(EM)POWERING AMA

THE GREEN ENERGY TRANSITION BEYOND DUALISM

REPORT

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ABSTRACT

The dependence of the economy on fossil fuels and the lack of stringent policies to extensively implement renewable energy is an issue to be tackled at national level in the Netherlands. Reducing emissions, while making the shift to renewable energy and changing the existing energy systems towards a sustainable model has been discussed widely. This shift can only be possible with a strategic plan defining the role of all involved stakeholders. Spatially, we can prepare for this transition by creating conditions for this change to occur in the future. The concept of circularity can be used as a tool to analyze the spatial and economic implication of energy flows. This involves exploring synergies between the environment, economic and social conditions that contribute to the growth of the green energy economy. The project demonstrates this by proposing a strategic plan for the Amsterdam Metropolitan Area (AMA) to develop energy transition landscapes.

Key words : Energy Transition Landscape, Dualism, Renewable Energy, Green Energy Economic Model, Amsterdam Metropolitan Area

INTRODUCTION

Netherlands stands at 7th place in the worldwide ranking of quality of life (Numbeo, 2016). These rankings are based on economic indicators (such as cost of living, purchasing power, affordability of housing), climate indicators (pollution and emissions) safety and healthcare. While Netherlands ranks relatively high in healthcare provision, safety and the economic indicators, its position on climatic indicators is much lower. This is amplified by the fact that Netherlands stands at 35th place in the Climate Change Performance Index of 2016. (CCPI, 2016). Energy policies, emissions level, efficiency, renewable energy and development of emissions are the indicators used to conclude these rankings. Netherlands ranks much lower than all its neighbors like Belgium, Luxemburg, Germany and United Kingdom, who are all within the top 10 of the ranking.

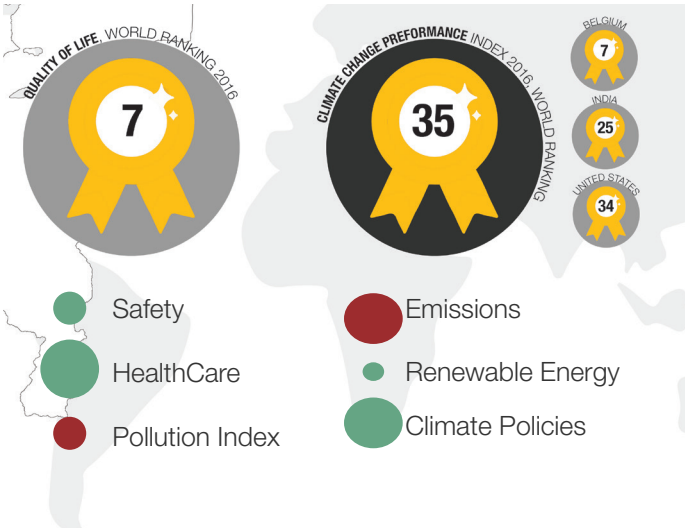

Image 1 World Ranking of Netherlands in Quality of Life and Climate Change Performance Index, 2016
Source: Authors

The Netherlands lies in the North Western part of Europe and holds a strong economic position within the European Union. The three biggest ports in the country – Amsterdam, Rotterdam and Venlo – are within the top 10 logistics ports in the EU and are an integral part of the logistics corridor of Europe called the 'The Blue Banana'. (Colliers International, 2015)

Image 2 Netherlands within the 'Blue Banana'.
Source: Authors

The national government promotes policies to increase the use of renewable energy and supports projects to implement this. The Dutch Energy Agreement 20203 is guided by international climate policies such as the Kyoto Protocol, COP21 and the European Commission Energy Strategy 2020. Even though there are strong policies that promote clean energy initiatives while trying to reduce greenhouse gas emissions, currently only 5.5% of the energy production within the country is from renewable sources of energy (Ministerie van EZ, 2015). However, the economic important

of natural gas in the Netherlands is not explicitly acknowledged. About 8-10% of the GDP of the country is contributed by natural gas (Geuns, de Jong, Slingerland, 2015). Mineral products such as coal, oil and natural gas constitute about 24% of imports and 28% of exports (OEC, 2015). If consumed at the same pace, the reserves of natural gas within the country would be exhausted in the next 20 years. Presently, economy of the Netherlands is dependent on an unsustainable carbon economy. Going forward, the Netherlands will have to address the duality within the trends of future development. The vision to make a shift to renewables is opposing the existing force of a carbon based economy.

Image 3 The 'Two Faces' of the Netherlands
Source: Authors

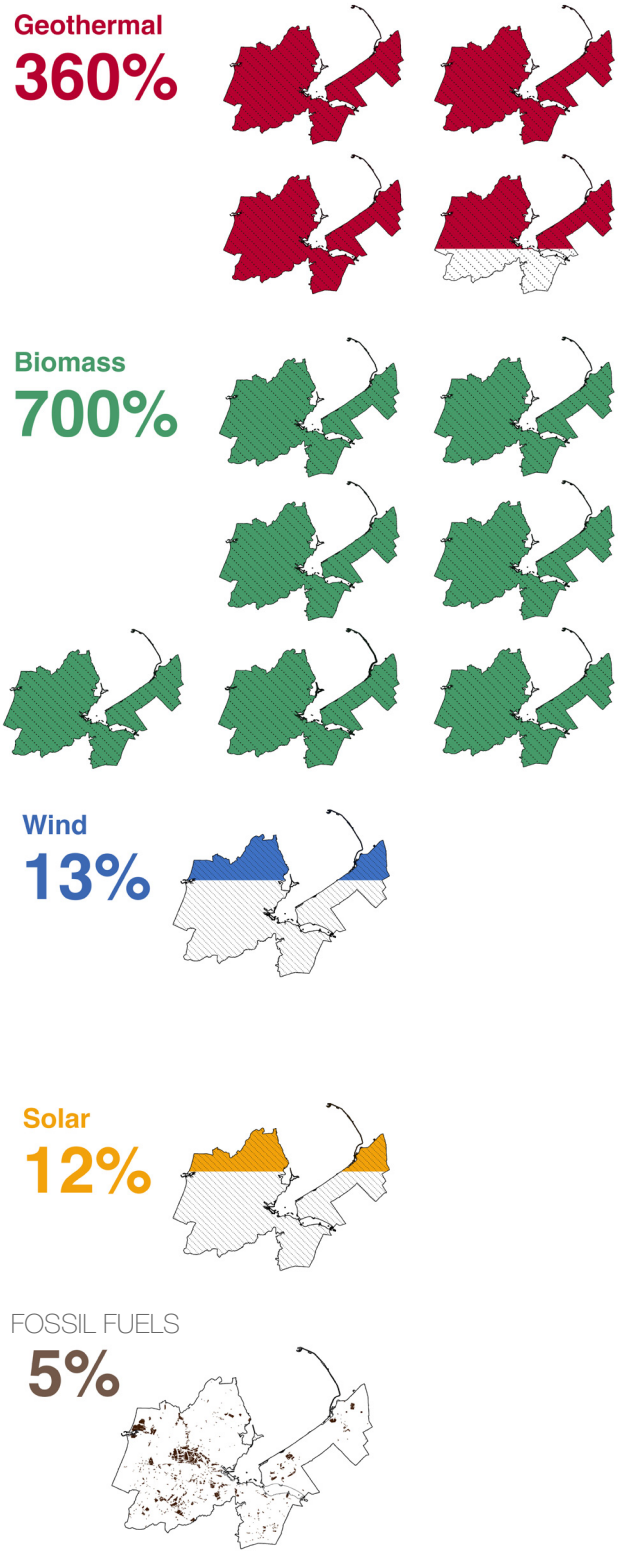

Image 4 Analysis of space needed for renewable source for energy production
Source: www.cbs.nl, nationaalgeoregister.nl
Sijmons, D., Hugtenburg, J., van Hoorn, A., & Feddes, F. (Eds.). (2014). Landscape and energy: Designing transition.

As compared to fossil fuels, renewable energy requires more space to be implemented. The analysis shows that the viability of sun and wind energy is higher than biomass or geothermal to make the shift to renewable energy. The economic feasibility of solar panels and wind turbines has been at an incline. (Al Gore, Inspiration 360, 2016) However the challenge lies in maintaining landscape quality while implementing this technology at a larger scale.

There is a support for the transition to renewables as well as the support for existing fossil based systems within the public sector, private sector and civil society. There are a number of protests against implementing renewable energy as well continuing fossil based initiatives (Du Pre, 2017 & Sandman, 2013).

Image 4 Protests against the installation of new windmills
Source: Sandman, H. (2013, March 21). Windmolens draaien niet op wind, maar op subsidie. Kanaalstreek.

Image 5 Protests against the installation of new windmills
Source: Du Pre, R. (2017, February 15). Kamer eensgezind: gaswinning Groningen komende jaren verder omlaag. De volkskrant.

PROBLEM STATEMENT

Overall, there is a visible dualism when it comes to the energy transition to renewables in the Netherlands. Moreover the divide between stakeholders and a spatial agenda to integrate renewable energy within the landscape lacks the attention it deserves within the strategy. Addressing this duality is the key to realize this transition to a sustainable economy that environmentally sound and socially inclusive. This report recognizes dualism as the biggest barrier to make a transition to renewable energy. An approach to tackle this is devised through the main research questions and theoretical framework. The significance of an integrated approach in the strategic plan has been emphasized. The conclusion attempts to highlight a key aspect for this transition to occur – a supportive spatial landscape.

PROJECT FOCUS AREA

The report and subsequent design project focus on tackling the duality with respect to the green energy transition within the geographical boundary of the Amsterdam Metropolitan Area (AMA). The Amsterdam Metropolitan Area (AMA) is the region surrounding Amsterdam, the capital of the Netherlands. It comprises of Amsterdam city, the provinces of Noord-Holland and Flevoland which are further comprised of 36 municipalities. It covers an area of approximately 1777.8 square kilometers with 2.4 inhabitants (AMA, 2016). It is the northernmost region that forms the Randstad Metropolitan Area, which is one of the largest and densely populated metropolitan regions of Europe. The AMA covers 5.2% of the total landmass of the Netherlands, contributes to 14% of the national energy production, 16.7% of the national energy consumption and hosts approximately 18% of the total population. (CBS, 2016)

Image 6 AMA in the Netherlands
Source: Authors

OBJECTIVES and GOALS

The objective of the project is to explore the environmental, economic and social potential of the AMA to make a transition toward the green energy economic model.

This has helped to further formulate the goals for the project. The design framework of the project is realised through 5 goals.

(1) Protect and strengthen the spatial quality of AMA by exploring synergies between natural landscapes, green energy and recreation.
(2) Decentralize Energy Production.
(3) Strengthen local economies and create more jobs.
(4) Decrease emissions.
(5) Improve existing mobility model.
(6) Stimulate acceptance, awareness by including all stakeholders in the energy transition.

RESEARCH QUESTIONS

The objective of the project is to explore the synergies between the environmental, economic and social potential of the AMA to transition to a green energy economic model.
The theoretical framework does not focus on the need for making the switch to renewable energy sources. Rather, it discusses the implication of this change on the landscape, economy and society. The main research questions discussed are as follows:
How can urban sustainable development enable the AMA to make a transition to the green energy transition?
What is urban sustainable development?
What is the relationship between the circular economy and the green energy transition?

Dualism related to the energy transition is explicitly visible when examined through the three pillars of sustainable development, namely the environment, economy and society. This is further illustrated by the following sub research questions:

What is the relationship between landscape quality and implementing renewable energy? (Environmental Framework)
What is the relationship between the current trend of economic growth and implementing renewable energy? (Economic Framework)
What is the relationship between society and implementing renewable energy? (Societal Framework)

In conclusion we discuss the spatial implication of the energy transition:
What are the spatial conditions for future energy transition landscapes to emerge?

THEORETICAL FRAMEWORK

(1) Urban Sustainable Development

The balance between environmental preservation, social equity and economic growth are well recognized as the three pillars of sustainable development. Nijkamp (1993) has adapted this framework to include the spatial component that can be used by environmental designers.
The spatial dimension explicates the elements of environment, economy and society within the built landscape. This framework provides a comprehensive way to understand and analyze the built environment through the lens of sustainable development. This has provided a tool to understand the structure of the AMA and further explore the potential of renewable energy.

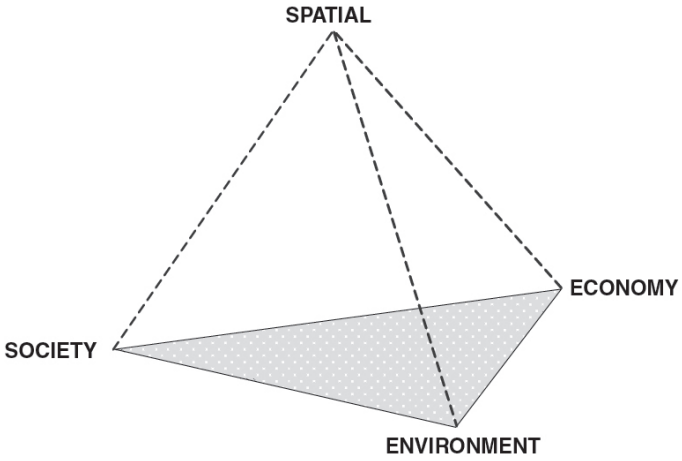

Image _ Sustainable Development Analysis Framework
Source: Nijkamp triangle modified by Dourojeanni, 1993

(2) Relationship between the circular economy and the green energy transition

The current energy production and consumption pattern can be perceived as open-ended or linear. Power plants feed electricity or natural gas for heating into a grid that distributes energy to each individual building. In the Netherlands only 5.6% of total energy production is contributed by renewable energy (Schoots, Hekkenberg, Hammingh, 2016). This implies that energy production is a carbon intensive process contributing to release of greenhouse gases. Additionally, residual heat and by products of many industrial uses is lost to the environment. This linear trend needs to be challenged.

The model of circularity formed by Rood and Hanemaaijer from Planbureau voor Leefomgeving (PBL), consists of three elements: production, consumption and reuse. (Rood and Hanemaaijer, 2016). The input of production consists of two options, namely renewable and finite materials. (Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, C2c). The transition from fossil fuels towards renewable energy provides a new input: from finite materials towards infinite renewable. The model shown is an adaptation of the circular economy model into a green energy economic model. There are three elements of this model that can be used to close the loop of the existing non-linear chain. Using renewable sources of energy (such as wind), decreasing energy consumption (such as energy efficient buildings) and reusing by-products of the current energy production chain (such as CO2),

The green energy industry is an economy for investment for three reasons: greater energy independence, improved environmental benefits from reduced greenhouse gas emissions and positive economic impacts (Engle and Kammen, 2009). The economy contributes to creating jobs locally, for example while renovating or adapting the existing built environment and for long term technological research. (Geuns, van, J., Jong, de S., Slingerland, 2015)

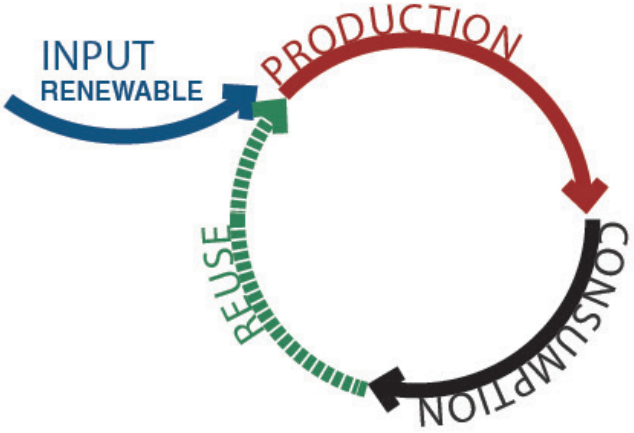

Image _ Green Energy Economic Model
Source: Authors

(3) Environmental Framework

Implementing renewable energy such as solar, wind and biomass consume much more space than energy derived from fossil fuels. The large surfaces required by solar panels and huge diameters of modern wind turbines are a contrast to isolated power plants that feed energy to the power grid which is also partially underground. The shift to renewables will figuratively and literally bring energy to the surface. Addressing the complexity of the geographical dimension of renewable energy is the key challenge for planners and designers in the near future. (Sijmonds, 2014)

Dutch philosopher Martijntje Smits has drawn up a conclusion of a four-fold method of how societies react to change – embrace, banish, adapt or assimilate. In the example of wind turbines, banishing it would be to create isolated wind parks and embracing it interpreting the disadvantages as advantages. Adaptation is the adjustment of these structures while assimilation is the most pragmatic strategy. Assimilation happens when we take the time to adjust this context to a new phenomenon. (Smits, cited by Dorst, van & Sijmons, 2014)

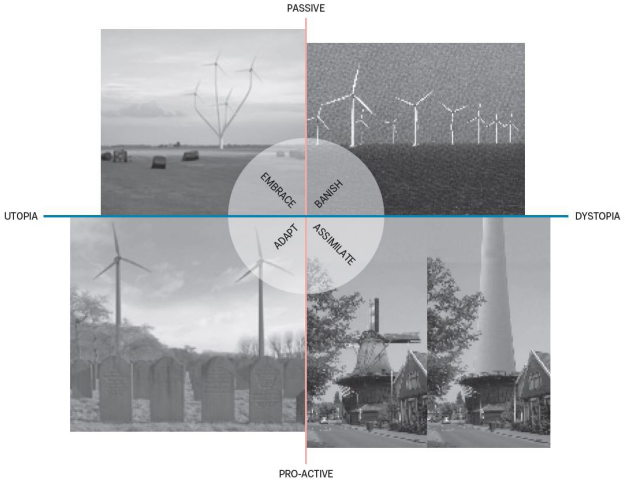

Image _ Representation of the four-fold typology
Source: Clockwise: NL Architects, MVRDV, Paul van Beek Landschappen, Hans van Houwelingen, Source: Windturbines in het Nederlandse Landschap, deel II Visies, The Hague, Rijksadviseur voor het Landschap, 2007

(4) Economic Framework

Currently, the economy of the Netherlands is heavily dependent on fossil fuels. This fact cannot be negated when addressing the future of energy.

Sijmons (2014) describes the three necessary features of the future energy source: affordability, reliability and sustainability. Lower emissions make renewable energy environmentally sustainable. The social and environmental costs related to renewable energy is much lower than that of fossil fuels. Reliability on renewable energy is increasing as technology evolves.

As planners and designer, we need to be able to accommodate new technology into the built environment as it progresses.

(5) Soceital Framework

The shift to green energy economic model can only be realized when all the stakeholders i.e. the public sector, private sector and the civil society are in agreement. Policies in the public sector can be successfully implemented if there is an acceptance of green energy initiatives among civil society and the private sector. All in all we know that there is a general acceptance of renewable energy initiatives however, it is not a priority. Two aspects are of primary concern: the economic implication and the involvements of residents in the decision making process. (Zoellner, 2008). In order to reach ‘local’ acceptance of national policies and initiatives, people need to believe that they are the direct beneficiaries of financial gains or reduction of costs. Moreover, they are likely to accept new initiatives if the public sector engagement is consistent throughout the decision making process as well as continue afterwards.

DISCUSSION

Awareness about the duality within the environmental, economic and social framework when it comes to energy transition is imperative to be able to draft a spatial agenda and strategic plan to implement it.

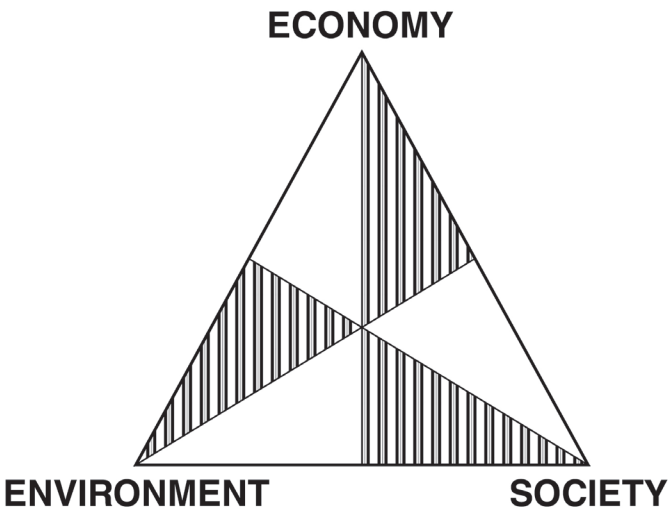

Image _ Dualism within the three frameworks
Source: Authors

There are many publications devoted to understanding the relationship between renewable energy and the urban form at the individual, neighbourhood and community level. In contrast there are a few publications devoted to understanding sustainable energy transition at the larger scale. (Stremke and Dobbelsteen, 2012) In the future, energy will no longer be a 'hidden' element. It will come to the surface and be consciously integrated into the landscape. On the regional scale the designer needs to look propitious combinations of spatial quality and renewable energy technology. These landscapes are not about including 'foreign' elements within the existing or natural landscape but about the creation of a new cultural landscape (Dorst, van & Sijmons, 2014). As these landscapes change from an illusion or a view and start producing energy and adding value to its local surrounding, it can attain more strength and meaning.

From our understanding of the green energy economy and sustainable development framework, we believe that the transition to renewable energy landscapes needs to be environmentally sound, economically viable and socially inclusive. The spatial transition to landscapes that support this in the future are an assimilation of the existing land use and urban form to be able accommodate renewable energy in the future. Therefore we can define energy transition landscapes as a physical environment that can evolve on the basis of locally available renewable energy sources without compromising landscape quality and biodiversity. This also provides for an opportunity for local economies to emerge thus adding to a socially fair transition. (Stremke and Dobbelsteen, 2012)

The design approach of the proposed energy transition landscapes is at the intersection of the green energy economic model and sustainable development. Addressing dualism from the environmental, economic and societal perspective is an essential component of the design process. Using this approach will result in a unique spatial intervention for different landscapes while achieving the same goal.

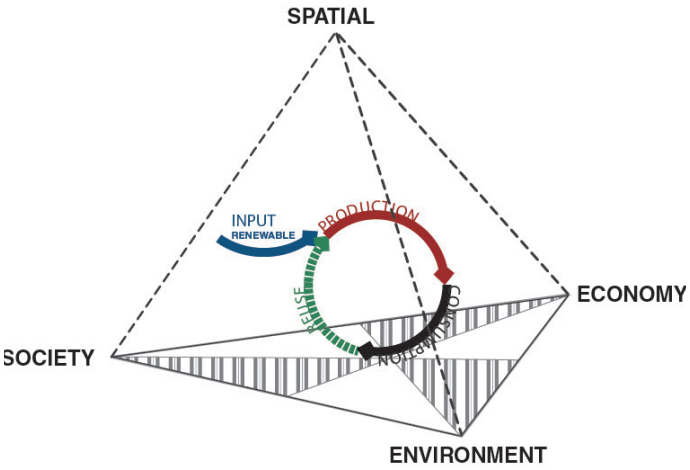

Image _ Design Approach of the Energy Transition Landscapes
Source: Authors

CONCLUSION

For urban planners and designers, understanding the spatial dimension of the three pillars of sustainable development namely, the environmental, economic and societal, is relevant to be able to intervene in the built environment.

The green energy economic model is derived from the concept of circularity. Addressing energy transition through the introduction of a new economic model is necessary to make a definitive shift to renewable energy.

Our understanding of sustainable development, circularity and the green energy economic model is spatially explicated through the introduction of a new cultural landscape - Energy Transition Landscapes.

ETHICAL STANDPOINT

The project proposal is envisioning a future for the AMA that can enable it to make a transition to the green energy economy model through synergized energy transition landscapes. Our objective is to design and plan for a sustainable future by shifting to a renewable energy model that is environmentally, economically and socially. As Urbanists, we can contribute to this transition by creating spatial agenda for this change to occur and engaging with stakeholders to create a long term strategic plan to implement the vision.

An energy source is sustainable if it affordable, reliable and ecological sensitivity. These factors have been taken into consideration while determining local solutions for renewable energy production in the AMA. The planning gain of the proposed energy transition landscapes are intended to add to the overall quality of life of residents. Therefore, addressing spatial quality of the landscape is equally important as analyzing the technical feasibility of the renewable energy sources. The interaction of the built landscape, infrastructure and landscape is the core idea of the project proposal.

The transition to renewable energy will have a radical economic implication as a large part of the GDP of the Netherlands depends on natural gas which is a carbon based fuel. Persuading stakeholders to switch to a sustainable energy model based on renewable sources is a challenge. Implementing policies to achieve this shift requires political and public support. The volatile nature of political agendas and the profit motive of private companies can be a barrier to following through to the transition to energy landscapes. The implementation of the vision will require interventions from the government and cooperation from the private sector and civil society. Often political agendas, private sector interests and public opinion may not align with the overall vision of transitioning AMA to a green energy economic model. Bring stakeholders on board is crucial to move toward a shared vision for a sustainable future. Creating local jobs and promoting social inclusiveness is a crucial outcome of the vision and strategic plan.

For the public acceptance and implementation of this vision, a strategic bottom up approach that emphasizes continuous engagement with stakeholders is crucial. In parallel, a top down implementation of policies at the regional scale is equally necessary to engage with the large stakeholders such as local municipalities and large private companies. As urbanists we need to design and facilitate a plan that can balance the interests of stakeholders to make this transition economically feasible and socially inclusive.

As the globe moves toward renewable energy sources, the question of adapting the current landscape to promote this change will come to the forefront. Accommodating renewable energy within the existing built environment will need to be addressed by almost every city, municipality, region and country. As urbanists, we are at the intersection of designing spatial quality, considering technical feasibility and facilitating stakeholder negotiations. Although grounded in the geographical boundary of the AMA, the intention of the vision and strategic plan is to provide a set of design principles that can be migrated to other areas within the Netherlands or to other landscapes that are striving to implement energy transition landscapes.

CONCLUSIONS

For urban planners and designers, understanding the spatial dimension of the three pillars of sustainable development namely, the environmental, economic and societal, is relevant to be able to intervene in the built environment.

