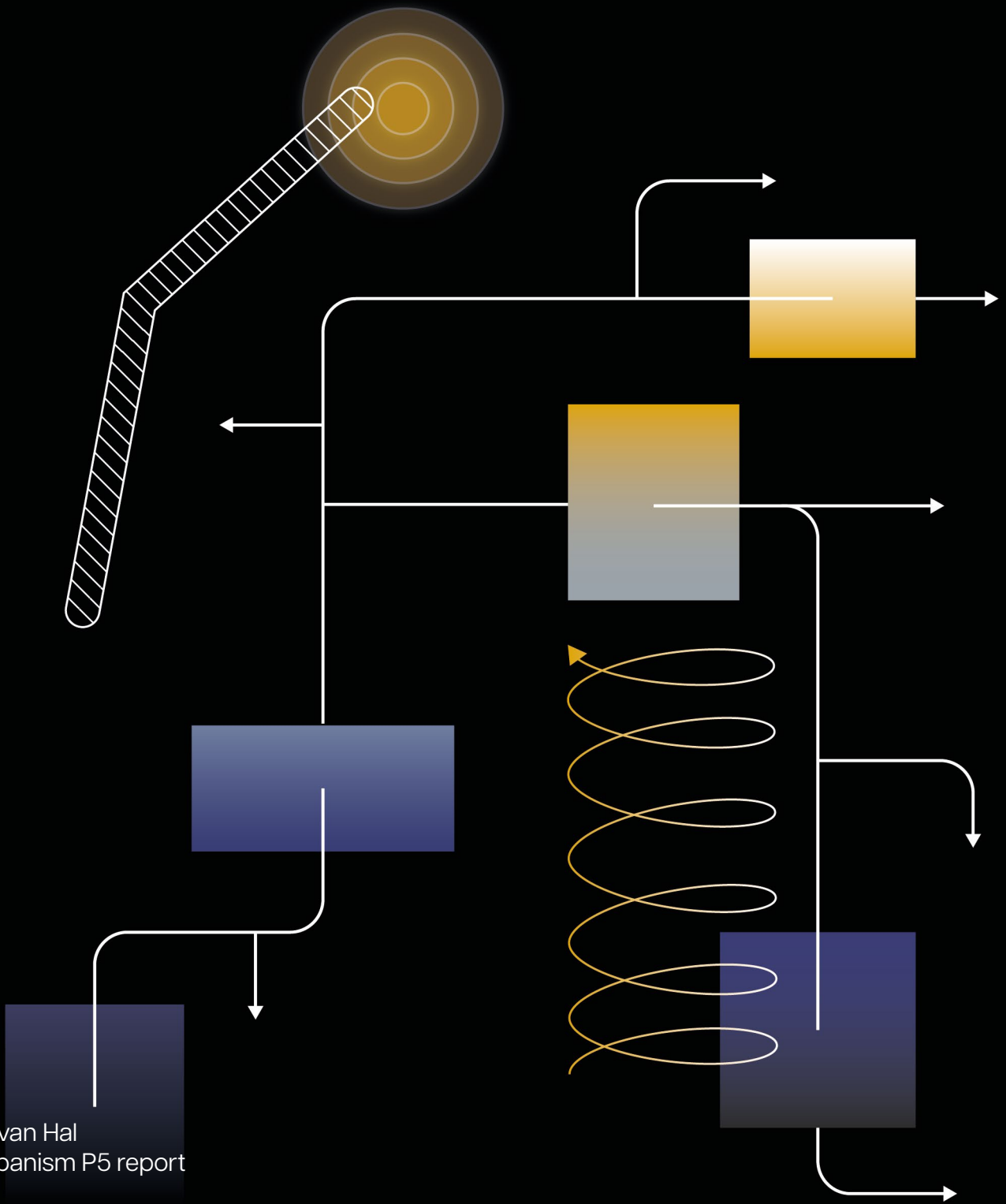
emPOWERed

transitioning towards just energy futures in vulnerable neighborhoods in Rotterdam South.



Sophie van Hal
MSc Urbanism P5 report

TU Delft
14-06-2024

Colophon

Master Thesis: “emPOWERed: Transitioning towards just energy futures in vulnerable neighborhoods in Rotterdam South.”

P5 report

Student name: Sophie van Hal
Student number: 5648394

1st mentor: Dr. Roberto Rocco
2nd mentor: Dr. Geertje Slingerland
External: Dr. Robert Gorny

Graduation studio: Planning Complex Cities
Studio coordinators: Dr. Verena Balz & Dr. Caroline Newton

TU Delft - Faculty of Architecture and the Built Environment
Department of Urbanism, Julianalaan 134, 2628 BL, Delft, The Netherlands.

TU Delft | Bouwkunde

Sophie van Hal *14-06-2024*

> Image 1: Proposed wind farms North Sea
Source: (Rijksoverheid, n.d.)

Acknowledgements

This past year has been a wonderful ride of exploration, curiosity and learning. Both my professional career and personal experiences have grown tremendously.

Cities are never perfect and I am excited to see what challenges will come my way next.

This project would not have been able to take shape as it has without the guidance of my mentors Roberto and Geertje. Thank you both for all that you have done for me and this thesis.

I would like to thank Rowan, Deniz, Lucia, Veysel, Ilias, Ilham, and many others for wanting to work with me in this project. You all set your personal time aside to help me set up, create space and provide input for our neighborhood workshops.

Thank you to my family and friends for supporting me in this journey throughout my academic years. To my parents, thank you for supporting me throughout all. To my grandpa, thank you for always wishing me good luck on my entire academic journey. This achievement is dedicated to you.

Lastly, thank you to Dylan for always being there for me. You have truly been my rock throughout this past year.

Foreword

“The world will not be able to cope with climate change without a global energy transition”
(ISO, 2022)

The starting point of this thesis project is todays energy system. Our cities are in a position of change; not yet free of the fossil-based system, but piloting towards cleaner energy futures.

A desired future, in line with the UN SDG 7, where each citizen has equal access to affordable energy.

Before our cities can fully enter this state of being, injustices in underlying systems and regimes still stand. The uncovering of socio-economic, -spatial and -technical barriers together with the experimentation of change is an important step for the cities we live in today and the future.

(Goal 7 | Department of Economic and Social Affairs, n.d.)

Abstract

The energy transition is a complex challenge for cities. All sectors of society will have to change. Many sustainable opportunities arise, but injustices are still present. Often, people in disadvantaged positions are not properly recognized, included in decisions and left to deal with the burdens. Lack in proper citizen participation, causes current energy transition policies to appear distant from the local, implementation scale.

Using socio-economic, spatial analysis and governance mapping, this project showcases energy vulnerabilities and the skewed institutional perspectives on local transition capacities. By combining expert interviews, policy analysis and imaginative co-creation sessions in the case study area of Hillesluis, Rotterdam, a more just governance structure and inclusive participatory practice can be formed.

The project exposes injustices in underlying systems of power and decision making, as many policy incentives are aimed towards financial benefits.

The current participatory process of transitions in itself is characterized by ex-ante responses and informs rather than actively engages communities. This results in many citizens who are in disadvantaged positions, albeit financially or socially, are left out. Thus keeping loops of injustice in place.

Through theoretical and co-creation experimenting, a just participation process was formed, however the execution therein showcased many difficulties. Measures such as frequent city-wide campaigns, transparency and adaptive area-based strategies could divert these fragilities in participatory processes for future sustainable transition research.

