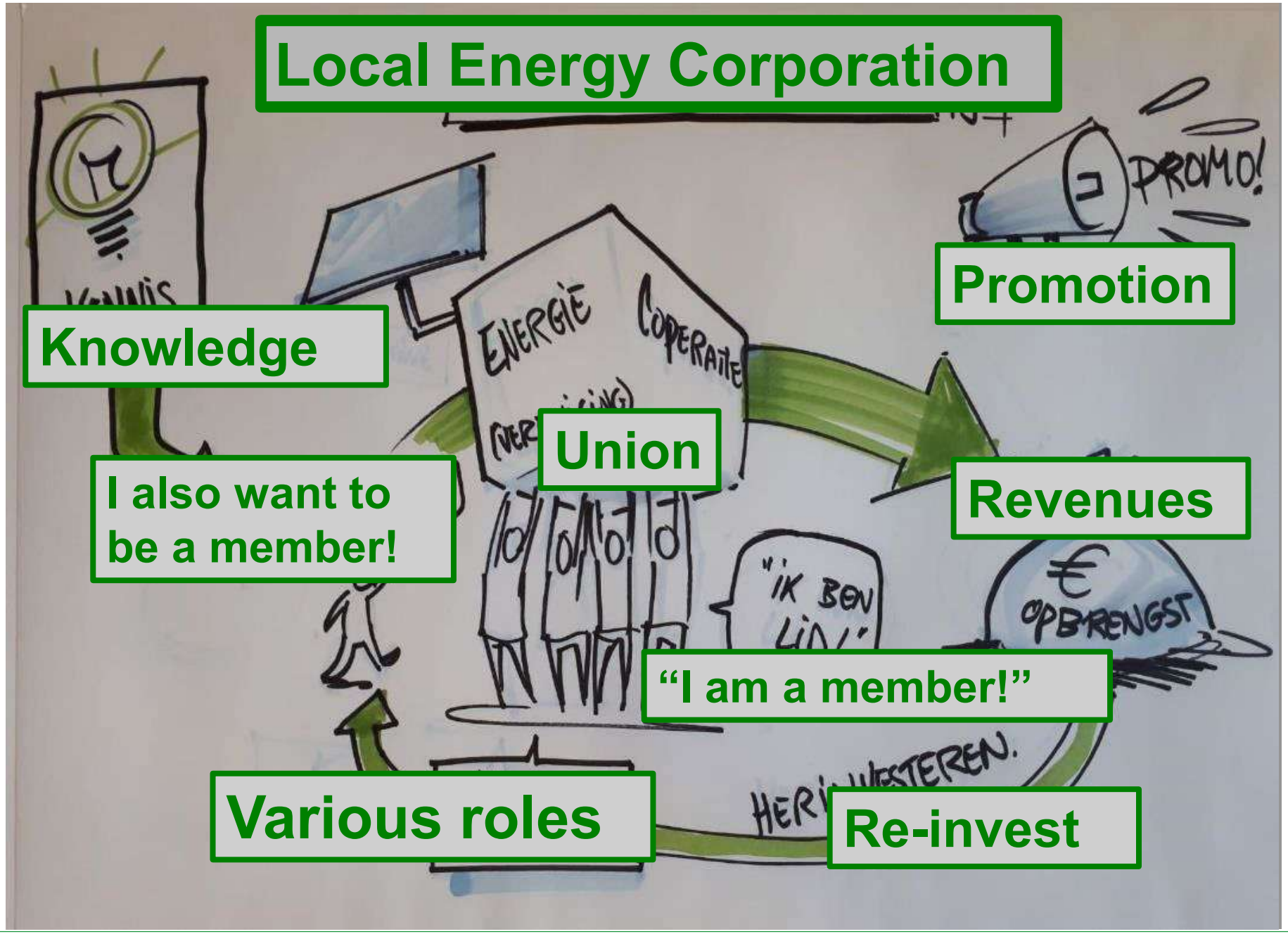



Transition Paths
Living
Neighbourhood
Energy, waste, water
Social
Mobility
Health / care
Education
Work
Economical
Entrepreneurial Region
Environmetal
Circular Economy
Smart Energy Delta
Social
Next Society
Smart Digital Delta

Climathon 26 oct. 2018 with Climate-KIC: Public event as a start for inviting inhabitants to come their ideas of “Neighbourhood of the future”

Result:
5 arrangements with potential to be developed further by residents with support of public neighbourhood team

1. Local Energy Corporation, owned by citizens
2. The most sustainable playgarden for young and old
3. Creating friends gardens and stimulate contacts
4. Dealing with flooding, heavy rainfall & sewenage
5. Be social and do it together


Local Energie Corporation
Knowledge
Promotion
Union
I also want to be a member!
Revenues
"I am a member!"
Various roles
Re-invest
ENERGIE
COPERATIE
"IK BEN LID!"
OPBRENGST
PROMO!

Arrangements mapped and presented to alderman / vice mayor Arno Bonte

The Living Lab Prinsenland / Het Land in short

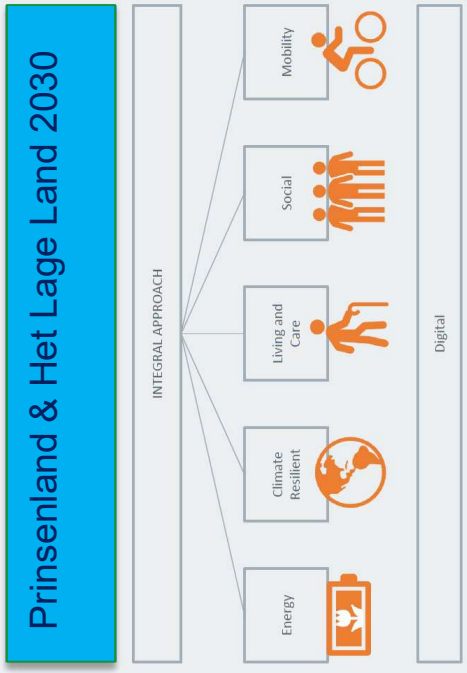
Transition Paths Roadmap Next Economy Metropol Rotterdam / The Hague

Integral approach on disctrict themes

Connecting with energy and initiatives from residents and businesses

ROADMAP NEXT ECONOMY

- Smart Digital Delta — Towards zero marginal costs
- Smart Energy Delta — Towards zero carbon
- Circular Economy — Towards zero waste
- Entrepreneurial Region — Towards new productivity
- Next Society — Towards an inclusive society



Citizens initiatives

1. Local Energy Cooperation
2. Most sustainable playgarden
3. Friends gardens & contacts
4. Flooding, rainfall, sewenage
5. Be social, do it together

Business initiatives (Green Business Club Rotterdam Alexander)

1. IBIS Power for Technical College
2. Circular waste management
3. Electric taxi services
4. Car sharing 2.0
5. Sustainable Business Zones

Throughout the year:
Using public events to stimulate residents to give their ideas for a better neighbourhood

IEA – Triple-A workshop
25 september 2019

Gemeente Rotterdam

Triple-A: stimulating energy effective retrofit of privately owned terraced houses

André de Groot / Oubbol Oung

(City of Rotterdam)

TRIPLE-A:
Awareness, easy Access & Adoption

Program period: 2017 - 2020

Total budget: € 5,3 mln. (60% EU)

Projectpartners:

TU-Delft (NL)

Rotterdam (NL)

Breda (NL)

Kent County Council (UK)

Antwerp (BE)

Mechelen (BE)

EOS Oostende (BE)

University of Ghent (BE)

Eandis / Fluvius (BE)

PSEE Picardie (FR)

Interreg 2 Seas Mers Zeeën
Triple-A
Awareness + Access = Adoption
European Regional Development Fund

Aims Triple-A

- Supporting local authorities and regions by **developing tools** that strenghten their strategy
- **Stimulating** homeowners to retrofit their houses in a CO2-efficient way
- To develop **market offers** for retrofitting that help to speed up the market

Interreg 2 Seas Mers Zeeën

Triple-A

Awareness + Access = Adoption

European Regional Development Fund

Cooperation with observer partners and follower cities

ALLIANTIE+

Bouwend Nederland
de vereniging van bouw- en infrabedrijven

buur kracht.

eit Climate-KIC

INNOVATIECENTRUM DUURZAAM BOUWEN

Rabobank

STEDIN.NET

UNETO-VNI | TECHNIEK NEDERLAND

vereniging eigen huis

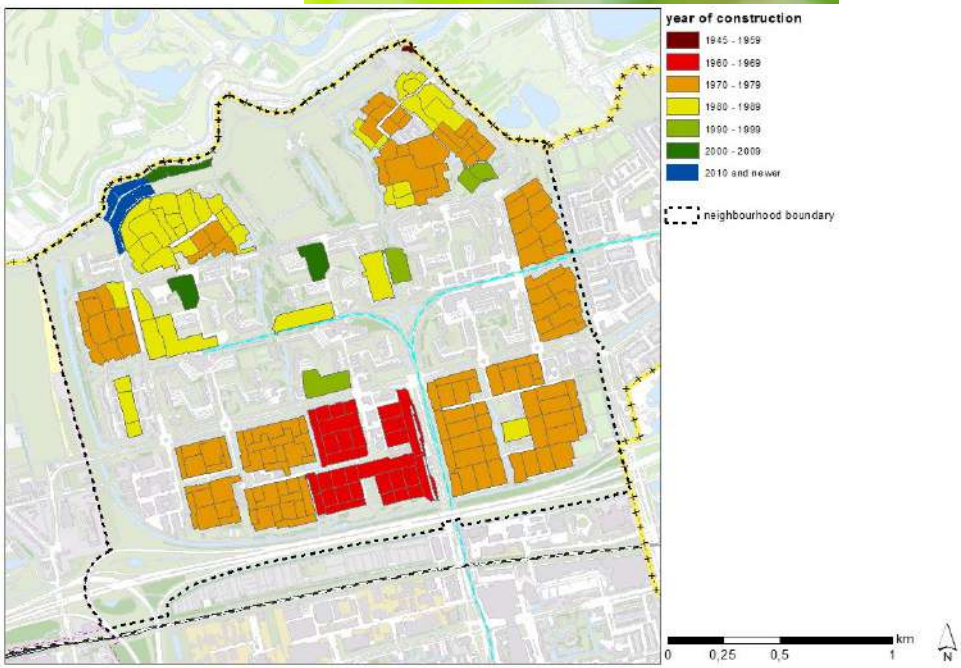
sta sterker

Gemeente Vlaardingen

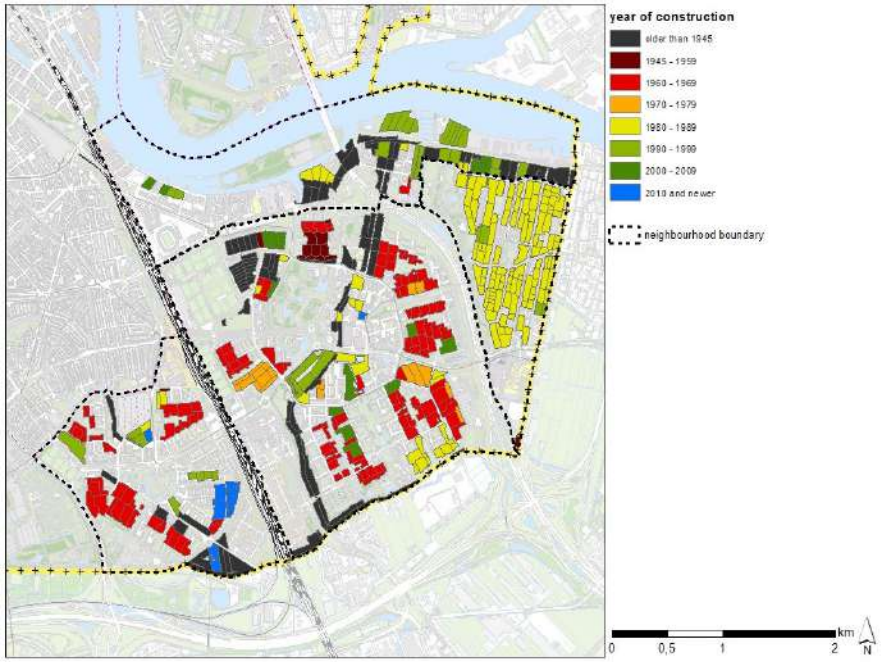
Leiden

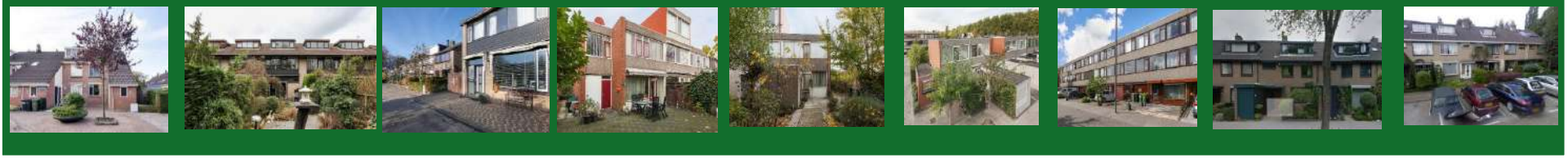
Two focus areas

Prins-Alexander

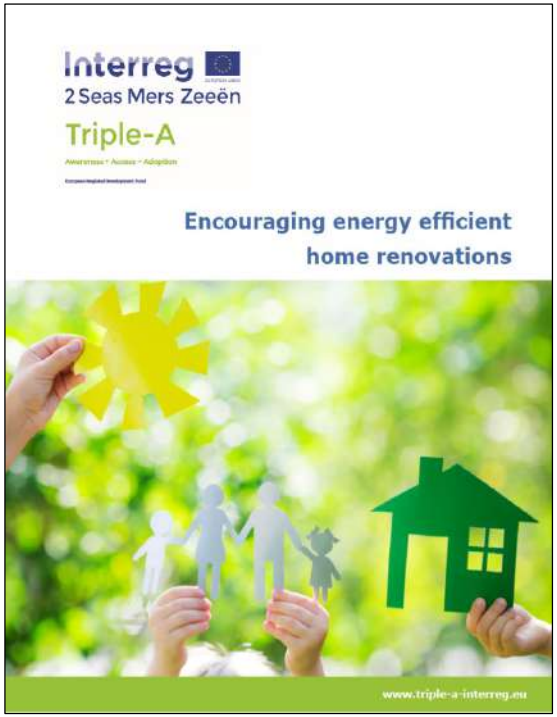


IJsselmonde





The Triple-A approach: 4 lines of action



1: Making websites and webfunctions of local authorities more attractive for home owners

2: Introduce home energy monitoring-systems to give insight in energy use at home (**HEMS**)

3: To set up neighbourhood info and ad vice centers adviescentra (**Pop ups**)

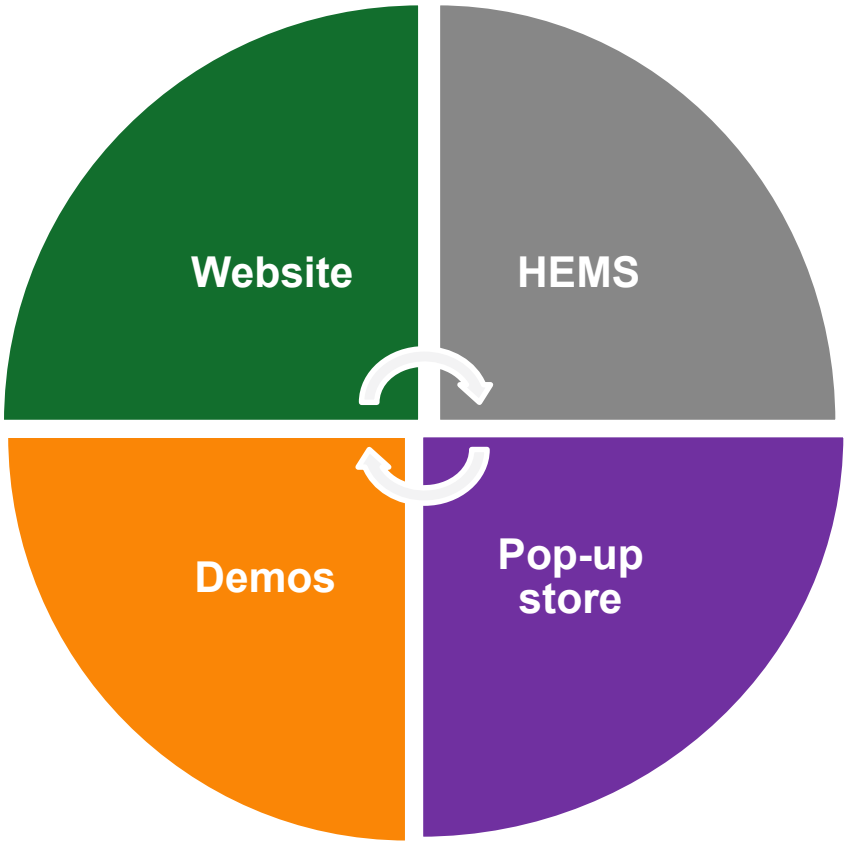
4: Showing real life examples of retrofitting that were already realised (DEMO EXEMPLARS)

+

Targets for Rotterdam:

- 600 ton reduce CO2 per year
- 400 houses where measures were realised

Neighbourhood approach



Helping to developing the supply side and connection with regional SME's

Preferred partner: independent regional info and advice center WoonWijzerWinkel

In onze showroom in Rotterdam kunt u zien én ervaren welke concepten en producten er zijn op het gebied van duurzaam wonen. Onze experts geven onafhankelijk en persoonlijk advies en helpen u tevens met het aanvragen van vrijblijvende offertes. U kunt ook online offertes aanvragen. Met ruim 300 **WoonWijzerWinkel gecertificeerde bedrijven** bent u verzekerd van kwaliteit tegen een scherpe prijs en wordt u ontzorgd met **€ 3.000,- WoonWijzerWinkel garantie** op de werkzaamheden!