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(EM)POWERING AMA

THE GREEN ENERGY TRANSITION BEYOND DUALISM

DESIGN PROJECT

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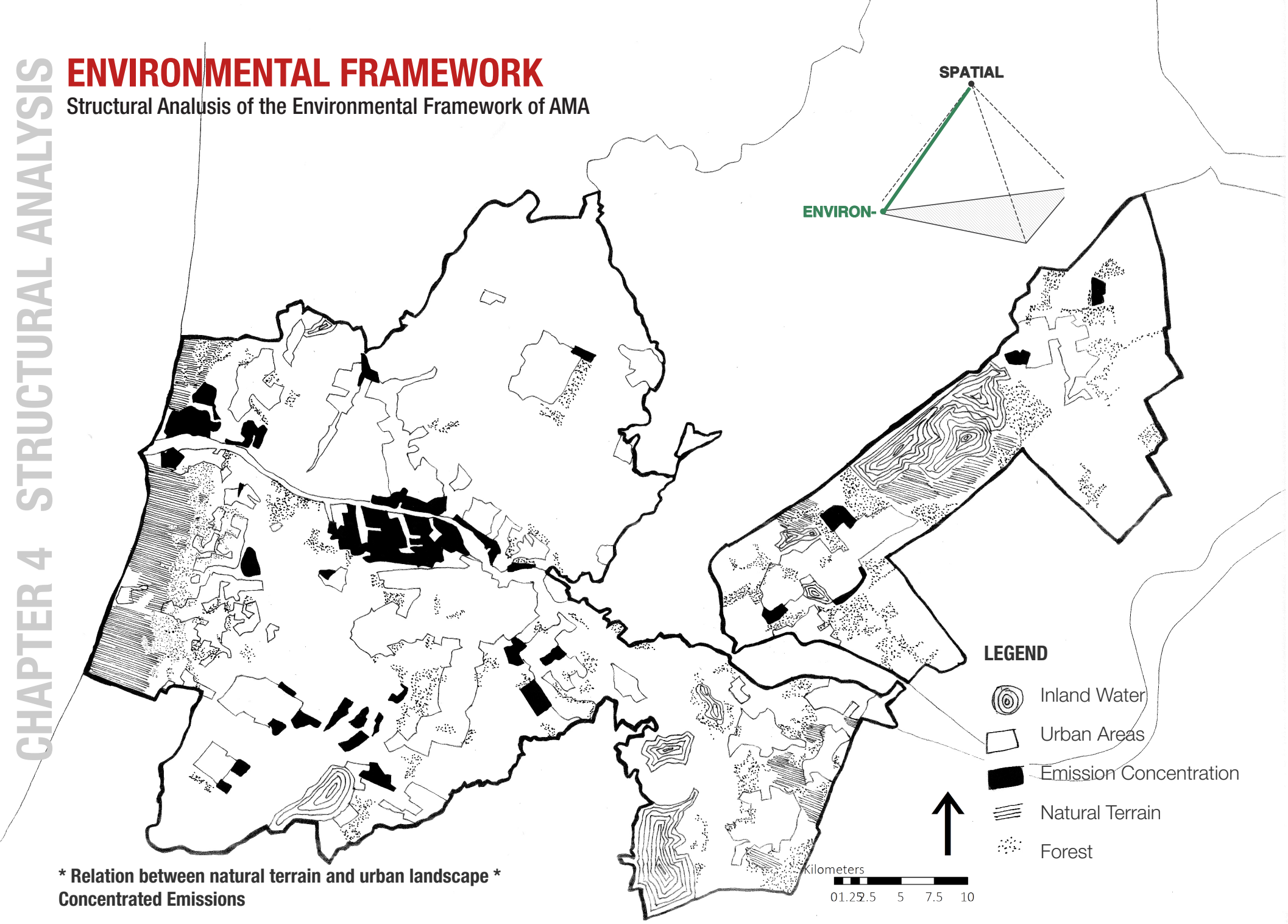
ENVIRONMENTAL FRAMEWORK

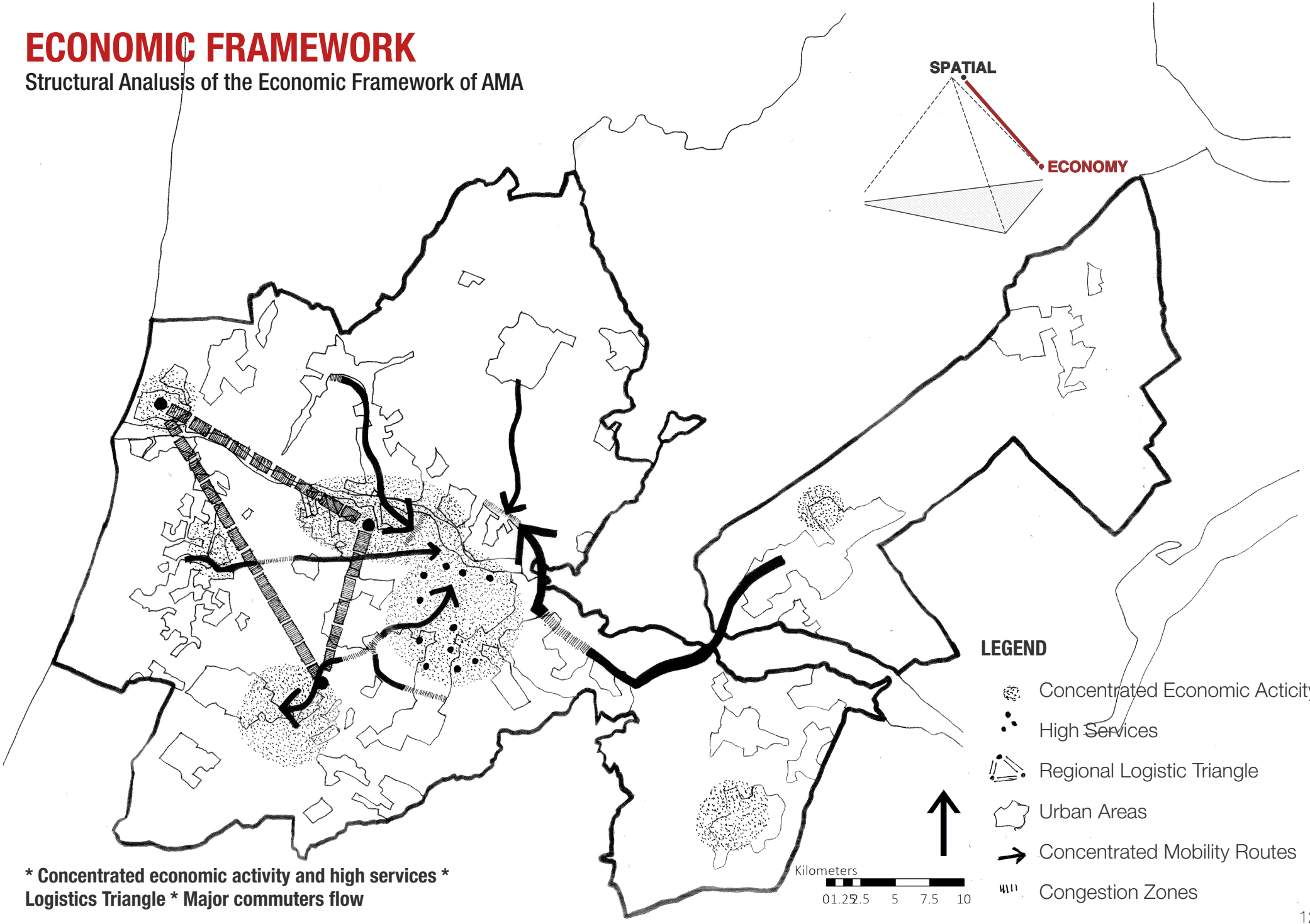
Structural Analusis of the Environmental Framework of AMA



*** Relation between natural terrain and urban landscape ***
Concentrated Emissions

ECONOMIC FRAMEWORK

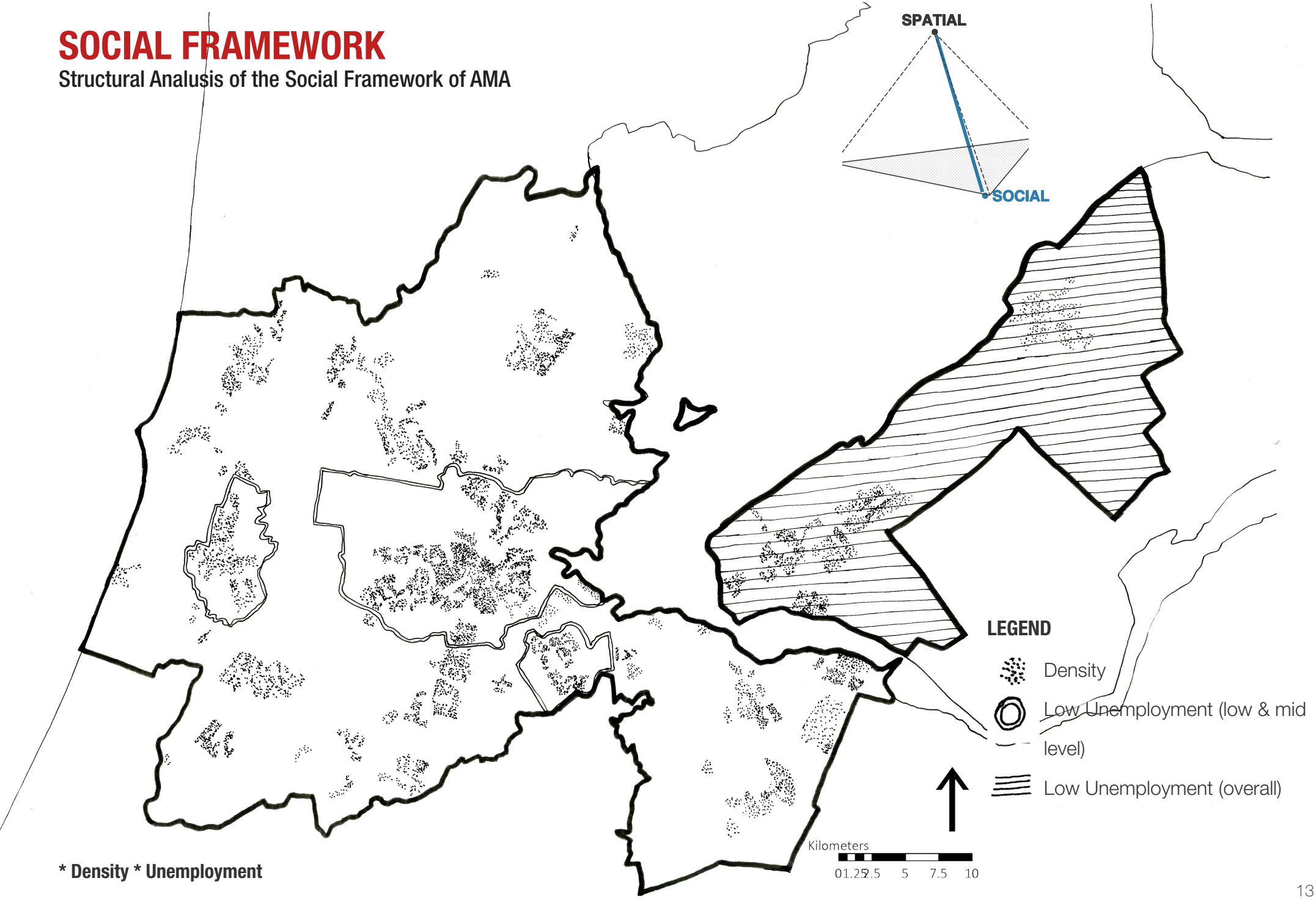
Structural Analusis of the Economic Framework of AMA



*** Concentrated economic activity and high services ***
Logistics Triangle * Major commuters flow

SOCIAL FRAMEWORK

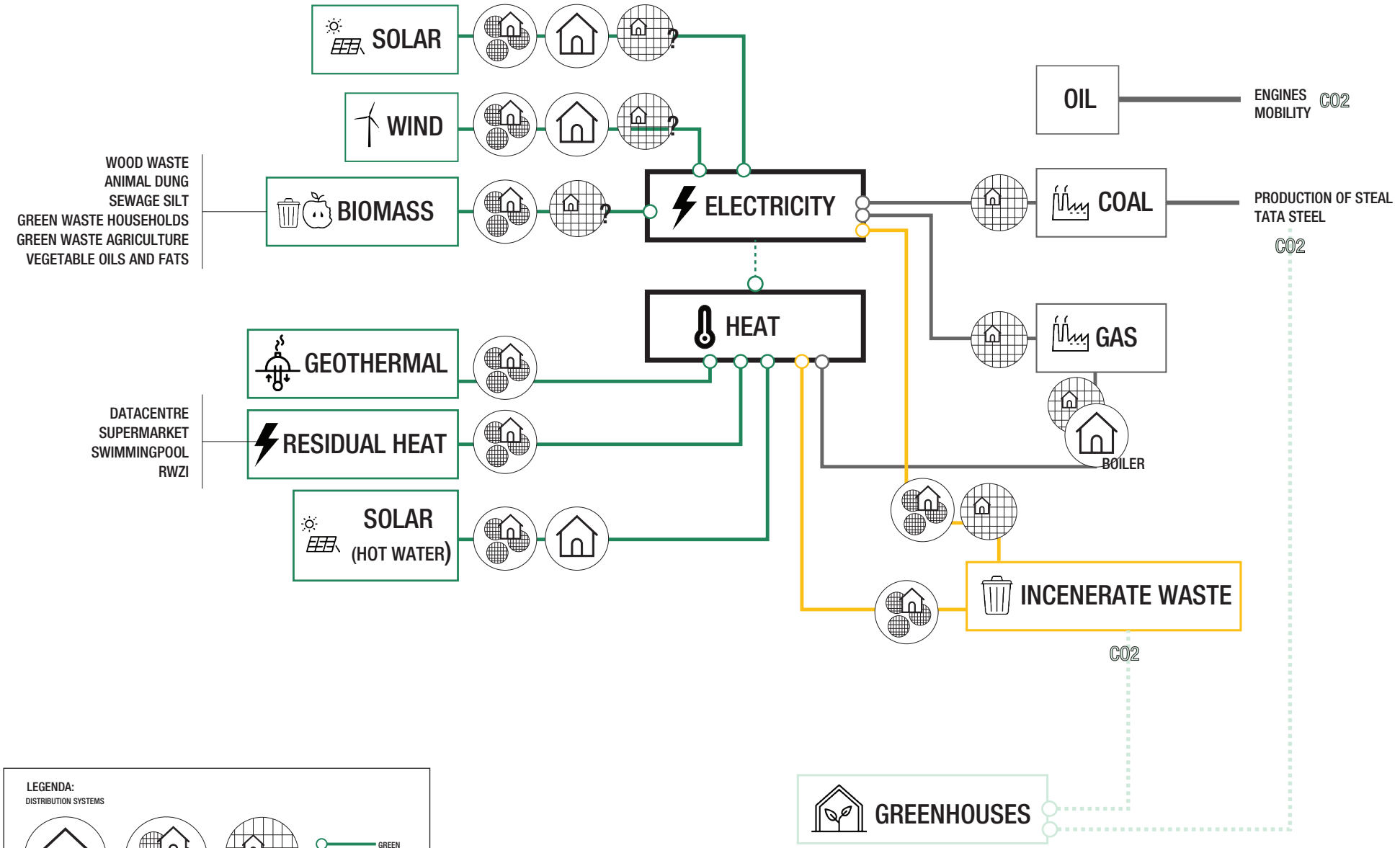
Structural Analusis of the Social Framework of AMA



*** Density * Unemployment**

OVERVIEW

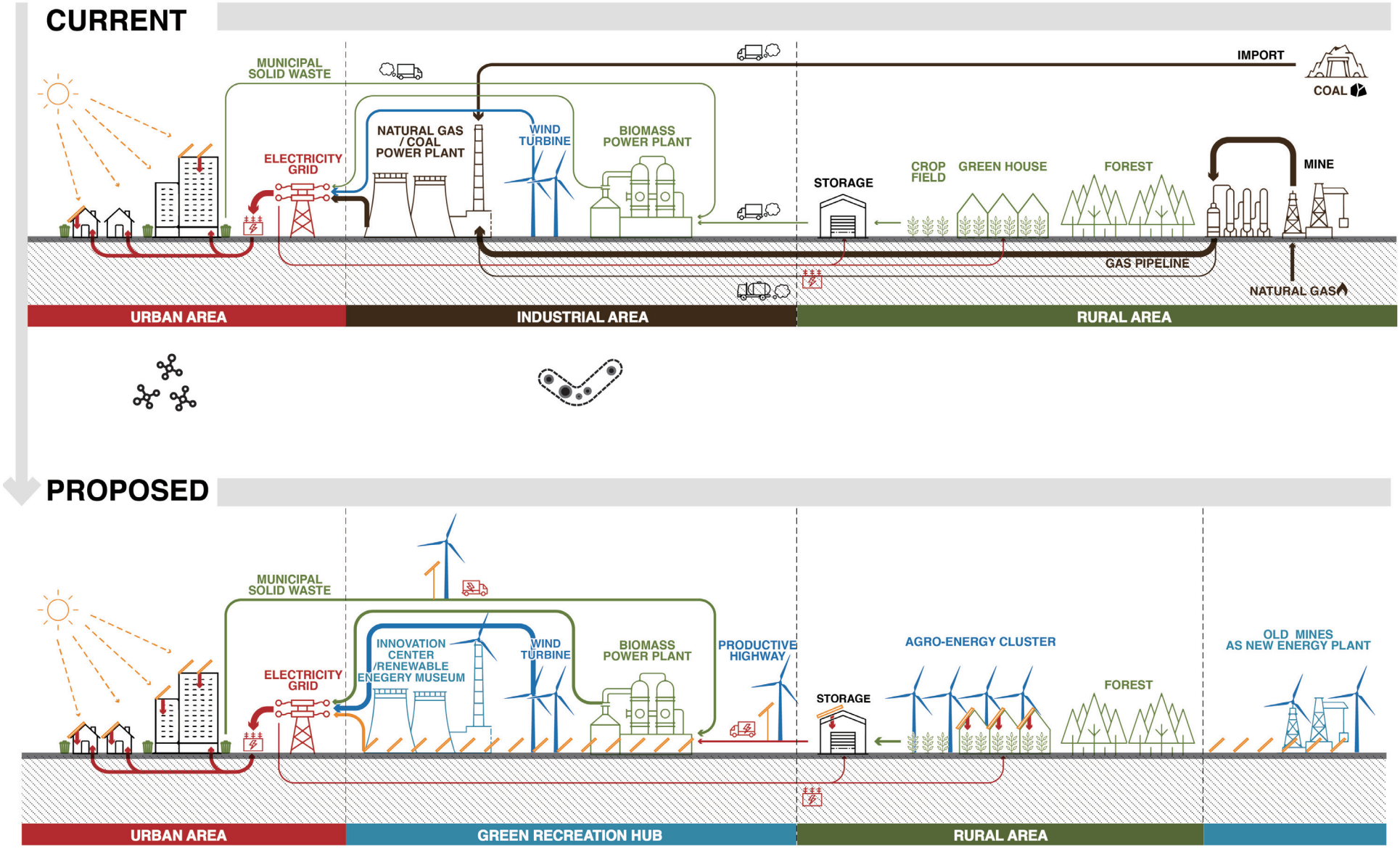
The relationship between energy flows in the built environment



For energy flows, the nonrenewable sources of energy for electricity and heat production are within large infrastructure or district scale. Renewable sources of energy can be produced and distributed in a district scale. So the future renewable energy distribution system will make a transition to the district scale.

ELECTRICITY

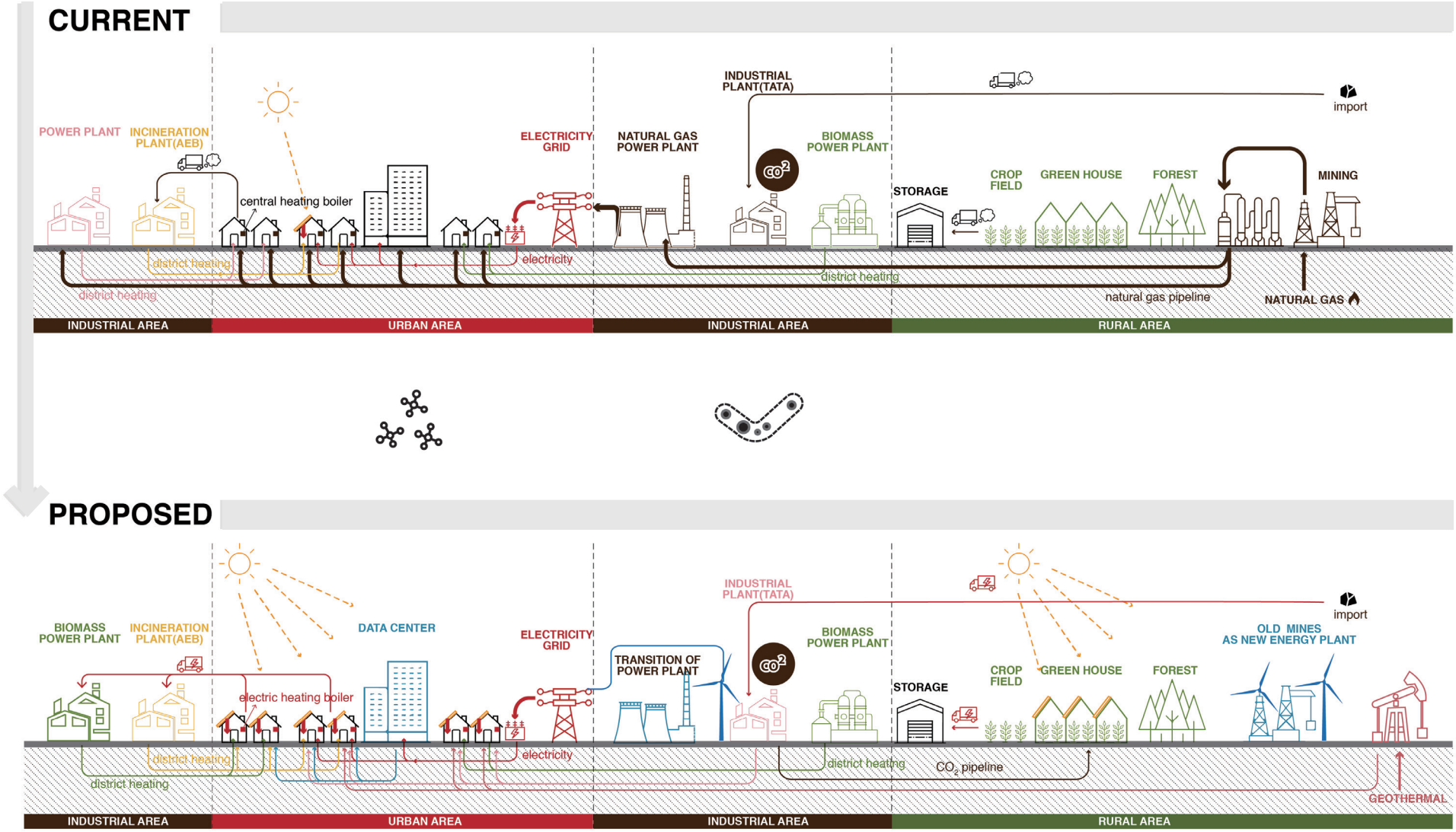
The transition of carbon based fuels for electricity production to renewable energy