As socio-technical transitions are becoming more complex, innovative perspectives and empirical research are needed. This project not only critically examines current governance structures and participation processes, but proposes measures to overcome the experienced socio-spatial and procedural barriers towards just energy transitions. Resulting in more human-centred and socially innovative policy aims towards a just energy transition for all.

KEYWORDS

ENERGY TRANSITION

PARTICIPATION

CITIZEN ENGAGEMENT

GOVERNANCE IN SUSTAINABILITY TRANSITIONS

Contents

Part 1

Energy in our urban environments

> Image 2: A fossil-based energy industry
Source: Ina Fassbender/AFP/Getty Images

Introduction

Since the start of the industrial revolution and subsequent commercial energy usage, transitions of the system have been inevitable. Due to other societal developments, such as the car industry in the 1950's, the search for and use of efficient fuel sources skyrocketed (image 3). Fossil fuels such as oil and gas became the norm and society, infrastructure and consumers adapted accordingly (Bhutada, 2022). However, with the rise of climate change induced disasters, cities face an urgent need to change (Rijnmond, 2021). Throughout time, energy sourcing, distribution and use became not only unsustainable, but hyper complex as well. This complexity is linked to the growing importance of the individual consumer in the energy system as a whole (Upham et al., 2020).

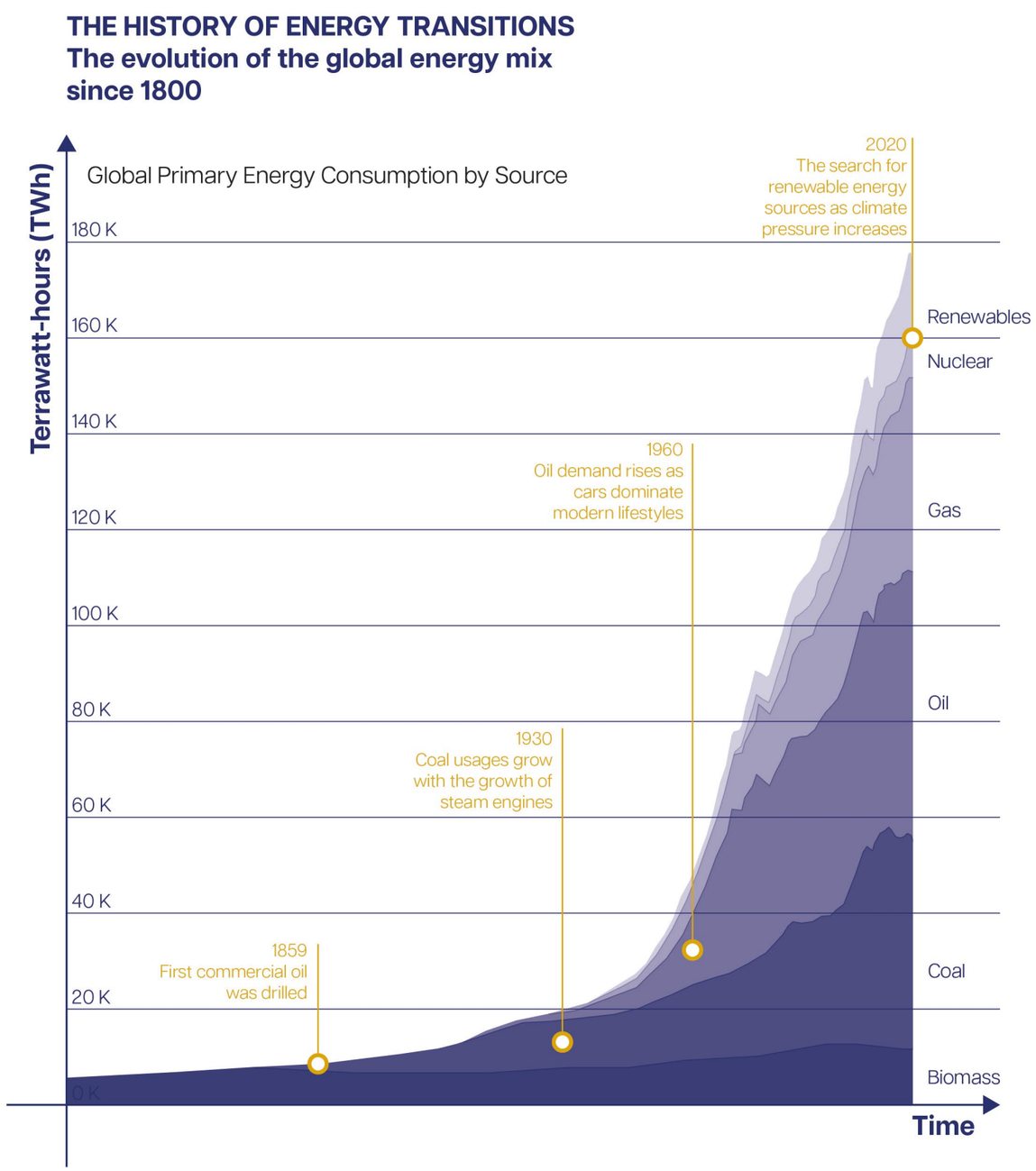
Energy, from source to use, is based on 20th century centralized systems. With the growth of urban regions, energy demand skyrocketed and centralized energy system became the norm (Adil & Ko, 2016). A centralized energy system sources and distributes energy through large scaled infrastructures to multiple regions. However, agreements are made that these systems are not sustainable anymore and we have to transition towards decentralized ones. These new, decentralized systems inhibit renewable energy sources in close proximity to local needs (Cooper, 2023). This poses as great opportunities for cleaner energy futures and brings consumers closer to the energy source.

Energy affects us all, so transitions in energy should include all. However, in current day systems, albeit political fields, technological innovations or societal values, many injustices are still present. EU has appointed cities as the main drivers towards cleaner energy futures, but many socio-economic barriers are still in place (NetZeroCities, n.d.). Deep rooted injustices are brought to the surface through the modern day energy transition. Nationally, 7% of Dutch citizens live in energy poverty, for the city of Rotterdam this number covers almost 11% of its residents (TNO et al., 2021). People are unable to pay energy bills and with rising energy prices, this issue will become more widespread. Energy is a basic human right, but many are still in doubt if objectives set up by municipal, national or even global policies are feasible (Foundation Abbe Pierre, 2023; AD & DPG Media, n.d.). It is often citizens with a combination of a low income and those who live in older rental or social housing that have a hard time to invest in cleaner energy solutions for their homes (Agterbosch, Wentink & Paenen, 2020).

These issues, regarding energy vulnerable citizens as described above, are overlooked in policies regarding cleaner energy futures (Feenstra et al., 2021) . Policies are missing the spatial and social implications that shifts society towards sustainability goals (Caragliu & Graziano, 2022). However, the flip side of energy problems can be traced to consumer behavior as well. There is a lack in knowledge regarding energy sustainability amongst common citizens, resulting in a lack of motivation to participate (Van Den Brand, 2021).

A gap is present between socio-spatial implementation and policy formation and decision-making processes (Laes et al., 2014). As the energy transition can become fruitful for all sectors of the urban environment, the unjust distributions of the costs and benefits that are currently still in place have to be critically explored, evaluated and redesigned in order to reimagine collaborations (Garvey et al., 2022). There is a lack in emperical research of how social, technological and political advancements towards cleaner energy futures can co-evolve and co-exist (Adil & Ko, 2016; Garvey et al., 2022).