- ✓ Showroom met compleet assortiment
- ✓ Objectief & deskundig advies
- ✓ Betrouwbare offertes en uitvoering

WOON WIJZER WEBSHOP

Open: Ma - Vrij | 9.00 - 17.00 uur, Za | Op themadagen - 9.00 - 13.00 uur
Gratis parkeren!

The Customer Journey

DIFFERENT GOALS AND TAKE INTO ACCOUNT THE DIFFERENT STEPS IN THE PROCESS OF DECISION MAKING OF HOMEOWNERS

- Awareness
- Access to advice
- Acces to measures
- Aid by execution
- Recognition (sharing experiences and willingness to take next steps)

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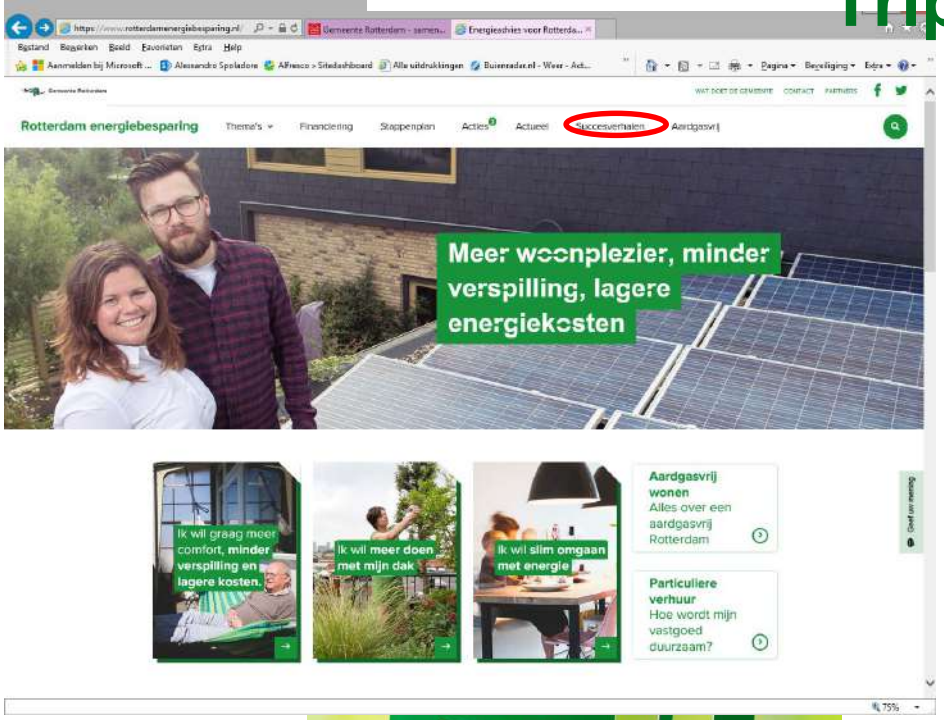
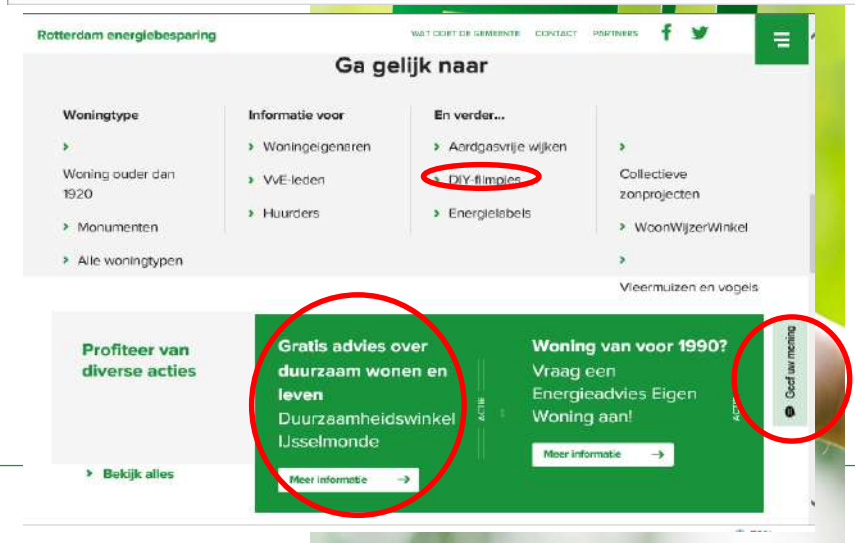
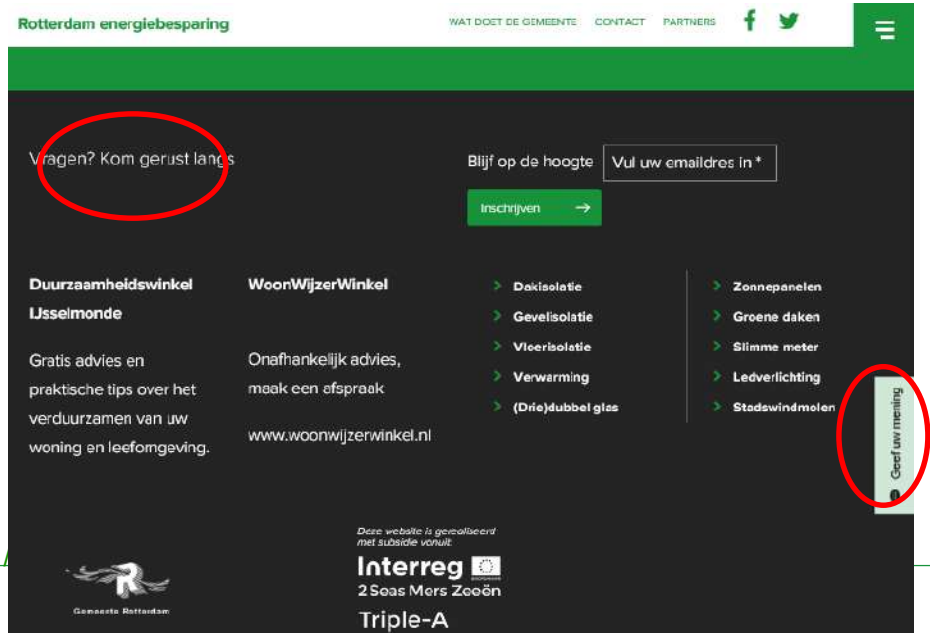
Rotterdam website with functionalities developed under Triple-A







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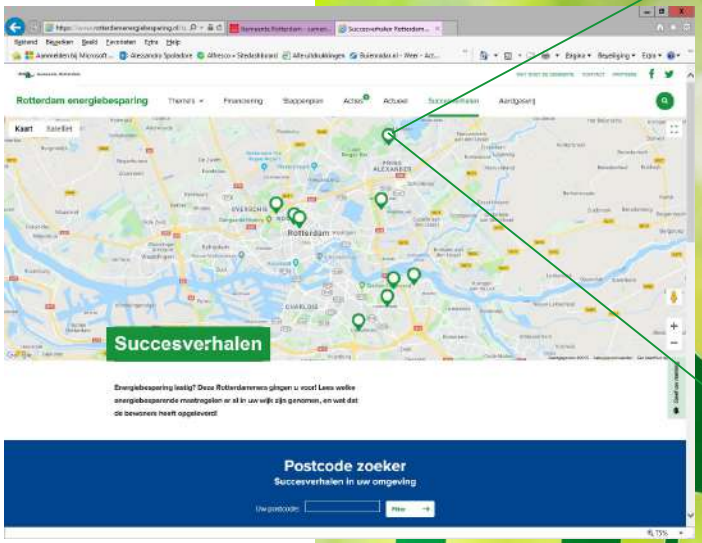
Succes stories



Jeronimus, bewoner 3069 KR

Eengezins tussenwoning - Ommoord

Jeronimus woont in Ommoord, Prins Alexander Heidebuurt. Hij leeft daar met zijn partner en twee kinderen in een eengezins tussenwoning gebouwd rond 1979. Isolatie was in de tijd dat zijn huis werd gebouwd in opkomst, maar technieken waren nog niet zo ver ontwikkeld als nu. Dit neemt natuurlijk niet weg dat u in een oudere woning ook prima aan de slag kunt met energiebesparing en meer comfort. En dat is precies wat Jeronimus heeft gedaan: in kleine stappen heeft hij zijn eigen energierekening fors teruggebracht!

Geef uw mening

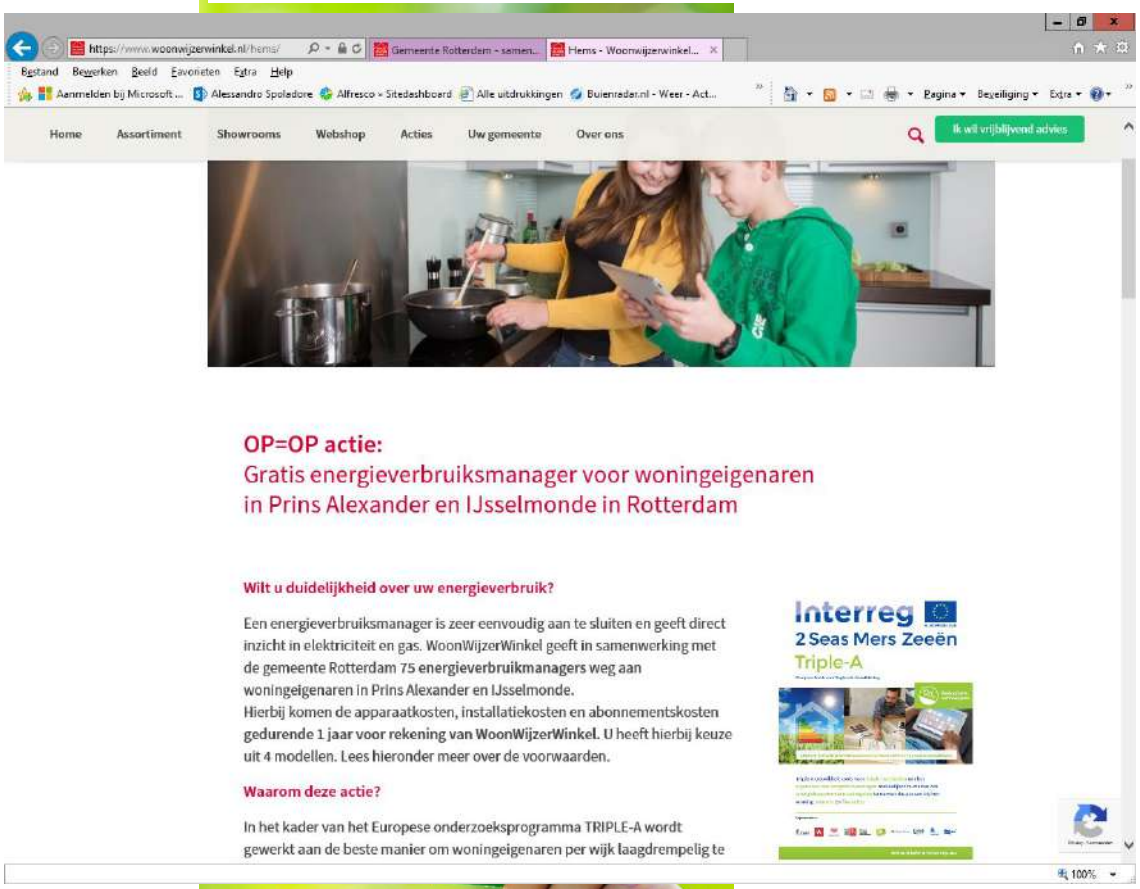
Rotterdam energiebesparing
WAT DOET DE GEMEENTE CONTACT PARTNERS

(12-18 jaar)

Genomen maatregelen	Gedragsveranderingen, isolatievormen, ledverlichting, zonnepanelen
Energielabel vóór maatregelen	C
Energiekosten vóór maatregelen	€ 250,- p/m
Energielabel na maatregelen	A
Energiekosten na maatregelen	€ 50,- p/m

Geef uw mening

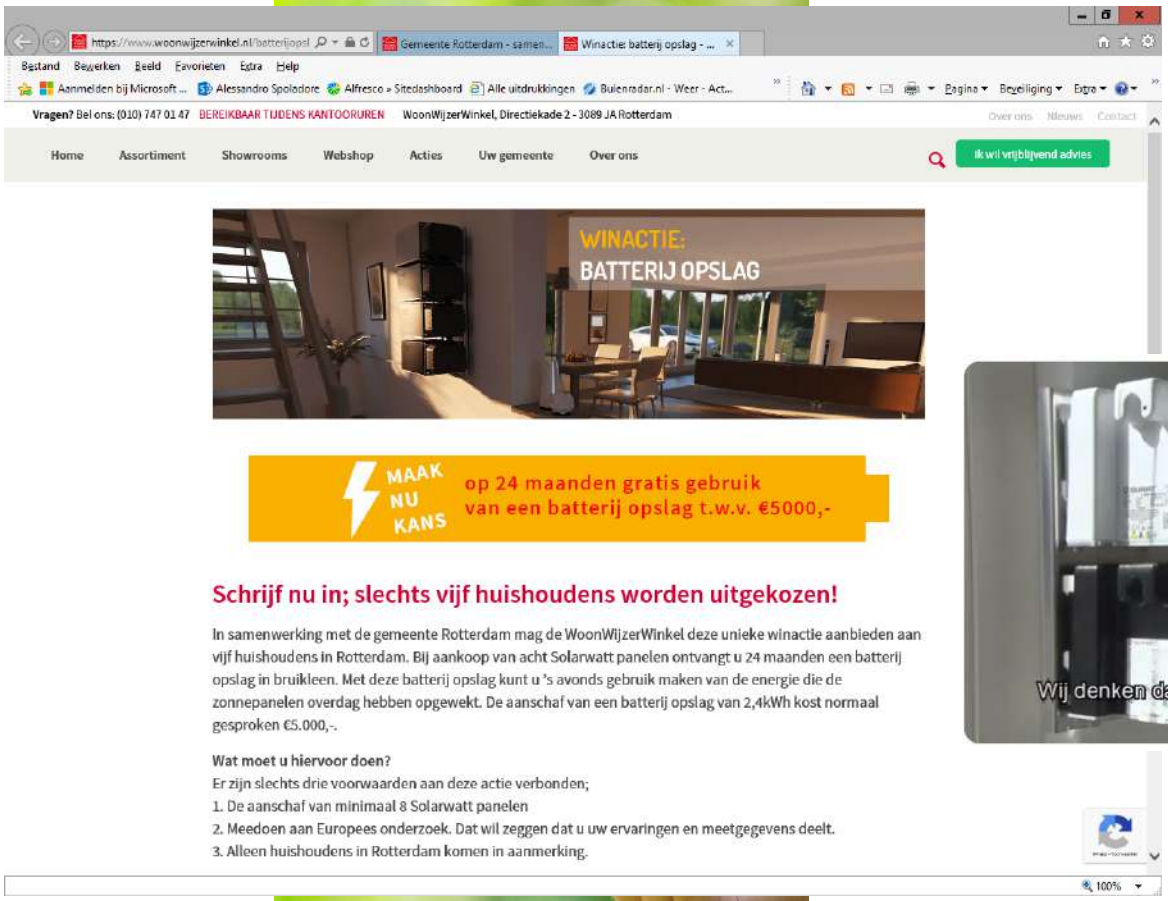
Home Energy Monitoring/Management Systems (HEMS)



LINK naar actie

50+ interested home owners for free use of HEMS and willing to share their experiences

Home Energy Monitoring / Management Systems (HEMS)



LINK naar filmpje

POP UP: Sustainability concept center IJsselmonde

Concept with wide scope:
- Energy savingmeasures
- District heat / free of natural gas
- Climate adaptation
- Water
- Green roofs
- Circular / Waste separation

…

Several values:
- Livability of the neighbourhood
- Comfort of houses
- Sustainable lifestyles

In cooperation with partners:
WWW, VVE010, JINC, BWT, SB, MO,W&I

Duurzaamheidswinkel in Keizerswaard 80 IJsselmonde.
per 1 nov. 2018 open voor 1 jaar
→ **Opening period extended with 1 year !!!**

What to do in 2020?