*** Energy transition from fossil fuel to green energy * District energy system**

HEAT

The transition of carbon based fuels for heat production to renewable energy

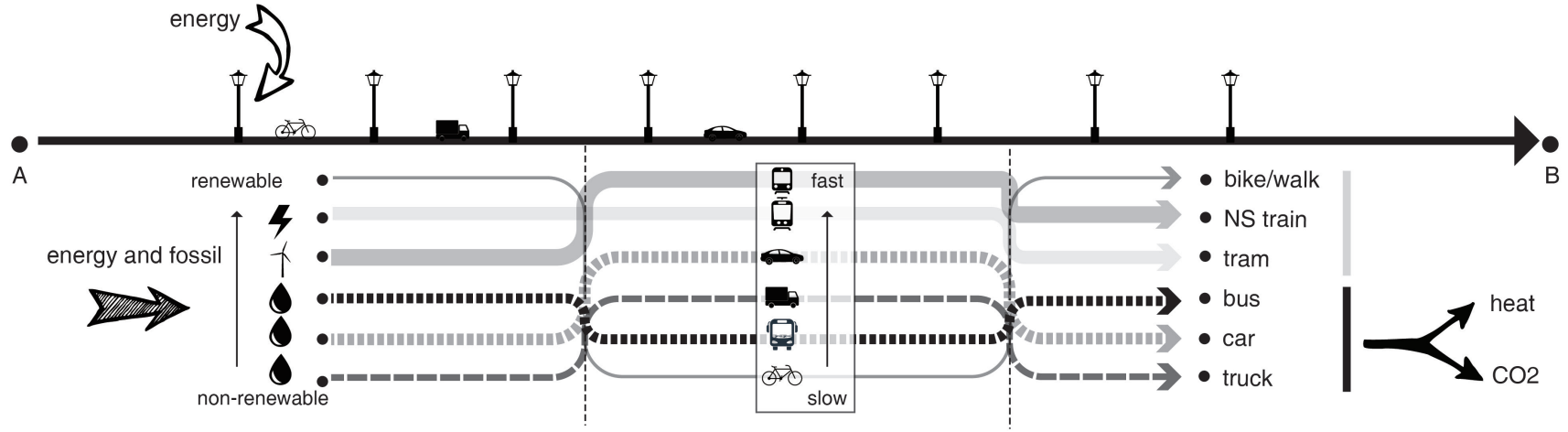


*** Energy transition from fossil fuel to green energy * Residual heat * District heating network**

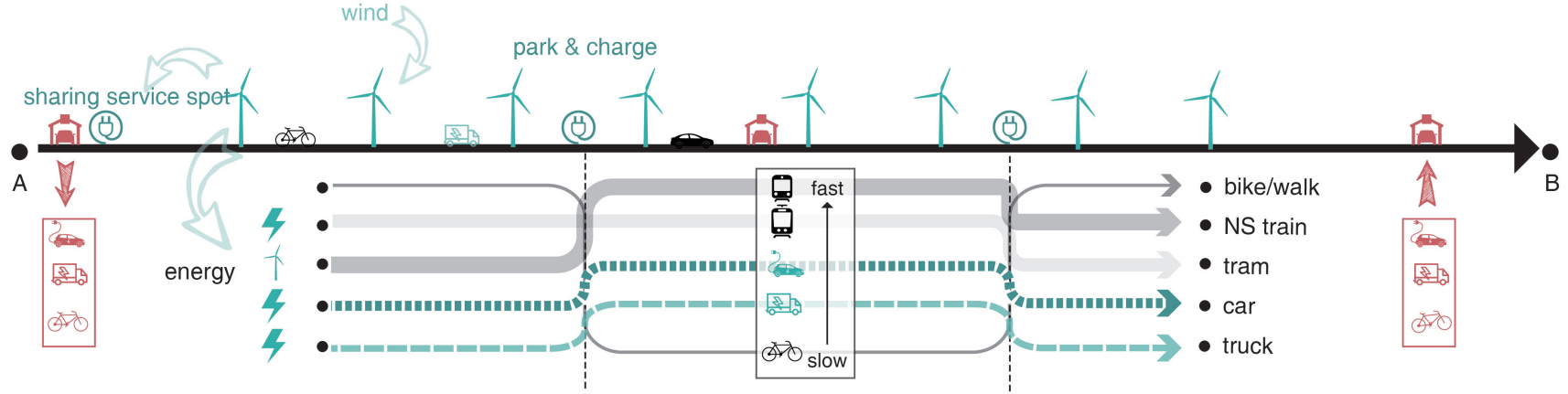
MOBILITY

The transition of mobility system from fossil fuel to green energy

CURRENT



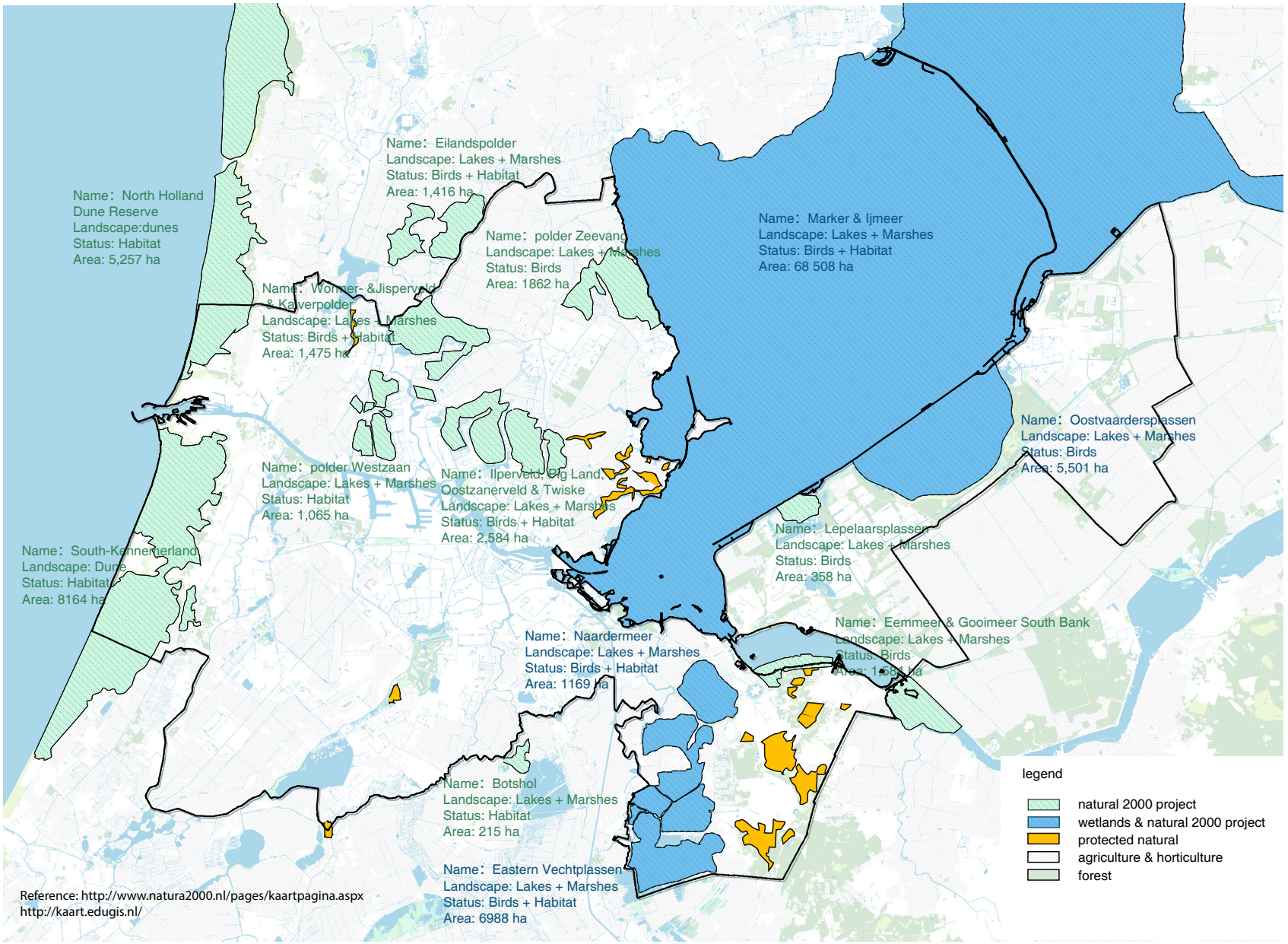
PROPOSED



*** Sharing system * Wind energy * Transition of energy consumption to energy production**

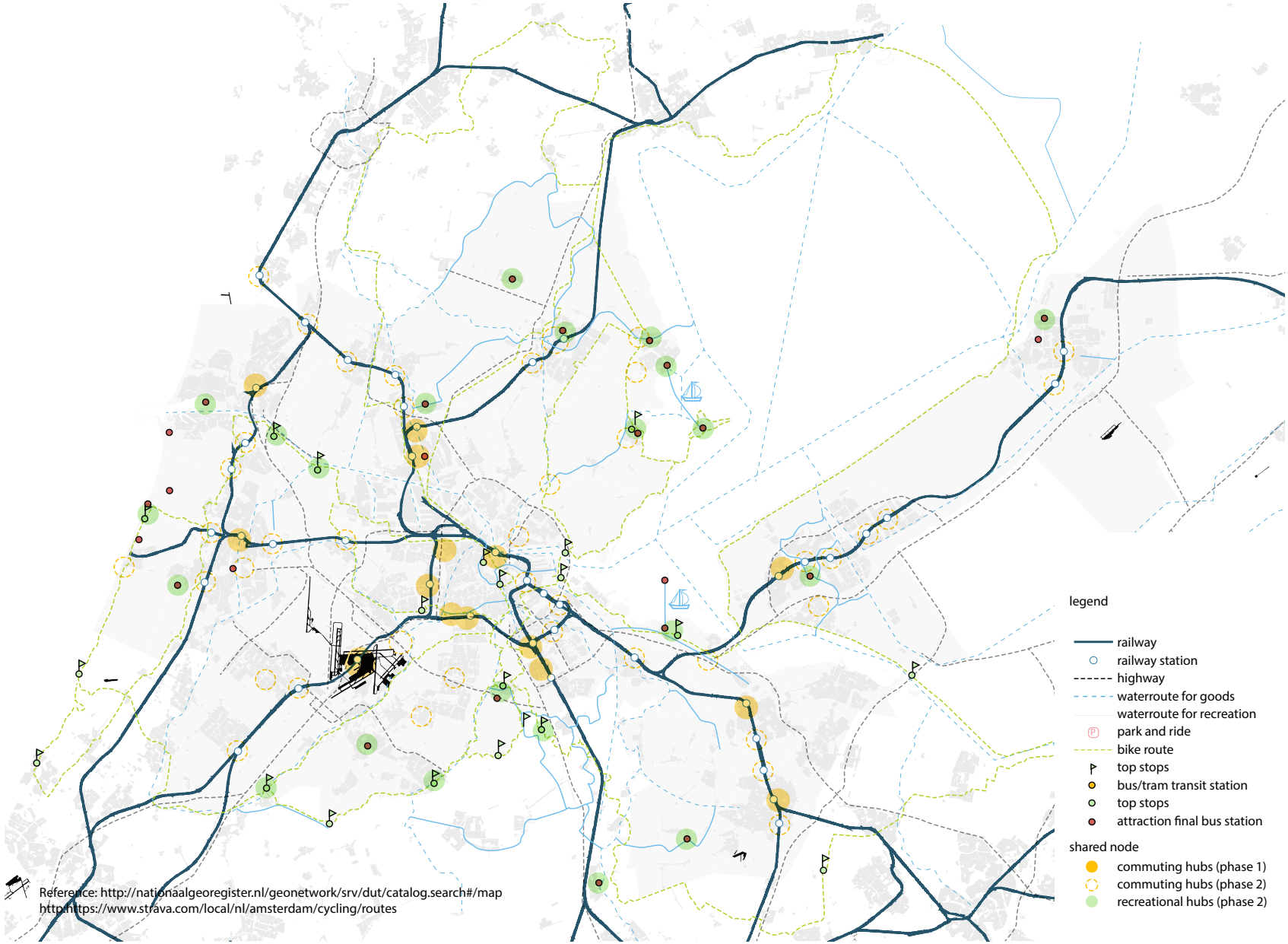
LANDSCAPE

The landscape layer illustrates the relationship between the natural landscape within the AMA. Based on data about protected sites, natural habitats and wetlands, it is possible to create a single layer to eliminate where new development cannot occur.



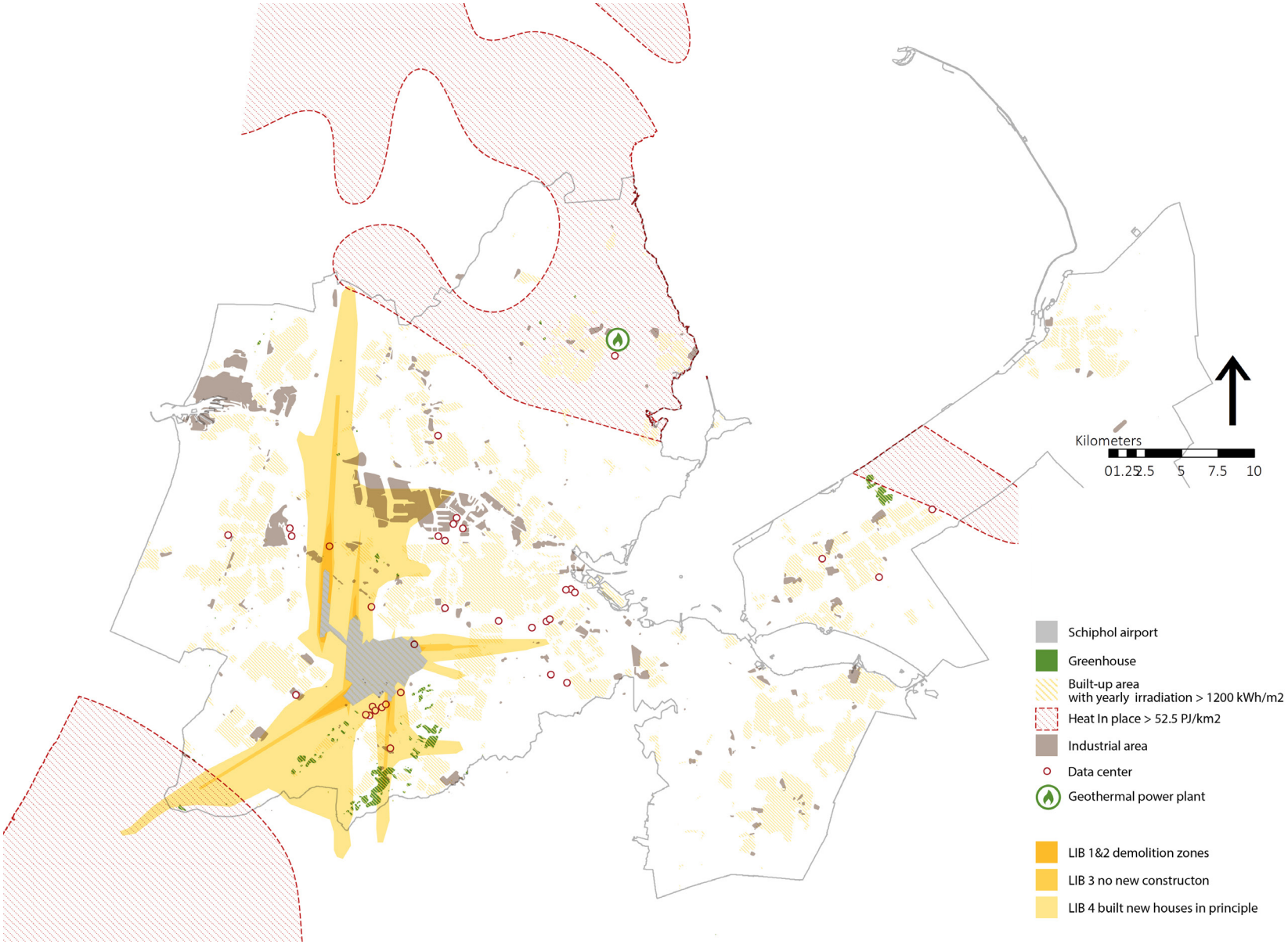
MOBILITY

The mobility system is understood through three layers - the first one is the train system, second one is the highway system and the third one are recreational routes. Identifying important nodes at the intersection of these three contribute to the crucial understanding of implementing a flexible sharing system in the future.



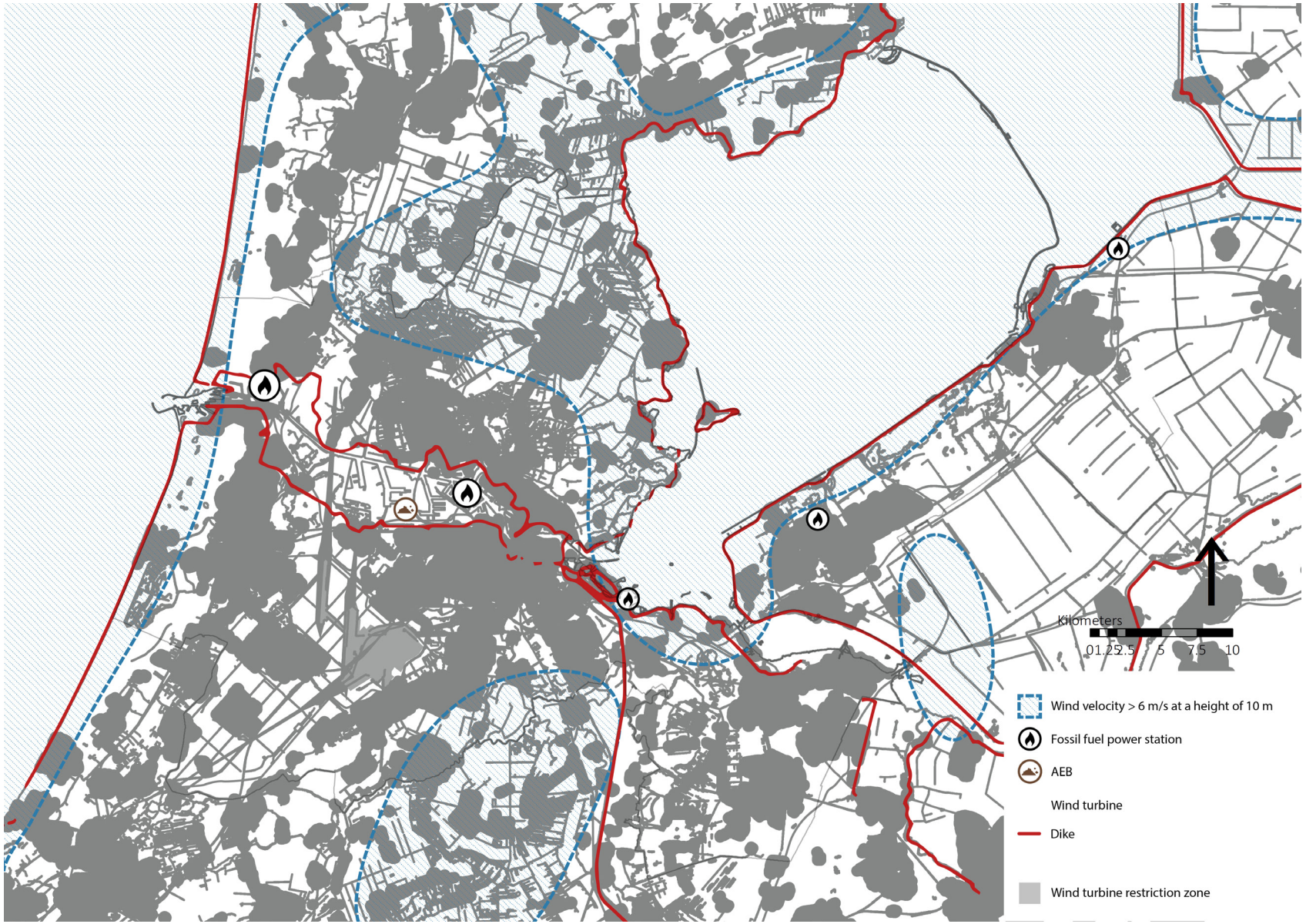
ENERGY CONSUMPTION

Cities are categorized based on the density and size to devise solutions to reduce energy consumption. For large highly dense cities with historical towns, energy efficient solutions should be at a household level. For medium density and mid-sized cities the potentials within district sharing system should be explored for examples with greenhouses ,datacenter and geothermal energy.



ENERGY PRODUCTION

The potential for wind energy comes from a calculation of wind speed, offshore areas and large empty areas that have a strong potential for developing wind energy. The restrictions for wind energy based on the regulations of minimum distance between windmills and landscapes and infrastructures.



VISION

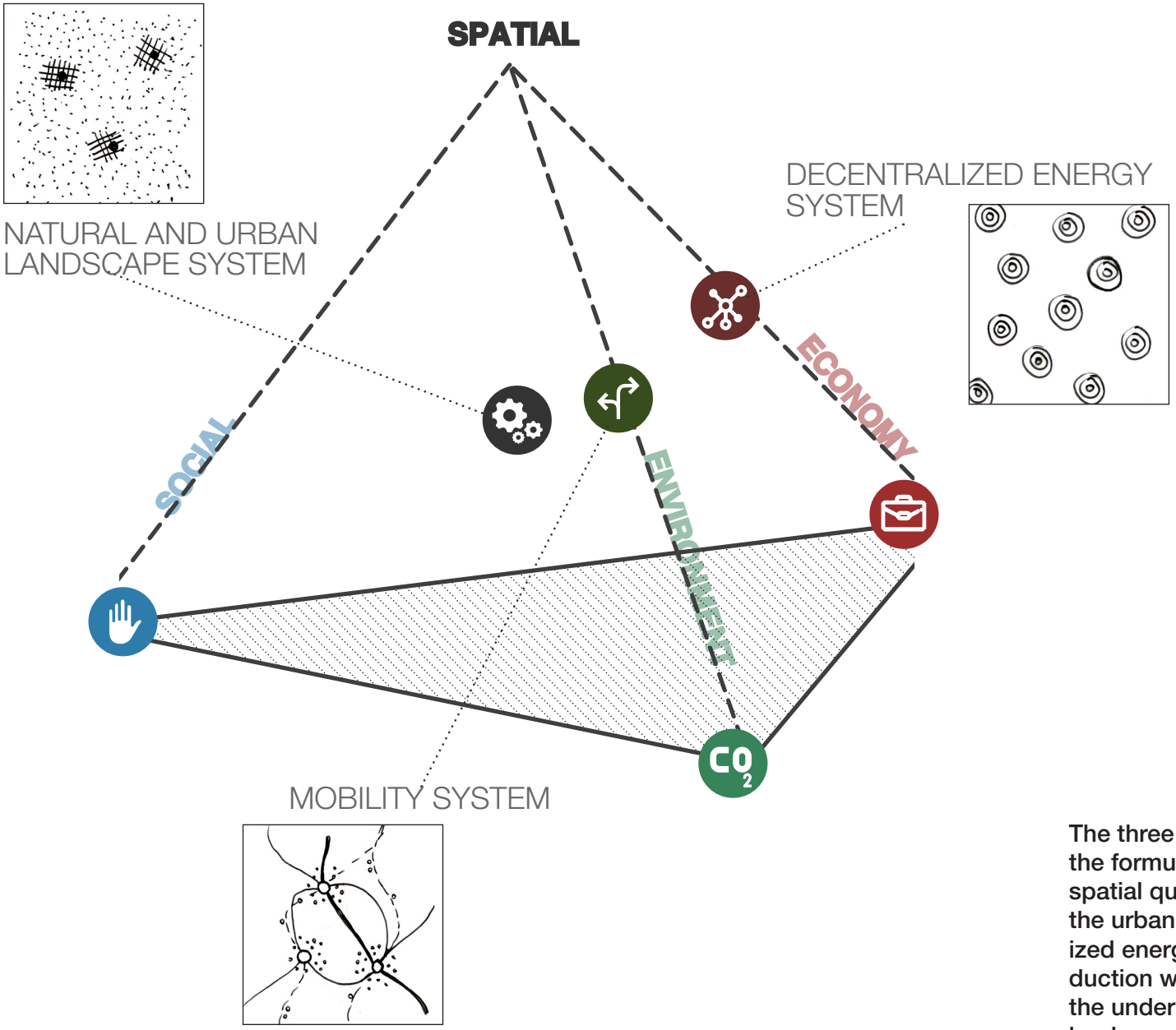
In 2040, AMA is empowered by the **green energy transition** through **three spatial systems** that have shaped the future energy transition landscapes. Together the layers form a seamless landscape: a landscape where energy production is integrated within the built and natural environment. Our vision goes beyond the spatial implementation of green energy transition as it shapes opportunities to **strengthen AMA from an economic, social and environmental** perspective.

(01) **Decentralized Energy System:** It empowers and incentivizes municipalities through a decentralized system through the implementation of renewable energy. Decreasing consumption and adapting the current built environment to reuse energy flows can strengthen local economy and provide more jobs. This can strengthen the local economy and provide jobs. The decentralized system tackles dualism that lies within attitude of citizens by involving them within the design process of the energy transition.

(02) **Mobility System:** This system thrives to make consumption less , by implementing a flexible sharing system for e-bikes and e-cars and stimulate the increased use of public transport. The integrated system allows users to pick and drop off a ‘shared’ electric car or electric bike at any hub in the region. the system also emphasizes on the optimizatione use of space by adding energy production within the mobility system. Both aspects of the mobility system will be applied on a larger scale to not only strengthen AMA, but also AMA within the Randstad system.

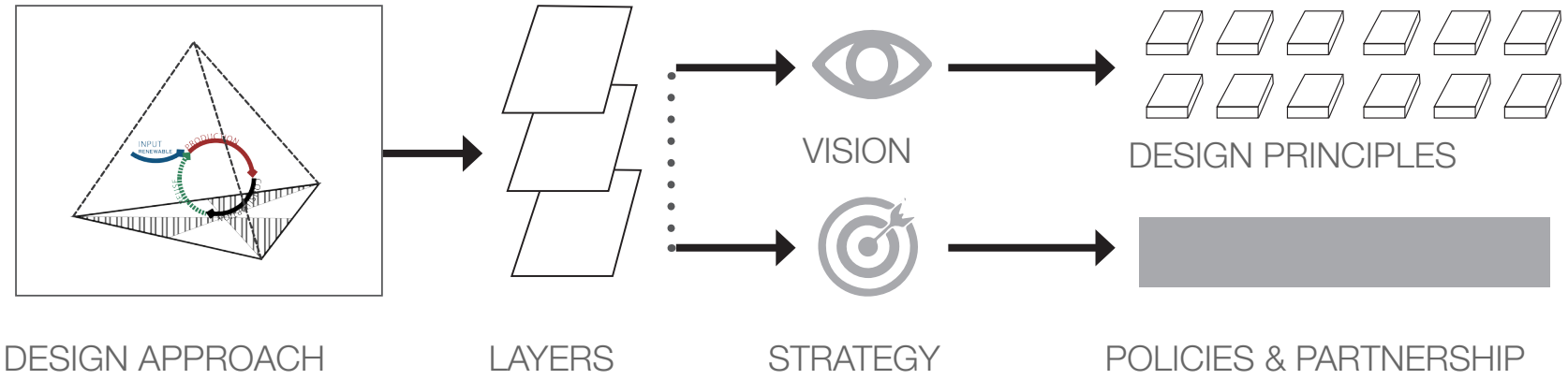
(03) **Natural and Urban Landscape System:** The switch from energy resources will create new values for the current energy producing landscapes and future energy landscapes. Post fossil areas will be transformed to areas with new public space reconnecting urban and natural landscape areas. Implementing wind energy in the current natural landscapes can provide new recreational uses within the landscape and collaboration with farmers.

RELATIONSHIP BETWEEN THE GOALS AND SPATIAL LAYERS OF THE VISION



The three spatial layers relate to every landscape and the formulated goals. Protecting and strengthening spatial quality can be achieved in exploring synergies in the urban and natural landscape system. The decentralized energy system promotes renewable energy production within each municipality. The mobility system is the underlying infrastructure system that integrates the landscape, green energy and recreation.