> Image 3: The history of energy transitions
Source: (Bhutada, 2022) & Visual Capitalist/Vaclav Smil, BP Statistical Review of World Energy via Our World in Data



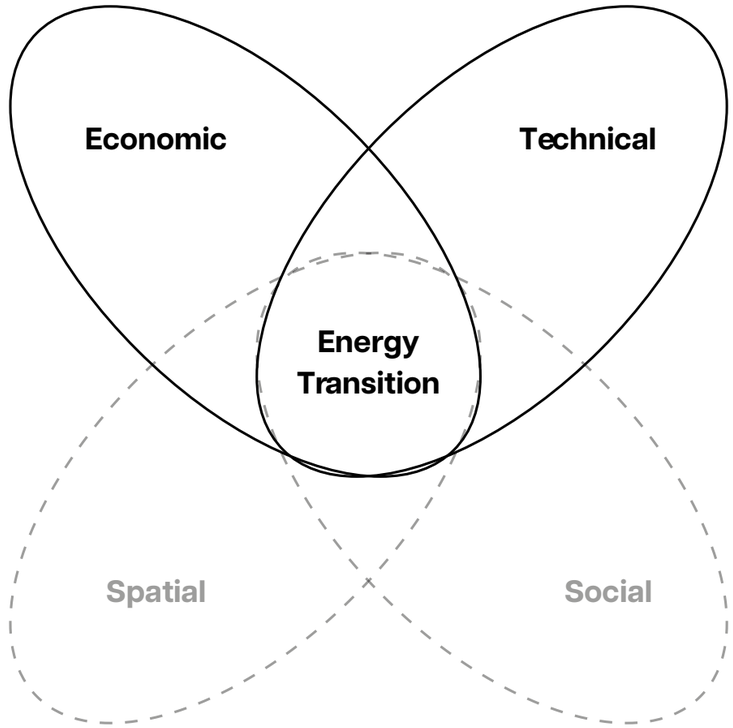
Context: The energy transition

Multidimensionality of the energy transition

The current fossil-based energy system is unsustainable. Hence the need for a cleaner, more climate-neutral system. The energy transition can be described as a gradual shift in the current energy supply structure, towards a sustainable one. More renewable energy sources like solar, wind and hydropower should become the new standard of sustainability (What Do We Mean by Energy Transition?, n.d. & Harichandan et al., 2022). Besides the supply of, storage and consumption of fossil-based energy is in need of a transformation as well (S&P Global, n.d.).

The energy transition is thus not only a technical or economical one, but spatial and social as well (diagram 1). New infrastructures will have to be built, the existing built environment needs to be retrofitted, but most importantly, energy consumption patterns and behavior of individuals will have to change.

> Diagram 1: Dimensions of the energy transition
By author



Global level

In 2015, global leaders signed the Paris Agreement to fight climate change and keep rising temperatures below 2°C (UNFCCC, n.d.). Through establishing strategic plans for long-term goals, global efforts to lower greenhouse gas (GHG) emissions are activated. As the energy system is one of the greatest emitters of greenhouse gas emissions, it takes up a central position in both the issues and solutions (The World Needs a Swift Transition to Sustainable Energy, 2021).

In 2016, the Sustainable Development Goals [SDGs], were put in action by the United Nations (Martin & United Nations, 2018). Goal 7, regarding the energy problem, prioritizes to “ensure access to affordable, reliable, sustainable and modern energy for all” (Goal 7 | Department of Economic and Social Affairs, n.d.). Again emphasizing the multidimensional character of the energy transition.

Even though progress towards a cleaner energy future is being made, acceleration is very much needed, especially in developing countries (IEA, n.d.-a). The need to advance is ever more prevalent when looking at moments of crises, e.g. the conflict in Ukraine and Russia, which uncover the volatile nature of our current energy system: high dependencies for fossil-based energy sources and unsustainable consumption thereof (IEA, n.d.-b & Zhang et al., 2023).

Europe

In 2019, based on both the Paris Agreement and the SDG framework, the European Commission deployed the EU Green Deal. This set of policy initiatives’ main objective is to reach zero emissions by 2050, with important short-term milestones set for 2030 (Koundouri et al., 2021).

In order to reach net zero emissions in Europe, the energy sector has to change drastically as it contributes to 75% of all GHG (European Commission, 2021a). The objective for a cleaner, European scaled energy system encompass topics like the integration of decarbonized systems and infrastructures (ibid). Europe’s geographical potential of the development of wind-farms at sea are a main focus. From the seven goals, only one explicitly states the mobilization of individual consumers regarding the concept of energy poverty. The European Energy union, established in 2015, aims to aid the journey towards cleaner energy futures for consumer and businesses with goals similar to those of the Paris Agreement, SDGs and the EU Green Deal (Energy Union, n.d.).

The EU Missions, under the umbrella of horizon Europe research program, guides cities towards the climate goals of 2030 and 2050 (Climate-neutral and Smart Cities, 2023). As cities are the important but complex drivers of change, this program aims to form collaborations between governance, innovative solutions and citizens daily life (ibid.).

> Image 4: Global agreements towards sustainability
Source: (Andrews, 2017)

The Netherlands

Dutch national policies and action is in line with the European goals of reaching zero GHG emissions in 2050. The national government is focusing on clean energy sources, better infrastructure and the scaling up of sustainable energy projects (Ministerie van Algemene Zaken, 2023). TNO states that within this energy transition, there is an opportunity to increase the Dutch technical, social and political status internationally through innovative research agendas (Energy Transition | TNO, n.d.).

The ”Klimaatakkoord” (Climate accord) is the leading national agreement regarding climate change action in the Netherlands. The same goals are presented as those on European and global scale. The accord gives the power for action at the local municipalities, which in turn make their own version of the accord based on local challenges and capacities (Ministerie van Economische Zaken en Klimaat, 2019).

Rotterdam

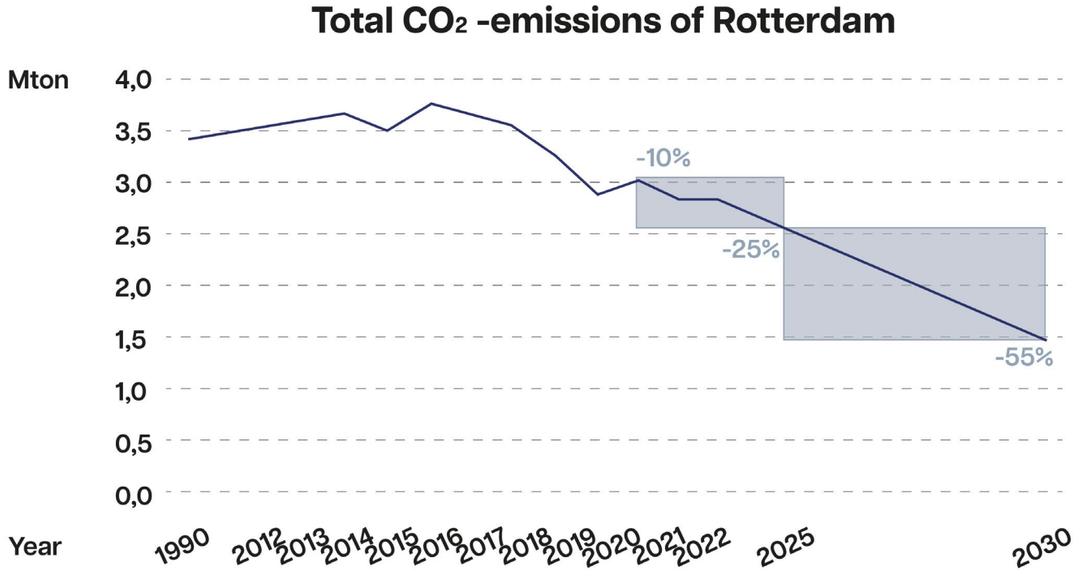
As the EU Missions described, cities are important actors in the journey towards climate neutrality (Climate-neutral and Smart Cities, 2023). The city of Rotterdam has multiple policy programs in place, aimed at propelling the city towards European, even global, climate goals.