- Reaching Triple-A program targets on the WP's!
- Optimising local website, combining energy saving with other subjects
- Starting sustainability shops in other neighbourhoods, also on initiatives of citizens (not only in shops)
- Keep working on optimising supply side with observer partners
- Dissemination activities (MRDH, Province of South-Holland, etc.)
- Triple-A closing conference in december 2020 with next steps

Meer informatie over Triple-A

- Erwin Mlecnik, project coördinator Triple-A
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- e.mlecnik@tudelft.nl
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- Oubbol Oung, projectleider Triple-A Rotterdam
- Gemeente Rotterdam, Stadsontwikkeling Afdeling Duurzaam
- o.oung@rotterdam.nl
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- Veerle Willaert
  Communicatie Manager Triple-A
  Ghent University, Power-Link
- Veerle.willaert@ugent.be
- **+32 (0) 59242745**

- André de Groot, Project-adviseur
- Gemeente Rotterdam, Stadsontwikkeling Afdeling Ruimte en Wonen / Duurzaam
- aj.degroot@rotterdam.nl
- **+ 31 (0) 6 5333 1432**

- Of via een Triple-A project partner: contactgegevens in Triple-A brochure:

WWW.triple-a-interreg.eu

For more information, please contact:

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Experiences regarding building renovation at district scale

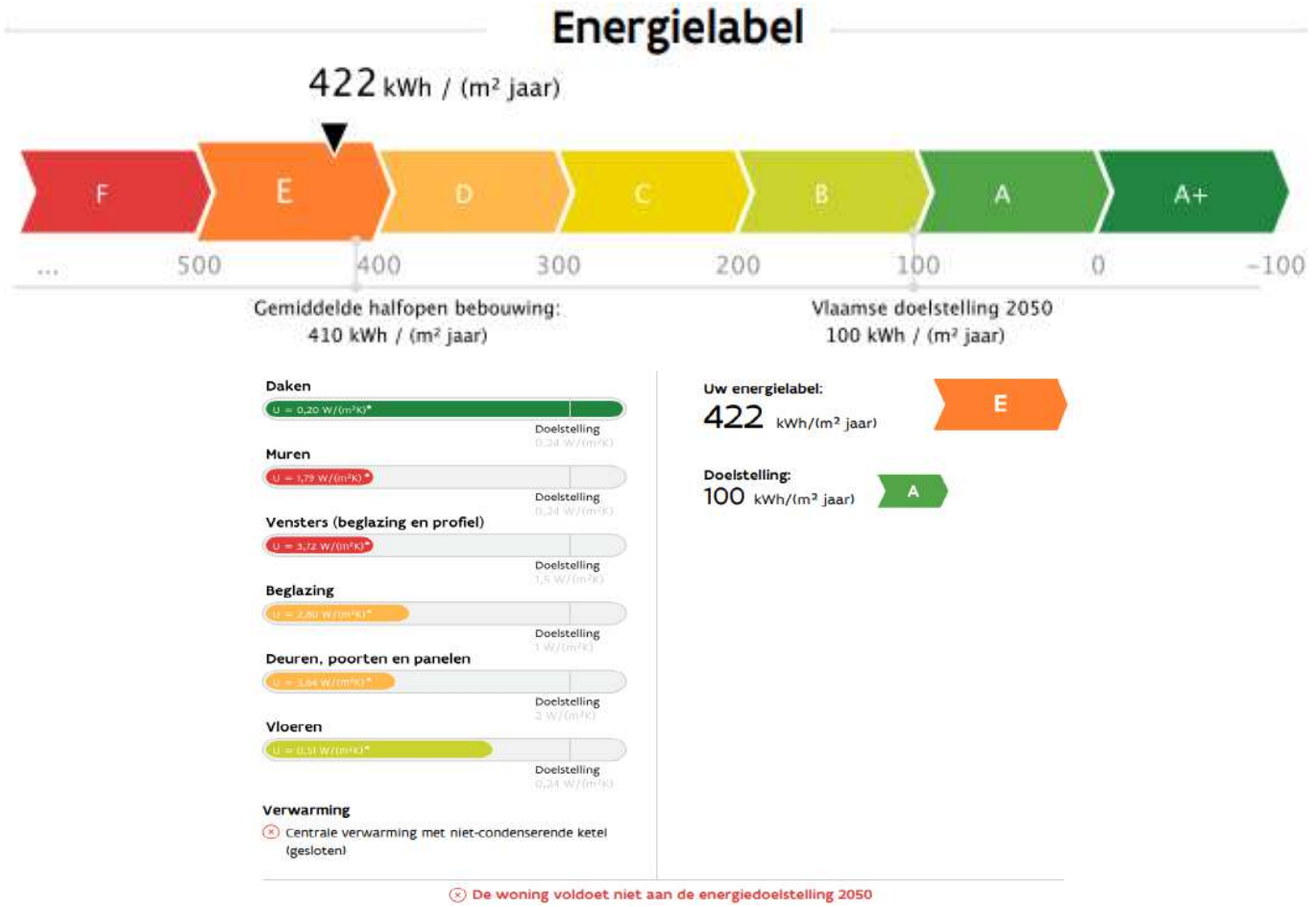
Group renovation of owner-occupant's houses in Mechelen

Ighor Van de Vyver – City of Mechelen

IEA EBC Annex 75 Workshop on Upscaling energy renovation to the district level
Delft, Wednesday 25.09.2019

Towards a decarbonising building stock in Flanders

- Ambition: decarbonised building stock by 2050



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Challenges

- 95% of the Flemish houses do not meet this target
- increase needed: renovation rate from 0.8% to 3% per year
- estimated cost of approximately 40,000 to 150,000 € per in-depth energy renovation

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nZEB district renovation to the rescue?

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energie sprong

Energiesprong Countries

Energiesprong Projects

Projects inspired by Energiesprong

California

New York State

Barriers

- Energy savings: **Performance gap** makes it difficult to make a succesful bussiness case
- **Investment cost**: homeowners are difficult to convince to invest > 40.000 €
- Owner structure (**individual homeowners**) is a barrier for district renovation

Experiences in Flanders…

Group renovation in Leuven

- Neighbourhood with same building typology
- Renovation package based on this typology
- Result: Only one renovation…

City-zen Fuck-up Night, geleerde lessen #1: Klimaatneutraal worden begint bij de bewoners – maar ze gaven niet thuis

De Fuck-up Night in Antwerpen die op 22 november '18 plaatsvond, was een avond waarin falen gevierd werd. In het verlengde daarvan lanceren we een serie van drie verhalen over de geleerde lessen bij het maken van fouten. Lees, huiver en doe er je voordeel me; fouten die je niet meer hoeft te maken

Klimaatneutraal begint bij de bewoners thuis – *maar ze gaven niet thuis*

Geert Vanhorebeek houdt zich bezig met het programma 'Leuven klimaatneutraal in 2030'. Met als doel Leuven bewust te maken: minder uitstoot en duurzamer gedrag. Het doel was een collectief renovatieproject op te starten: buurten informeren, bewoners stimuleren om duurzame energiemaatregelen te nemen. Maar ook schaalvoordeel behalen; zoveel mogelijk inwoners bereiken. In totaal waren acht potentiële homogene wijken geïnventariseerd voor het betreffende project.

Het proces in 5 quotes…

#1
"Uiteindelijk hebben we twee homogene wijken op ons buikgevoel uitgekozen. In deze wijken hebben we goed uitgepakt, onder andere met een mobiel energieloket en renovatie begeleiders. Maar wat bleek; in de homogene wijk, was geen sprake meer van gelijke woningen. Een groot gedeelte van de woningen waren allang weer verbouwd. Zo zie je dat de praktijk vaak anders uitwijst dat de theorie."

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Esdoornplein

- Neighbourhood (street) in sub-urbs of Mechelen
- 44 single family homes
  - Majority owner-occupied
  - Building age < 1970 (1958)
  - Row-houses, semi-detached
- Awareness-raising campaigns revealed highly motivated citizens with interest in improving the energy efficiency of their home(s)

Maak kennis met de eerste klimaatstraat in Mechelen

"Ons doel? Een klimaatneutrale wijk worden"

In het Esdoornplein, een wijk met 44 quasi identieke woningen, nemen Bram en zijn buren het voortouw om samen duurzaam te renoveren. Van lampen en vensters tot daken en gevels: al wie wil, doet mee.

Bram: "In 2016 kwam het idee van zo'n gezamenlijk energiebesparend renovatieproject ter sprake op een samenkomst van Mechelen Klimaatneutraal. Onder meer onze wijk leek daar erg voor geschikt. Zonder veel aarzelen hebben we heel de wijk en een aantal mensen van Mechelen Klimaatneutraal opgetrommeld voor een kick-offsessie. Meteen bleek dat de helft van onze wijk geïnteresseerd was. 'Als we de planeet willen helpen, moeten we zelf iets ondernemen', was het algemene gevoel."

Stap voor stap

"Om te beginnen hebben we samen renovatieadvies aan huis aangevraagd bij de stad. Een aangename verrassing voor de meesten onder ons, want zo bleek onder meer dat er winst te boeken viel met vrij eenvoudige maatregelen. Een aantal onder ons schakelden meteen over naar ledverlichting of lieten nieuwe ramen plaatsen."

"Voorts bleek dat een aantal van onze daken niet zo goed geïsoleerd waren. Vooral dakisolatie heeft een grote impact op je energieverbruik, moet je weten. Dus hebben we gezamenlijk aannemers aangeschreven en daaruit eentje gekozen. Voor aannemers is het interessant om bij meerdere mensen de klus uit te voeren, wat betekent dat hun offertes wat lager liggen dan anders."

"Momenteel bekijken we wat mogelijk is op vlak van gevelisolatie. Onze gevels dateren namelijk van 1958, da's toch al eventjes. Als ook dat erop zit, zijn de buitenlagen van onze woningen in orde: dat scheelt een slok op de borrel."

Dankjewel, coach

"De buurtsubsidie die we kregen van Mechelen Klimaatneutraal investeren we deels in bewustwording en communicatie en deels in begeleiding van een coach.

> "De coach maakt ons het leven veel makkelijker"

Die coach is echt een grote steun. Hij gaat bij iedereen langs, maakt een bestek op, contacteert aannemers, onderhandelt met hen een groepskorting, hij stelt die voor, vraagt vergunningen aan ... Dat maakt het voor ons veel makkelijker en laagdrempeliger."

"Dat onze woningen bijna identiek zijn, is handig voor onder meer vergunningen en technische tekeningen. Als die voor de eerste woning al gemaakt zijn, kan je de tweede bij wijze van spreken bijna 'copy-pasten'. En het creëert ook een synergie. Zo'n collectief gevoel van 'laat ons zelf iets ondernemen en het goede voorbeeld zijn'. We hopen andere wijken te inspireren, en de kennis die we opdoen gaan we uiteraard gretig delen."

10

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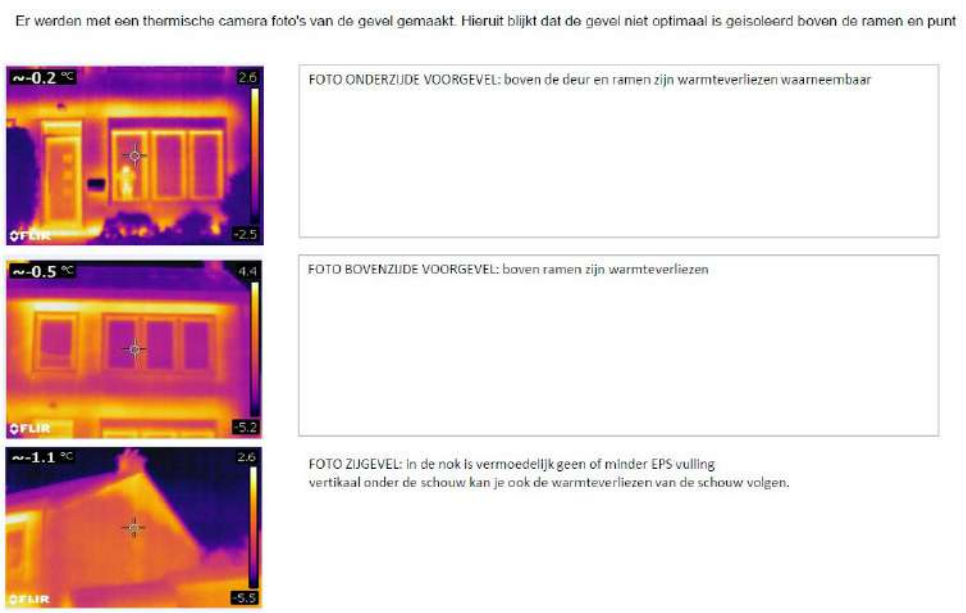
Home renovation

- Initially: interest in **home improvement**
  - Home-visits with free renovation advice ca. 10#, resulting in:
    - Roof insulation (4#)
    - LED-relighting



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Group renovation

- Next step: **group renovation**
  - Ca. 10# households interested
- Neighbourhood subsidy
  - Financial support Mechelen Klimaatneutraal (3.750 €)
  - Neighbourhood initiatives for climate action
- NZEB-coach
  - System launched by DSO Fluvius (Eandis – Infrax)
  - Technical assistance for energy renovation measures
  - Grant: min. 10 households, €400 per household

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Maar wat doet zo'n BENOvatiecoach precies?

ADVIES

Begin je best met een nieuwe condensatie-ketel, of met dakisolatie? Wat je ook doet, start niet in het wilde weg, maar vertrek van een duidelijke visie.

De BENOvatiecoach staat je bij voor het opstellen van jouw BENOvatie- traject, om onaangename verrassingen te vermijden.

En vergeet niet dat er tal van ondersteunings-maatregelen zijn: premies, subsidies, energieleningen,... ook hier kan de BENOvatie-coach je helpen.

PLANNEN

Wil je meer details over bepaalde werken? De BENOvatiecoach gaat voor jou op zoek naar offertes.

Let wel op: elke offerte is anders! Er zitten vaak verrschillen in de opmetingen, materiaal-keuze, technieken... Samen met de BENO-vatiecoach analyseer je de offertes, zodat je duidelijk weet wat er gedekt is, en vooral wat er niet inbegrepen is.

Nog niet overtuigd? Dan zoekt de BENO-vatiecoach verder, tot je genoeg informatie hebt.

UITVOERING

Is de beslissing genomen? Ga je voor de uitvoering van één of meerdere energie-besparende ingrepen? Super, gefeliciteerd! Je hebt net de juiste keuze gemaakt om jouw woning klaar te maken voor de toekomst!

Nu wordt het spannend! Zijn er duidelijke afspraken met de aannemer(s)? Worden de werken uitgevoerd zoals neergeschreven in de offerte? Is de materiaal-keuze correct? Zijn er zaken over het hoofd gezien? Worden er "onvoorziene meer-werken" uit de mouwen geschud? Dit moet tijdens de werken goed opgevolgd worden.

De BENOvatiecoach houdt contact met de aannemers, en bezoekt geregeld de werf. Zo blijft alles onder controle.

PREMIES

De werken zijn uitgevoerd, we kunnen opgelucht ademhalen. De factuur is betaald, alles is terug schoon gemaakt. Maar je hebt natuurlijk nog recht op een aantal premies! Waar te beginnen? Welke premies zijn van toepassing? Hoeveel krijg je precies? Geen paniek, ook hier zorgt de BENOvatiecoach ervoor dat de premiebedragen rechtstreeks op jouw rekening komen.

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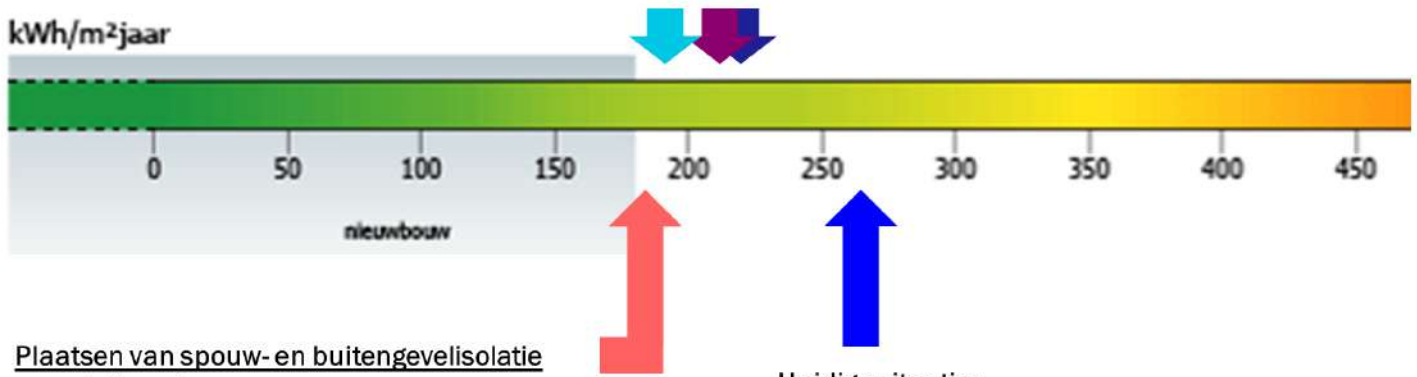
Wat is het effect van de energiebesparende maatregelen op uw EPC?



Plaatsen van spouw- en buitengevelisolatie en schrijnwerk

- Voor- en achtergevel van de "originele" woning
- R_d = 2.35 m²K/W (spouw) + 3.5 m²K/W (gevel)
- Schrijnwerk in PVC, 2+ kamers, U_g = 1.1 W/m²K

➔ EPC 191 kWh/m²jaar (-26%)

Huidige situatie:

- Zoldervloer geïsoleerd met 12 cm minerale wol
- Buitenschrijnwerk in PVC met dubbel glas
- Geen gevelisolatie
- Verwarming en SWW met condenserende HR Top ketel

➔ EPC 259 kWh/m²jaar

home 2 home

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Analyse van de offertes

Spouwmuurisolatie

- Prijzen variëren sterk per aannemer
  - [redacted] 17-19€/m²
  - [redacted] ~22€/m²
  - [redacted] 29 €/m²
  - [redacted] 24-38€/m²
- Voor sommige woningen is afbakening nodig

700 – 1400 €*
Rijwoning – voor- en achtergevel

Gevelisolatie buitenzijde

- Prijzen per aannemer zijn zeer uiteenlopend
  - Incl/Excl dakafwerking
  - Incl/Excl blauwe hardsteen
  - Incl/Excl beschermingslaag
- Invloed van het aanbrengen van isolatie is 1500-2000€ (bij rijwoningen)

3500 – 5000 €*
Rijwoning – voor- en achtergevel, geen isolatie!