DESIGN APPROACH

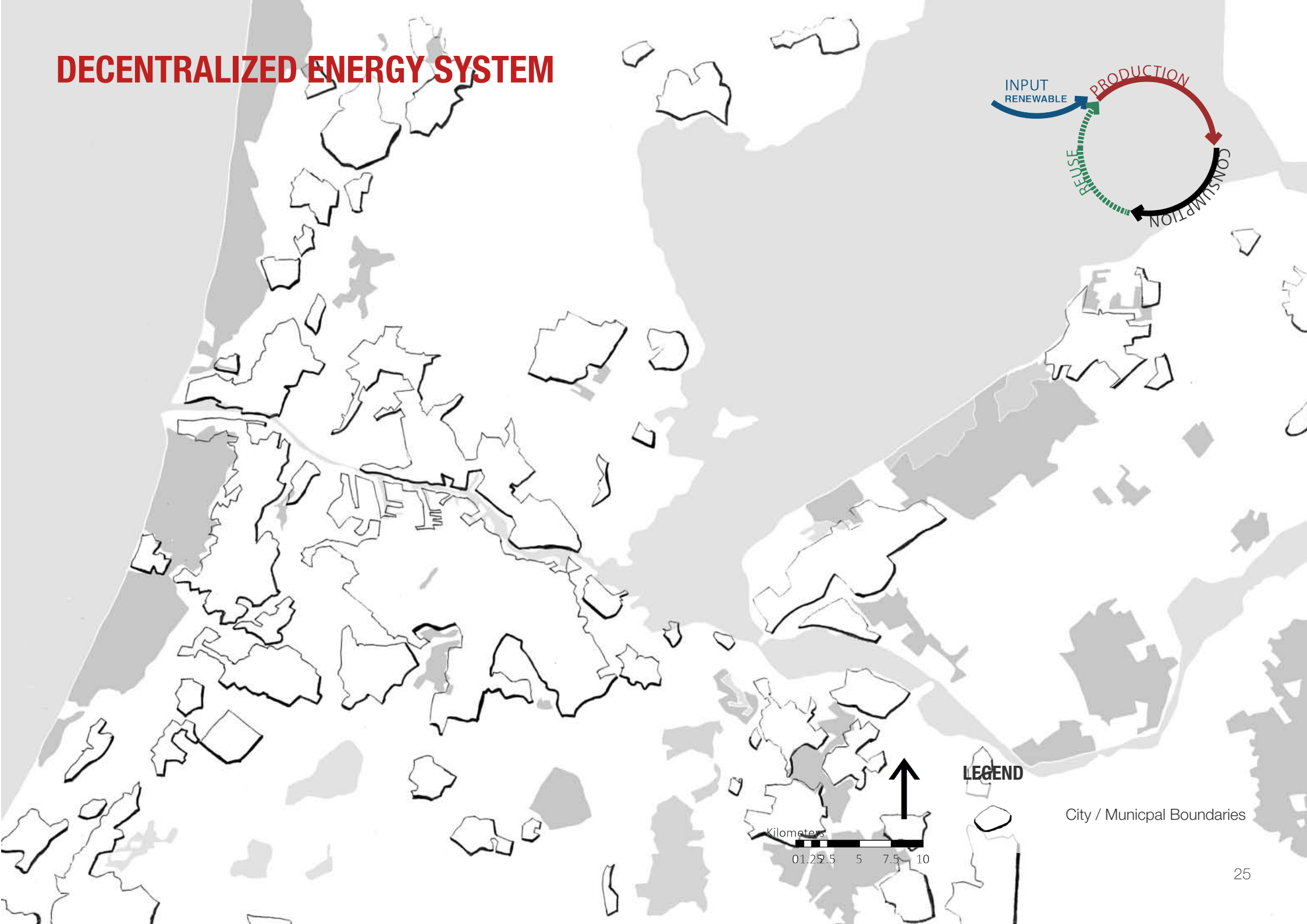


ENERGY

TRANSITION LANDSCAPES

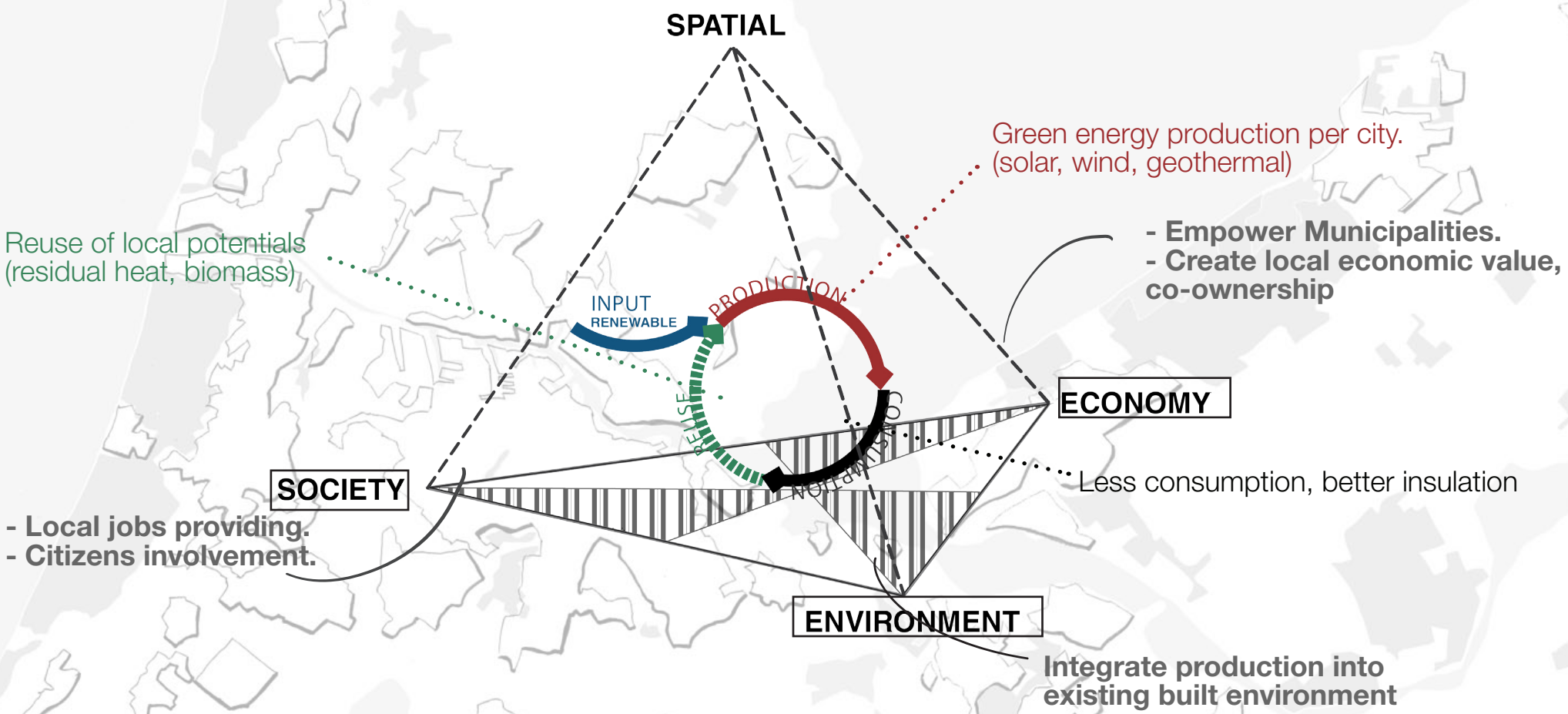
The design approach is strongly embedded within the theoretical framework. Exploring the environment, economic and social perspective in the green energy economic model to overcome dualism has been applied to each layer. This has resulted in a vision per spatial layer and implementation strategy for each. The vision provides design guidelines on achieving the goals per layer along with highlighting key projects in the strategy. These layers have then combined to form the final vision and the energy transition landscape.

DECENTRALIZED ENERGY SYSTEM

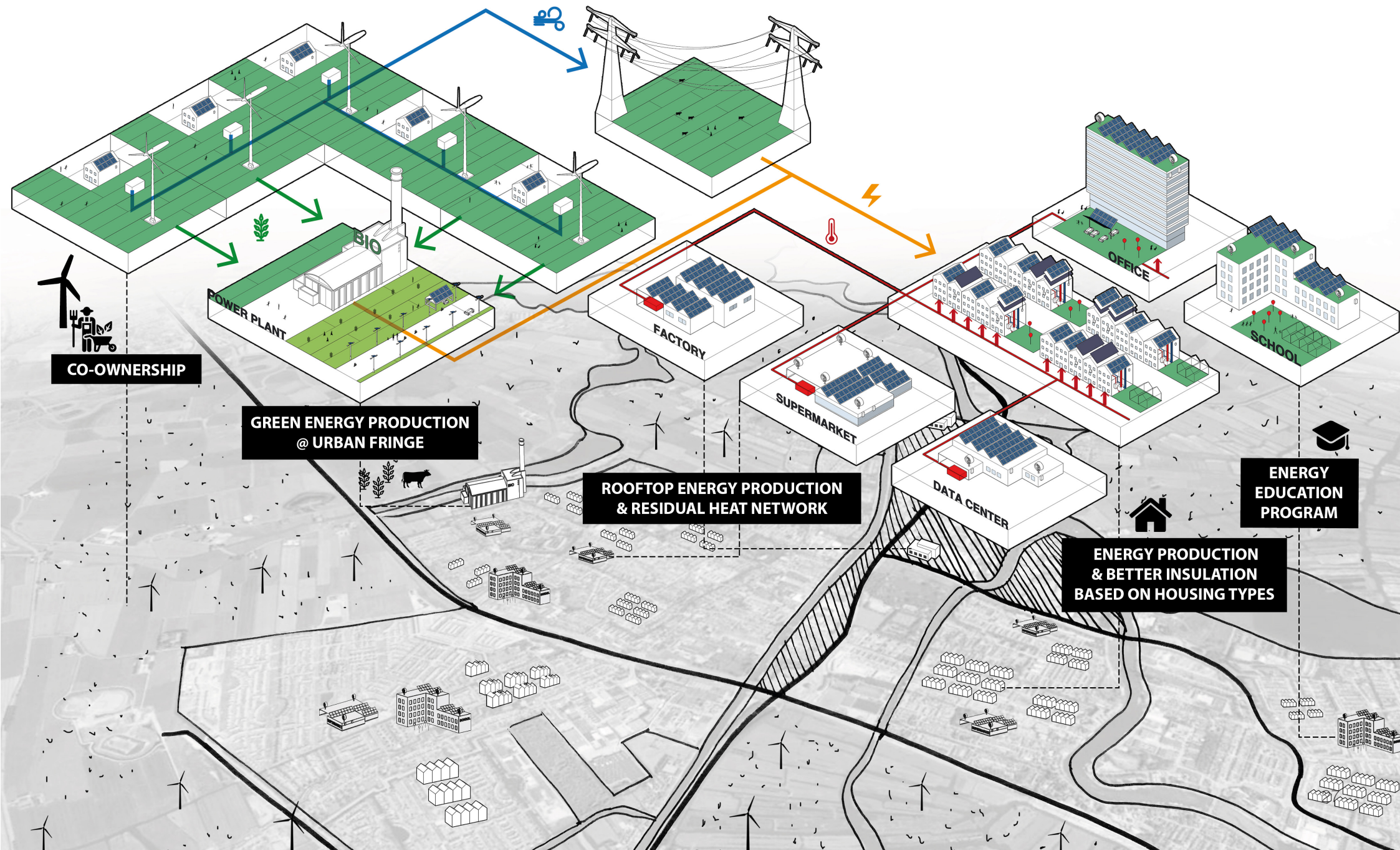


DECENTRALISED ENERGY SYSTEM -- DESIGN APPROACH

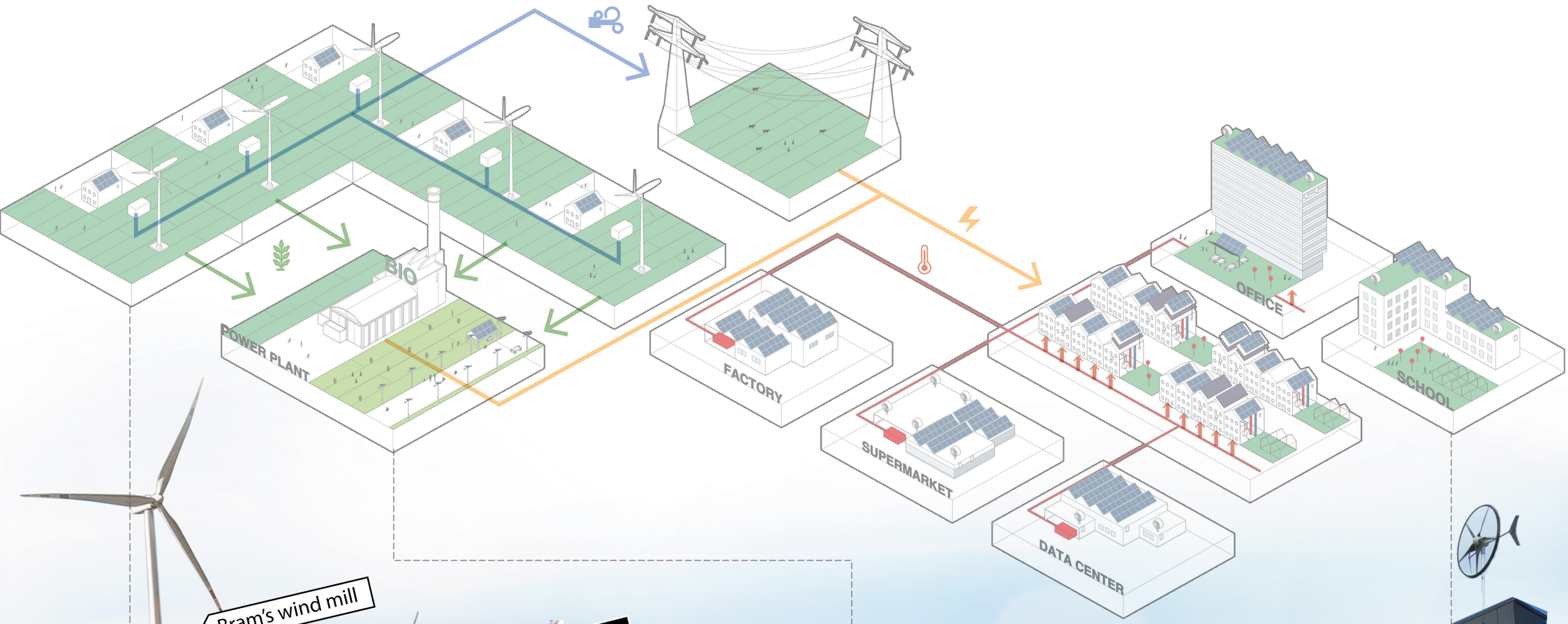
GOAL 2040: Residential areas are running on 100% renewable energy



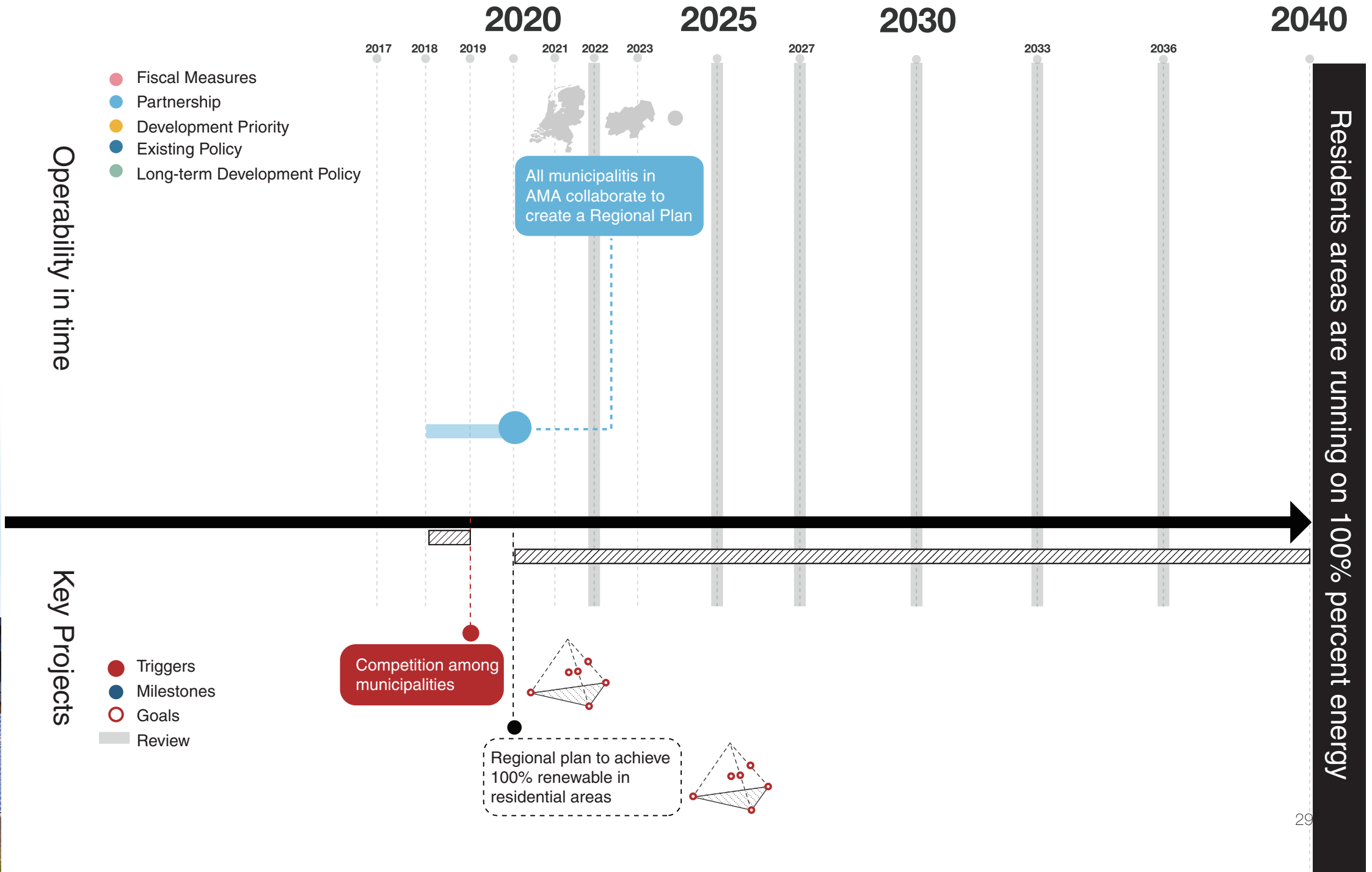
DECENTRALISED ENERGY SYSTEM -- DESIGN PRINCIPLES

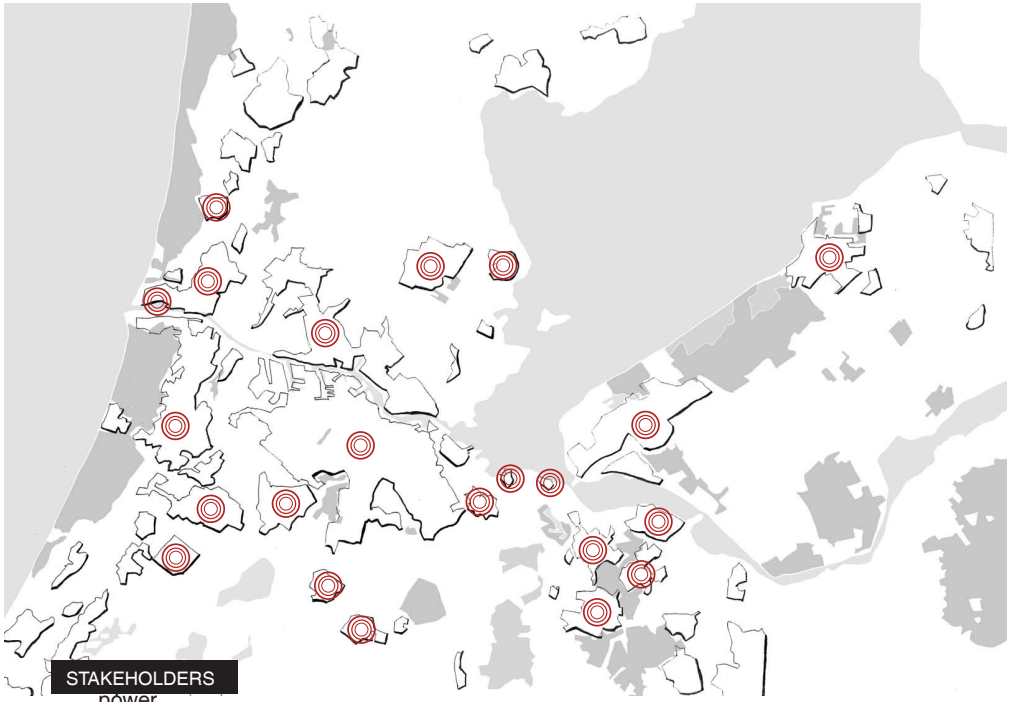


DECENTRALISED ENERGY SYSTEM -- IMPRESSION



IMPLEMENTATION STRATEGY





This strategy aims at empowering municipalities to come up with innovative solutions to tackle the transition to renewable energy. Through partnerships a new regional plan can be created that is a combination of key projects in every municipality as well as promotes collaboration between neighboring municipalities. This will be triggered through a competition between municipalities that promises a funding to implement the most innovative solutions.

DESIGN COMPETITION MUNICIPALITIES AMA

January 2018, Amsterdam

Dear Municipality,

In December all Municipalities within the **Amsterdam Metropolitan Area** have come to the agreement to collaborate on the *decentralized energy goal for 2040*. We, the board of the **Metropolitan Region Amsterdam**, would like to congratulate you on this achievement! We see a future where residential areas have shaped a system to be fully self reliable when it comes to energy production.

We are pleased to announce that the next phase will include a competition between the municipalities! This competition is formed to gather innovative ideas on how to implement a new decentralized energy system. We have received a fund from the national government to make the transition possible and collaborate on a new regional plan for AMA

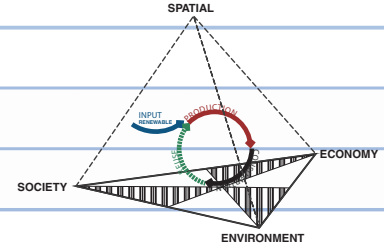
After a year we will gather all ideas and formulate an overarching regional plan. The regional plan will have projects that will strengthen every municipality within the AMA. Besides the implementation of the regional plan, there will be allocated fund for projects. that aptly respond to the requirement of the design brief

Requirements:
Projects should be embedded within the green energy transition model.
* Projects should integrate renewable energy into the current built environment and be able to Quantify the amount of added energy.by these sources
* Projects should take into account the reuse of flows (co2, residual heat, biomass) and quantify the amount of energy savings by implementing the reuse of flows.
* Projects should reduce energy consumption and quantify the overall reduction in energy consumption
* Projects should stimulate the local economy and provide jobs. estimate the amount of jobs and local turnover.
* Show projects/actions to involve citizens within the process.
*. The projects should demonstrate the inclusion of all the stakeholders involved through innovative business models.
* Collaborative Projects that propose solutions across municipality boundaries are also welcome.

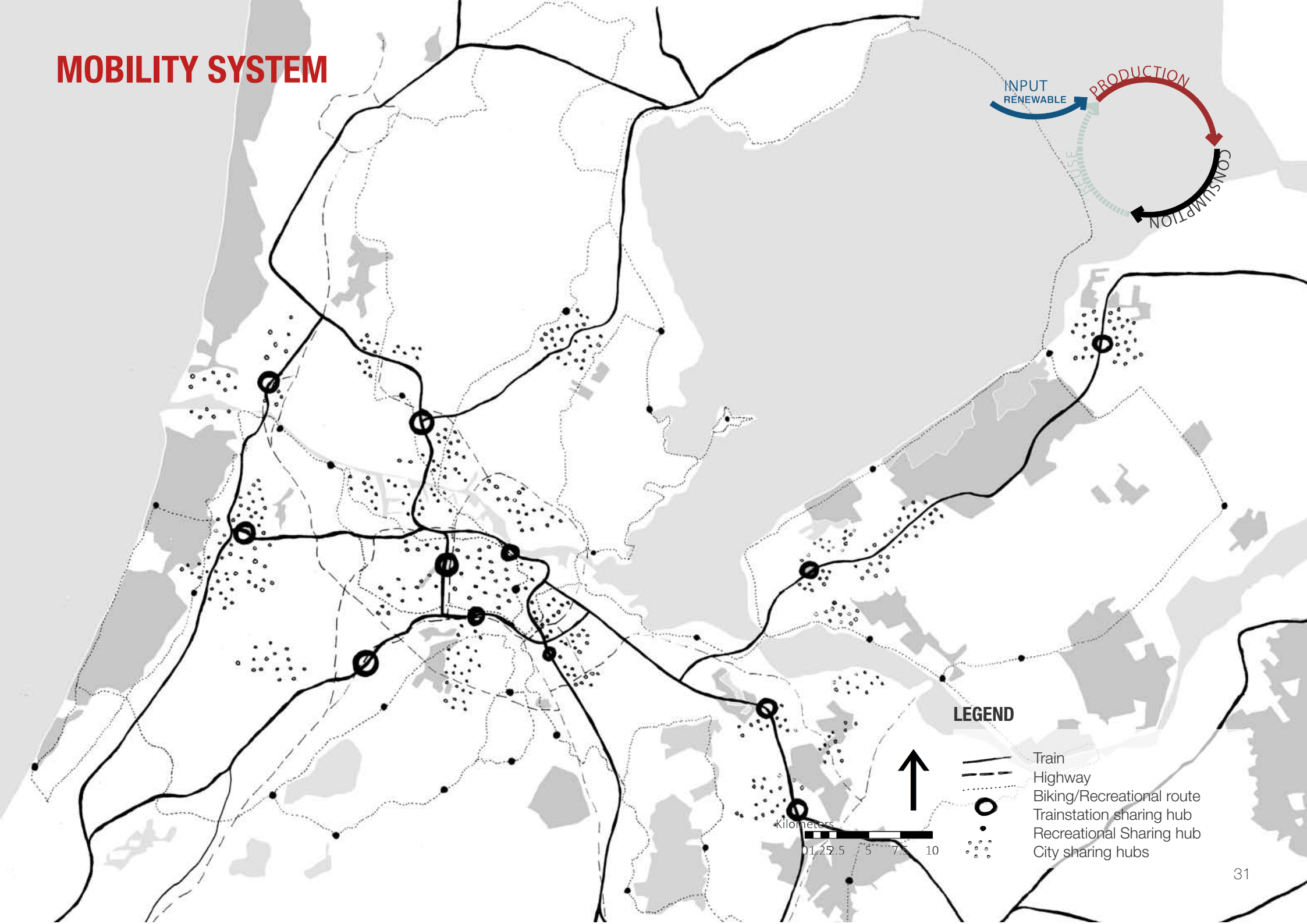
With the design brief we send you design principles and inspirational ideas that show examples of how the decentralized system can work. We ask you to formulate a set of projects that fit the requirements of the design brief. So let the completion get started! We are looking forward to your contribution.