In 2019, over one hundred institutional and non-institutional bodies formed the “Rotterdams klimaatakkoord” (Climate accord of Rotterdam) (Rotterdams Klimaat Alliantie, 2019). This accord inhibits an agreement towards better collaboration between multiple parties in order to reach the cities’ climate goals. The execution of the accord is divided into several groups, each with their own domain of the urban area and accompanying sub-goals (ibid.). One of which is the group for sustainable energy.

The ”Rotterdamse Energiesysteemvisie” (Energy system vision of Rotterdam) gives further focus on the aims of the city. Its main goals contain: the diversification of the energy supply, creating a system network and changing the urban landscape in favor of clean energy measures (Gemeente Rotterdam, 2021).

However, cities are facing a great sense of ugency. Public resistence is rising an time to implement real, and most importantly fair, change is running out (diagram 2 and image 5).

> Image 5: Energy crisis protests.
Translation (left): Shareholders are warm, we are not!
Translation (right): End the energy crisis!
Image source: (SP, 2023)



> Diagram 2: CO2 reduction goal of Rotterdam
Source: (Gemeente Rotterdam, 2021)

Problem field

Transition policy

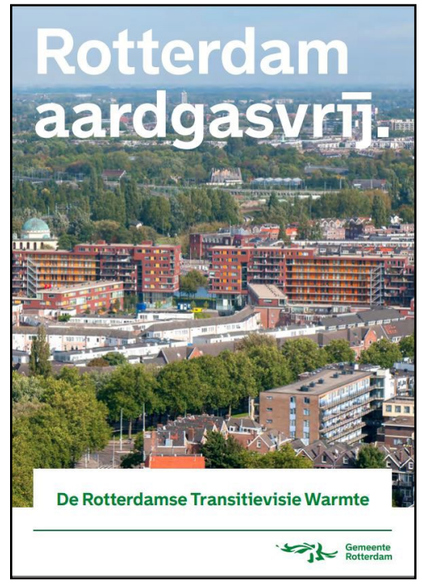
Policies can be broadly defined as a course of action generated by a multitude of context-specific stakeholders. Urban policies on the other hand, inherit a spatial element which could steer the distribution of socio-economic opportunities, with a general understanding of increasing welfare for all users of the city (Edwards & Imrie, 2015). Formed by a multitude of non- governmental or governmental actors, urban policies are dependent on the spatial context, scale-level, objective and socio-political frame they are set in (ibid.). Unfortunately, Drozdz stated that due to the shift in political milieu an rise of a neoliberal agenda, societal injustices and inequalities have become intertwined in urban policies (2014).

As mentioned before, the challenge of the energy transition is a complex journey through diverse scales and domains. This journey requires an “all hands on deck” approach. Proper socio-spatial context-focused policy can steer cities towards a smooth, efficient and most importantly, just transition towards sustainability (Nieminen et al., 2020 & Hughes & Hoffmann, 2020). These types of policies are termed as transition policies, which focus on the transformation of society for the greater benefit of sustainable socio-technical systems for all (Alkemade et al., 2011). Hughes & Hoffmann (2020) argue that the intersection between transition policies and justice is still underdeveloped and stress the importance of integrating principles of justice.

The city of Rotterdam has released several policy documents which share a common goal for sustainable energy futures, but lack a spatial and social representation of society (image 7).

As Caragliu & Graziano (2022) argue, dominant policies regarding urban transitions are ‘space-blind’ and lack the exploration and integration of the spatial dimension of the energy transition. On the other hand, Hanke and Lowitzsch (2020) state that social aspects are usually underrepresented in policies, thus enabling unfair and unjust distributions of the costs and benefits of the energy transition.

This can become an issue when policies that don’t recognize socio-spatial differences between neighborhoods are to be implemented. Sustainability policy regulations and goals thus run higher risks of failure. It is in neighborhoods that might not have the most transformative capacity, albeit financially or socially, that are hit the hardest by these policy failures.



> Image 7: Policy documents ‘ Rotterdam Energy system vision’ and ‘ Rotterdam gas free’. Source: Gemeente Rotterdam

Energy poverty & vulnerability

Consumers are key players in the energy system. Energy demand and supply are thus interlinked. While the transition to a cleaner energy supply is often seen from a technical or economical standpoint, shifts in energy consumption and subsequently the energy transition as a whole, is an inherently social one as well (Lennon et al., 2019).

There are multiple reasons why society has an important role in the current energy transition. A transition towards cleaner energy has great potentials for improving overall health, the creation of jobs and the building of sustainable lifestyles (Birol & Bocca, 2022). In a commentary paper, Upham et al. (2020) argued that individual actors are of great importance to the diffusion and implementation of new, in this case, energy innovations. Besides technological diffusion, people are also at the forefront of shaping new cultural and societal values regarding sustainable energy use habits (ibid.).

Thus, social support and participation is key for a sustainable energy transition, but many households still face challenges with the greatest being energy poverty (Birol & Bocca, 2022).

Energy poverty can be generally defined as the burden to allocate a significant amount of income to energy costs and bills (Hearn et al., 2022). Globally, nationally and locally, energy poverty numbers are rising due to increasing costs and insecurities of the total energy system (Energiearmoede Voorkomen | TNO, n.d. and diagram 3). For example, current sustainable energy measures from the city of Rotterdam often depend on large investments like solar panels on roofs, changing from gas to induction cooking or purchasing an electric personal vehicle (Duurzaam010, 2022). These measures are heading towards a more sustainable direction, but leave out people who are simply not able to afford such measures. Low income residents thus have a harder time to invest in cleaner energy solutions for their homes (Agterbosch, Wentink & Paenen, 2020 & Nationale Ombudsman, 2022).

Hearn et al. (2022) redefine energy vulnerability in a broader term, as people living in energy poverty can be defined as energy vulnerable as well. The abovementioned financial burden that households face can be seen as a vulnerability regarding the current energy system and proposed sustainable energy programs. Even though many studies focus on energy vulnerabilities such as access, affordability or efficiency, spatial vulnerabilities are underrecognized in academia and policy making (Bouzarovski et al., 2017).

Some examples of energy vulnerabilities are given below:

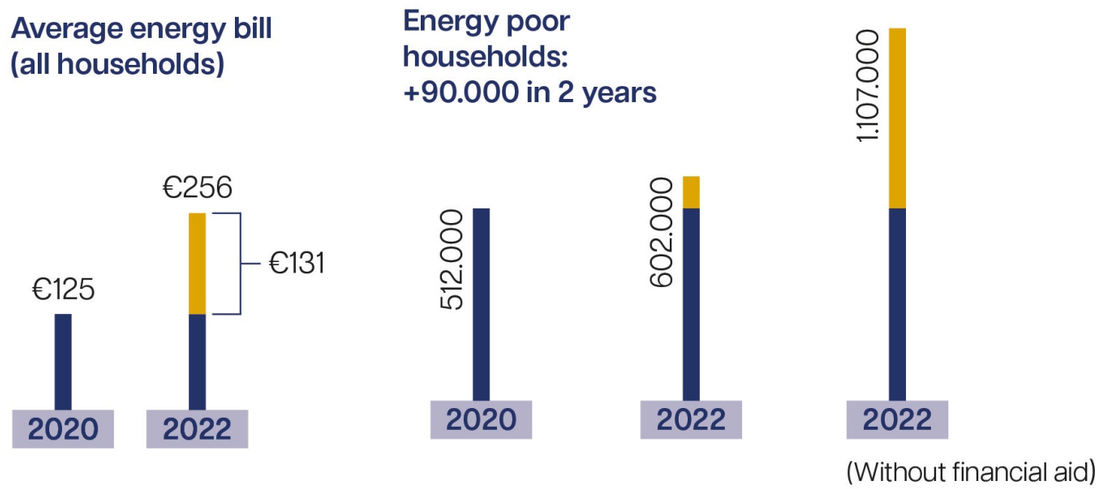
Access: can be seen as the access to cleaner energy measures one can implement. When households are reliant on social housing corporations or private landlords, this access is severely limited.