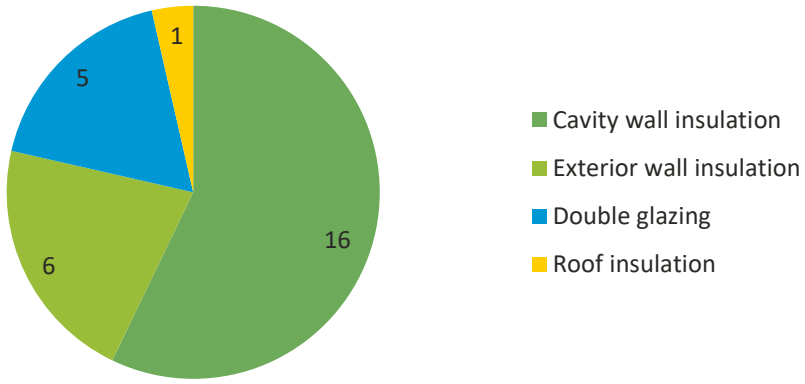
* Prijzen zijn indicatief!

home 2 home

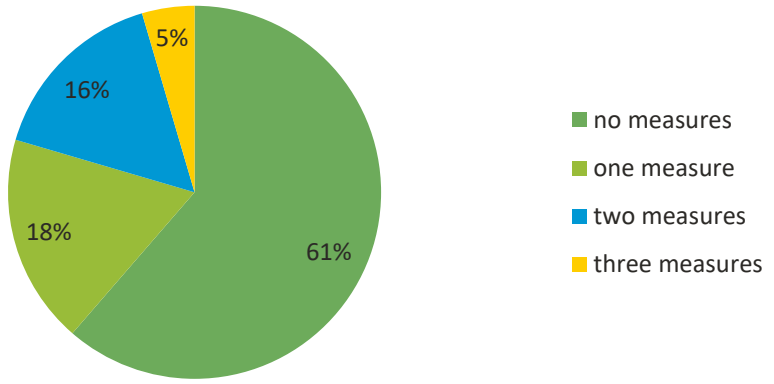
Results

- 17 participants out of 44 households
- Measures: cavity wall insulation (#13), external insulation with ETICS (#7), high performance glazing (#5), attic floor insulation
- 6 out of 17 required a building permit

 # homes per energy measure [#]



 # measures per home [%]



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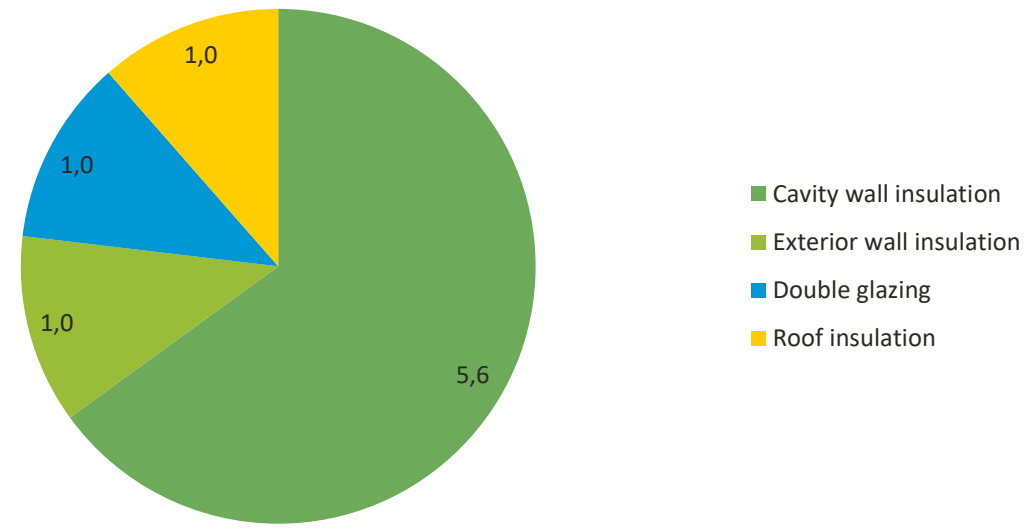
Expected impact



average	**0,51**	tCO2e/y
minimum	**0,162**	tCO2e/y
maximum	**1,638**	tCO2e/y
TOTAL	**8,64**	tCO2e/y

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Support from the local authority

- Information and advice
  - Info-sessions
  - Mobile pop-up
  - Home-visits with technical advice and thermograph
- Financial support
  - Neighburhood initiatives (€3 750)
  - Energy loan 1% (for 4 households)
- Technical support
  - NZEB-coach
  - Building permit

Conclusions

- **More than one third** of the inhabitants participated in the project (>33% compared to renovation rate 3%)
- Reflections
  - Renovation rate: only captures #building permits
  - No deep renovation => but increased chance to engage homeowners => do not only focus on deep renovation
  - Same building typology (BUT: nice-to-have or must-have?)
- Success factors
  - Highly motivated citizens with good group dynamic
  - Client-focused NZEB-coach
  - Facilitation from local authority
- Building further on the success factors…

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Integrated approach: supporting the whole customer journey

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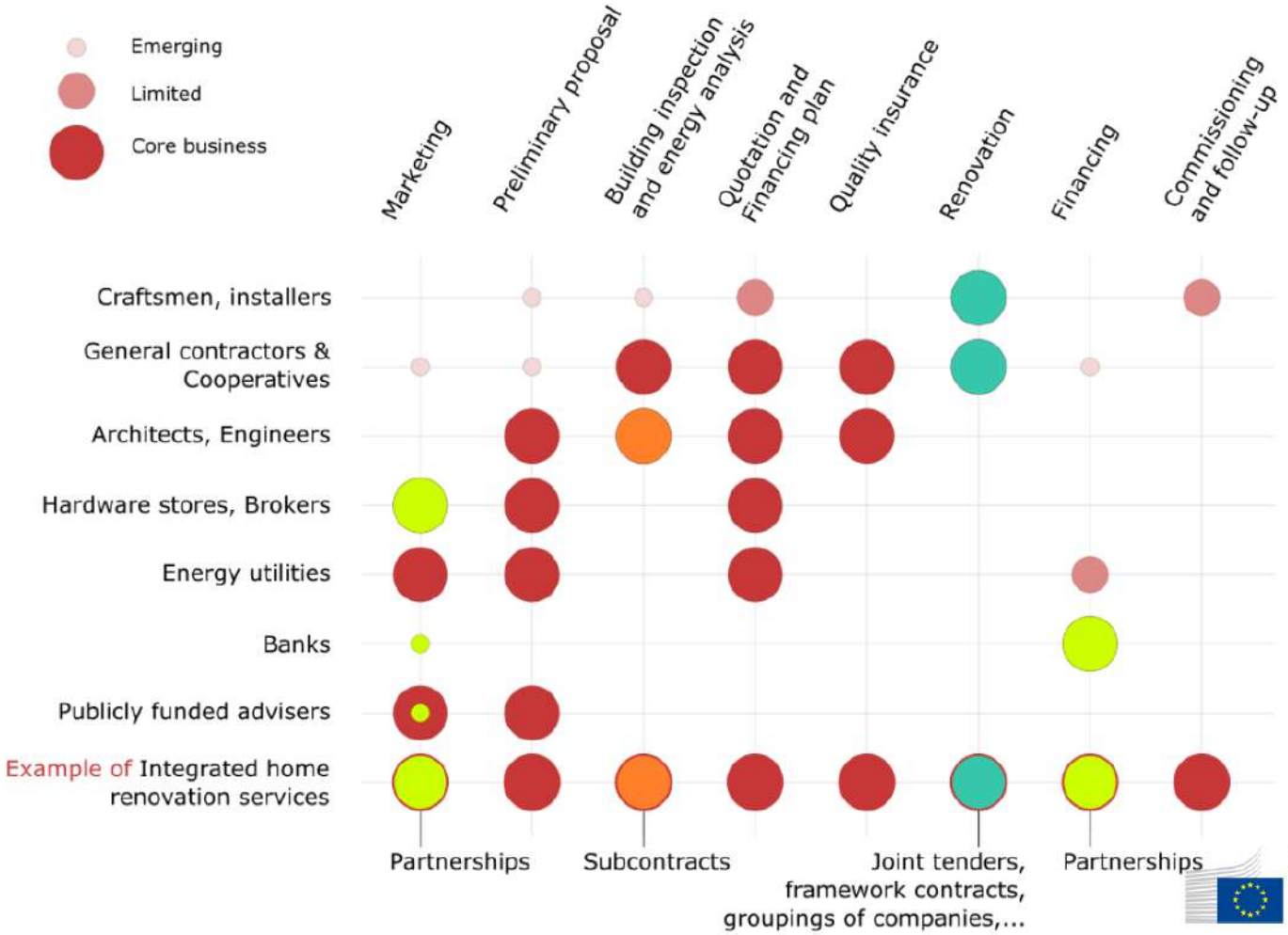
Integrated approach: Towards a one-stop-shop



European Commission

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Group approach: empowering neighbourhoods + collective support

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Thank you

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- W www.mechelenklimaatneutraal.be | http://www.triple-a-interreg.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme

The role of ESCO's in large scale renovation

Factor4, Johan Coolen

Delft, September 27th 2019

This project has received funding from the European Union's Horizon 2020 research and innovation programme

Agenda

- Factor4
- EPC why
- EPC how
- EPC further improvements
  - Quality standards
  - Residual value
  - Circular materials

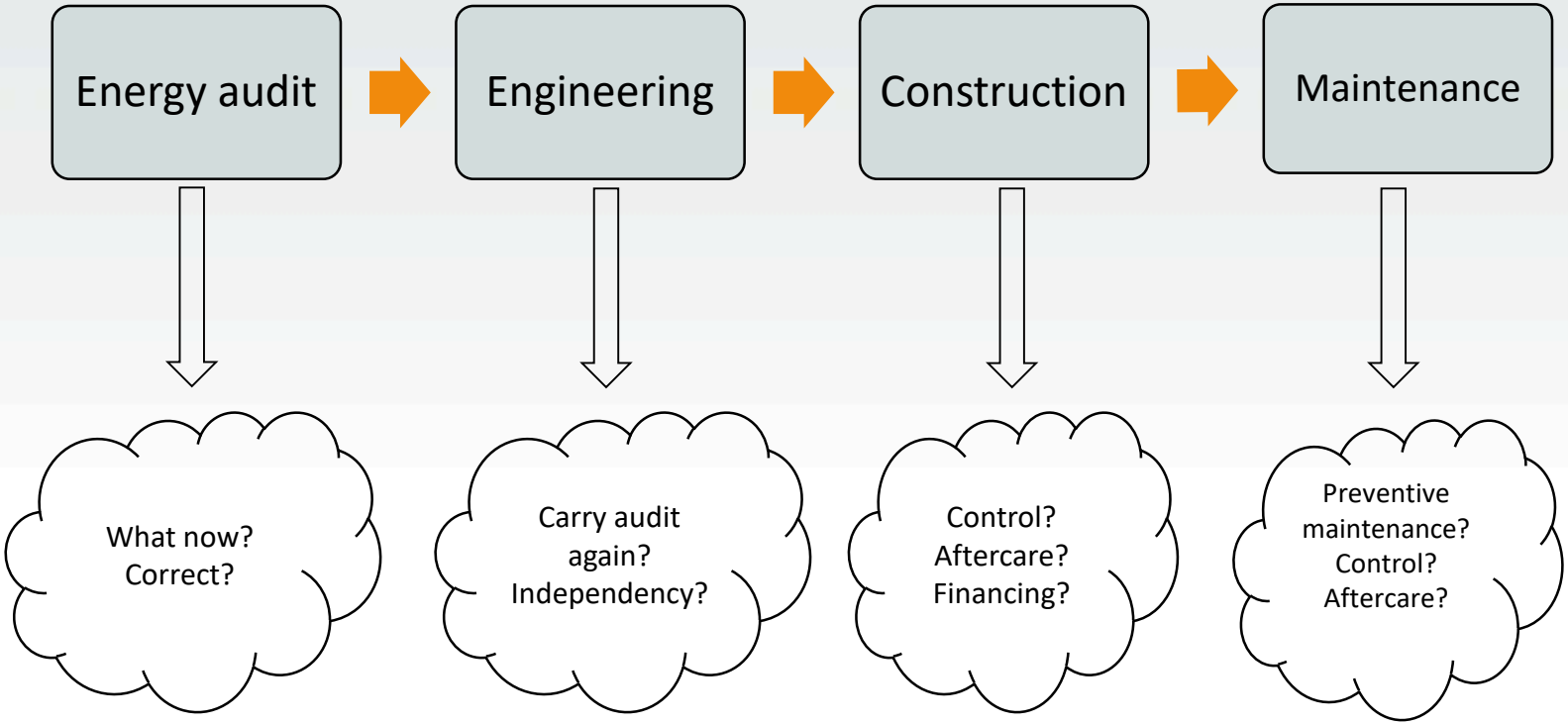
This project has received funding from the European Union's Horizon 2020 research and innovation programme

Factor4

- **Building Performance Consultants**
  - Since 2006
  - 10 senior experts, Belgium
- **Scope**: improve building performance of existing buildings*:*
  - Energy
  - Maintenance
  - Comfort
  - Circular materials
- **Approach**: performance based implementation via energy performance contracts ('EPC')
  - Facilitator of EPC contracts : public sector
  - ESCO in private sector (SMEs)

This project has received funding from the European Union's Horizon 2020 research and innovation programme

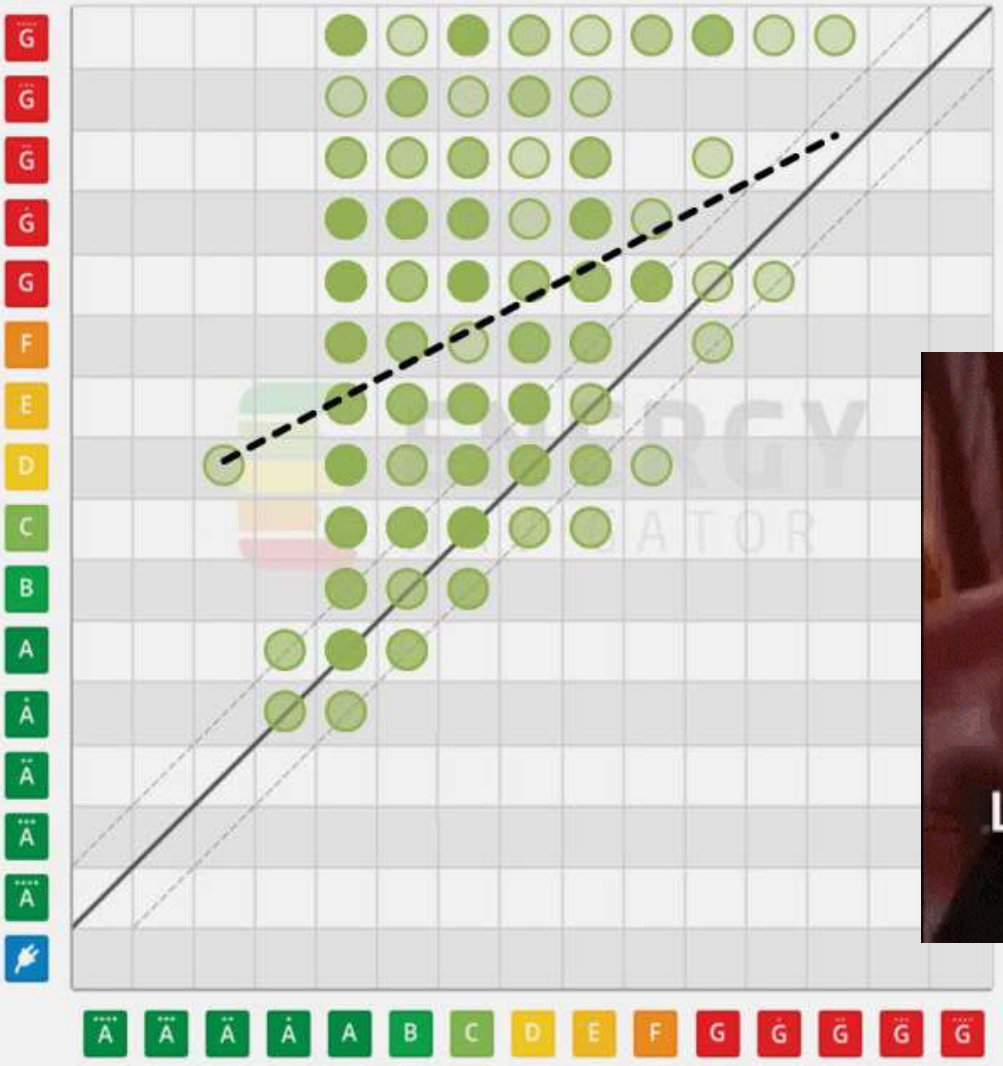
EPC why?



Cost inefficient and only small part of energy saving potential realised...