Kind Regards,

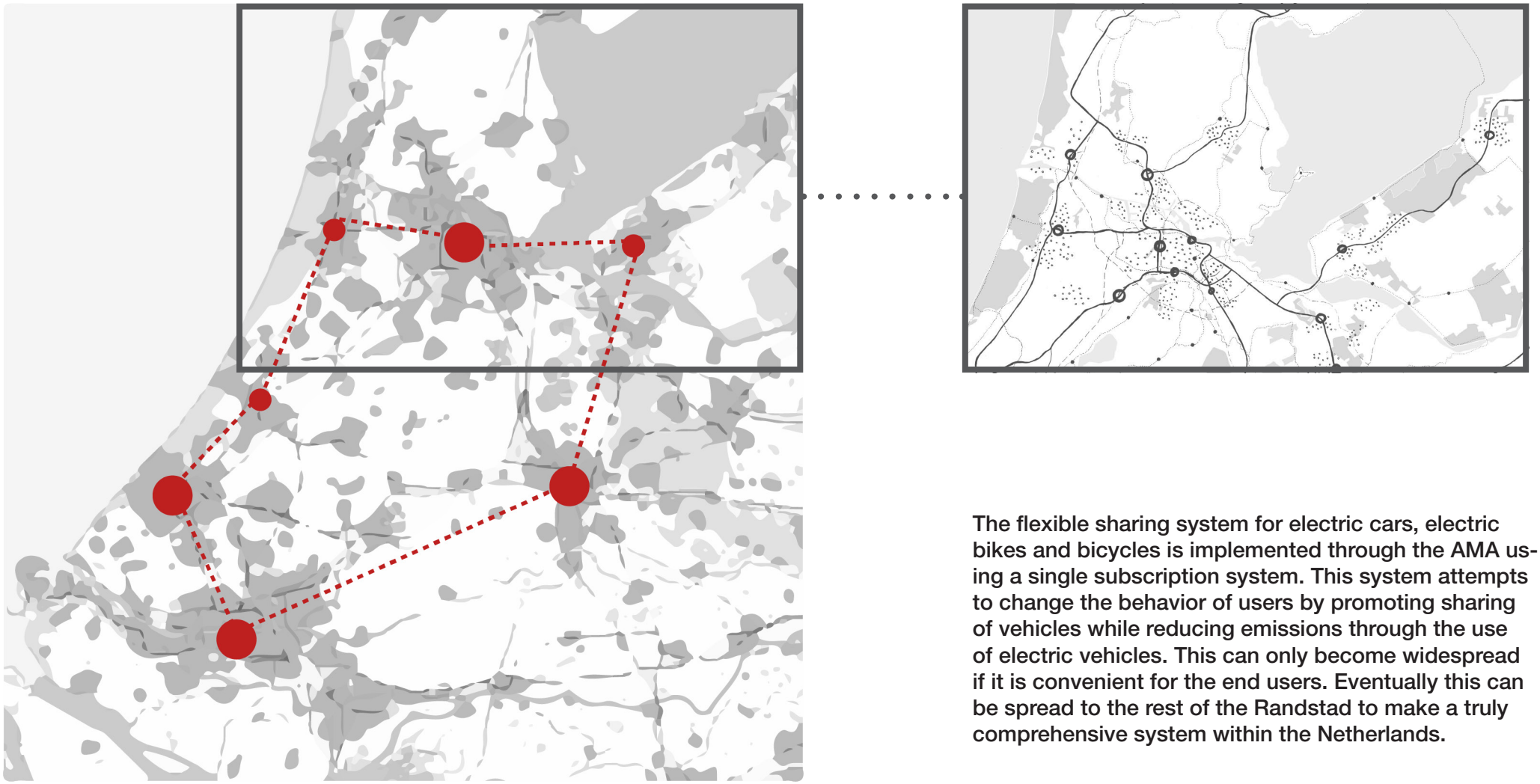
The Board
Metropolitan Region Amsterdam



MOBILITY SYSTEM



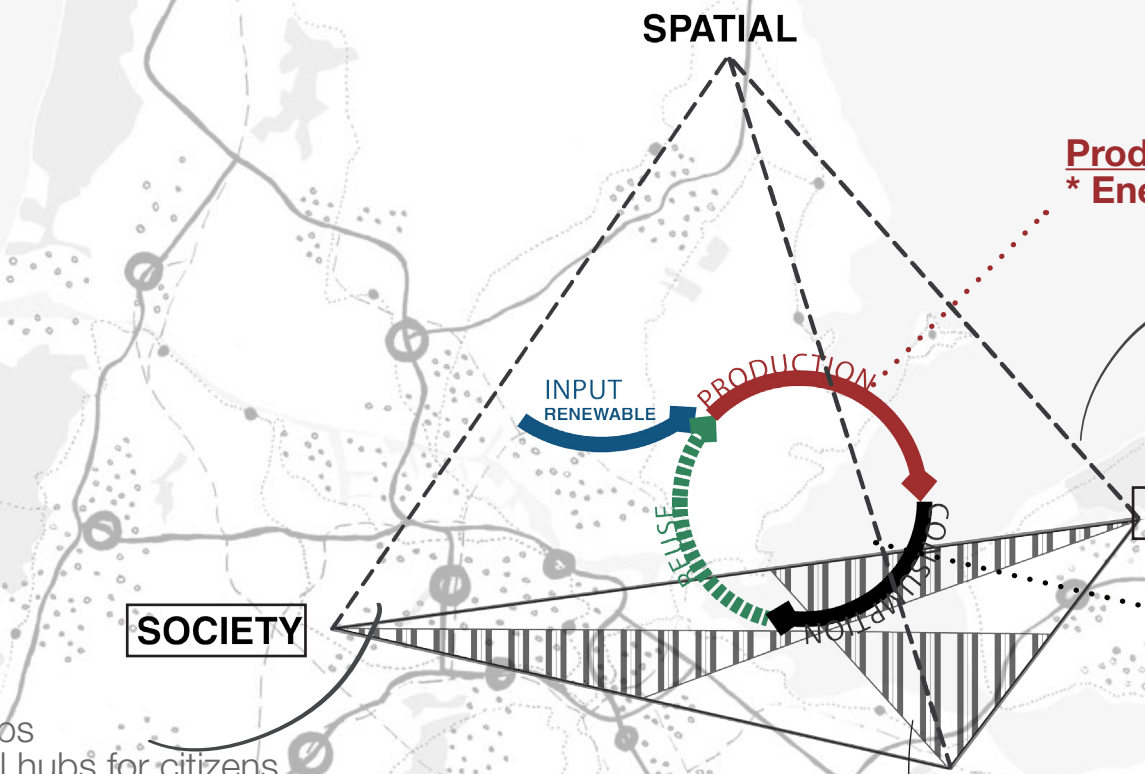
MOBILITY NETWORK OF THE AMA IN RELATION TO THE RANDSTAD



The flexible sharing system for electric cars, electric bikes and bicycles is implemented through the AMA using a single subscription system. This system attempts to change the behavior of users by promoting sharing of vehicles while reducing emissions through the use of electric vehicles. This can only become widespread if it is convenient for the end users. Eventually this can be spread to the rest of the Randstad to make a truly comprehensive system within the Netherlands.

MOBILITY SYSTEM -- DESIGN APPROACH

GOAL 2040: Extend the flexible sharing network & Adapts roads to generate electricity



Production
*** Energy generating roads (highway)**

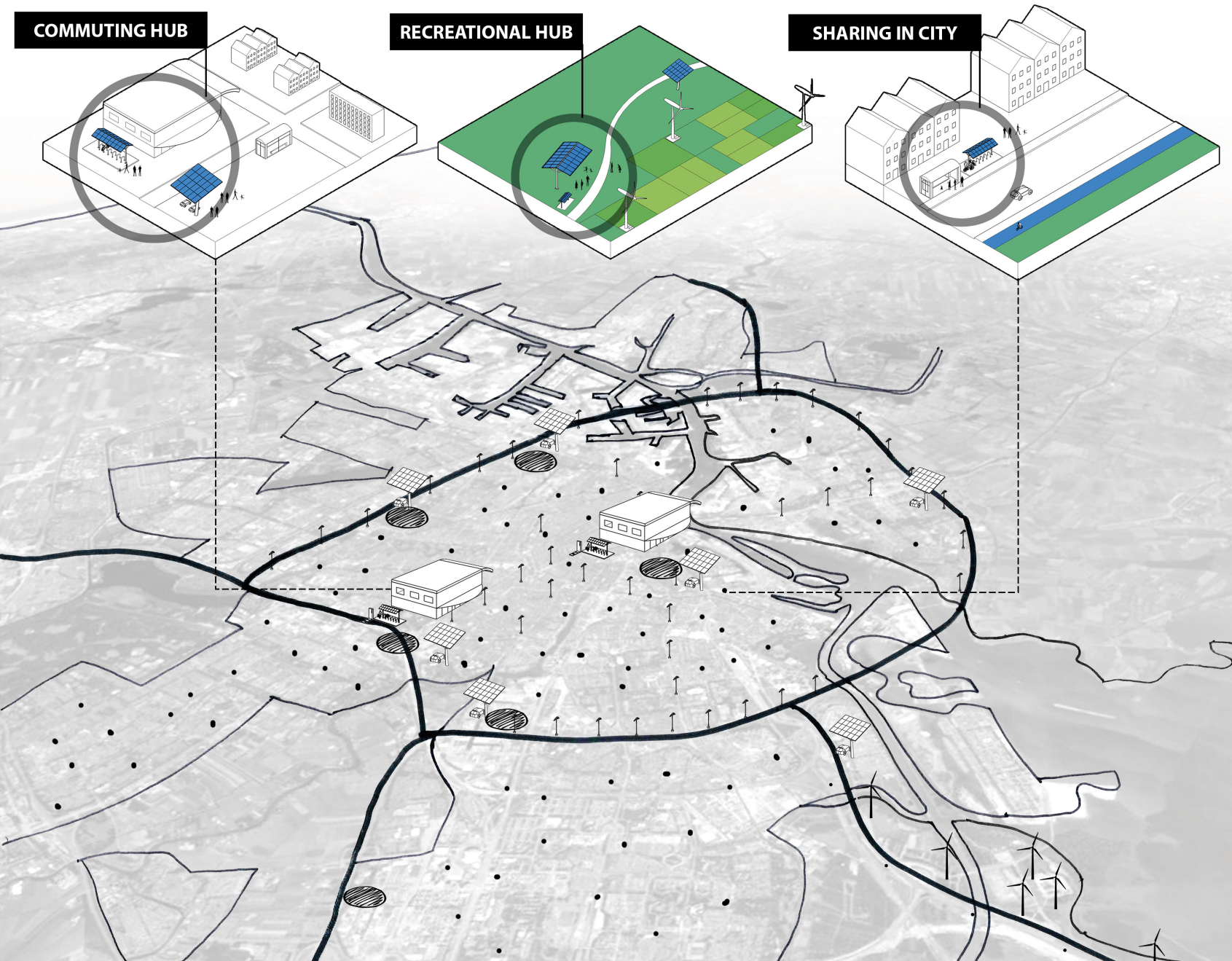
- Joint Venture at R&D mobility lab and execution

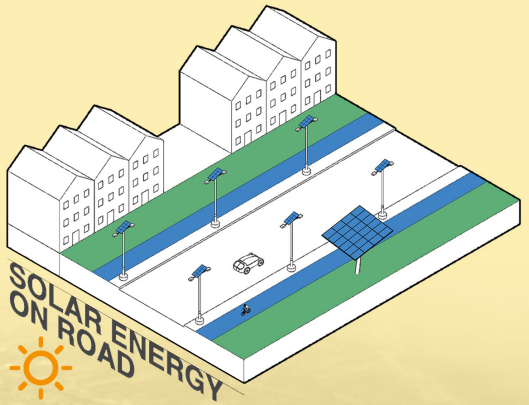
Consumption
01. Cheaper public transport
02. Flexible sharing network: Sharing commuter & recreational hubs, small and large
03.Flexible sharing subscription

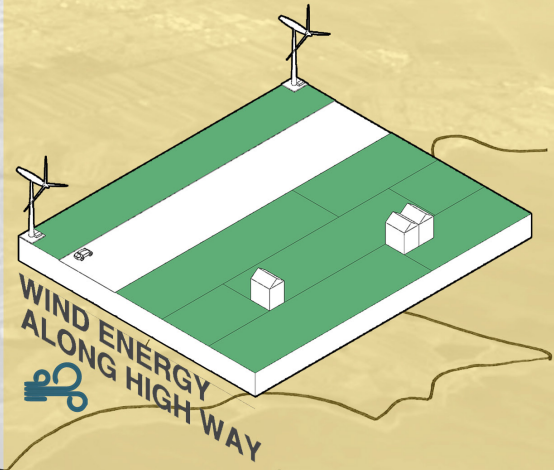
- Providing jobs
- Recreational hubs for citizens

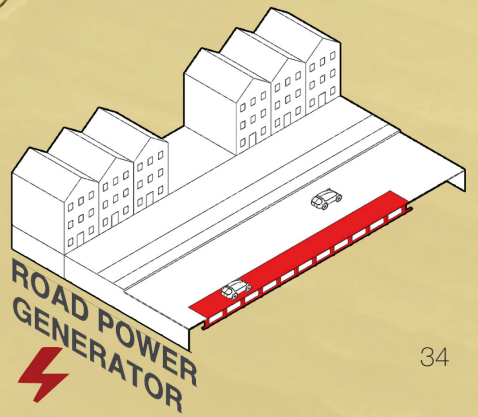
Integrate production into existing built environment - roads

MOBILITY SYSTEM -- DESIGN PRINCIPLES



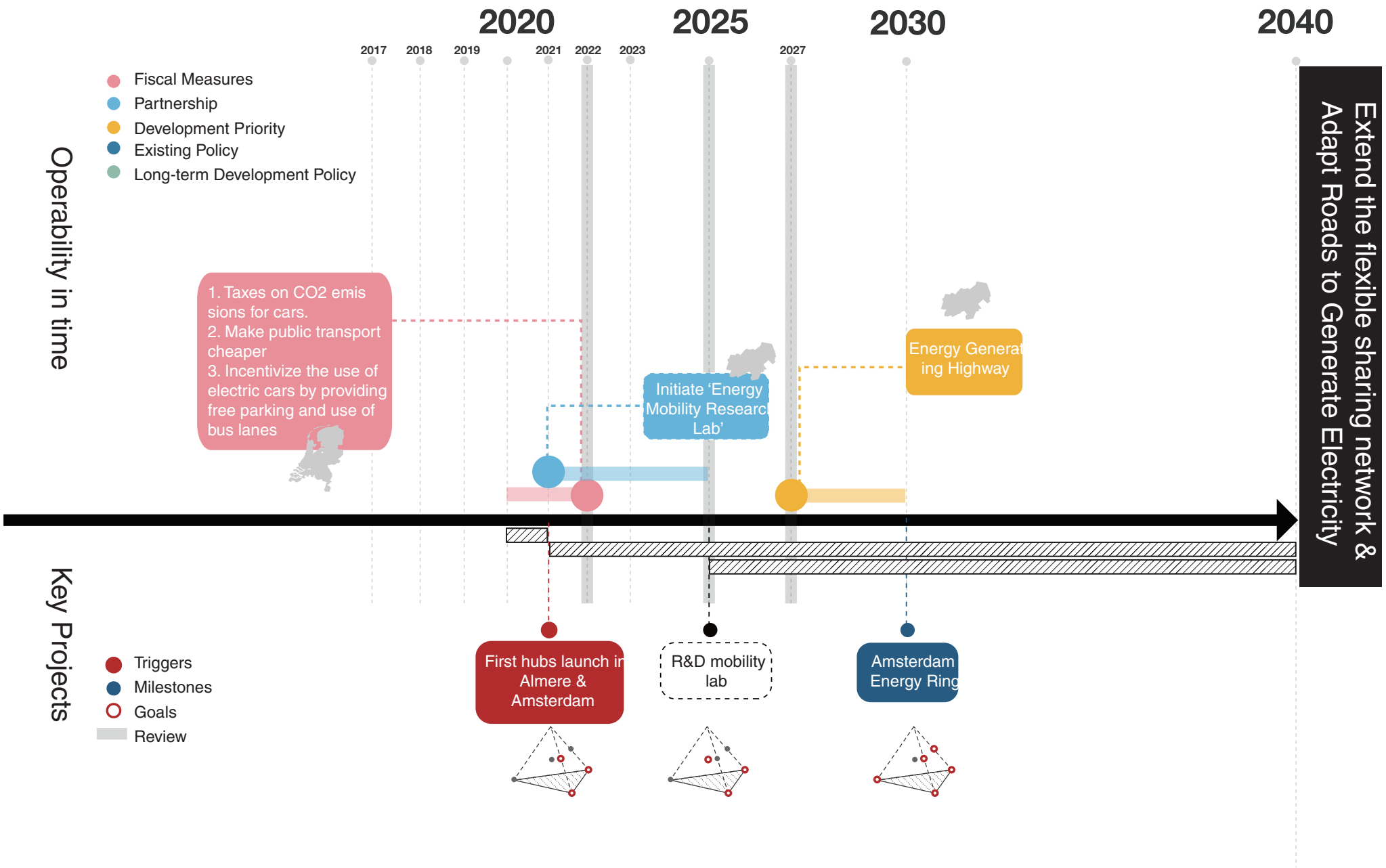






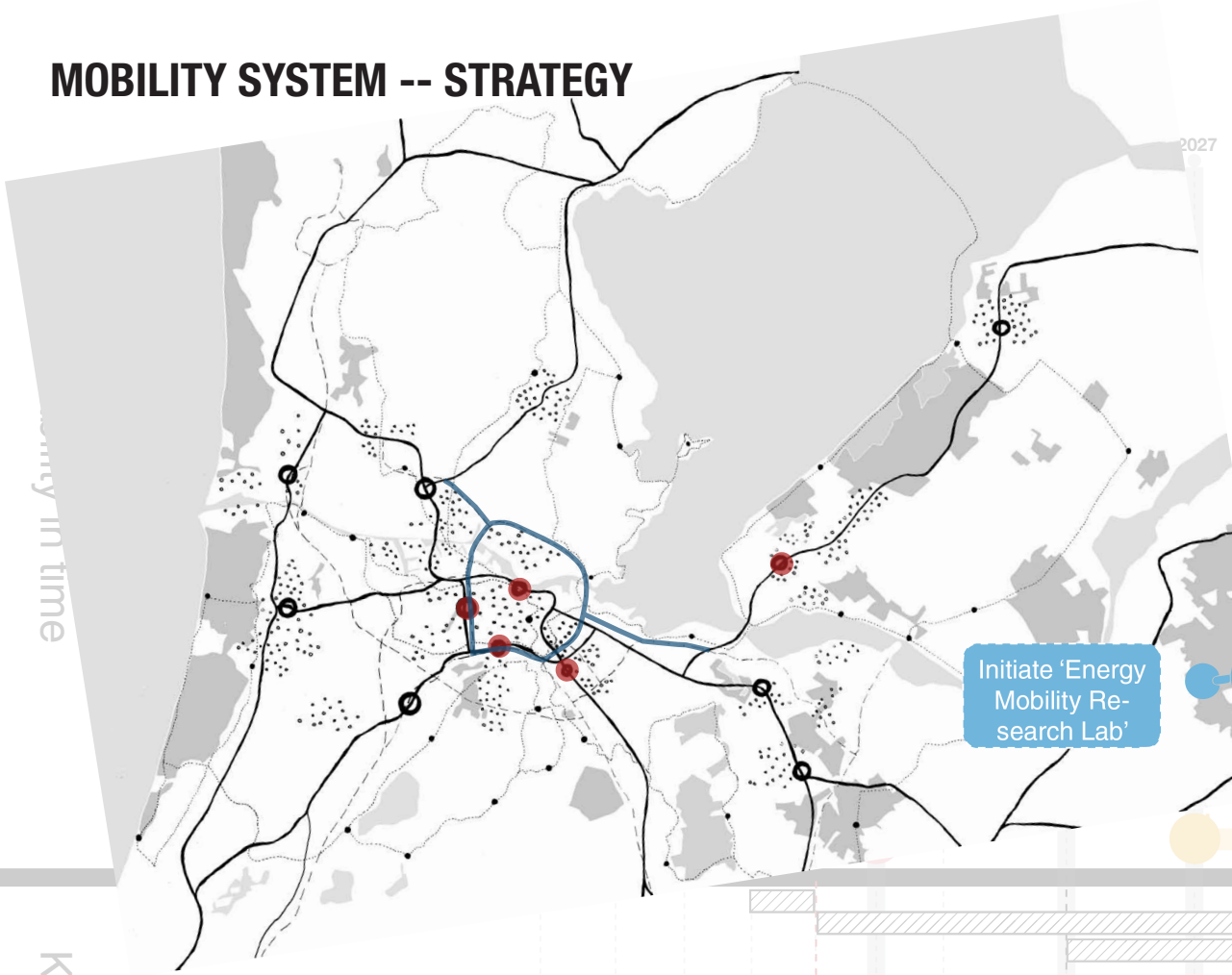
MOBILITY SYSTEM -- IMPRESSION

MOBILITY SYSTEM -- STRATEGY



MOBILITY SYSTEM -- STRATEGY

To promote the use of the sharing system, fiscal measures can be adopted in combination with proving incentives to use electric cars. Taxes on CO2 emissions for cars should be introduced, public transport should be made cheaper to encourage a more frequent use and electric cars can be incentivized by providing free parking and the use of bus lanes. The first hubs should be opened in areas with maximum users, in Amsterdam Centraal and Almere. Technology to generate electricity is well on its way and can be initiated within the AMA. To be able to achieve this the government should invest in the research of this technology though a 'Mobility Research Lab'.