Affordability: often times, low-income households simply cannot afford proposed measures such as solar panels.

Efficiency: reports state that energy poor households are often situated in buildings that are relatively older and thus have a lower energy label (Mulder et al., 2023). New homes are built with better energy efficiency, but low income households are not able to afford this.

Energy vulnerabilities are thus layered, meaning the citizens who are struggling to afford cleaner energy measures are often times reliant on housing corporations or private landlords for implementing measures of sustainability. This makes it even harder for these groups to play an active part in the energy transition (Energiearmoede Voorkomen | TNO, n.d.).

The continued patterns of unjust which cause these energy disadvantages can in turn lower social acceptance for newer energy systems proposed by policy makers or institutions; a vicious cycle of resistance and misrecognition (diagram 4). Thus, encouraging people to act has great potential for a just energy transition, however vulnerable groups are still heavily underrepresented (Hanke & Lowitzsch, 2020).



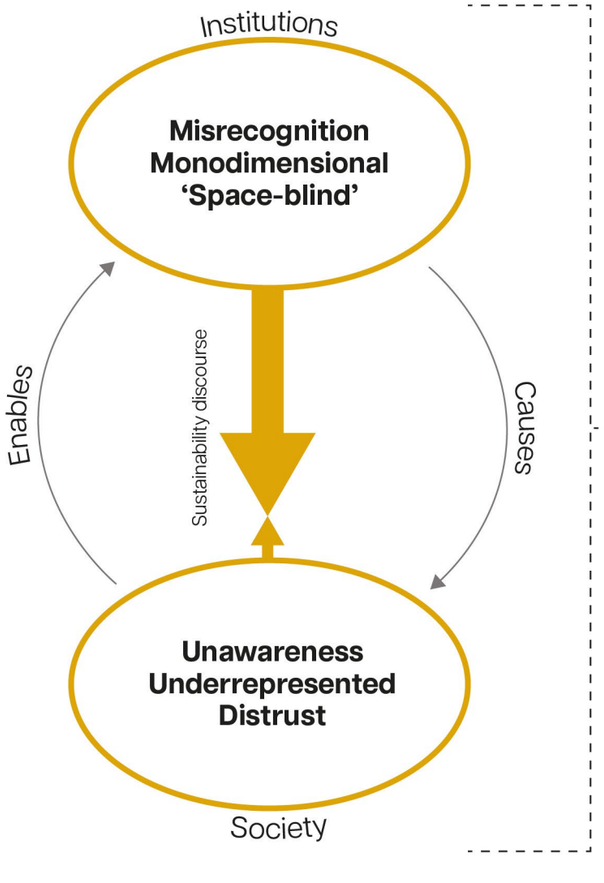
> Diagram 3: Energy poverty numbers 2020-2022, the Netherlands.
Source: (Mulder et al., 2023; in Rapport Energiearmoede in Nederland 2022)

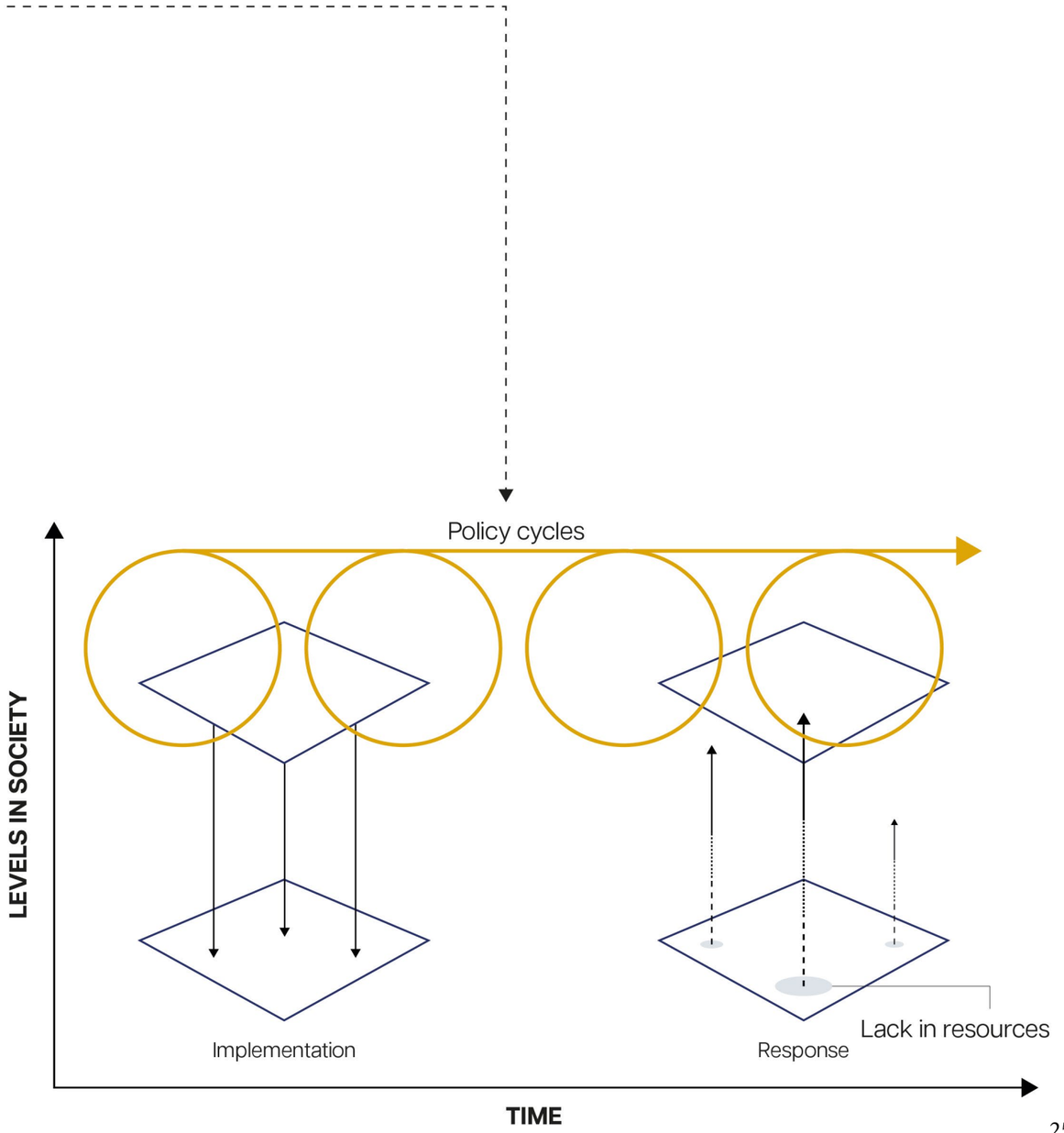
Cycles of unjust in transition policy making

However, the social issues concerning the energy transition are dual-sided. Top-down practices and objectives are too distant from local implementations, causing issues like energy poverty to persist. On the other hand, social resistance towards cleaner energy measures is rising (Lennon et al., 2019). The phenomenon of NIMBY-ism is a good example of public resistance towards large scale renewable energy projects. Resistance towards these implementations are often the result of citizen not feeling heard in the decision making process (Universiteit Leiden, n.d.). Another cause can be a lack in general awareness of, usually highly technological, information. The everyday citizen is often unaware of large-scale and long-term plans set up by central or local governments (Naafs, 2023).