This project has received funding from the European Union's Horizon 2020 research and innovation programme

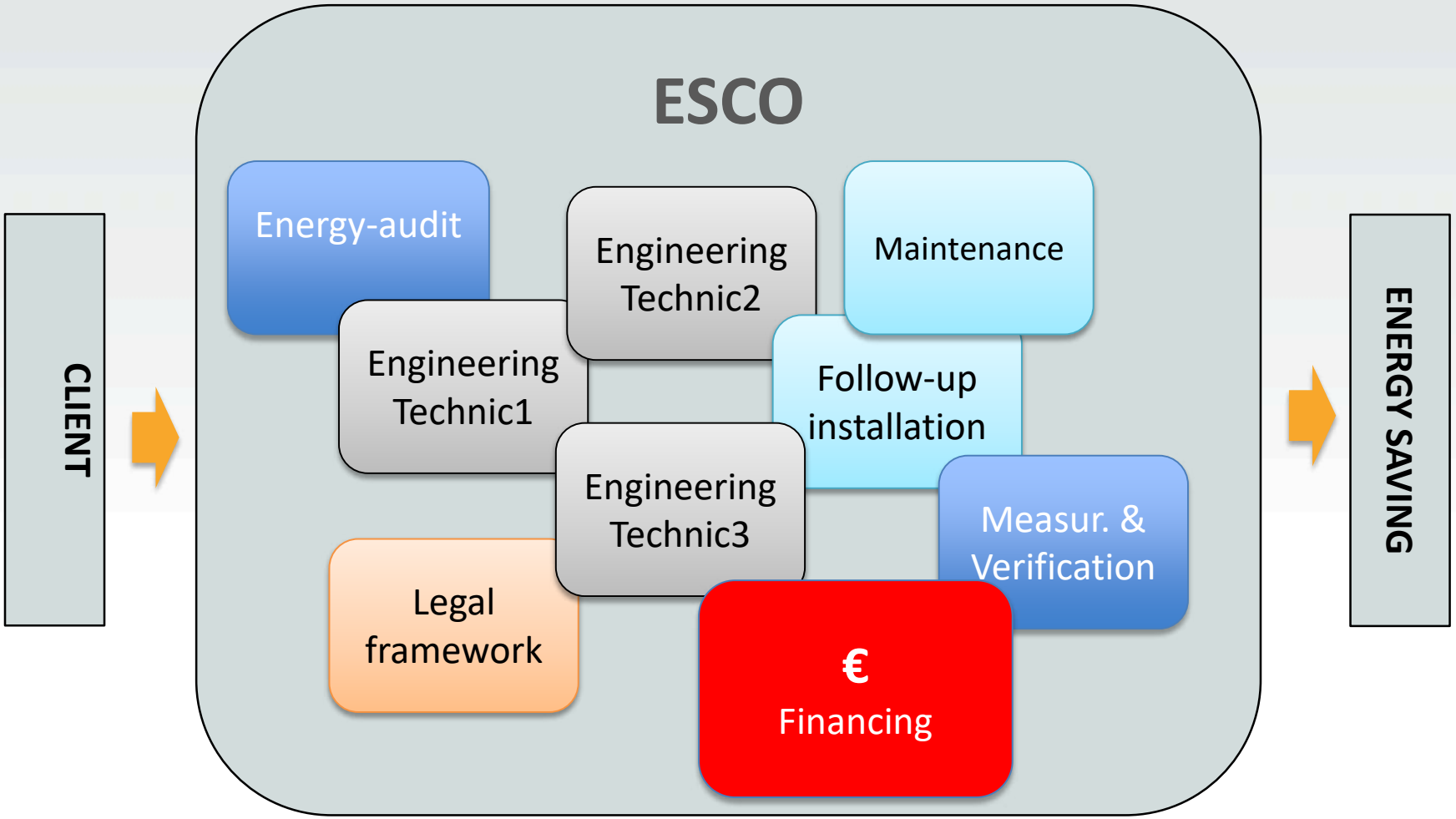
EPC why?



Energiebenchmark van 234 kantoorgebouwen (2015 t/m 2018) door e-nolis/ENGIE in Nederland (2018)

This project has received funding from the European Union's Horizon 2020 research and innovation programme

EPC how



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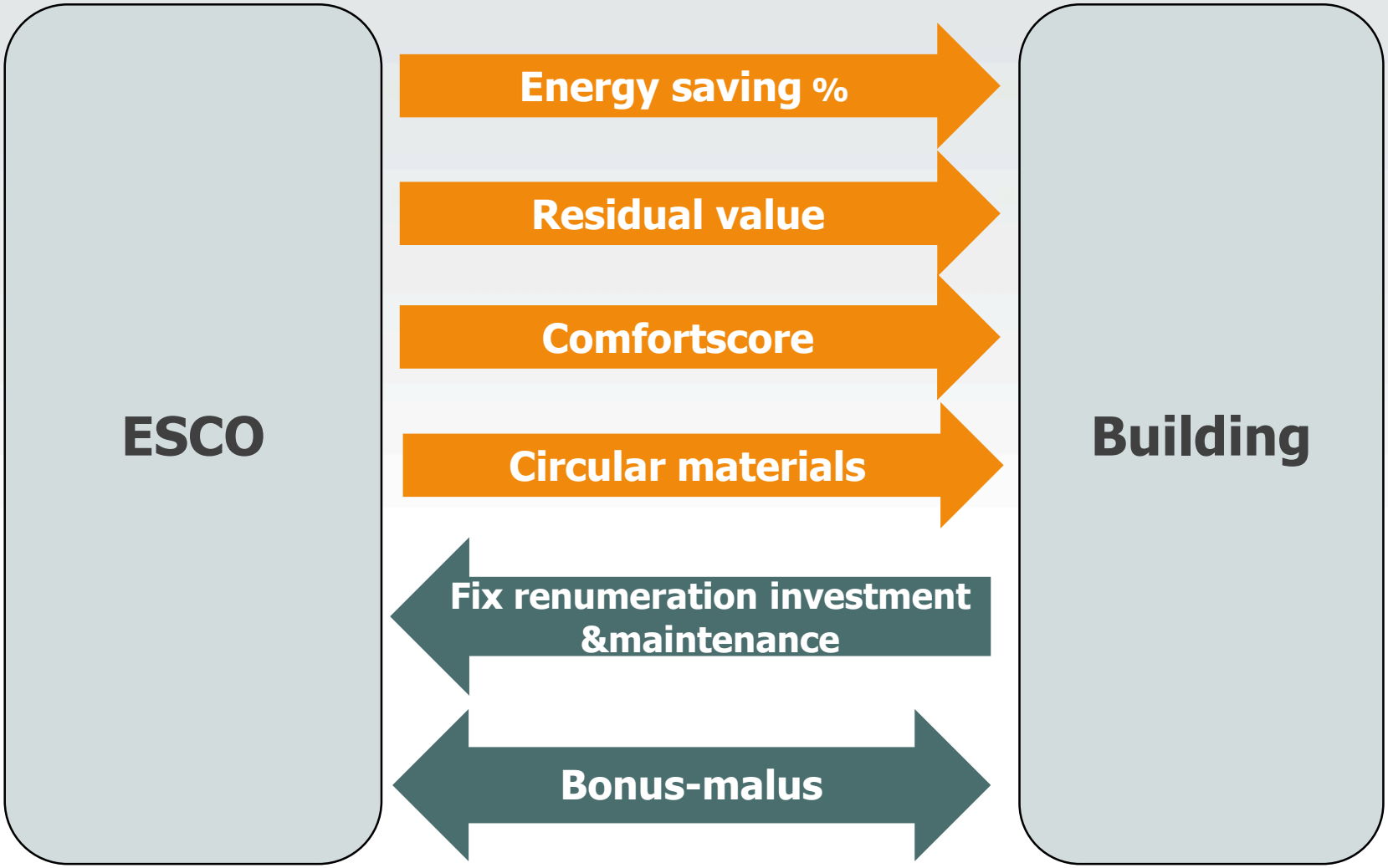
EPC how



Source: Factor4, 2019

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EPC how

- Two types of performance based contracts

Name	ESCO guarantees…	Example
EPC Energy performance contract	**…energy saving%** e.g. 35% energy cost saving	stad Sint-Niklaas EPC-contract 9 municipal buildings (44.000 m², energy cost 520k€/year) of City of Sint-Niklaas
ESC Energy supply contract	**… fix price per unit supplied energy** e.g. fix price per unit supplied thermal power (MW_{heat}) and heat (MWh_{heat})	VUB VRIJE UNIVERSITEIT BRUSSEL ESC contract 24 MW district heating plant of University campus VUB in Brussels

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EPC how

- Easiness of application of performance-based contracts in case of 'energy renovation on the district level '?

	Residential buildings	Non-residential buildings
EPC guaranteed saving on heating, cooling and/or electricity	👍 Points of attention: • Limit transaction costs -> many decision makers (unless housing corporation) • How to control/influence energy consumption behaviour of building users? Big market potential!	👍👍👍
ESC supply of heat, cooling and electricity	👍👍👍	👍👍👍

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EPC how

Compared to conventional contracting:

- ✓ Up to 3x more energy saving per € investment thanks to performance based contracting
- ✓ Up to 2x less facilitation costs, internal staff ánd external consultant/engineer

-> and significant further improvements are possible!

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EPC further improvements: quality standards

Main objectives QualitEE:

- Development of quality assurance standards of EPC
  - Technical Quality
  - Financial Quality
- Increased trust in EPC by clients and financers
- Easier financing and more EPC-projects

QualitEE

More info: www.qualitee.eu/be

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EPC further improvements: quality standards

9 Technical quality assurance criteria of EPC-projects

QC-1	Adequate **analysis**
QC-2	Quality of **implementation** of technical EE improvement measures
QC-3	Savings **guarantee**
QC-4	Verification of energy savings (**M&V**)
QC-5	**Value retention** and maintenance
QC-6	**Communication** between the EES provider and the client
QC-7	Compliance with us**ers' comfort** requirements
QC-8	Information and **motivation of users**
QC-9	**Comprehensible contractual** stipulations

-> verified via 38 assessment criteria

More info: www.qualitee.eu/be/publications/draft-guidelines-of-european-quality-criteria

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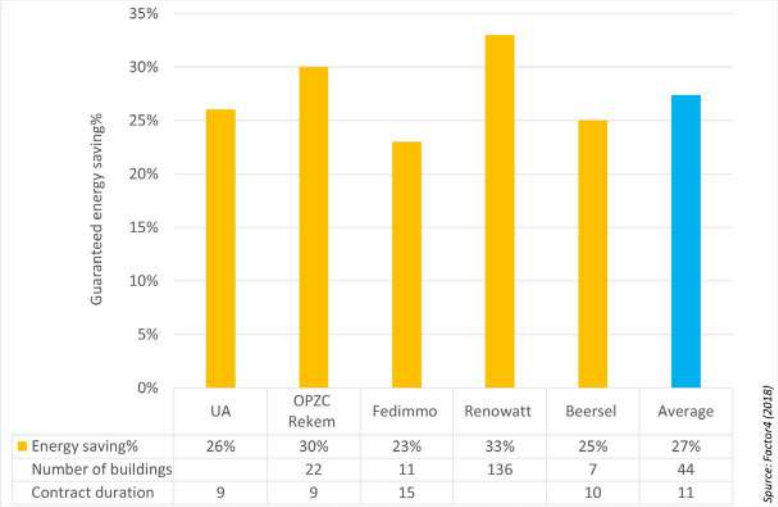
EPC further improvements: residual value

The problem:

- EPC-projects until now: only ±27% energy saving…
- Mainly technical measures (HVAC, lighting,…), almost no insulation measures

☹ *insulation measures are crucial for realising climate neutral buildings…*



	UA	OPZC Rekem	Fedimmo	Renowatt	Beersel	Average
Energy saving%	26%	30%	23%	33%	25%	27%
Number of buildings		22	11	136	7	44
Contract duration	9	9	15		10	11

The solution:

- Create incentive for ESCO for proposing measures with lifespan of 30 years

? *but how to do it within a reasonable contract duration, ie ± 10 years?*

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EPC further improvements: residual value

Conditie 3

56105 CV-leidingen onderstation

onderstation

K2GV01 Verval tussen 50%-75% van de levensduur

Ernst	Intensiteit	Omvang	Conditie	Risico/prioriteit
Gering	2	5	3	Gebruik en bedrijfsproces - matig effect Technische vervolgschade - matig effect

Activiteit:	2020	Hvh	Totaal
Herstellen		80,00 m1	€ 1.000

enige tekenen van corrosie geconstateerd. niet ernstig, incidenteel.

Conditie 2

56101 CV-expansievat voorschakelvat

onderstation

K2GV02 Verval tussen 75%-87,5% van de levensduur

Ernst	Intensiteit	Omvang	Conditie	Risico/prioriteit
Gering	2	4	2	Gebruik en bedrijfsproces - matig effect Technische vervolgschade - matig effect

Activiteit:	2026	Hvh	Totaal
vervangen expansievat		1,00 st	€ 2.050

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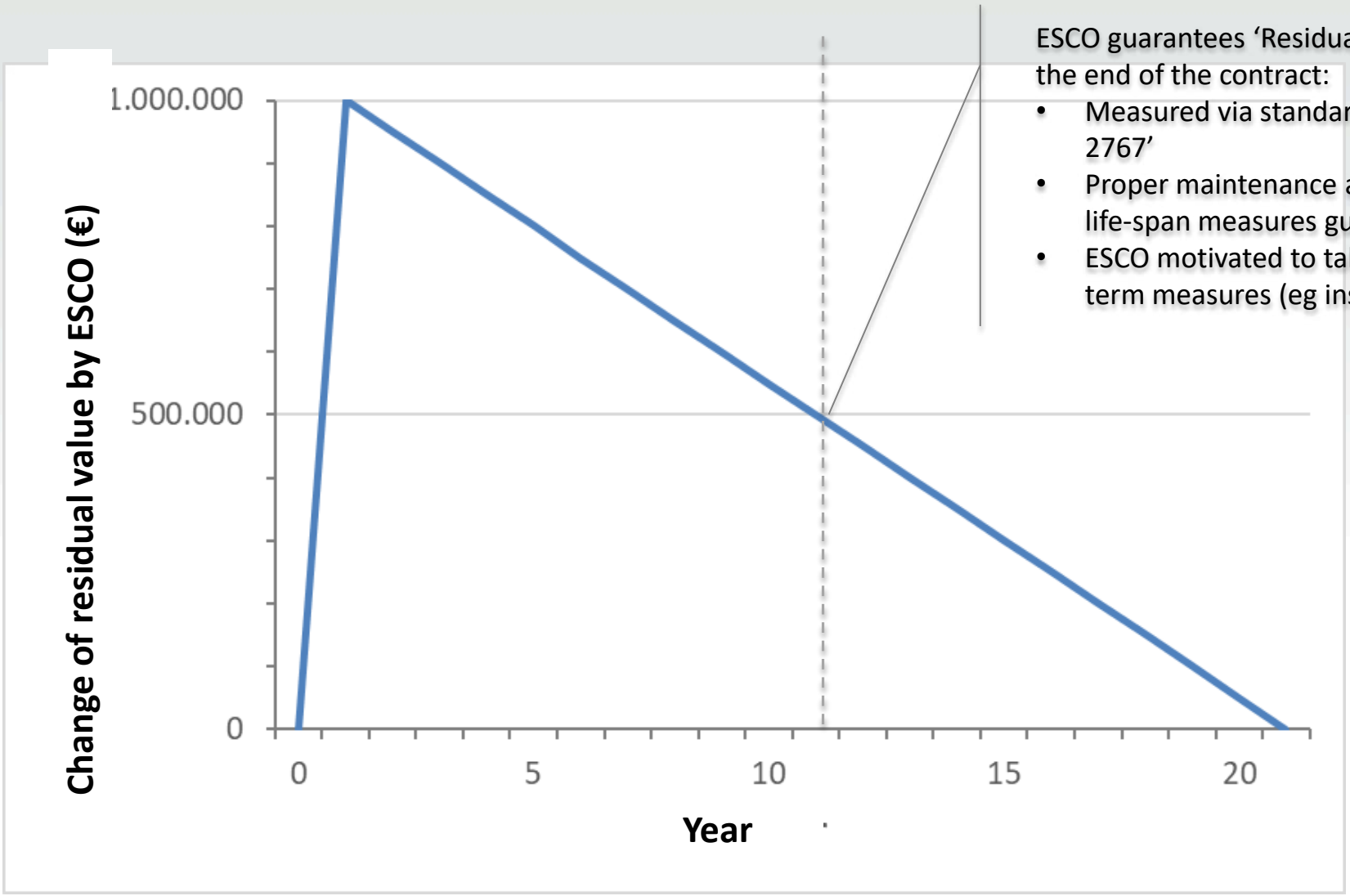
EPC further improvements: residual value



ESCO guarantees 'Residual value' at the end of the contract:

- Measured via standard 'NEN 2767'
- Proper maintenance and long life-span measures guaranteed
- ESCO motivated to take long-term measures (eg insulation)

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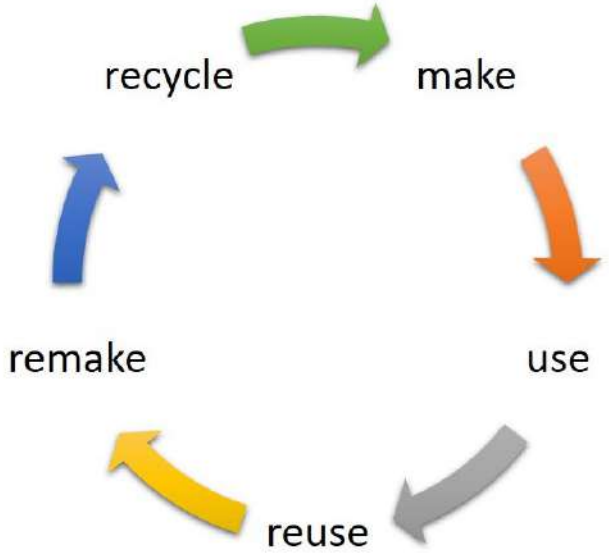
EPC further improvements: circular materials

Performance criterium: **environmental impact** of elements installed (e.g. pump, boiler, insulation material,…) =

- ~ Environmental cost of materials during production
- ~ Demontability, reusability and recyclability of elements



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Questions?