Initiate 'Energy Mobility Research Lab'

Energy Generating Highway

STAKEHOLDERS

power

Ministry of Infrastructure

NS

AMA

Car production Co

Tech Co.

interest

citizens

Extend the flexible sharing network & Adapt Roads to Generate Electricity

Key Projects

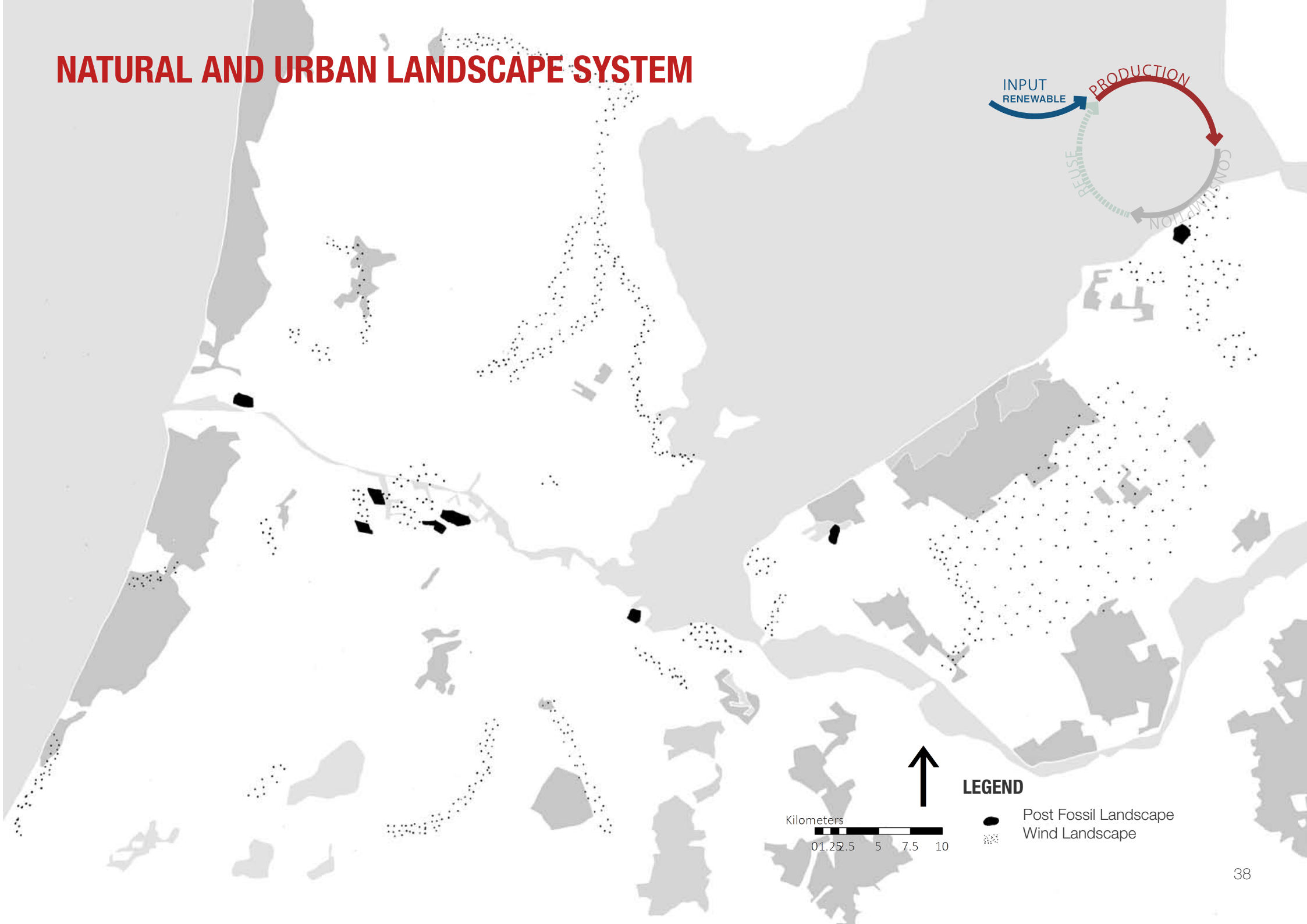
- Triggers
- Milestones
- Goals
- Review

First hubs launch in Almere & Amsterdam

R&D mobility lab

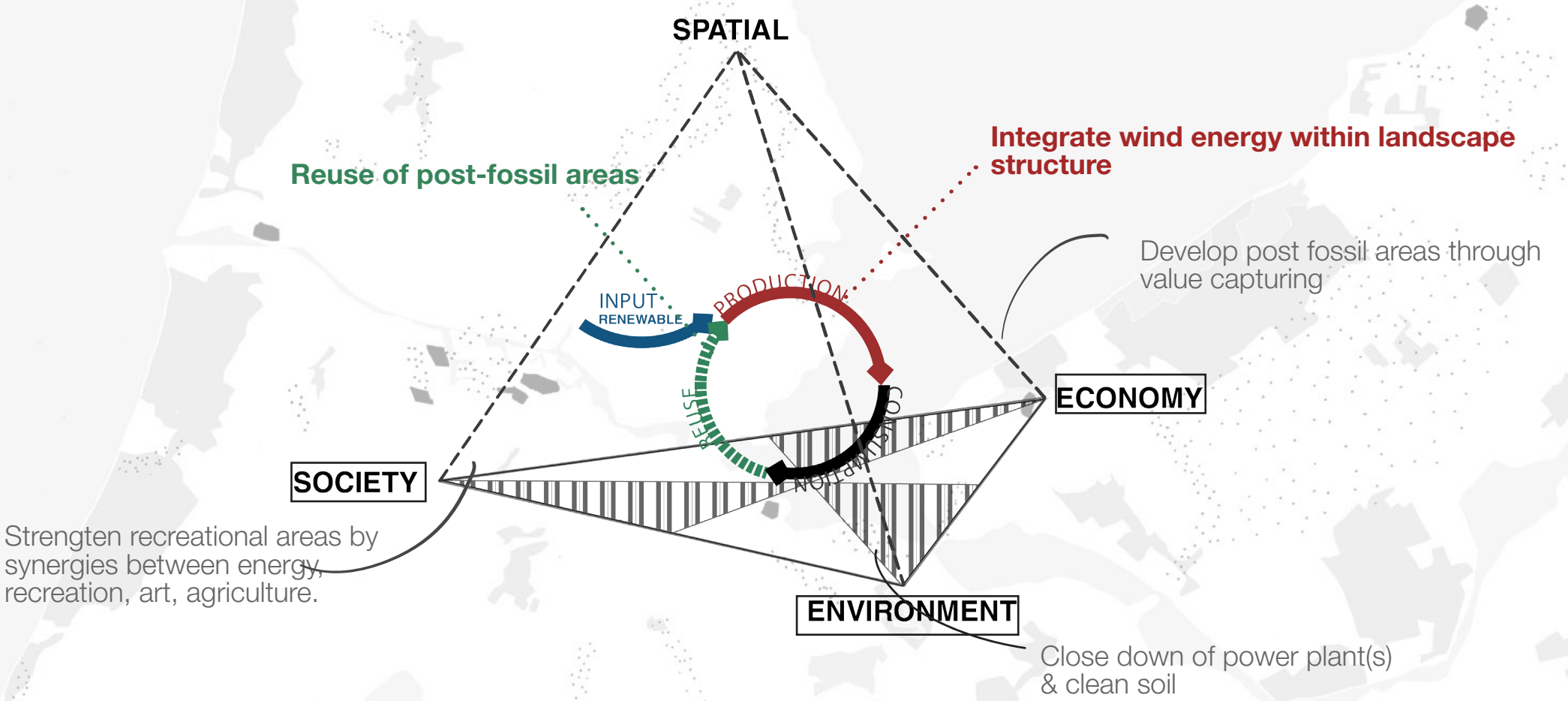
Amsterdam Energy Ring

NATURAL AND URBAN LANDSCAPE SYSTEM

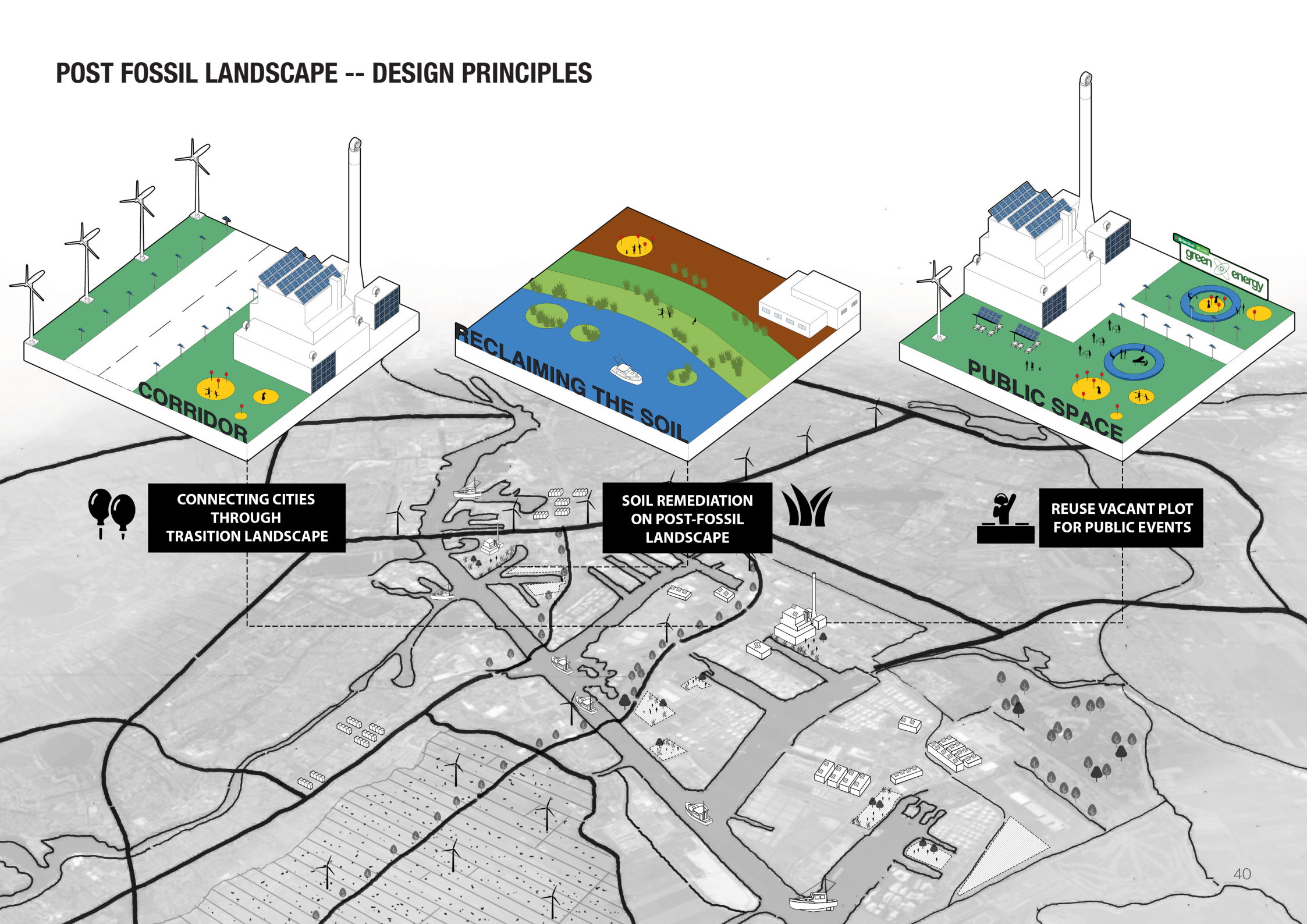


NATURE AND URBAN LANDSCAPE SYSTEM -- DESIGN APPROACH

GOAL 2040: Enhance spatial quality through energy transition landscape



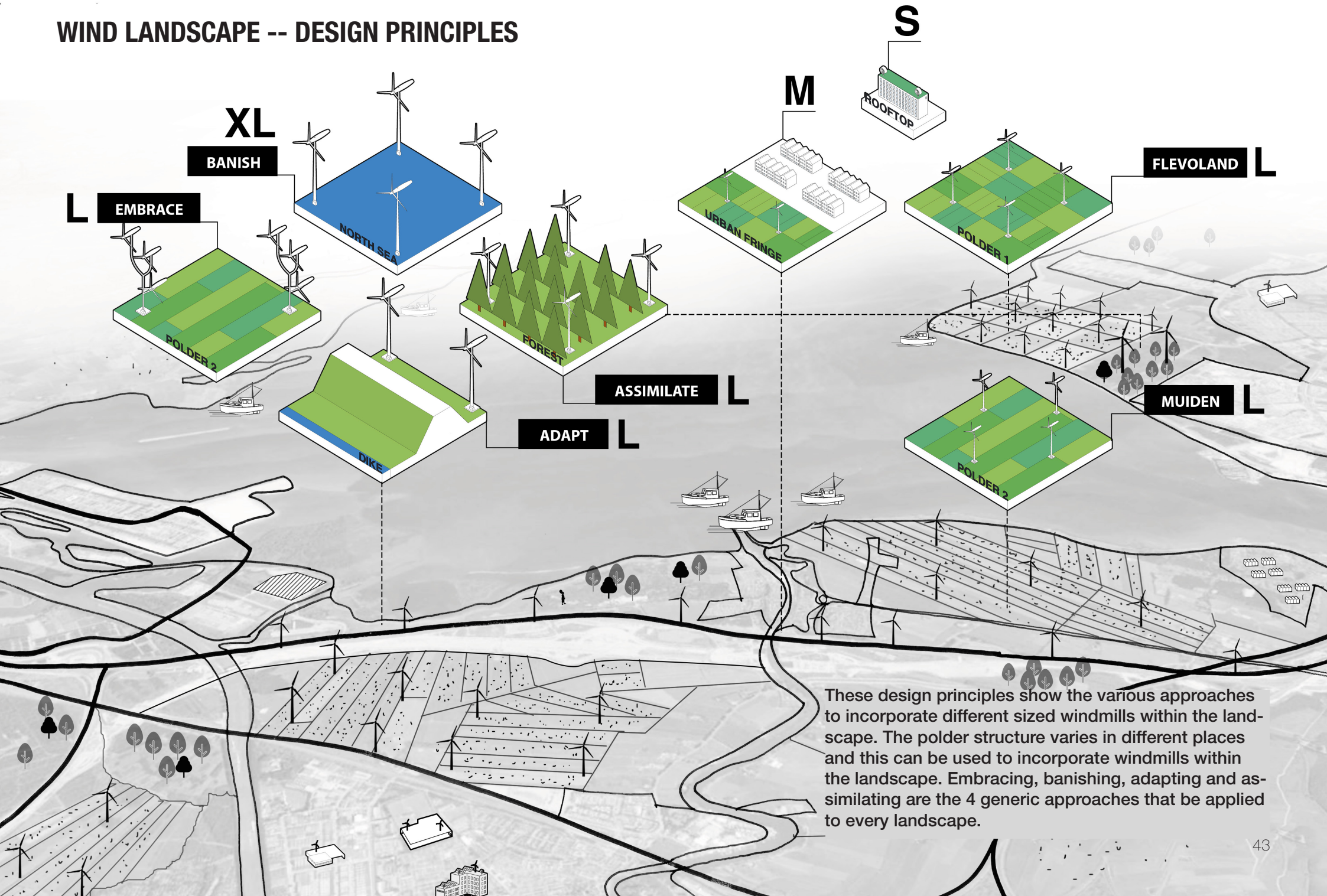
POST FOSSIL LANDSCAPE -- DESIGN PRINCIPLES



POST FOSSIL LANDSCAPE -- IMPRESSION

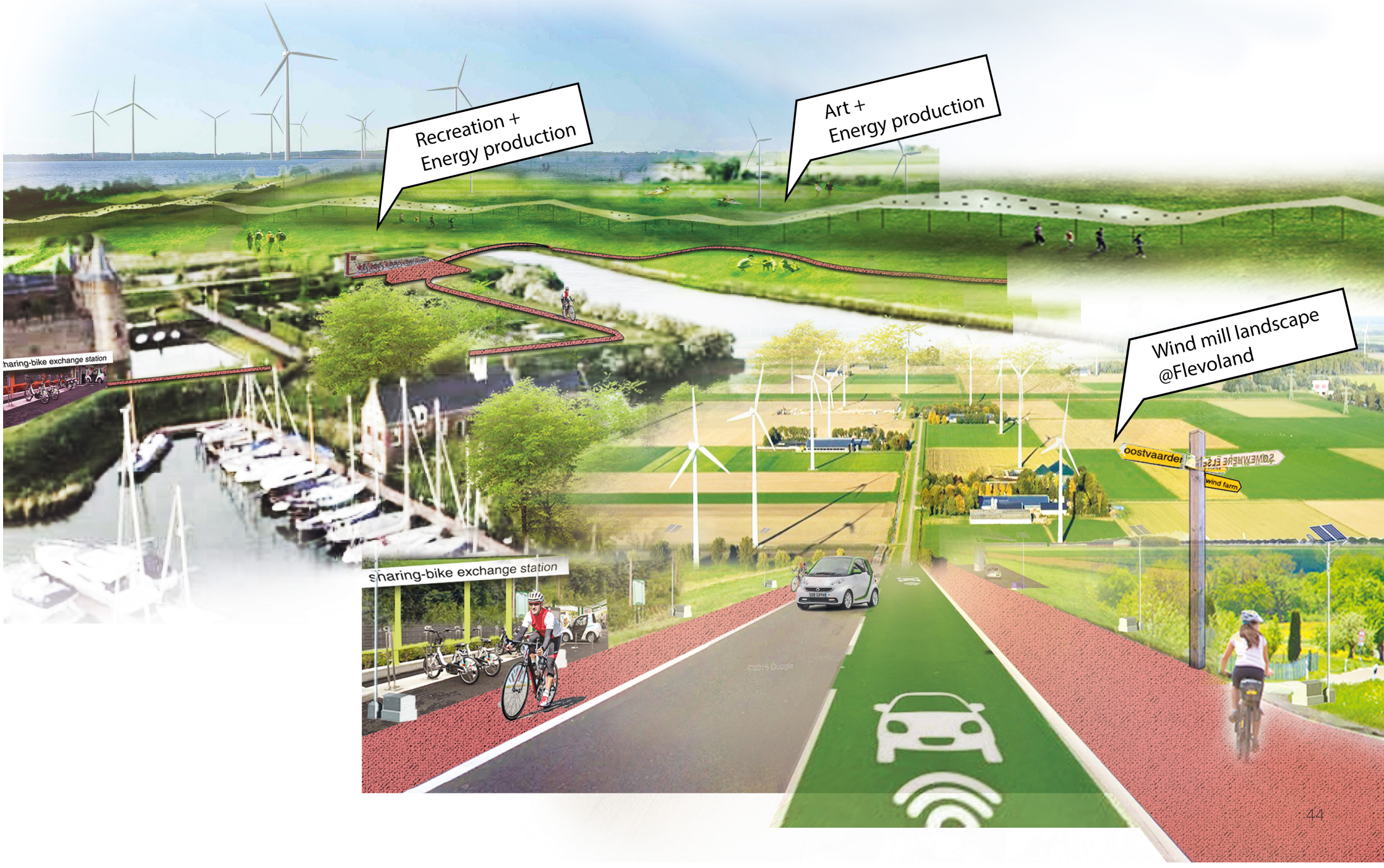
POST FOSSIL LANDSCAPE -- IMPRESSION

WIND LANDSCAPE -- DESIGN PRINCIPLES

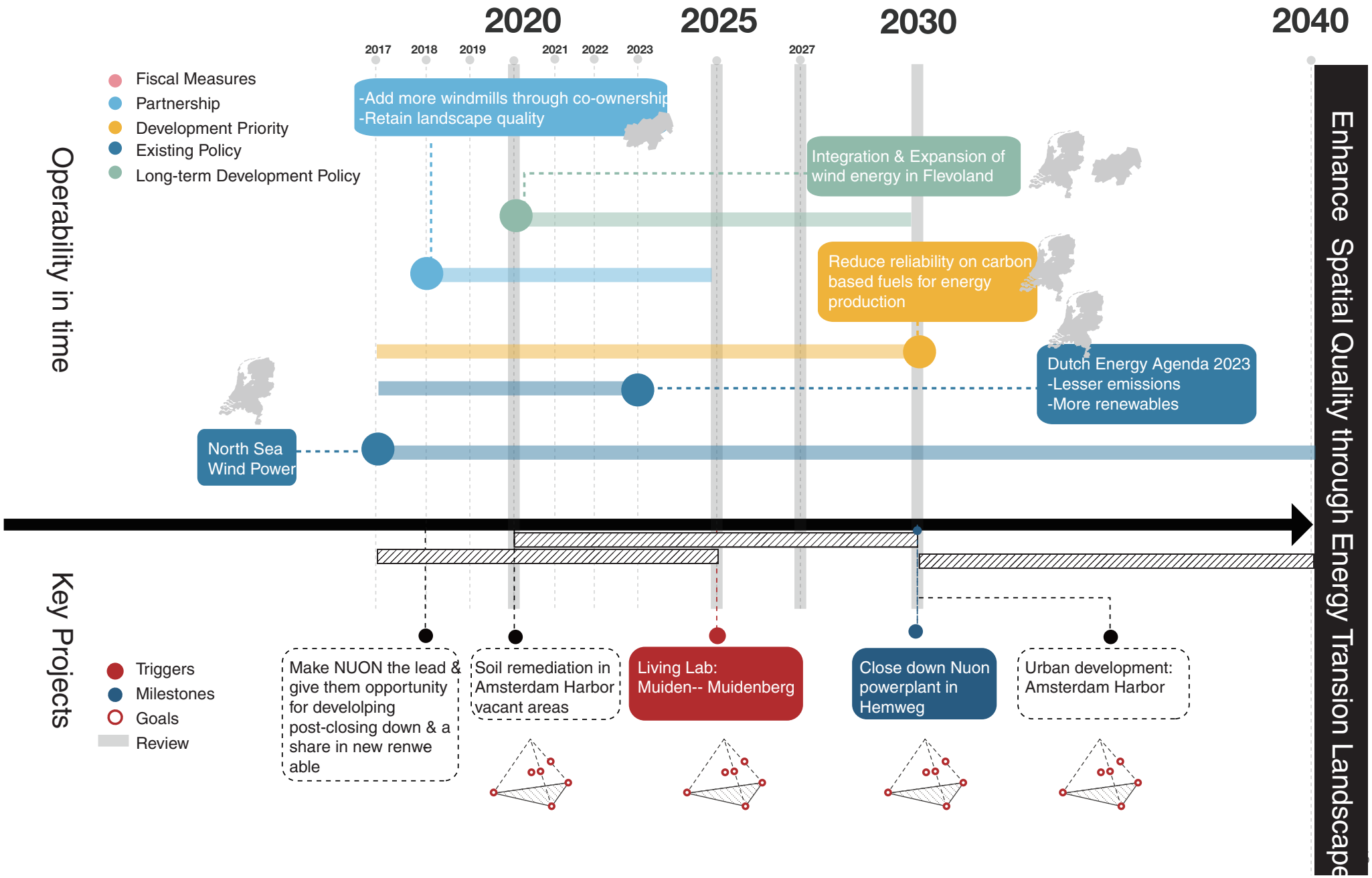


These design principles show the various approaches to incorporate different sized windmills within the landscape. The polder structure varies in different places and this can be used to incorporate windmills within the landscape. Embracing, banishing, adapting and assimilating are the 4 generic approaches that be applied to every landscape.

WIND LANDSCAPE -- IMPRESSION



NATURE AND URBAN LANDSCAPE SYSTEM -- STRATEGY



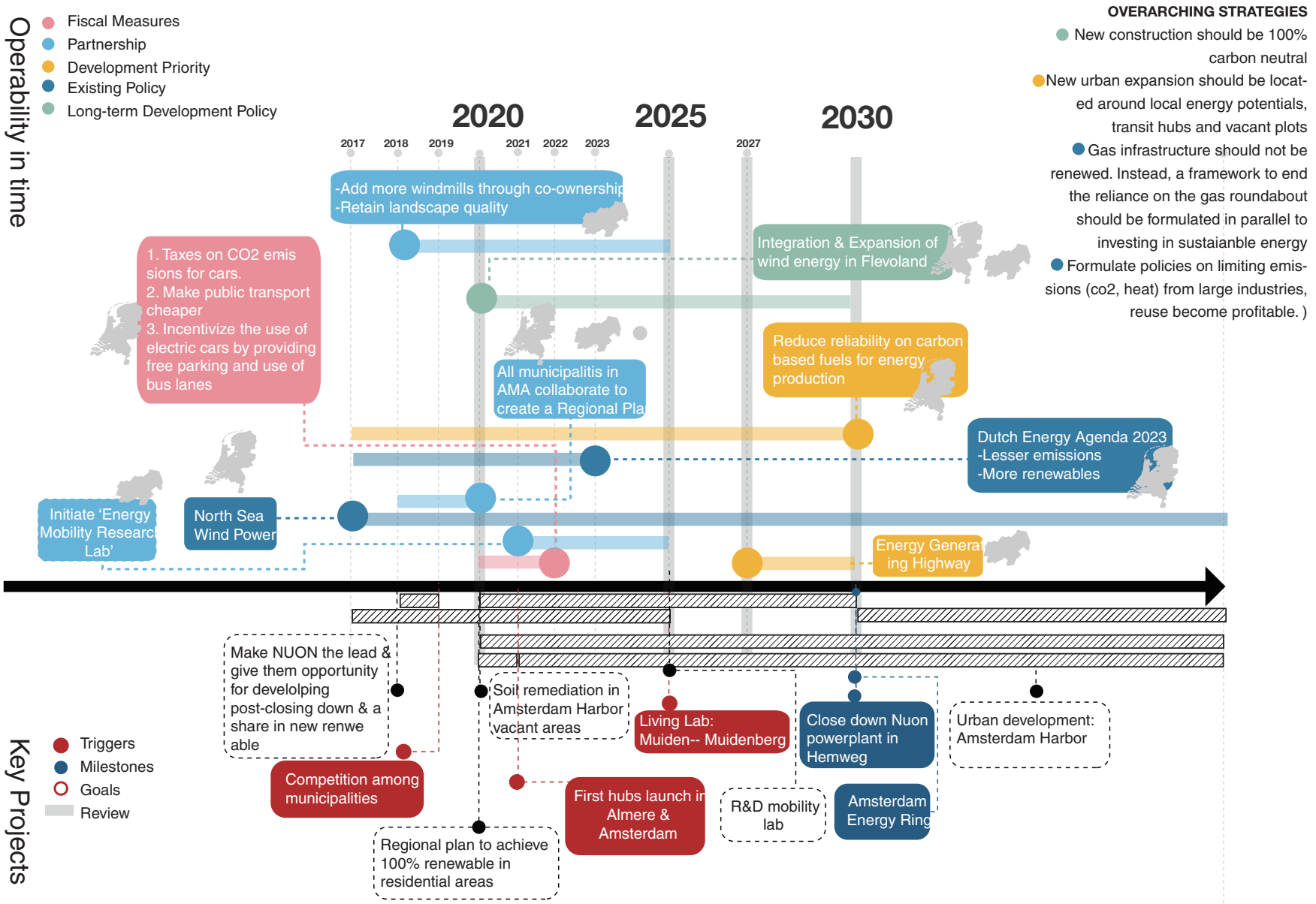
NATURE AND URBAN LANDSCAPE SYSTEM -- STRATEGY

The urban and natural landscapes aim to create two typologies of new cultural landscapes - post fossil areas and the integrated wind energy landscape. Creating the new identity of fossil areas involves making a switch to environmentally friendly, economically feasible and socially inclusive development in the future. For AMA, we propose the shutting down of NUON power plant in Hemweg. This is to make a strong statement about the future of energy production. To do this however, research into compensating for the energy produced by the plant needs to be a priority. Infact NUON can take the lead to do this and have a share in the new renewable energy initiatives. This should be in parallel to soil remediation efforts and formulating a program for future urban development in the harbour. Wind energy landscape can be implemented in Muiden-Muidenberg as a pilot project to be able to test the proposed design principles and create a showcase project for the rest of the region. Learning from the success and failures of both these initiatives can help to identify further steps of improvement going forward.