Local input, knowledge and responses to institutional policy proposals are crucial for proper implementation. However, the adequate resources or platforms in order for citizens to engage with higher up institutions are not available or accessible. This causes that the concerns, needs or input of these resource deprived groups are not implemented into policies. Thus, keeping the policy cycle in higher levels of society and keeping cycles of unjust in place. Again, this highlights the gap between sustainability policies and the local implementation scale. When citizens are not given a proper platform to voice concerns or evaluate their own actions, which are then not implemented into policies, social resistance and unwillingness to participate in cleaner energy measures can grow (diagram 4).

It is, however, possible to activate people when they are given proper tools and support in order to experiment and change social norms and values (CORDIS, 2016). However, in current energy transition discourse and decision making processes this is not the status quo.





> Diagram 4: Cycles of unjust in transition policy making
By author

"Designing, creating, and implementing energy transitions that replicate past injustices — or create new ones—not only does not lead to sustainable and equitable energy futures but also wastes a significant opportunity to create improved human outcomes via sociotechnological systems transformation" (C. A. Miller & Richter, 2014, p. 80)

Social Innovation & Multi-actor collaboration

As urban challenges become more and more complex, stimulating innovative ideas become another major pillar in the energy transition. The European Commission is investing billions of euros into research programs to enable technological ideas for sustainable energy futures (European Commission, 2021b). Experimentation with new ways of living in so-called 'Living Labs' provides society with important feedback on our current lifestyles and how to change towards more sustainable ones (Voytenko et al., 2016). In leading transition theories, innovations, or strategic combinations thereof, created in diverse niche setting are key to kick-start overall systematic changes (Geels, 2002). Innovation can be defined throughout multiple perspectives, with 'technological' being the most common association throughout. However, as Krlev and Terstriep (2022) state, different perspectives on innovations are needed in modern day challenges wheras social innovation is the most underdeveloped.

In the energy transition, social innovation is defined as "innovations that contribute to the low-carbon energy transition, civic empowerment, and social goals through initiatives such as new forms of governance, social configurations, supportive policies and regulations, and new business models" (Dall-Orsoletta, Cunha, et al., 2022). Additionally, social innovations is purely social in its means and will eventually improve overall societal wellbeing (Hoppe and de Vries, 2018; Dawson and Daniel, 2010). So, the broad definition of social innovation can be stated as the innovation of society, by society, for society.

Current transition policy discourse lacks in the proper implementation of social innovation and is largely focused on economic or technological growth (Hoppe and de Vries, 2018; Thomas et al., 2022). This does not conclude that technological or economic innovations are inherently bad, it is the lack of social means and goals that could potentially hinder the overall energy transition challenge.

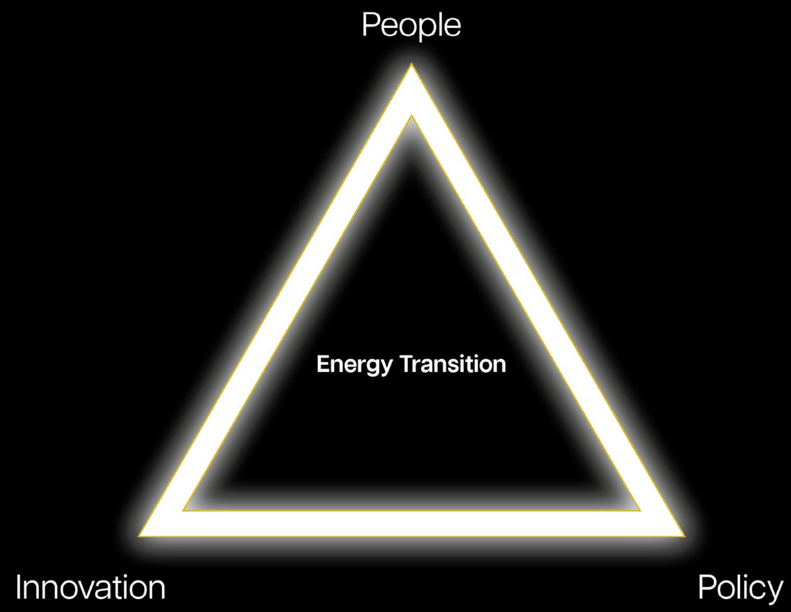
Fostering social innovation and the potential of civil society is not yet streamlined with current policy making processes as, shown in the abovementioned paragraphs, gaps between social actors and policy decisions are still present (Wittmayer et al., 2020). In order to implement more social innovation, the creation of multi-actor collaborations and networks exhibit solutions to bridge these gaps. Through building a network between private, public and civil society actors, new configurations to govern complex transition challenges arise (Medina-García et al., 2021).

Furthermore, Dall-Orsoletta et al. state that next to spatial innovation, social and institutional innovation drive the energy transition in cities as well (2022). As new energy systems ask for new social configurations, boosting social innovations can aid the process of untangling and subsequently achieve the best and most just strategies for complex urban problems (Hoppe & De Vries, 2018). Implementing new participatory approaches through the establishing of multi-actor networks show great potentials to aid in the journey towards just socio-technical transitions as well (ibid.; Medina-García et al., 2021).

However, Medina-García et al. (2021) identified that current emperical research regarding multi-actor collaborations and social innovation takes on a dominant persepective of bottom-up initiatives. This keeps a negative view on top-down institutions and practices causing the opportunity to study the fostering of multi-actor collaborations for social innovation towards sustainability transitions low (ibid.).

Concluding statement

Cities are facing great urgencies to change. Renewable energy sources are struggling to keep up with rising energy demands. Strategic action has to be taken now, in order for global goals to be reached. Stakeholders from many different fields, throughout various scale-levels have to work together and join forces. Cities are key drivers of the energy transition, but many barriers and injustices are still in place (Prieto, 2023). Current sustainability policies lack in recognition of social aspects and local implementations. A top-down approach is dominant in policy making with the assumption that when new technologies and economic models flourish, society will adapt accordingly (Buijs et al., 2023). This gap between social actors and policy objectives can cause injustices, which in turn, repeat patterns of injustice creating a vicious cycle (Laes et al., 2014). Social actors are becoming more important in the energy transition, but are underrepresented, misrecognized and not properly engaged in decision making processes. There is a need for better multi-actor collaborations, participation and evaluation in order to improve the role of civil society towards a just energy transition (Wierling et al., 2018). In simple words, good collaboration between policy, people and innovation is at the base of the energy transition in cities (Bardazzi and Pazienza, 2023). However, in the case of already disadvantaged neighborhoods based on socio-economic traits, this collaboration is theoretically and empirically under developed.