This project has received funding from the European Union's Horizon 2020 research and innovation programme

Questions?

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Contact

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Business Model, Political Instruments and Stakeholder Dialogue

Refurbishment on district level with simple owner structure

by taking the example of Salzburg city

DI Patrick Lüftenegger
Institute for spatial planning and housing
City of Salzburg, Austria

patrick.lueftenegger@salzburg.gv.at

SIR - Salzburger Institut für Raumordnung und Wohnen

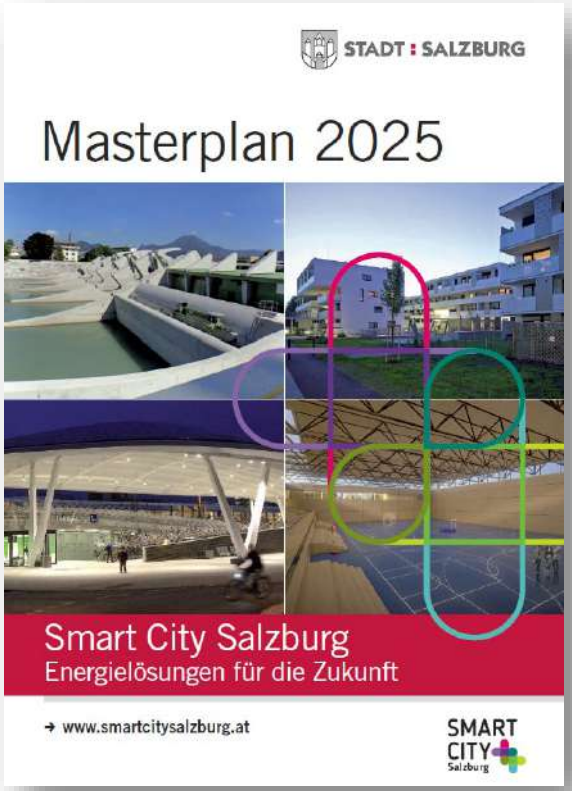
institute for spatial planning and housing

Consultant for all municipalities in the political district of Salzburg

- research, surveys, frame conditions
- information work, shaping of political ideas
- implementation of demonstration projects

For city of Salzburg we developed a Smart City Masterplan

Important parts are: refurbishment strategy and energy in urban planning process

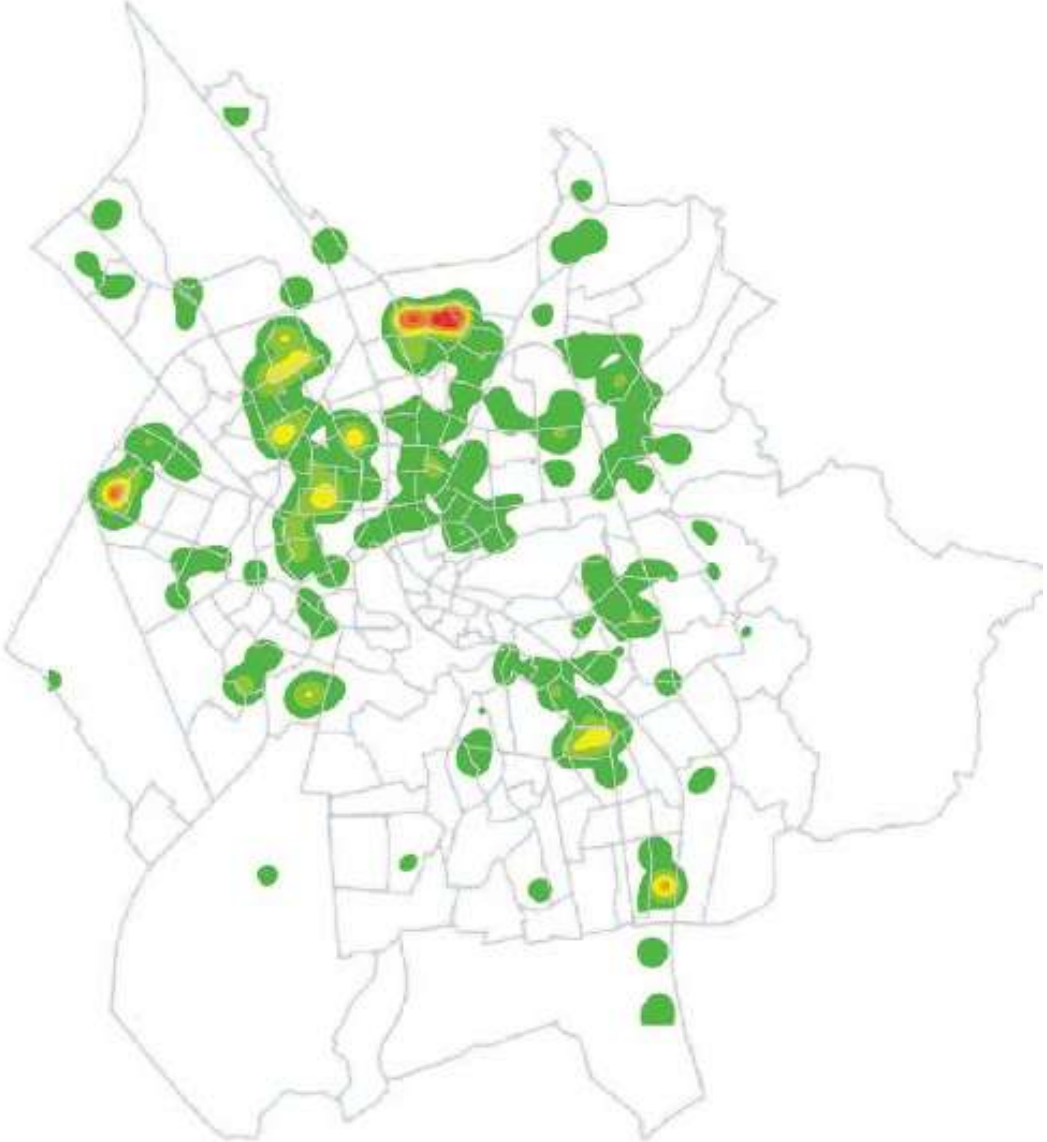


ANNEX 63

IMPLEMENTATION OF ENERGY STRATEGIES IN COMMUNITIES – PUTTING ENERGY IN URBAN PLANNING PROCESSES

Refurbishment strategy on basis of „Smart City Masterplan“

energy consumption, owner structure, age of building stock,…



…located district: Goethesiedlung

20 buildings, 1000 units, built in 1960/70

Shop, bank, cafe, kindergarten,…

Site owned by the city of Salzburg

Buildings owned by 3 social housing companies

District heat owned by the energy supplying company

…to whom shall we talk to

Residents: you have to pay more rent and will live on a construction site

Building owner: you´ll have to invest a huge amount of money to protect the environment

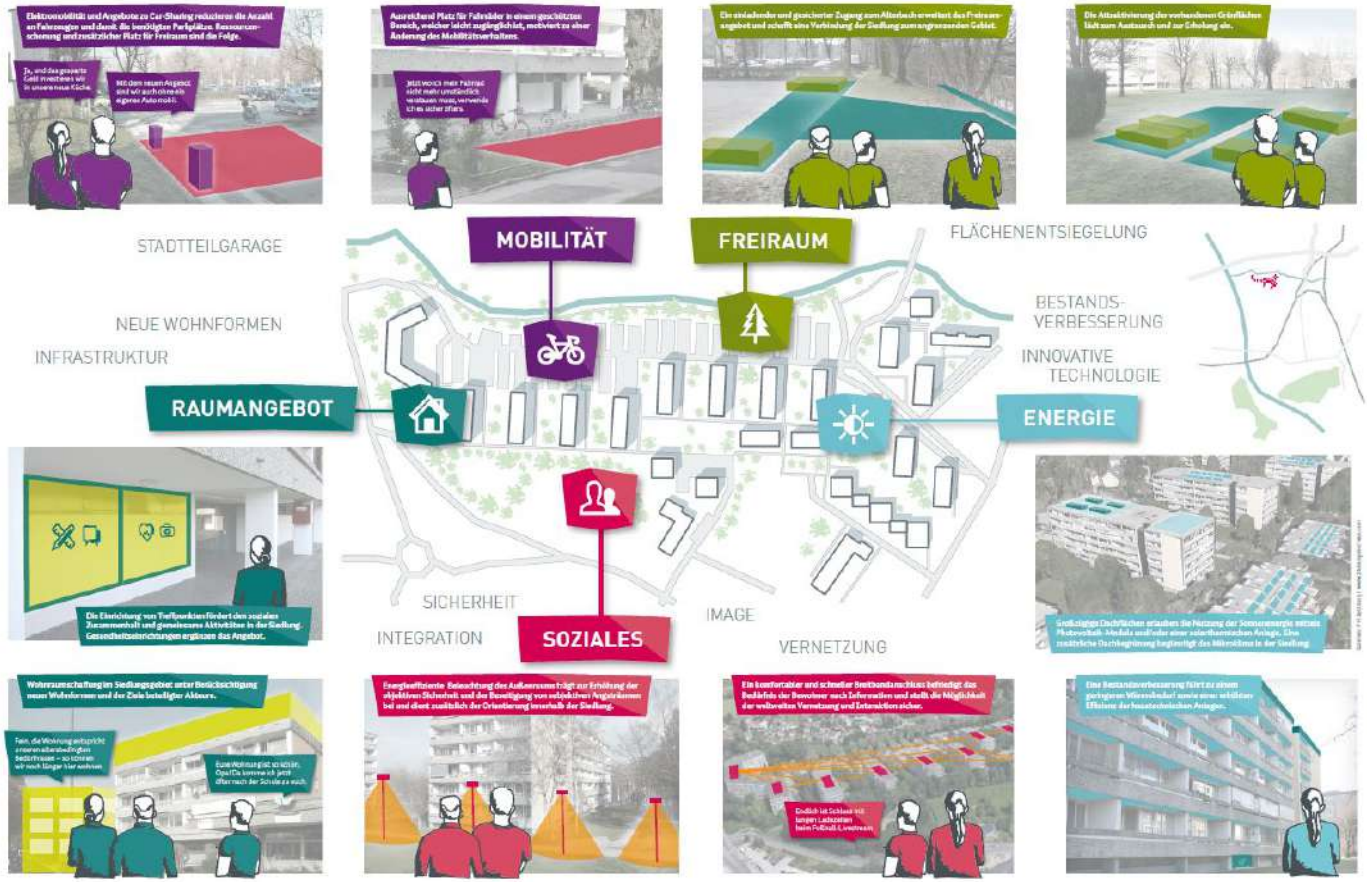
Energy supplying company: we will need just half amount of your district heat in the future because of reducing the energy consumption

Policy makers: we´ve planned a refurbishment nobody asked for but it´s good for the environment

…develop a refurbishment concept which offers some more

1. step: is the easiest

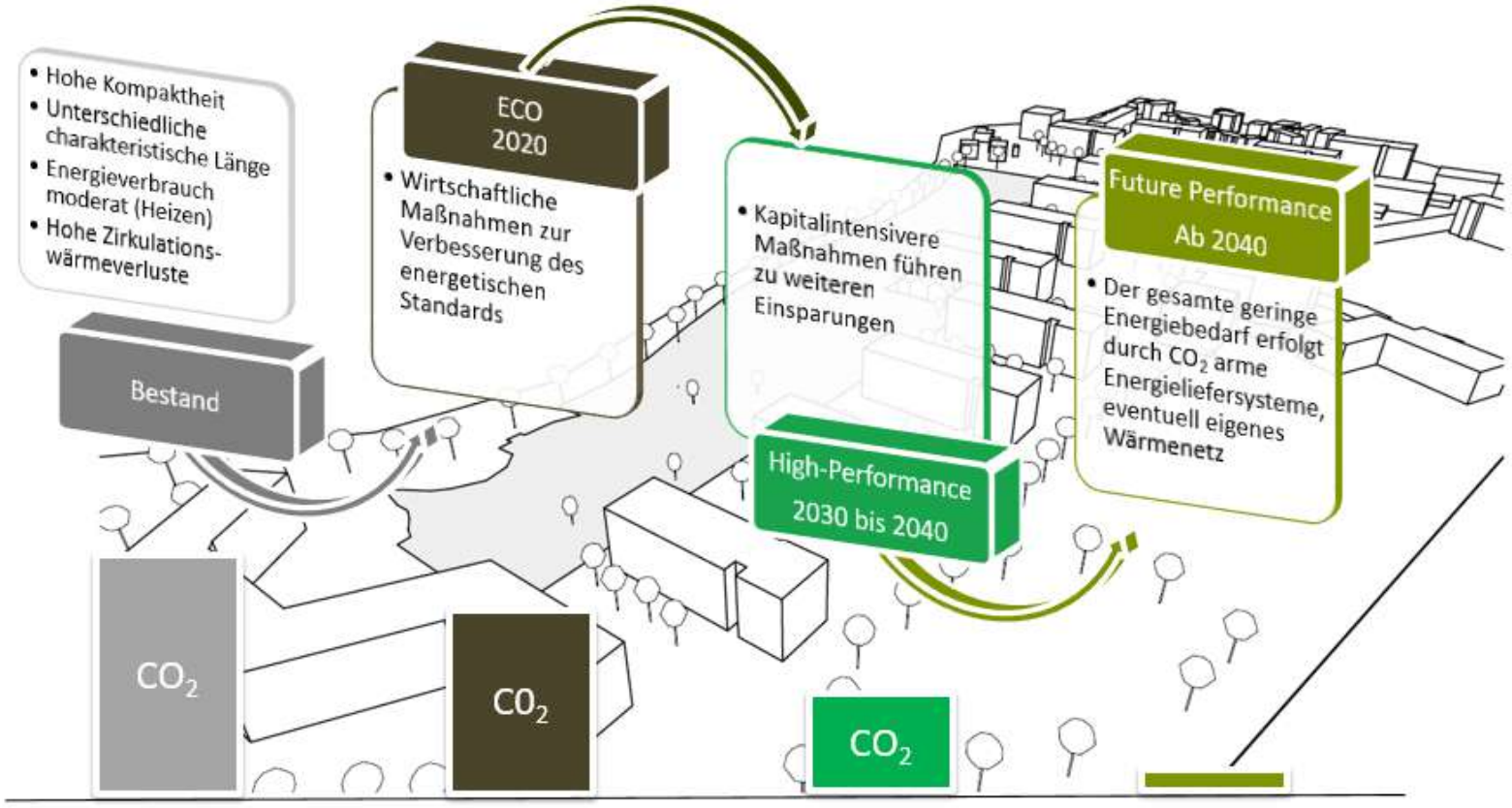
Find other reasons for refurbishment, create co-benefits and then find the right persons to talk to…



Ecology: How can climate goals be fulfilled?

2. step: not so easy

Development of scenarios depends from calculation models and used benchmarks (system boundaries, conversion factors, reference value e.g. per m² or per capita,…)

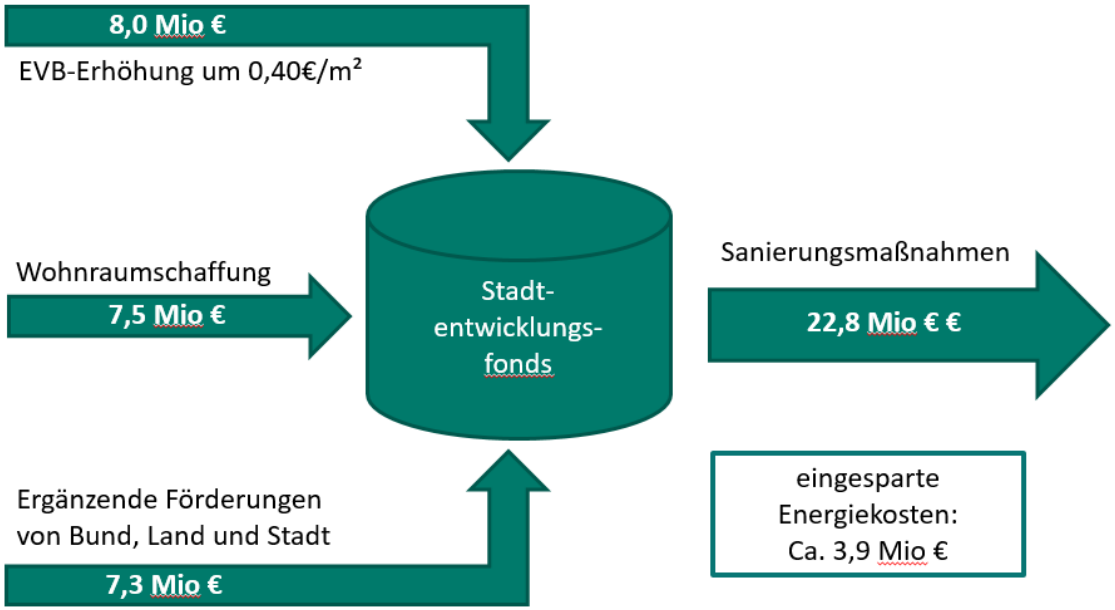


Economy: How can comprehensive concepts be financed?