Enhance Spatial Quality through Energy Transion Landscape


Kilometers
0 1.25 2.5 5 7.5 10
LEGEND
City / Municpal Boundaries
Train
Highway
Biking/Recreational route
Trainstation sharing hub
Recreational Sharing hub
City sharing hubs
Post Fossil Landscape
Wind Landscape

OVERALL STRATEGY



OVERARCHING POLICIES

- * **NEW CONSTRUCTION** should be 100% carbon neutral
- * **NEW URBAN EXPANSION** should be located around local energy potentials, transit hubs and vacant plots
- * **GAS INFRASTRUCTURE** should not be renewed. Instead, a framework to end the reliance on the gas roundabout should be formulated in parallel to investing in sustaianble energy
- * Formulate policies on **LIMITING EMISSIONS** (co2, heat) from large industries, reuse become profitable/.

To be able to achieve our vision and goals overarching policies are necessary. The national government is leading is formulating these policies for national level. The policies are related to energy neutral requirements for new buildings and neighbourhoods. The other two are related to the gas infrastructure and limiting emissions.

ENERGY TRANSITION LANDSCAPE

01. Decentralized Energy Landscape
Energy integrated built environment, system providing local economy, jobs and citizens involvement. Empowering municipalities.

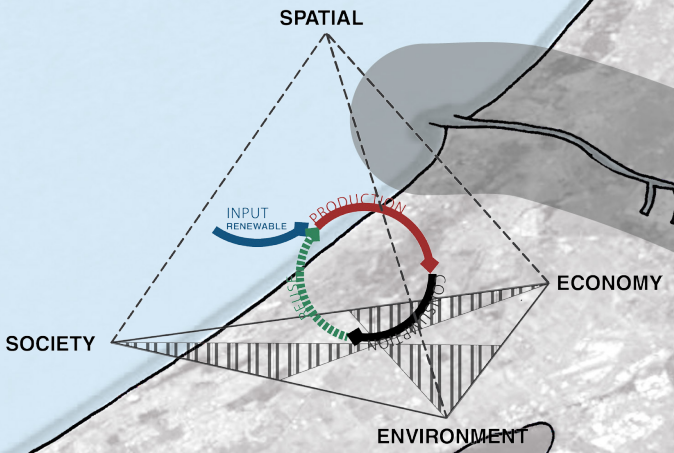
02. Mobility Energy Landscape
Energy integrated into mobility system and a flexible sharing system within the Randstad.

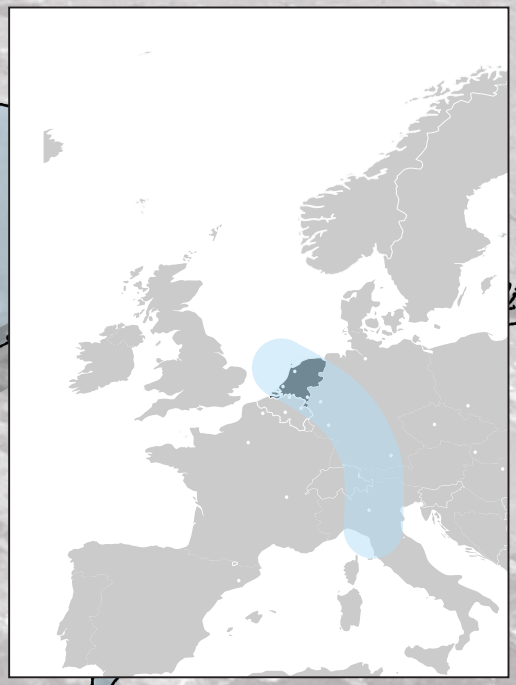
03. Post Fossil Landscapes
Transformation of former fossil fuel energy landscapes, creating new values for citizens

04. Wind Energy Landscape
Energy integrated into agriculture landscape: combination of recreation, nature and art, empowering farmers.

The final interventions results in the introduction of four new landscape typologies in the landscape. These can be migrated to almost every landscape within the AMA and the Nether-lands. The Mobility Landscape, The Decentralized Energy Landscape, The Post Fossil Landscape and Wind Energy Landscapes.

2040 and FURTHER





Within the AMA the first stages of the implementation strategy create a landscape that forms a spatial 'backbone' connecting areas along the water edge. This can set a national and global example of transformed energy landscapes seamlessly integrated within urban areas. Using the design approach this transition can be achieved in any context and landscape.

APPENDIX

OUKJE van MERLE

4135342

The roadmap of lesson learned

Looking back at the last 9 weeks I realize I have learned a lot. During my bachelor education the neighborhood scale has been the biggest scale of a project I have worked on. Thus the scale, and with that the work methods of a regional design & planning project, has brought me a lot of new knowledge. The next paragraphs show 'The roadmap of lesson learned'.

Departure | Evidence and Design Based

01. Working with data related to topics about regional structures and flow system within the circular economy has revealed a different approach to me. As a trained intuitive designer, I have started to appreciate this approach a lot, because your project will be strongly embedded in reality. The other side of the coin is that there is always more data than you have at hand. Nico Tillie told us that as an urban designer you need to balance the amount of work you put into doing research. I interpret the spatial strategies as a process of going back and forward: a duet between data and design interpretation.

First Destination | Vision

02. An example of a existing regional vision which I remember well is the map of the Randstad. It shows the structure as we still look at the region today: the cities connected and the green hart in between. A common vision today, but an eye opener at that time. It caused a huge change in perception: 'The world used to be flat and becomes round'. This is the power of a vision map. The storyline of a vision is therefore very important to be able to create this new perception. Building a strong storyline makes me tick and I think it has been a huge part of my contribution to the group work.

03. The other lesson learned about formulating a vision, is the ability to create a 1 + 1 = 3 formula. A vision and strategy can tackle several issues at once: for example working on spatial issues and social ones at the same time. This is good skill as an urban designer to train: go across fields and bringing them together.

Means of transport | Process

04. The SDS lectures and the workshops at the methodology class have been very helpful. As a group we were unfamiliar with many topics and the workshops 'forced' us to go out just get started: Layer approach by REPAiR, Storyboard workshop by Roberto Rocco and Strategy Development by Vincent Nadin. The lesson to learn is to try out different methods and tools as a group, even when you do not know the way to go forward yet.

05. Within the SDS lectures speakers have spoken about the communication and collaboration skills you need as an urban designer to be able to work in a diverse team. But it is an element I missed within the offering of tools and workshops. I have a lot of experience in collaboration within a diverse team and I tried to contribute this experience to our group. An example is the group and individual evaluation we did as a group after the mid-term.

Second part of the journey | Strategy

05. The greatest lesson I learned is related to formulating a strategy. Within the last weeks I started designing certain elements of our vision and strategy, but it is not about the exact outcome. The workshops, lectures and tutoring has taught me to develop triggers, key projects and spatial agendas, that will shape conditions for design projects. You cannot control the exact outcome, but you can shape the context.

Homecoming | Concluding

This project has been an interesting road for professional development. A road with many lessons, and traveled by a high speed train. Let's take some time to unpack my suitcase.

HU YE

4588428

For this nine-week quater, I learned a lot from the lecturers, teammates, tutors on how to organize the strategies in a regional scale. This high level of scale asks urbanist to have an eye on multiple perceptions of the built environment and the conflicting interests between them.

For our projects, “Empowering AMA -- the green energy beyond dualism”, we state the problem from social, economic, environmental perspectives in a higher level, and found out there are dualisms in each aspects when it concerns to energy transition, and we aim to tackle these dualisms by energy transition landscapes.

The first thing I learned is the knowledge about energy from SDS course. The most important part in our project is about energy transition landscapes. The lecture shows the energy in planning and helps us to integrate energy with landscapes. Planning is needed for energy as renewables need space, which is also the dualism we find in the environmental perspective during our research, because there is only a certain amount of space available with the attempt of maintaining the quality of life. The methods learned from this course helps us from understanding the current situation of energy to find a solution for energy transition landscape. Through mapping energy savings potential and exchange of energy waste flows map, we understand the current situation. we have 4 layers of potentials and restrictions, Combining with our 6 sub-goals, we have our 3 strategies of mobility, transition landscape, decentralized energy system.

Another thing learned from SDS course is how to organize the storyline and the role of urbanists in conversation with stakeholders. We have the social, economic, environmental triangle and start the research from this model. Within this model, stakeholders, landscape, mobility infrastructure need to be considered. The energy shift can only be possible with a strategic plan defining the role of all involved stakeholders.
When things are all comes together and seems disorganized, the lecture from the SDS course help us to go through it. It teach us how to order interventions chronologically and where to put actors and organizations that are involved in spatial change through a time table. It helps to organize the storyline, so we know what is the key projects and the milestone for the goals, and what actions and stakeholders are involved in these strategies.

The third thing I learned is the way of thinking from my teammates and tutors. Integrating all elements on such a scale is not an easy task. For me, the most difficult task is the continuity and logic of the framework, it is easily to get deviated from the original start when the scale is so large and everyting is so abstract, and my teammates are very helpful on that. For such a large scale, the boundary and definition is hard to control, it is easily to get either too specific or too general, for this, tutors plays an important role in guidance and thanks to our tutors, we went smoothly in our project.

But for the whole project, I still have doubts about the uncertainties, what we proposed are based on our current knowledge and the world is changing so fast. And it also leaves a question for me, what urbanists could do in such a large scale, sometimes I feel we are powerless and how things could go as we expected , I also have doubts in expectation, if what we expect is not others expect?

WANG YI

4640349

Providing a flexible spatial scheme instead of making blue print

In the past 8 weeks, I gained not only in the understanding of how to carry out a comprehensive strategic plan for a specific theme (circular economy), but also how an efficient team should be like.

Since spatial strategic planning is a very broad subject, it is understandable that the course put focus on circular economy, which in a way helps us to narrow down the research topic. The lecture/workshop series SDS invites experts from related fields to present how they apply the circular economy model in their projects and researches, which also helps us to gain the knowledge of sustainable urban planning, and get to learn more about different analytical methods.

From my perspective, working on regional planning and design is not making blue print. It's providing a flexible spatial scheme for the region to grow in a healthy way both physically and non-physically. As a qualified urban planner, we should not only focus on spatial interventions (which most of the students from an architecture background tend to focus on), but also spend more time on related fields, especially get some knowledge about technical issues and social issues. So during this course, I read policy documents, academic reports and theoretical papers which related to circular economy, especially the one talked about energy issue. With the help of my Dutch group mate, I also gained understanding of the conflicting political and social situation of the country, and get further understanding of the dualism embedded in the social-economic development.

Urban planners are mediators among different stakeholders. I learned it from the beginning of this quarter and kept it in mind throughout the course. Always remembering it helps me to evaluating the ideas we came up critically. For every project we proposed, we need to take different stakeholders into account, especially those who have less power but more interest.

The other thing I learned is that urban planners are not utopians. When it comes to spatial planning strategies, the first thing we thought must be the motivation and the feasibility. Why the government has to implement this project/policy first? Is the project strong enough to get investments from the private sectors? Will the policy be impeccable enough to get the expected output in the long run? We have to consider these issues, although in most of the times we cannot give answer to them.

Communications and collaborations are essential skills for urban planners. From this perspectives, I learned a lot from my groupmates. We had a lot of discussions every week, but they can be finished in a relatively short time, and we do not focus on minor details. Once we divided the works of each other, we do them separately and compile them before class. Sometimes we have conflicting ideas about the project, but we're willing to listen from each other and find a way to achieve consensus.

Everyone plays an irreplaceable role in the small group. Some are good for their critical and logical thinking, some can always come up with inspiring ideas for planning strategies and some are skilled at visualization. I'm not very good at logical thinking, but I tried my best to arrange information in a convincible way during the design progress, and at the same time looking things in a critical way (which I learned from my teammates). I also made great efforts on the visualization, devoting time to most of the strategic diagrams and the renderings.

KARISHMA ASARPOTA

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Unfolding the layers of complexity

The regional scale is at the core of comprehending urban planning and is exactly where complexity within cities emerges to the surface. The 'layer' approach is an essential tool to understand the physical reality and invisible actors and forces within a region. Without this it is impossible to put forward key projects or strategies that are purposeful.

The concept of circularity within the built environment is a recent field of study that is gaining momentum. Exploring 'flows' within the built environment is key to improving the legibility of the region and proposing improved interventions. Through the workshop and lectures of the 'REPAIR' team we gained a different perspective on understanding the spatial implication of 'invisible' flows in the metropolitan region.

'The Planning Game' made me reflect upon my ethical views as a planner and the choices I have to make about the type of work I do in the future. It also made me realize that no plan or strategy is ever successful without collaborations and stakeholder agreement. It might be necessary to change roles from time to time, even when they differ from your personal stance, as a way to get people on board to ensure the best approach to problem solving.

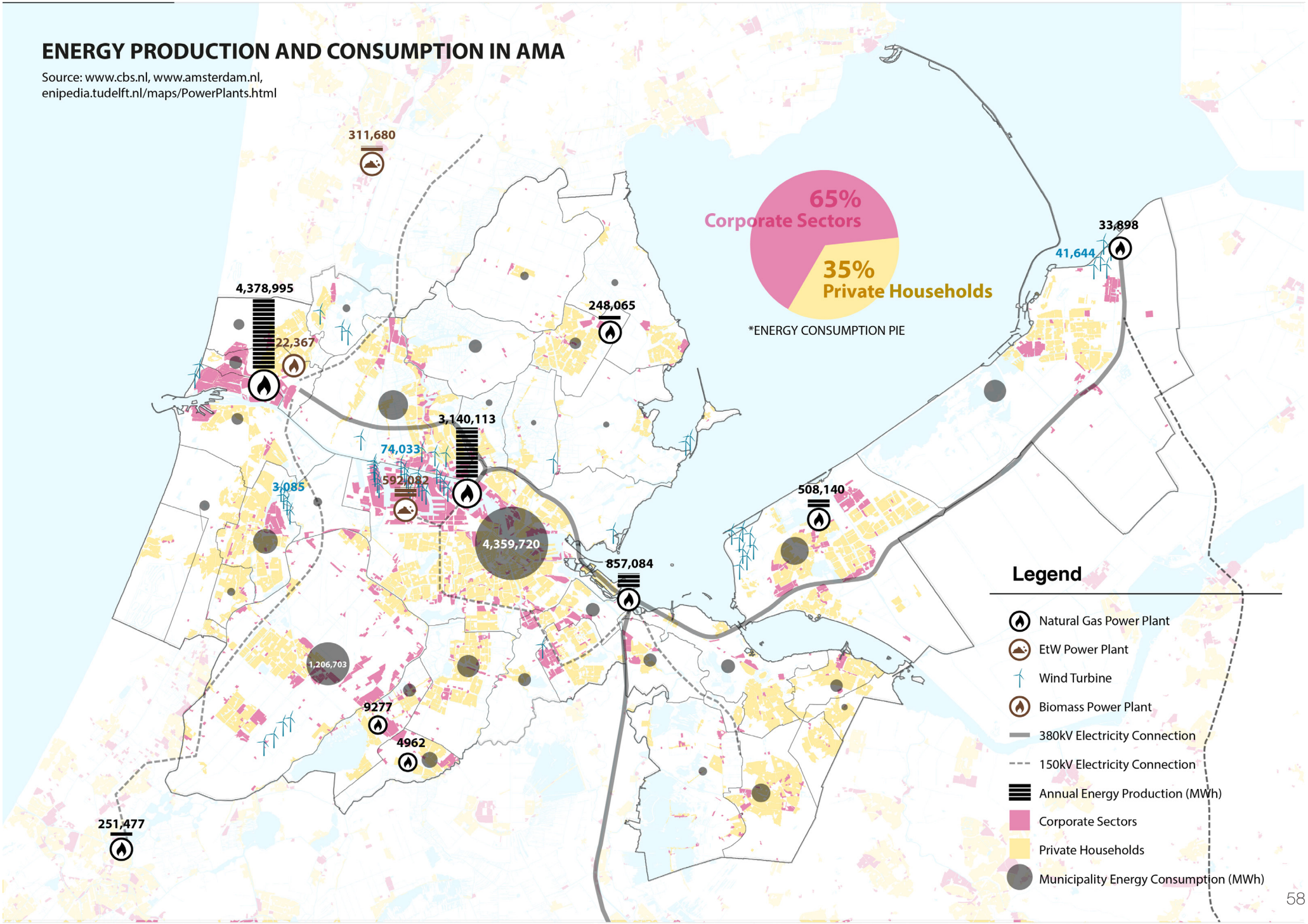
A strategy is different from a plan. While a plan tries to provide a 'blueprint', a strategy gives directives within an overarching principle or plan. It provides the tools to arrive at spatial interventions and strategies. Nothing can materialize without partnerships. A strategy can be successful when there is an emphasis and clearly defined approach to get people on board. Designing with synergy between all the landscape types' results in a coherent built environment inclusive for everyone. Natural layers such as water, land and greenery are just as important as infrastructure and buildings. Addressing this layers individually and then together will highlight new perspectives that can help resolve problems.

The dynamics of the course structure and tutoring approach was designed to make us realize the importance of clear communication. As urban planners, it is an essential part of our skillset. Technical knowledge and design tools can only take you to a certain extent. Through being put into teams to work with for 9 weeks, I realized that the amount of learning is much more than doing an individual project. Interacting and integrating every individual's ideas and opinions is a reflection of how the profession works. This provided us a platform to experience that and think beyond technical and design solutions.

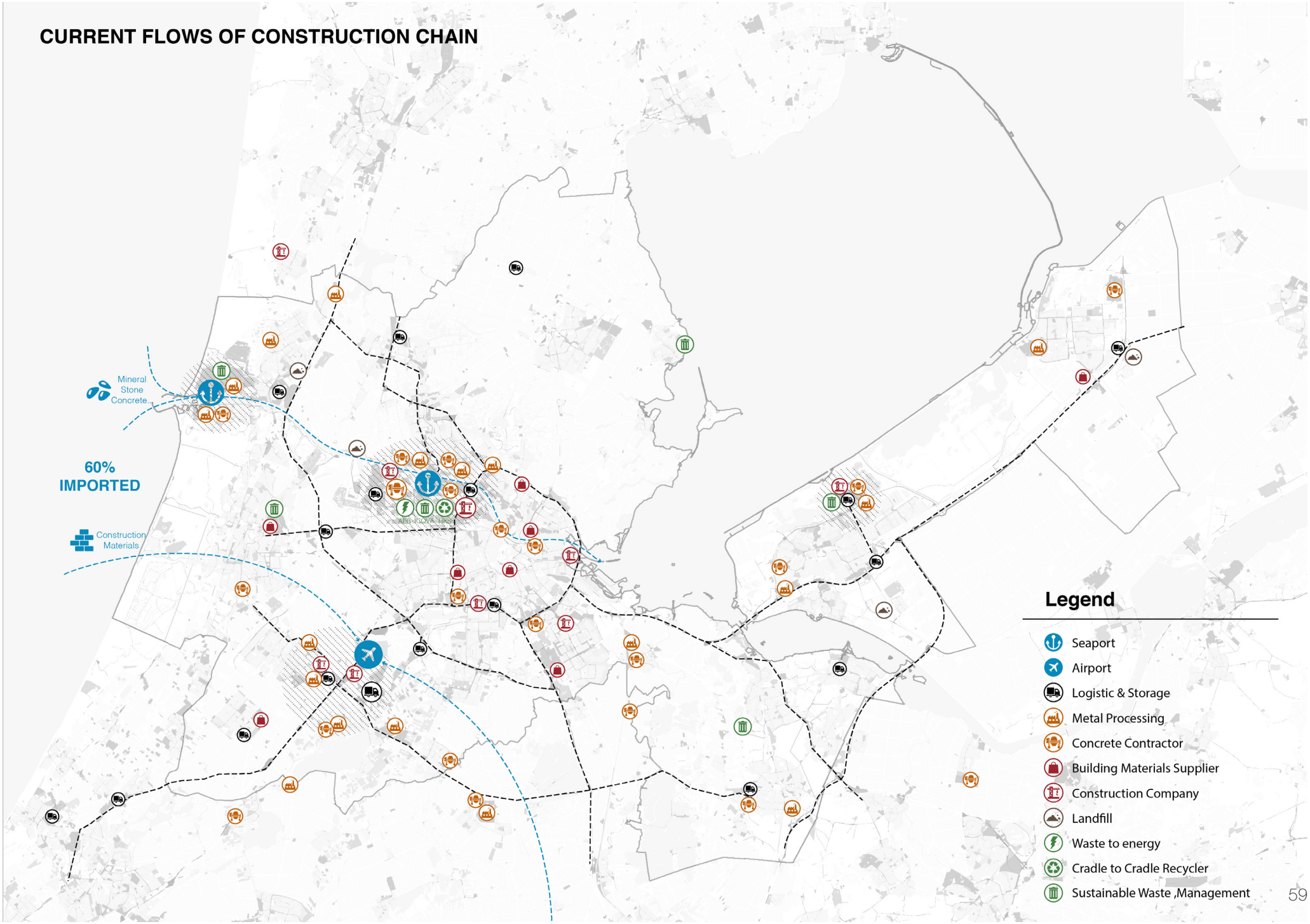
On the whole, the SDS sessions provided an essential understanding of concepts related to circularity and strategic planning within the regional scale. A lot of the topics covered were directly related to our project and provided us with references of feasible ideas to explore. It also provided an opportunity to interact with professionals in field and learn from their approach to tackle similar problems at the regional scale. On the whole, it provided an in depth perspective on relevant topics that were directly applicable to our studio work, thus making this dense course and vast amounts of information more comprehensive.

ENERGY PRODUCTION AND CONSUMPTION IN AMA

Source: www.cbs.nl, www.amsterdam.nl,
enipedia.tudelft.nl/maps/PowerPlants.html



CURRENT FLOWS OF CONSTRUCTION CHAIN



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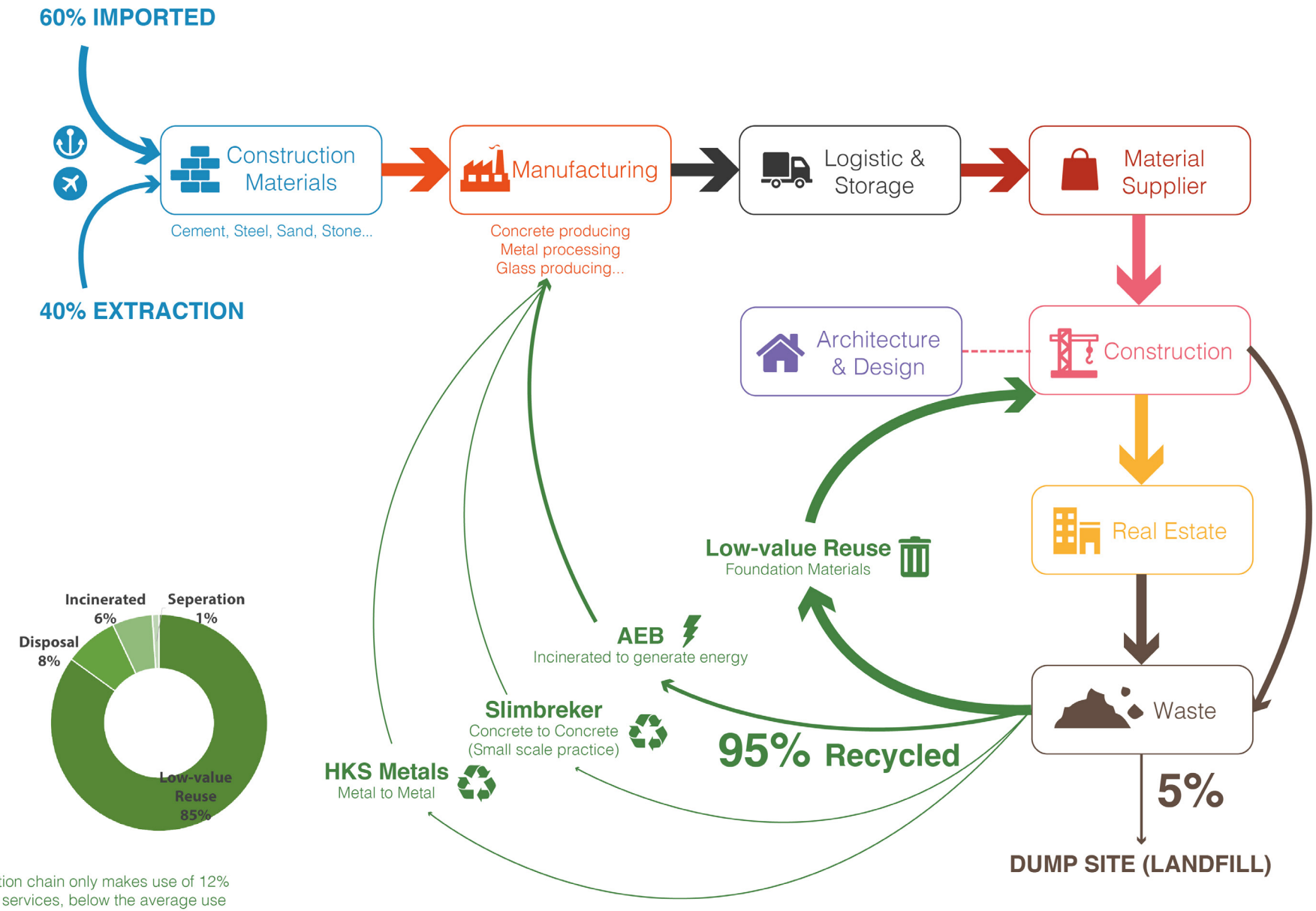
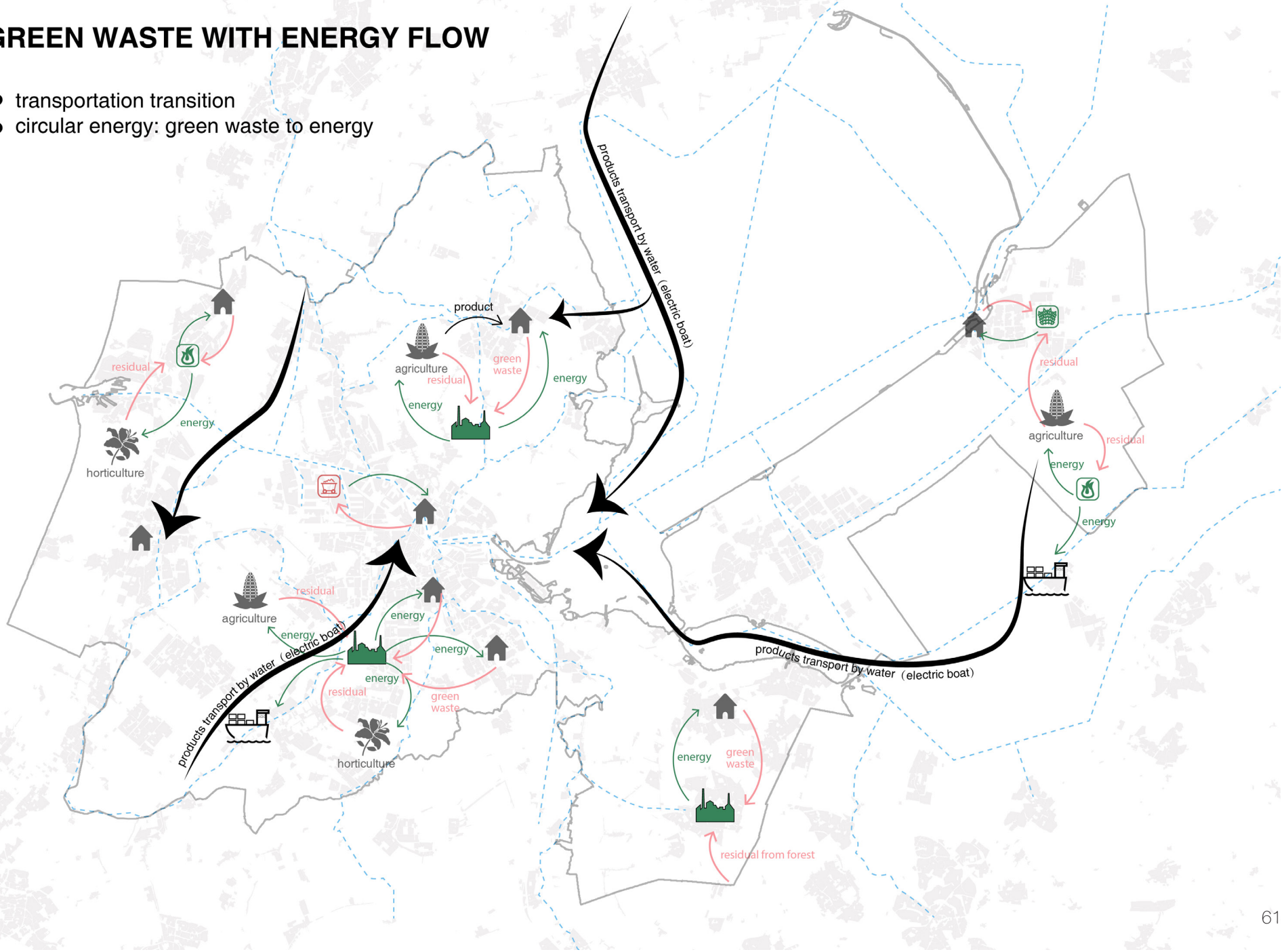