< Diagram 5: The energy transition triangle. By author

Part 2

Research design

Individually, collectively or cooperatively: how do we tackle the energy transition?
(Mandias, 2023)

Energy transition in Bospolder-Tussendijken: “Most people have no clue what is hanging above their heads”
(Naafs, 2023)

Bad luck for low-income: new energy allowance paid out later this year
(de Hulster, 2023)

Opinion: vulnerable neighborhoods deserve customization without an idealistic view
(Bokern & Croon, 2021)

Insecurities surrounding heating company hit Rotterdam-South: “natural gas free” projects come to a halt
(Liukku, 2022)

Doubts regarding cost and sustainability of heat networks
(OPEN Rotterdam, 2022)

No heating and cold dinners: over 600.000 households live in energy poverty
(Voermans, 2023)

Rotterdam: accumulation of challenges becomes too expensive for vulnerable neigborhoods
(Koldewey, 2021)

Ministry: at least 40 billion euros in subsidies towards fossil fuel industry annually
(Het Parool, 2023)

Citizens and small businesses pay the price of the energy transition, while big polluters are spared
(van de Weijer, 2021)

WHY?

< Image 8: Day-to-day newspaper headers. Source: Various.

Research questions

The main research question is as follows:

How can participatory planning practices facilitate multi-actor collaborations between people, policy and innovation towards a spatially just energy transition in Hillesluis?

MRQ

1. Multi-actor collaborations between people, policy and innovation:
A need to find new ways of governing and collaborating between actors in energy transition challenges

2. A spatially just energy transition through participatory planning practices:
Lack in proper participatory practices in energy transition decisions

3. Hillesluis:
Gaps between policy objectives and local implementations which negatively affect socio-economically disadvantaged neighborhoods.

SRQ's

The main research question is divided into 3 main categories of energy transition discourse, theoretical underpinning combine with spatial planning approaches and lastly the case study area. The sub-research question dive into these categories seperately:

SRQ-1: What is the current governance structure in the energy transition discourse in Rotterdam?

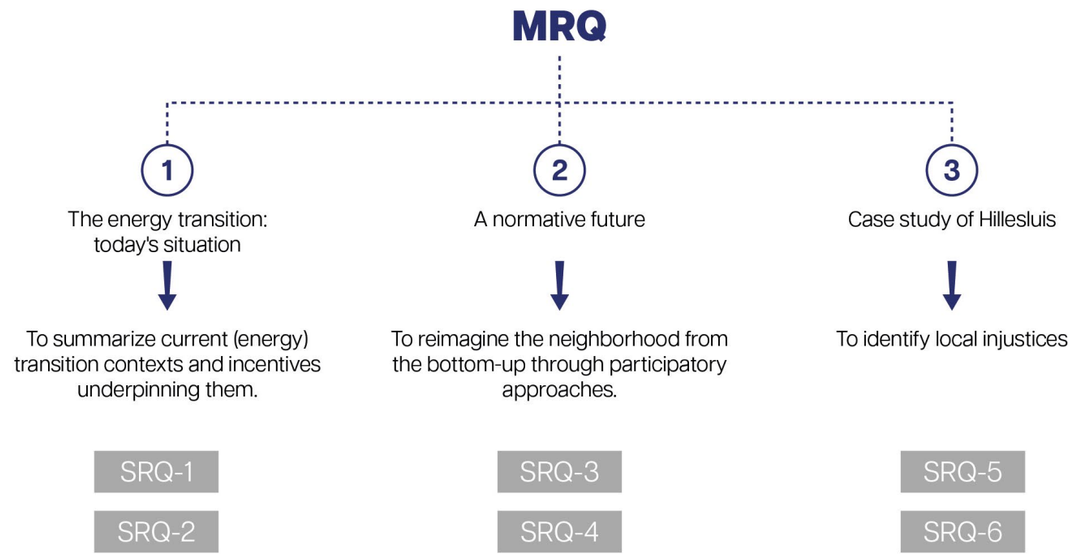
SRQ-2: Which stakeholders are leading the current energy transition and what are their relations?

SRQ-3: How can the role of civil society be redefined and strengthened in the energy transition in Hillesluis?

SRQ-4: Which participatory planning practices are needed for a more just energy transition?

SRQ-5: What are the spatial and socio-economic barriers that hinder the energy transition in Hillesluis?

SRQ-6: What are local energy injustices in Hillesluis and where are they located?



> Diagram 6: Sections of the MRQ
By author

Research aim

The current energy system is in need of change and the way we, as consumers, think about energy has to change as well. Municipal energy transition programs are rapidly being formed and implemented in cities. Programs and policies inherently aimed for improving the quality of our urban areas are far from perfect. Policy aims are too distant from the scale of actual implementation. This gap is especially wide in neighborhoods with disadvantaged qualities. The gaps between aim and implementation will only widen if not addressed, critically reviewed and explored on how to bridge them. Certain citizen groups, their needs and most importantly, valuable local knowledge and skills are not properly recognized, establishing that the current energy transition is not a just one for all.

This research takes up participatory approaches to explore new methods to bridge these gaps towards a just energy transition. The project aims to design an ideal, but case specific participation model through theoretical and context analysis. Subsequently, the project also aims to critically reflect upon this proposed model as participatory practices are known to be challenging to execute (Cornwall, 2008). Suggestions and recommendations are formed to mitigate participation risks and divert hiccups that can occur along the way.

This research project thus aims to:

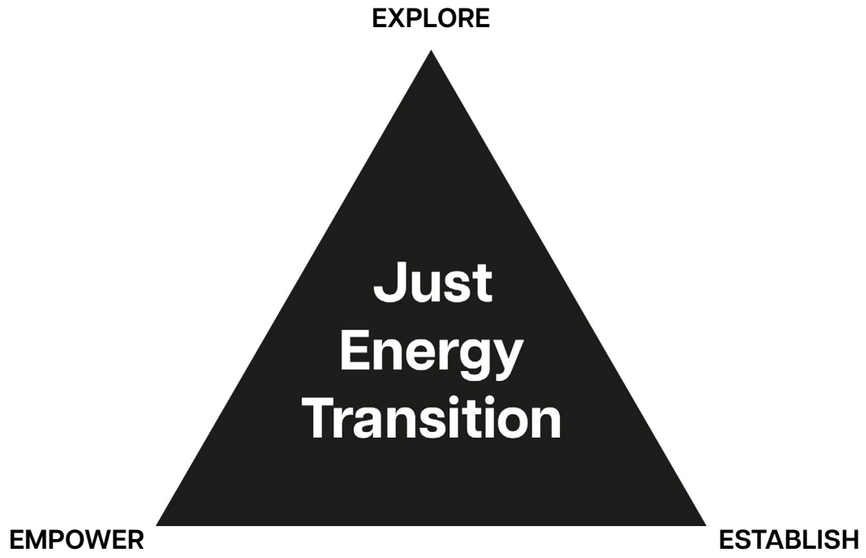
- **Explore** new ways of reaching a just energy transition in in disadvantaged neighborhoods using spatial justice principles.
- **Establish** and propose new governance structures that incorporate a fair distribution of power, focusing on the participation of actors of civil society.
- **Empower** local citizens to not only help uncover socio-economic and socio-spatial barriers that hinder the transformation of a neighborhood towards cleaner energy futures, but attempt to increase the imaginative powers to shape just future imageries/visions as well.

These research aims are accomplished by:

- Mapping and analyzing the current energy transition discourse and governance structure in order to identify/diagnose shortcomings and injustices.
- Identifying barriers and vulnerabilities in regards to current energy transition policies using case-related socio-economic and socio-spatial characteristics.
- Setting up co-creation workshops with citizens and experimenting with participatory approaches to aid the imagination of the future of the case neighborhood.

Further detailing of methods will be present in the ‘Methodology’ chapter on page 44.