3 step: makes it not easier

Economic consideration is also influenced by the calculation model and the circumstances (condition of the building stock, lifecycles of components) and there is the dilemma that the one that invests is often not the one who benefits

Who has to pay for what? Example of a district development fond



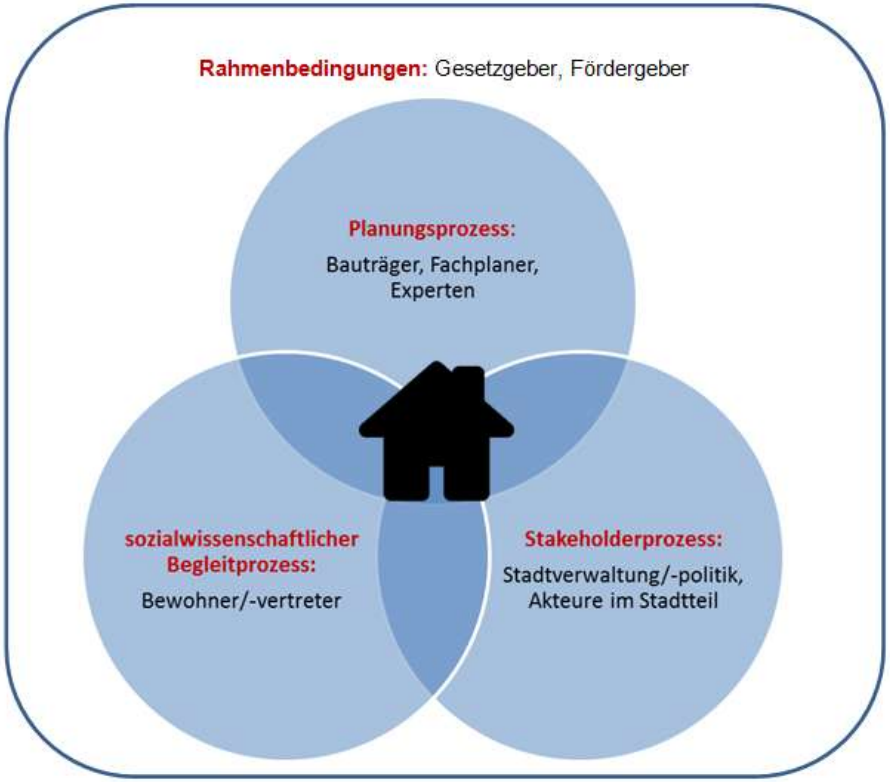
Stakeholder
Who is responsible for the coordination?

4. step – now it´s getting really difficult

Different points of view of the different stakeholders (property owners, energy supplying company, city, residents) and their individual situation can block the ideal solutions (because against personal plans, business models,…)

When process starts, a lot of parallel activities

- Stakeholder process
- Planning process
- Public participation process



<u>important</u>

Process design, communication structure,

overall coordination

…important

for district refurbishment in general: what are the triggers to get district refurbishment going (co-benefits like elevator and balcony on single building level)

for Annex: arrange agreement on calculation model (based on optimum ecologic scenarios, costs are very different and depend on business model)

for workshop "business model": what do stakeholders need to initiate a renovation, who has to pay for what, how to gain money

for workshop "policy instruments": which instruments help to initiate renovation

René Pie - September 2019

eit Climate-KIC

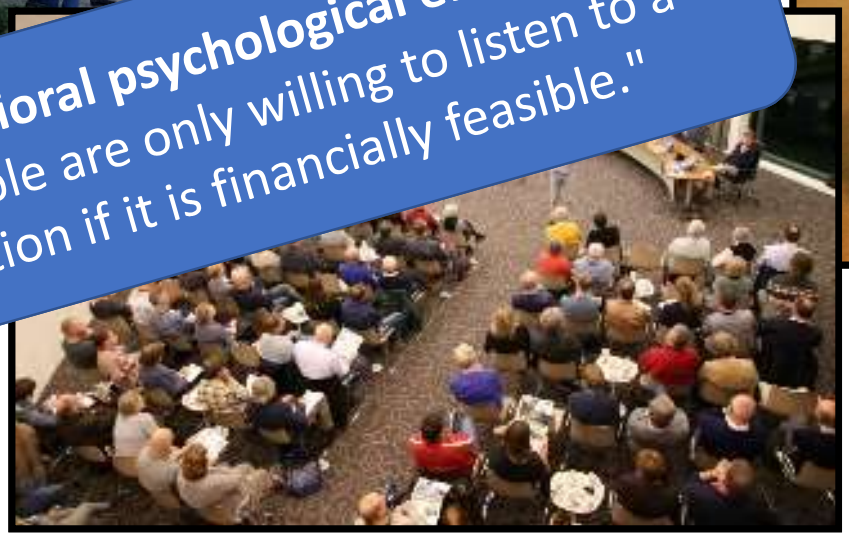
Integral team works iterative

eit Climate-KIC

Who is the customer and what is the problem?

Home owner

How can I…



Behavioral psychological effect
"People are only willing to listen to a solution if it is financially feasible."

CLIMATE MISSION
THE NETHERLANDS

Customer journey | 6 steps to energy-neutral refurbished home

1: Personal interview

2: Free refurbishment plan

3: Measuring on location

4: Quotation and financing

5: Execution

6: Monitoring and maintenance

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Open market model

Types of home owners

- Private owner / occupant
- Home owners association
- Social housing corporation
- Private landlord
- Institutional real estate investor

All individual situations with unique business cases and services

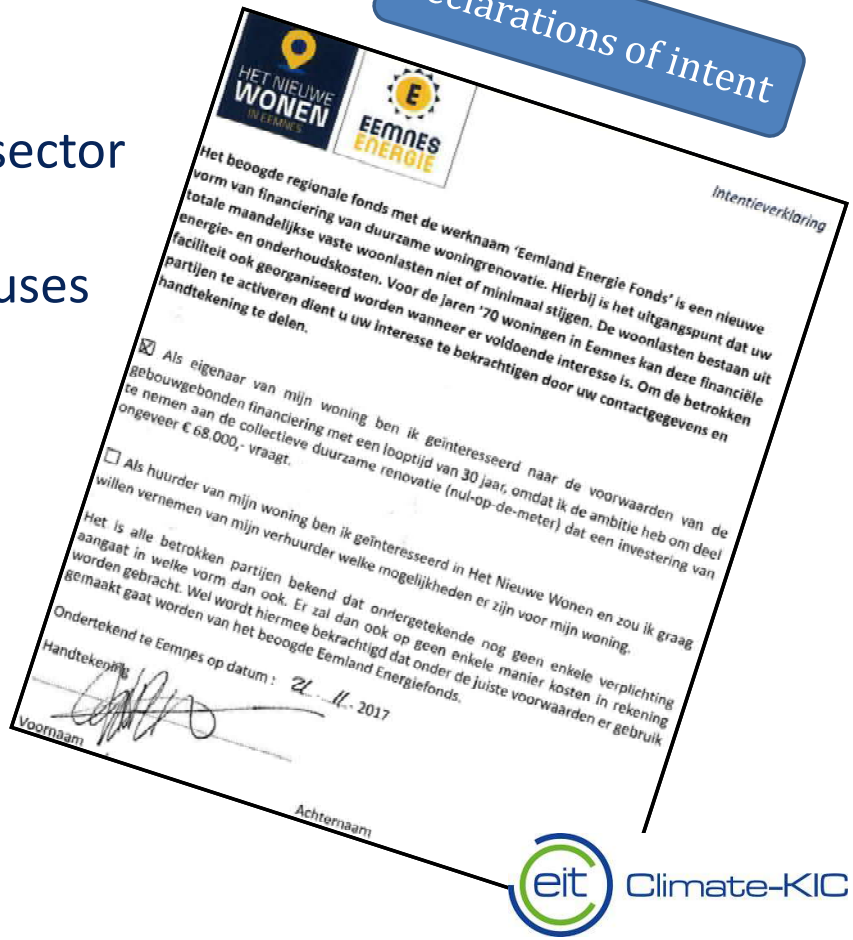
Potential energy sources

- All-electric
- Hydrogen
- Bio-gas
- District heating
- Geo thermal

Market situation as - is

- Prices are rising in the construction and installer sector
- Prefab manufacturers have/had focus on new houses
- Traditional offering based on transactions
- Not prepared for a mainstream service model
- Consultants advice but don’t take responsibility

declarations of intent


HET NIEUWE WONEN IN EEMNES

EEMNES ENERGIE

Intentieverklaring

Het beoogde regionale fonds met de werknaam ‘Eemland Energie Fonds’ is een nieuwe vorm van financiering van duurzame woningrenovatie. Hierbij is het uitgangspunt dat uw totale maandelijkse vaste woonlasten niet of minimaal stijgen. De woonlasten bestaan uit energie- en onderhoudskosten. Voor de jaren ‘70 woningen in Eemnes kan deze financiële faciliteit ook georganiseerd worden wanneer er voldoende interesse is. Om de betrokken partijen te activeren dient u uw interesse te bekrachtigen door uw contactgegevens en handtekening te delen.

☒ Als eigenaar van mijn woning ben ik geinteresseerd naar de voorwaarden van de gebouwgebonden financiering met een looptijd van 30 jaar, omdat ik de ambitie heb om deel te nemen aan de collectieve duurzame renovatie (nul-op-de-meter) dat een investering van ongeveer € 68.000,- vraagt.

☐ Als huurder van mijn woning ben ik geinteresseerd in Het Nieuwe Wonen en zou ik graag willen vernemen van mijn verhuurder welke mogelijkheden er zijn voor mijn woning.

Het is alle betrokken partijen bekend dat ondergetekende nog geen enkele verplichting aangaat in welke vorm dan ook. Er zal dan ook op geen enkele manier kosten in rekening worden gebracht. Wel wordt hiermee bekrachtigd dat onder de juiste voorwaarden er gebruik gemaakt gaat worden van het beoogde Eemland Energiefonds.

Ondertekend te Eemnes op datum : 21 - 11 - 2017

Handtekening:

Voornaam

Achternaam

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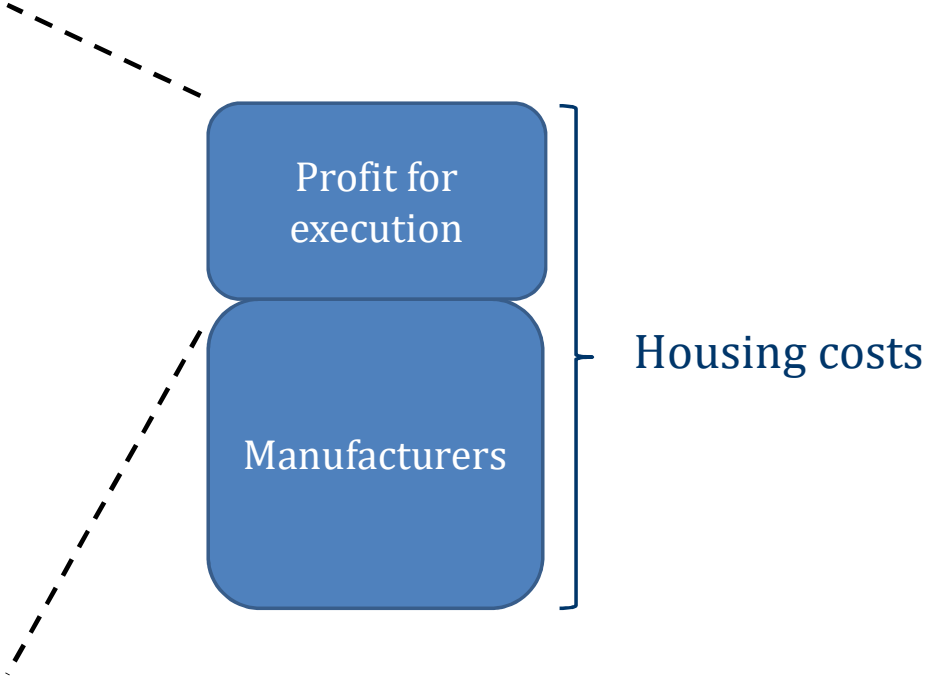
What we do different

- Home owners receive complete integrated retrofit plan
- Investment and periodic costs in one proposal
- System guarantee for 30 years
- One-stop-shop for logistics, production and waste flows
- Flexible and scalable value chain
- Home owners are ‘in control’

(not for) Profit model

- Knowledge institute and innovation
- Central facilities
- Risk fund
- Construction team
- Recruitment and training of staff
- Technical & financial plan check
- Energy counter
- Coordination with municipalities
- Management and automation



Real situation |1.600 m³ gas | 2.700 kWh electricity

Housing costs	now:	afterwards:
maintenance costs	€ 160,64	€ 321,86
raise for actual roof renovation	€ 8,68	-
maintenance / replacement installation	€ 20,36	
gas consumption	€ 84,00	
transportation costs for gas	€ 15,50	
electricity consumption	€ 45,00	€ 11,58
transportation costs for electricity	€ 19,75	€ 19,75
energy tax reduction	€ -31,11	€ -31,11
financial tax reduction	-	€ -44,59
Total	**€ 322,82**	**€ 277,49**

Proven business case!!
Based on energy consumption and maintenance costs

Home owners

- ✓ Privatly owned, Social housing, HOA, Investor

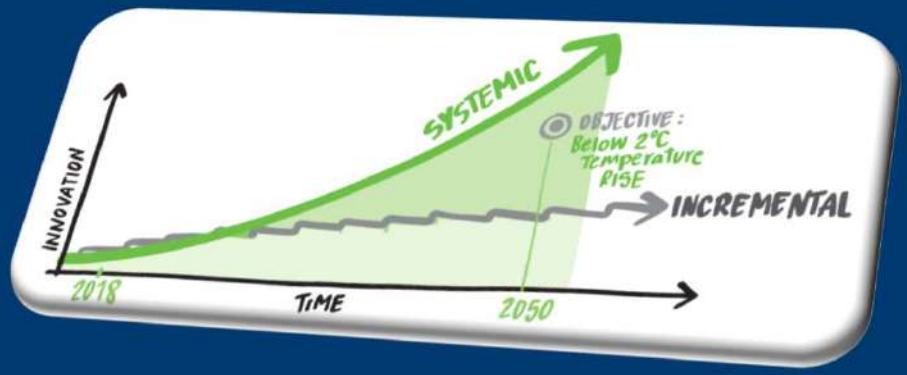
Governement

- ✓ Conditions to achieve CO_2 goals
- ✓ Energy poverty
- ✓ Market failure in the construction, installation and financial sector

Businesses

- ✓ New customers
- ✓ Logistics

'Goals are only achieved with an integral approach that provides both homeowners with expert support and financing tools and takes care of it with an excellent offer.'