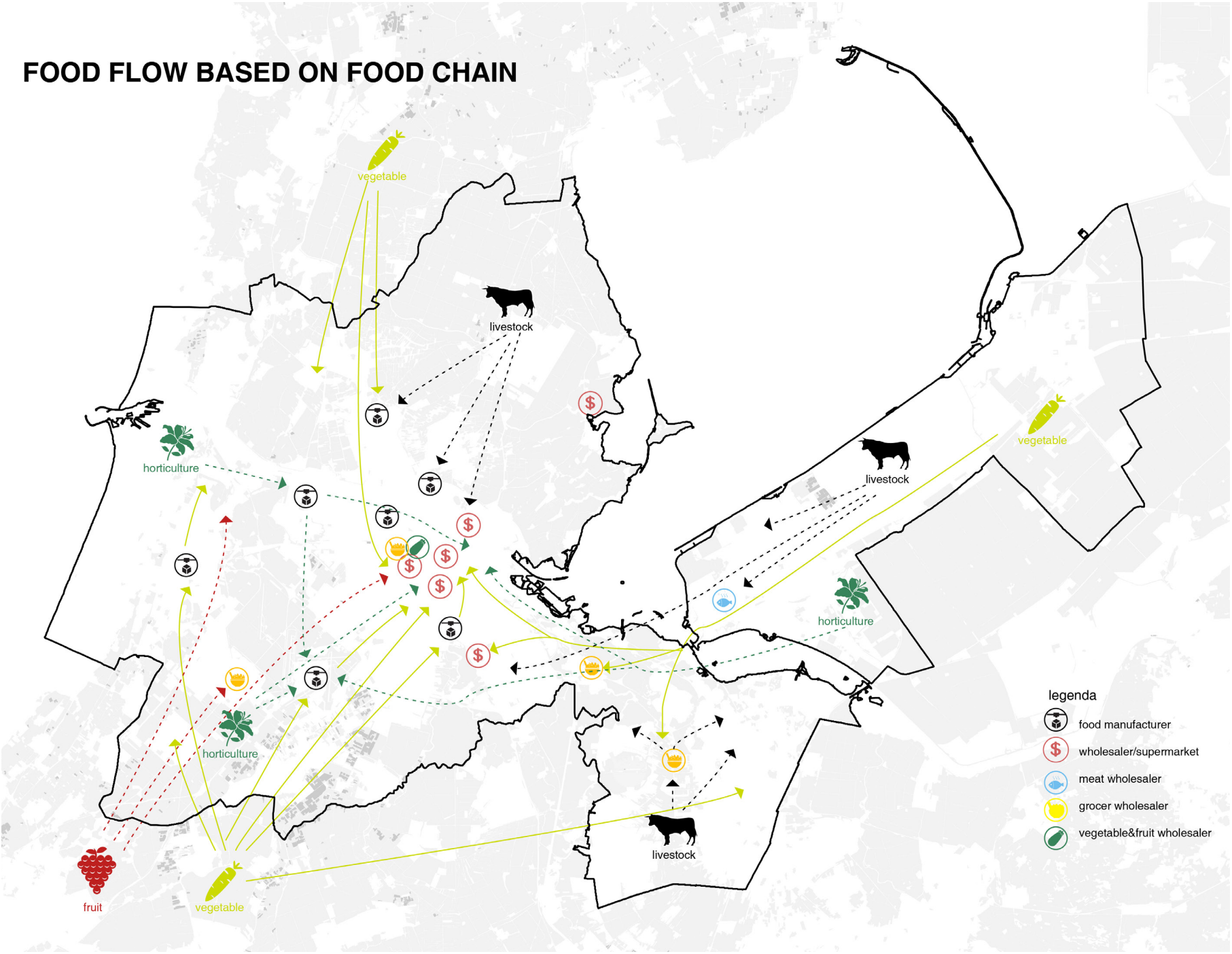
*Construction chain only makes use of 12% of circular services, below the average use in AMA. (Circular Amsterdam, 2013)

GREEN WASTE WITH ENERGY FLOW

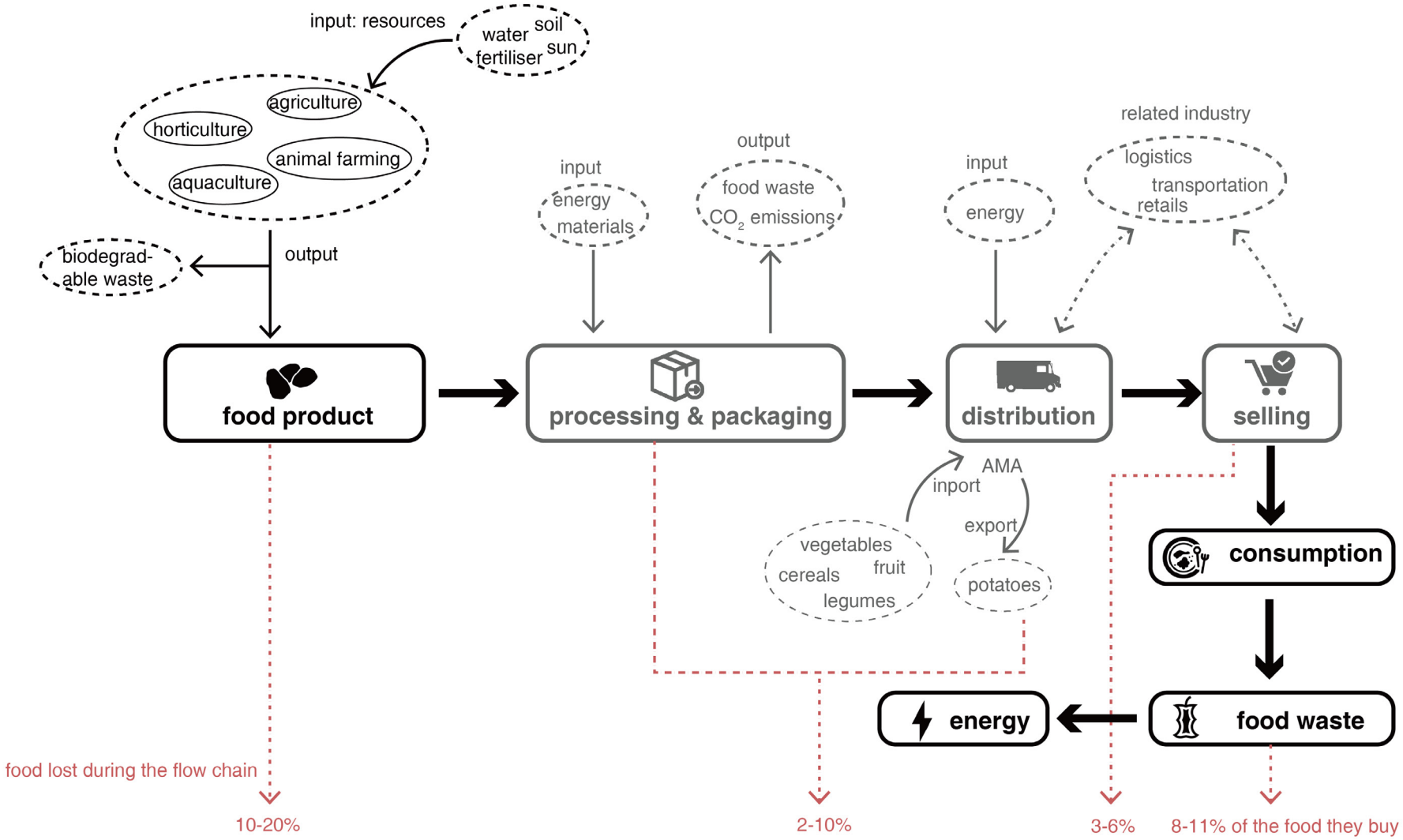
- transportation transition
- circular energy: green waste to energy



FOOD FLOW BASED ON FOOD CHAIN

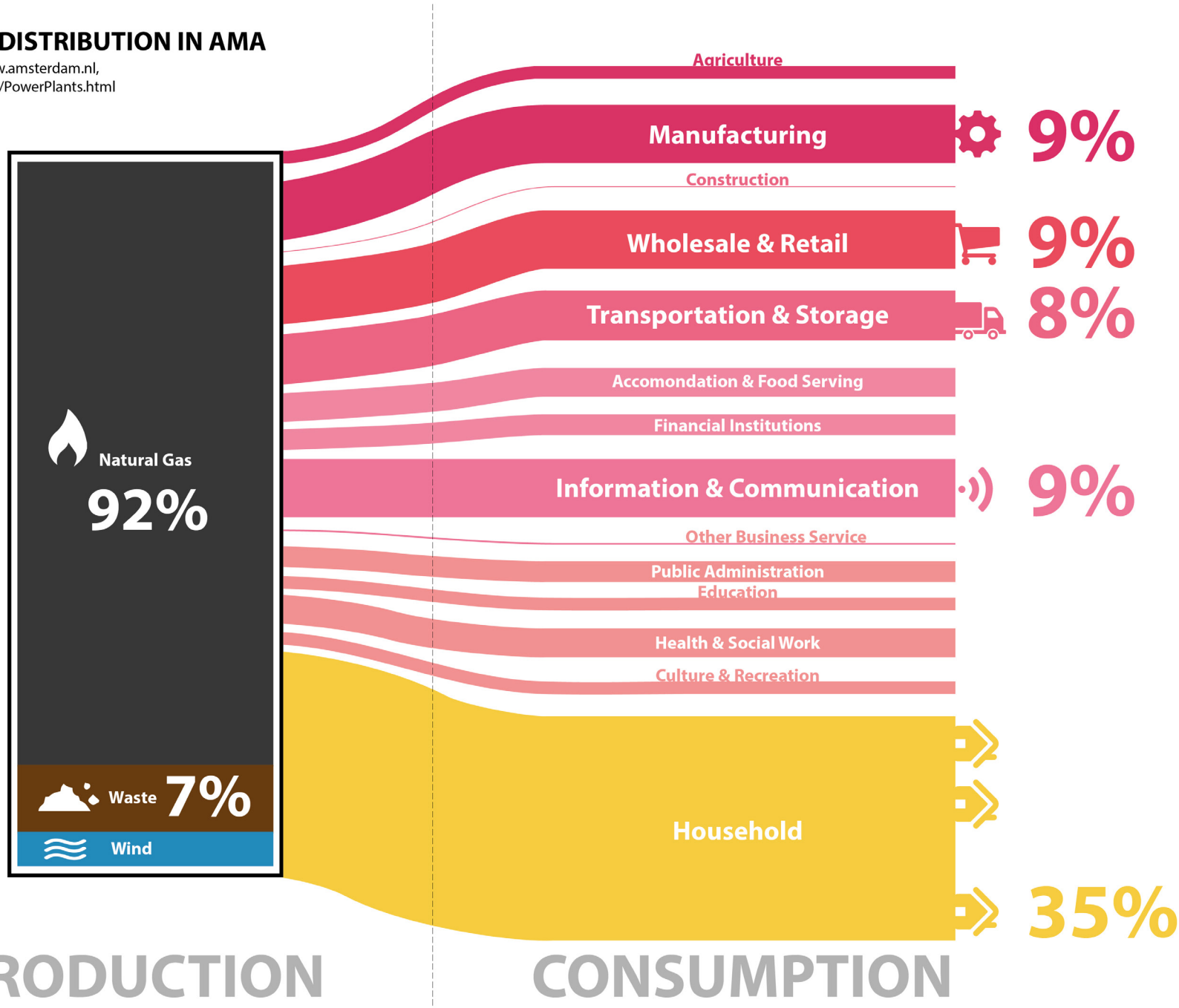


LINEAR FOOD FLOW CHAINS

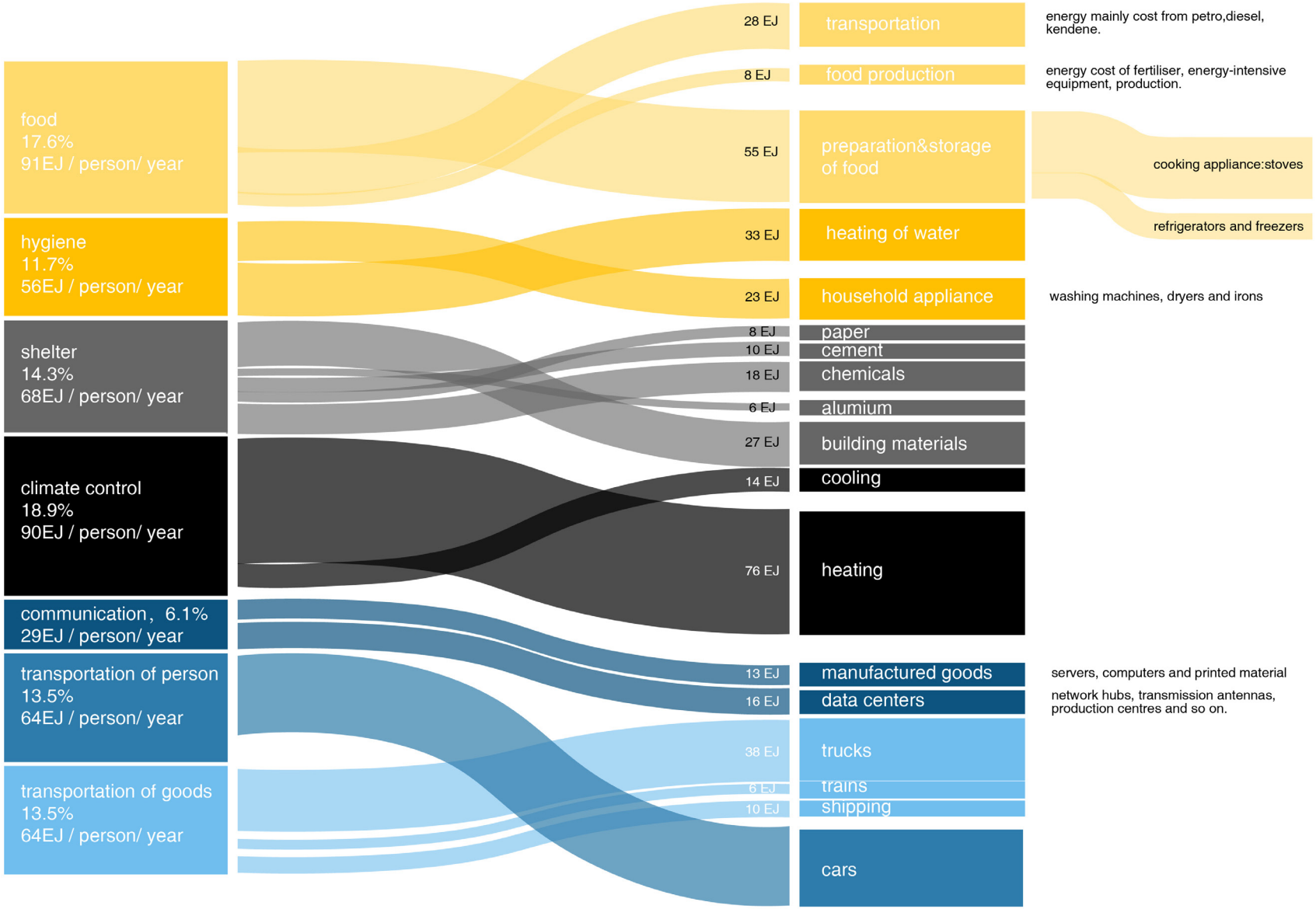


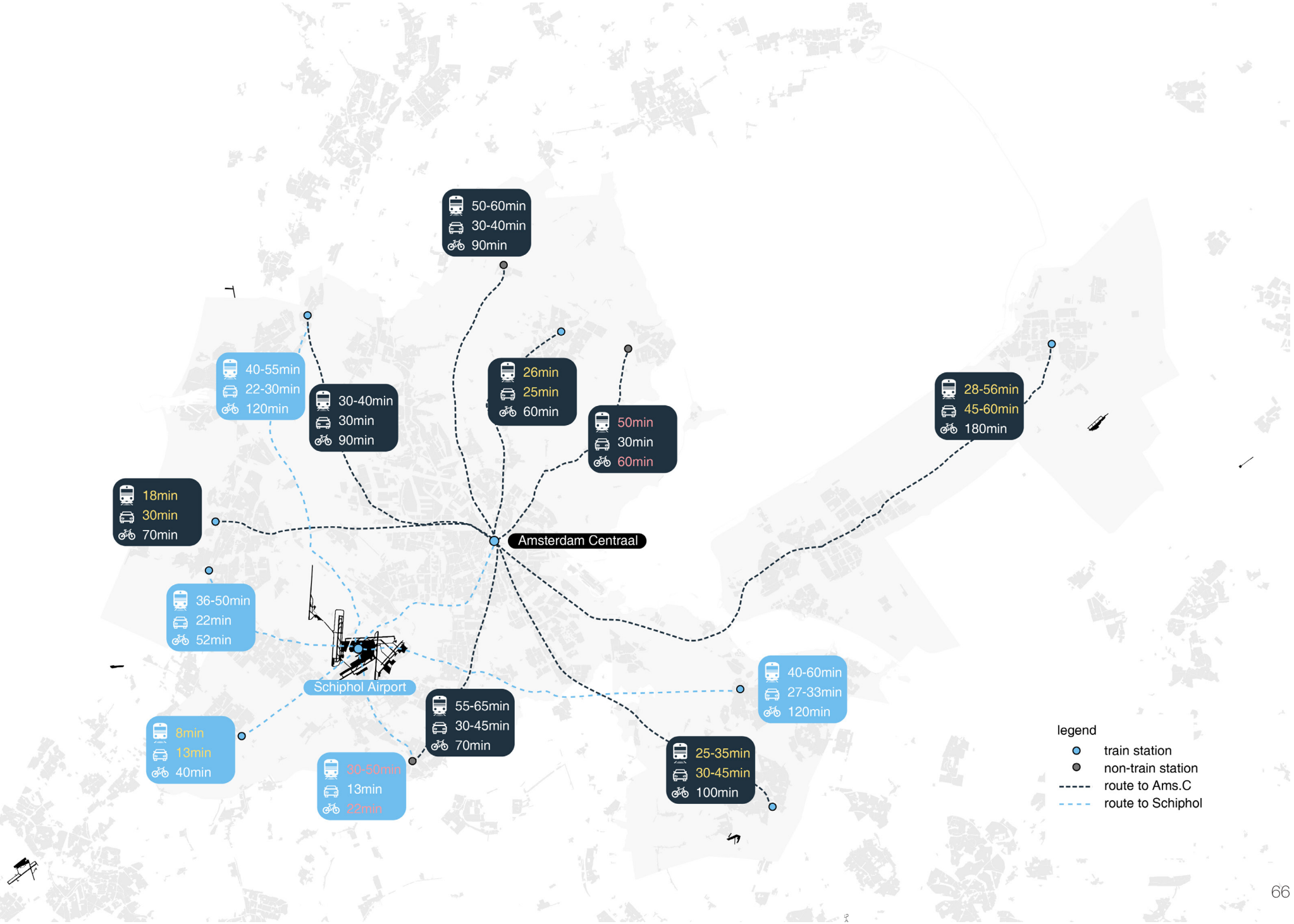
ELECTRICITY DISTRIBUTION IN AMA

Source: www.cbs.nl, www.amsterdam.nl,
enipedia.tudelft.nl/maps/PowerPlants.html



CONSUMPTION OF ENERGY

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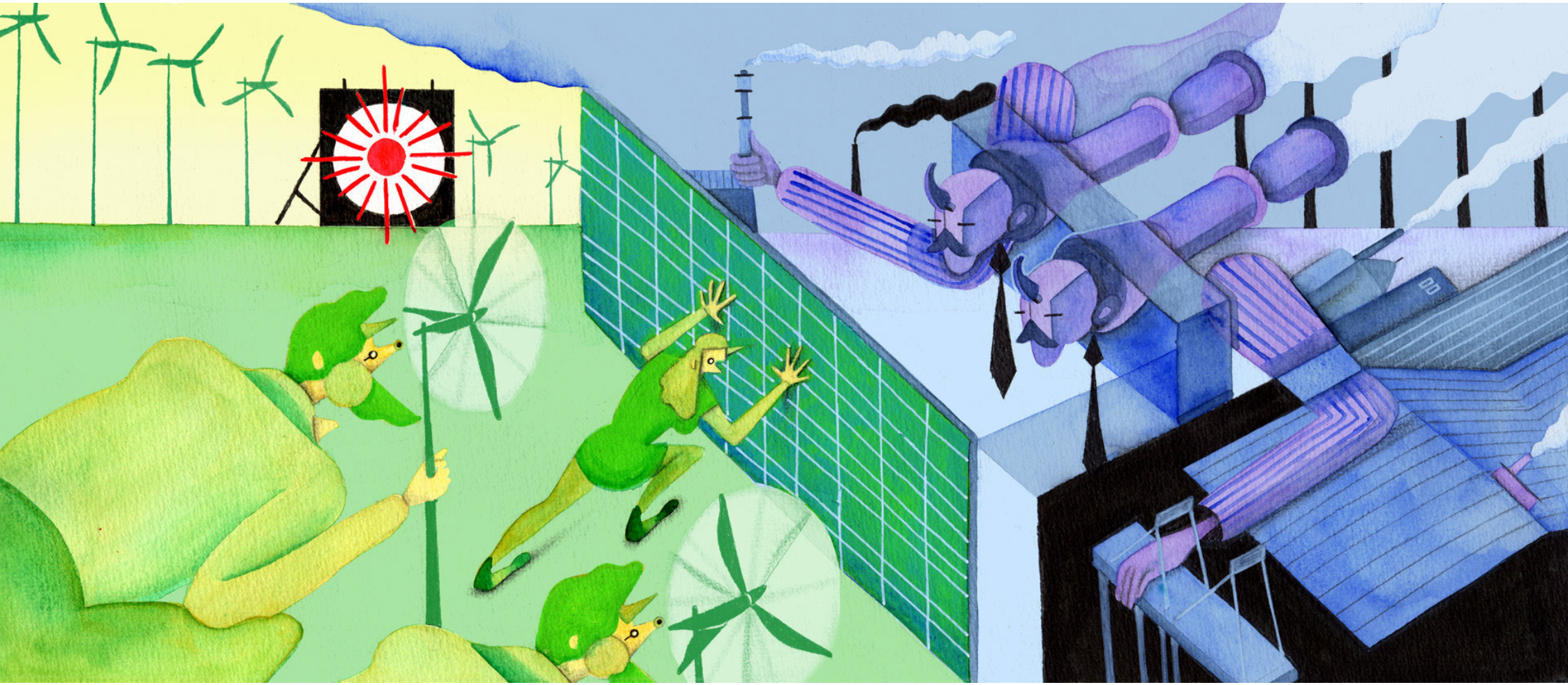

source:
www.decorrespondent.nl, illustration by Cliff van Thillo