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EBC
Energy in Buildings and Communities Programme

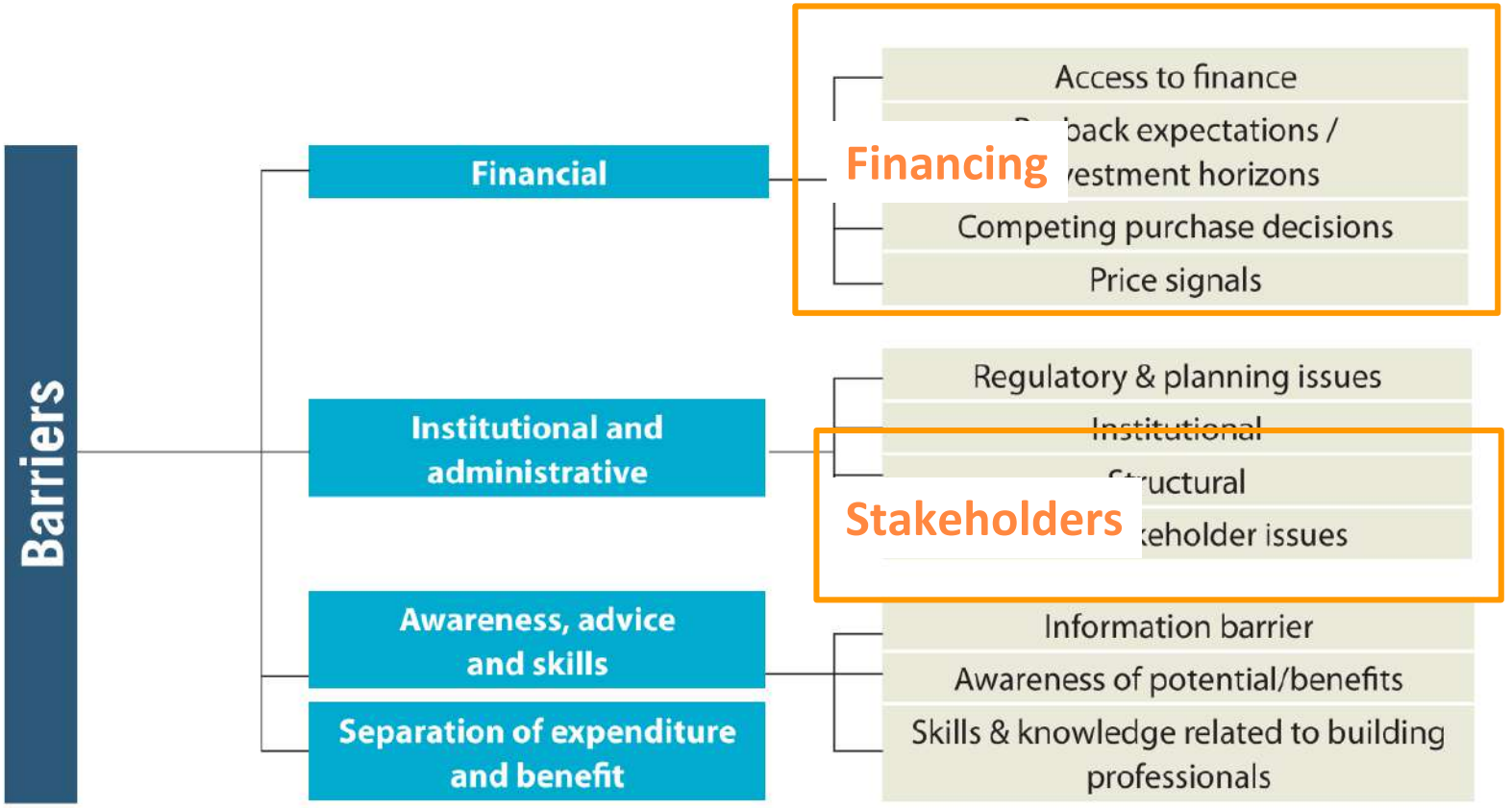
Annex 75 | Cost-effective Building Renovation at District Level Combining Energy Efficiency & Renewables

Subtask D: Policy Instruments, Stakeholder Dialogue, and Dissemination

EBC
Energy in Buildings and Communities Programme

Break-out Session 2: Discussion on Business Models for energy-efficiency renovations

Subtask D: Policy Instruments, Stakeholder Dialogue, and Dissemination



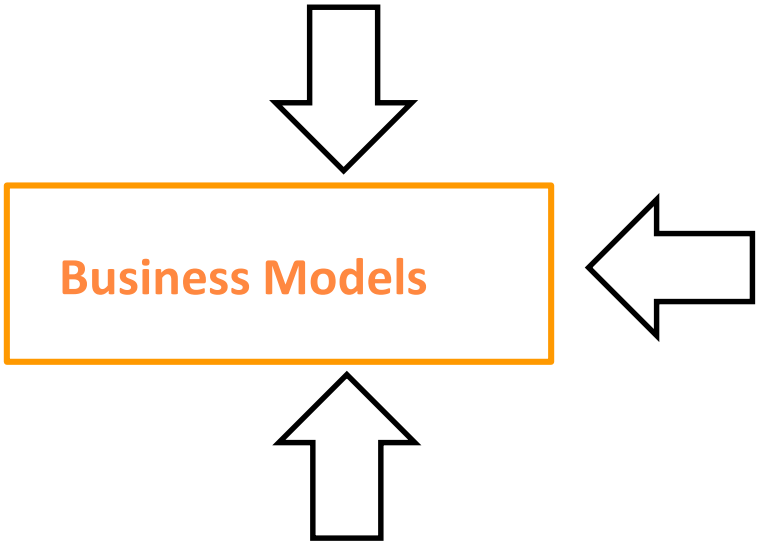
Barriers to renovation identified by the BPIE survey "European buildings under the microscope.

Figure from: BPIE, 2011

Cost-effective Building Renovation at District Level Combining Energy Efficiency & Renewables

EBC
Energy in Buildings and Communities Programme

Refurbishment
Building/complex level



Financing

Stakeholders

Renewable energy
District heating
Energy management

Cost-effective Building Renovation at District Level Combining Energy Efficiency & Renewables

EBC
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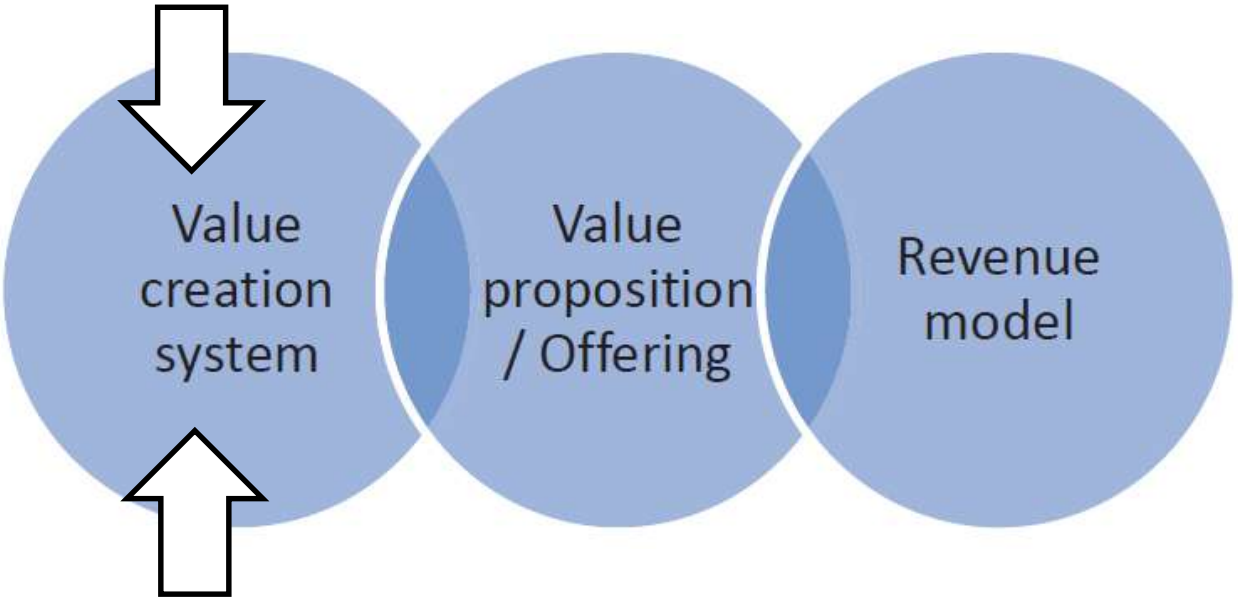
Refurbishment
Building/complex level



Renewable energy
District heating
Energy management

Catalogue of BM

- Literature
- Identify stakeholder
- Motivation/values
- Barriers to district level

Best practice example
On district level

- Analyse best practice example from STC
- Classify examples to the BM catalogues
- Identify how barriers were overcome

BM for case studies

- Exemplify the process for business model development
- Workshops/Inteviews of main stakeholders

Recommendations
for stakeholders dialogue

	Values proposition	Costumer relation
Traditional/atomised market model	energy cost savings, Single measures focus	Dedicated personal assistance. Finance is arranged via third party with little involvement in the retrofit process
Market intermediation model	energy cost savings, Single measures focus	One point of contract for sales, typically by an intermediary. Additional interface for finance
One-stop-shop	energy cost savings and home improvement Multiple Measures or comprehensive retrofit	One point of contract for sales of the full retrofit package Finance may be provided and arranged by the retrofit provider,
Energy services agreement (ESA)	Multiple Measures or comprehensive retrofit. Emphasis on energy services of temperature and hot water volume. Home improvement and comfort Energy savings performance contract (ESPC)	ESPC/ESA structure to fund retrofits. Lender captures energy savings and charges back to property owner
Revolving fund 'Gebouwgebonden financiering' (GGF)	Multiple Measures or comprehensive retrofit. Financial incentives for owners	Special Purpose Vehicle (SPV) receive new investment funds from different sources and to invest these in energy efficiency and low carbon measures in households

Catalogue of BM

- Literature
- Identify stakeholder
- Motivation/values
- Barriers to district level

Best practice example
On district level

- Analyse best practice example from STC
- Classify examples to the BM catalogues
- Identify how barriers were overcome

BM for case studies

- Exemplify the process for business model development
- Workshops/Inteviews of main stakeholders

Recommendations
for stakeholders dialogue

Aim

- To get an overview on existing stakeholders structures in the countries/regions/cities of the participants
- To reflect on barriers to upscale energy renovation to the district level.

Round 1: 15.30-16.15

Stakeholder motivations and barriers to engage in district renovation business models

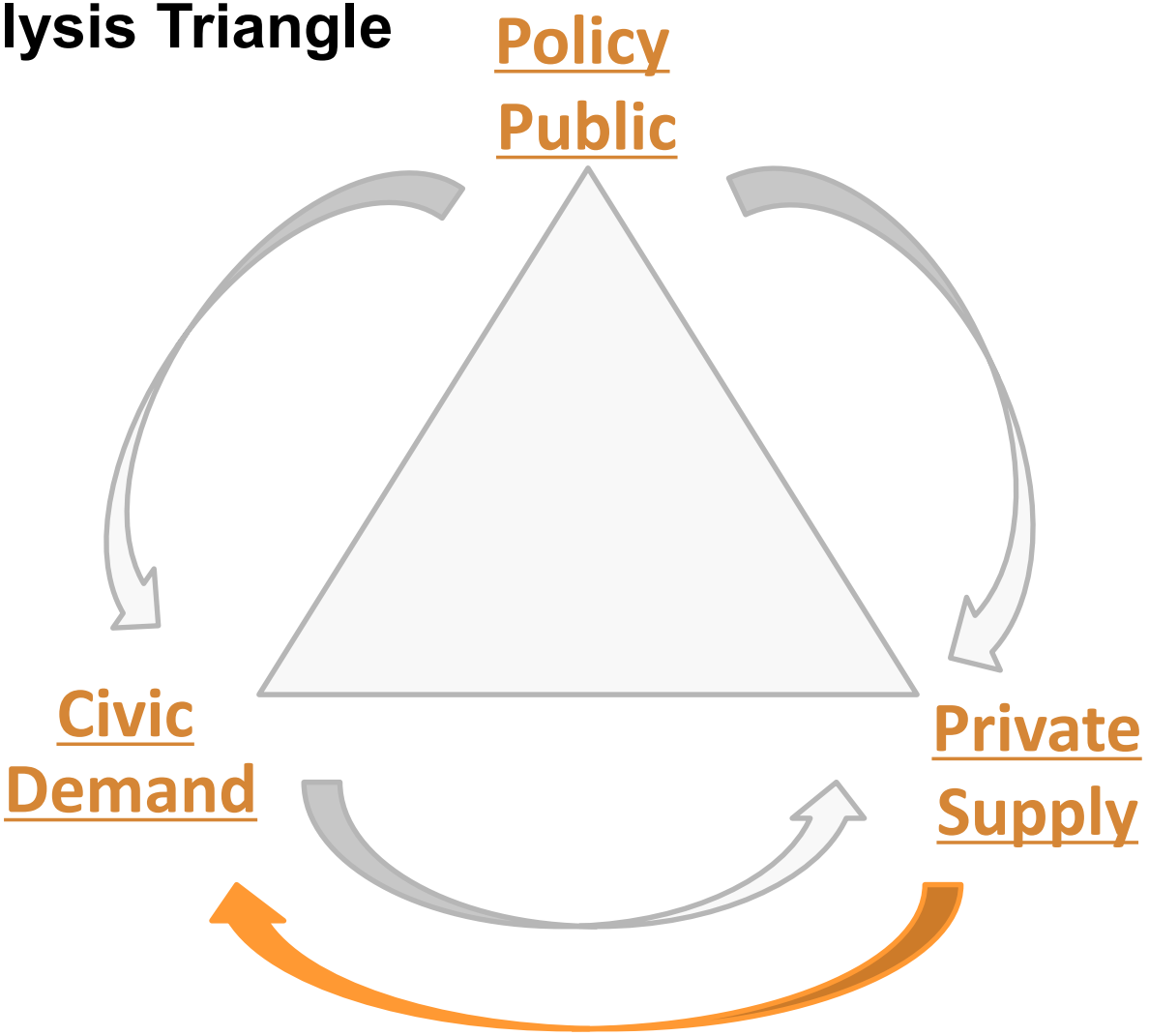
Round 2: 16.15-17.00

How to solve main barriers for business model development (financial mechanisms, supporting policy,..).

Round 1: 15.30-16.15

A. Distribute main stakeholders to the Actor Analysis Triangle

Actor Analysis Triangle



Round 1: 15.30-16.15

A. Distribute main stakeholders to the Actor Analysis Triangle

   - Where do you identify your role within those stakeholders

B. Write in **post-its** motivations for building and district renovation, with whatever they think is relevant

   - Distribute the post its according to actors

Round 2: 16.15-17.00

- Make smaller groups around the 3 Business Models archetypes

One-stop-shop

Energy Service Agreement

Financing schemes, such as revolving fund

	Values proposition	Costumer relation
Traditional/atomised market model	energy cost savings, Single measures focus	Dedicated personal assistance. Finance is arranged via third party with little involvement in the retrofit process
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Round 2: 16.15-17.00

- Make 3 smaller groups around the 3 BM archetypes
- Think from the percepective of the minucipality and discuss how to implement those models
- Answer the following question

Which are the main stakeholder involved?

Main motivation/value for them

What are the barriers/bottlenecks for those models to district?

How the BM help to overcome those

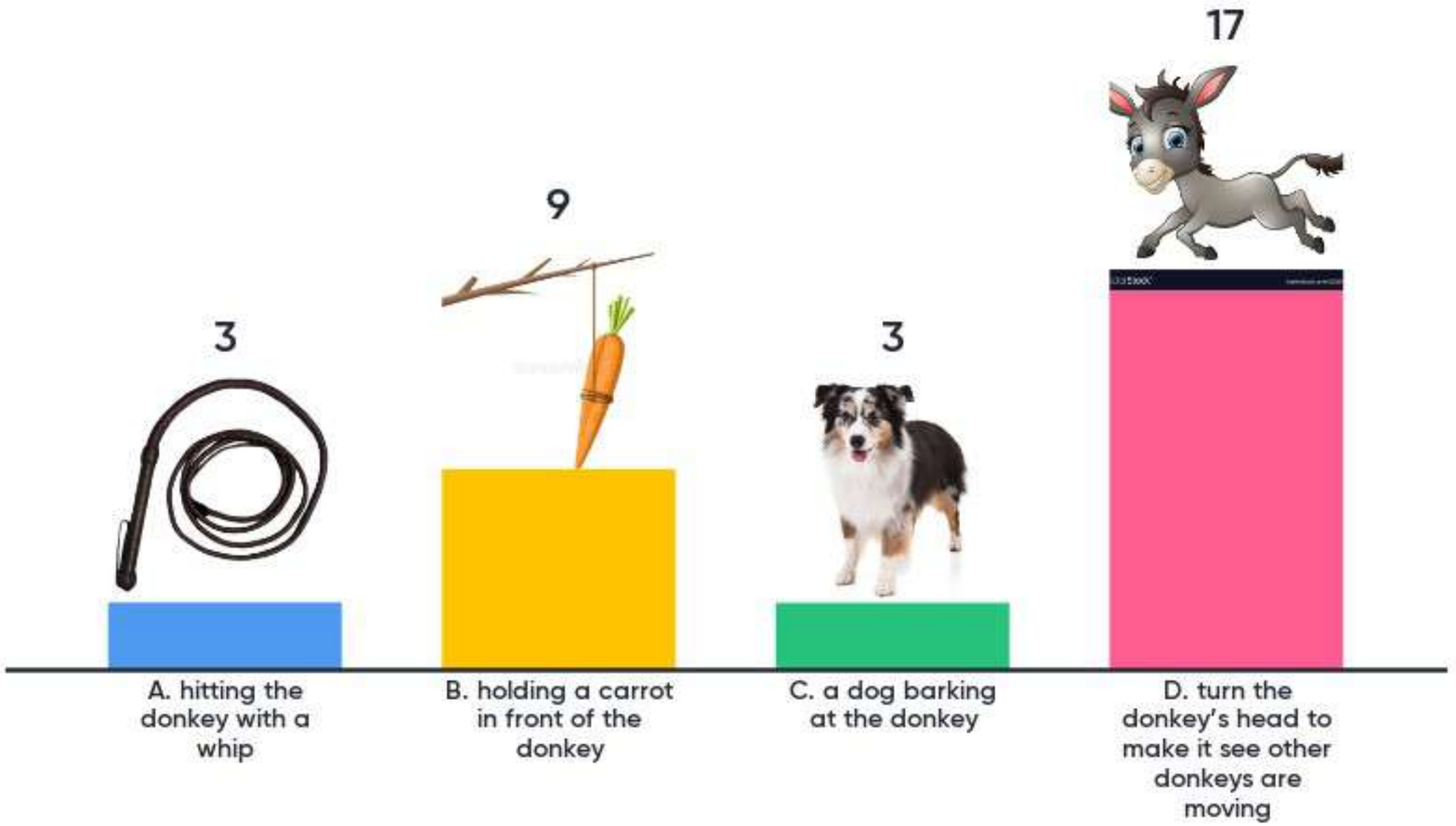
EBC
Energy in Buildings and Communities Programme

Break-out Session 2: Discussion on Business Models for energy-efficiency renovations

Subtask D: Policy Instruments, Stakeholder Dialogue, and Dissemination

What do you think is the most effective way to move an unwilling donkey?

Mentimeter



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What do you think are the most important stakeholders we need to activate to achieve sustainable housing?