< Diagram 7: Just Energy Transition triangle
By author



“People are, and must always be, at the forefront of urban transitions towards sustainability”

-Author

< Image 9: Energy crisis protests.
Source: (Hickson, 2022)

Theoretical frame

The main theories used in this thesis are spatial justice and transition management/governance in transitions.

Social sustainability

Reaching sustainable futures in urban environments require large scale, multidimensional and interscalar transitions. The concept of sustainability is a known, well researched and important topic in modern day society and future generations to come. Sustainability comprises of three main topics: economic, environmental and lastly social (Kandachar, 2014; Rocco, 2022). The latter of which is greatly underdeveloped and often seen as a secondary, byproduct of the other two. However, this view on sustainability causes great imbalances and leads to spatial and social injustices. Thus stressing the need of a holistic view on sustainability where, not only economical and environmental, but social aspects are considered as equally important.

Spatial Justice

The fair distribution and equal access to new, clean energy futures is a normative goal for cities. However, due to repeated patterns of unjust, especially in socio-economic vulnerable neighborhoods, this goal is yet to be achieved. There are winners and losers to every urban challenge, but it is the unfair allocation of those costs and burdens based on social, economic or geographical status that need to be changed in order for cities to fully transition to sustainable and just futures (Rocco, 2022).

This projects' main theoretical underpinning is based on spatial justice principles, namely: distributive, procedural and recognition (Soja, 2009).

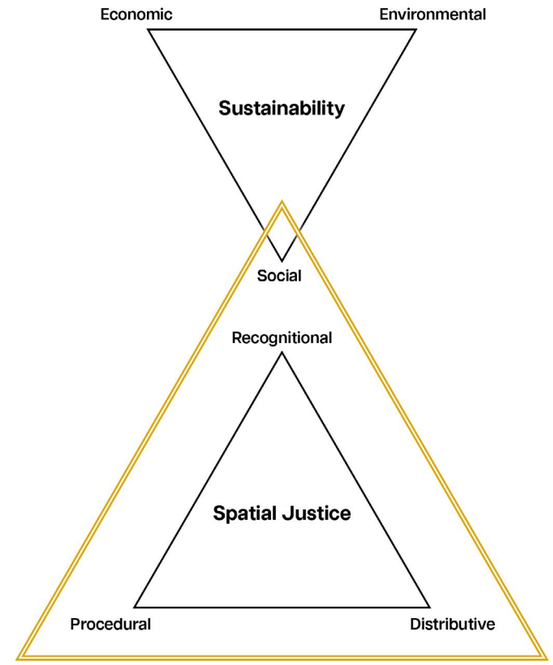
Distributive: the distribution of public goods.

Procedural: the fair and transparency in decision making processes.

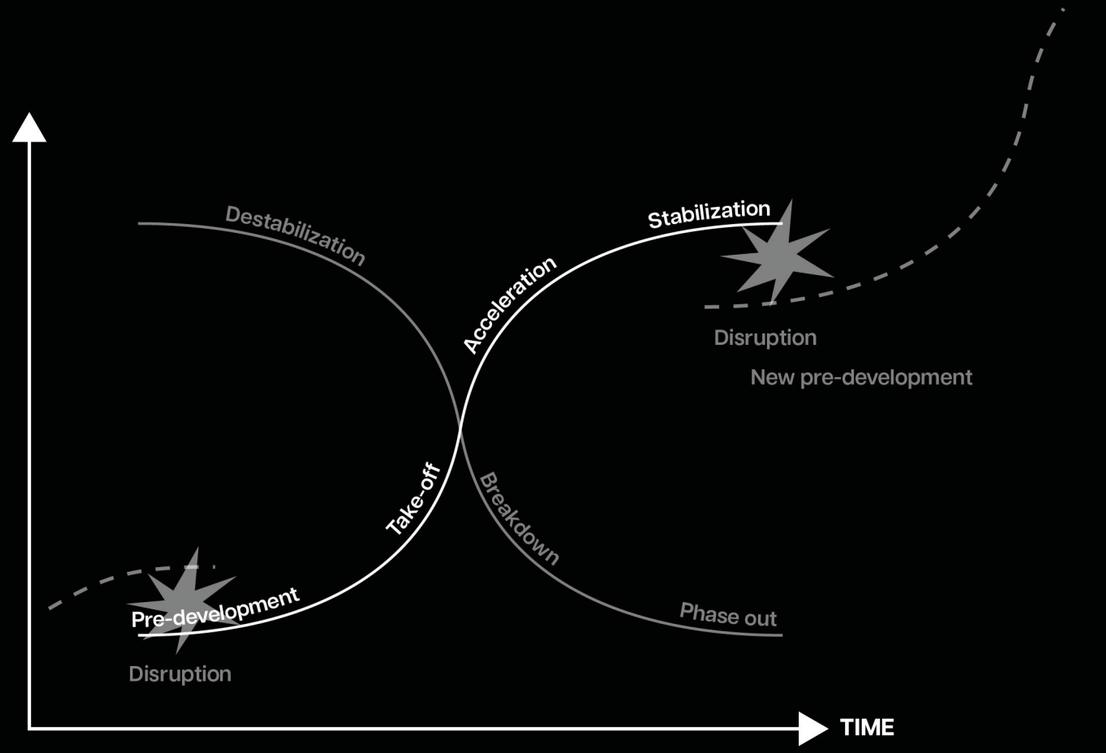
Recognition: equal and non-biased recognition in decision making processes.

Without justice, social sustainability cannot withstand against economic growth and environmental protection. Interpreting spatial justice principles can uncover where injustices stand, who is affected and how to improve decision making processes. As seen in the problematization of the energy transition, distributive, procedural and recognitional injustices are present so it is exactly these tenets that can, when improved, aid the development of sustainability planning practices (Banerjee & Schuitema, 2023).

Important to note is that justice principles and sustainability practices are not equal, rather they are mutually enforcing, both needed for achieving the aims set up in both sections. It is thus, as Campbell (2013) describes, a tension that keeps sustainable development and spatial justice an interesting and important topic to discover (ibid).



> Diagram 8: Overarching theories
By author



> Diagram 9: S-curve and X-curve in transitions
Source: (Laes et al., 2014; Silvestri et al., 2021)

Governance

The concept of governance rose in urban settings during the 1990 parallel to political shifts towards neoliberal agenda's, globalized world perspectives and complex urban issues (McCann, 2016). The state centred, top-down government structure called for a broadening and implementation of views towards 'out of state' power, a common definition of urban governance (ibid.). Governance can be described as the total configuration of actors, policy instruments and decision making processes of broad and problems in the urban environment (Schmitter, 2002; Meuleman, 2019). Governance is usually divided into three main players: private sector, public sector and civil society.

"State-market-society" (Jessop, 1998, p.5)

"state agencies and civil society" (Raco, 2009)

"the state, other public and private institutions, social movements, civil society and the practices of everyday life" (McCann, 2016, p. 313)

Different modes of governance, each with their own policy instruments and objectives for implying change often linked to socio-technical transitions, utilize specific policy instruments to change behaviour throughout different sectors. (Nieminen et al., 2020; Tenbensel, 2005).

Hierarchical: legislation and regulations like zoning or use restrictions.
Market: economic instruments such as funding or subsidies.
Network: informing and raising awareness through campaigns.

In socio-technical transitions, effective ways of multiple governance modes is needed to establish a consensus in decision making processes (Nieminen et al., 2020). Different governance structures have different configurations of which stakeholders are involved, who is in control and what the relations are between them to move towards shared goals.

Multi-level perspective

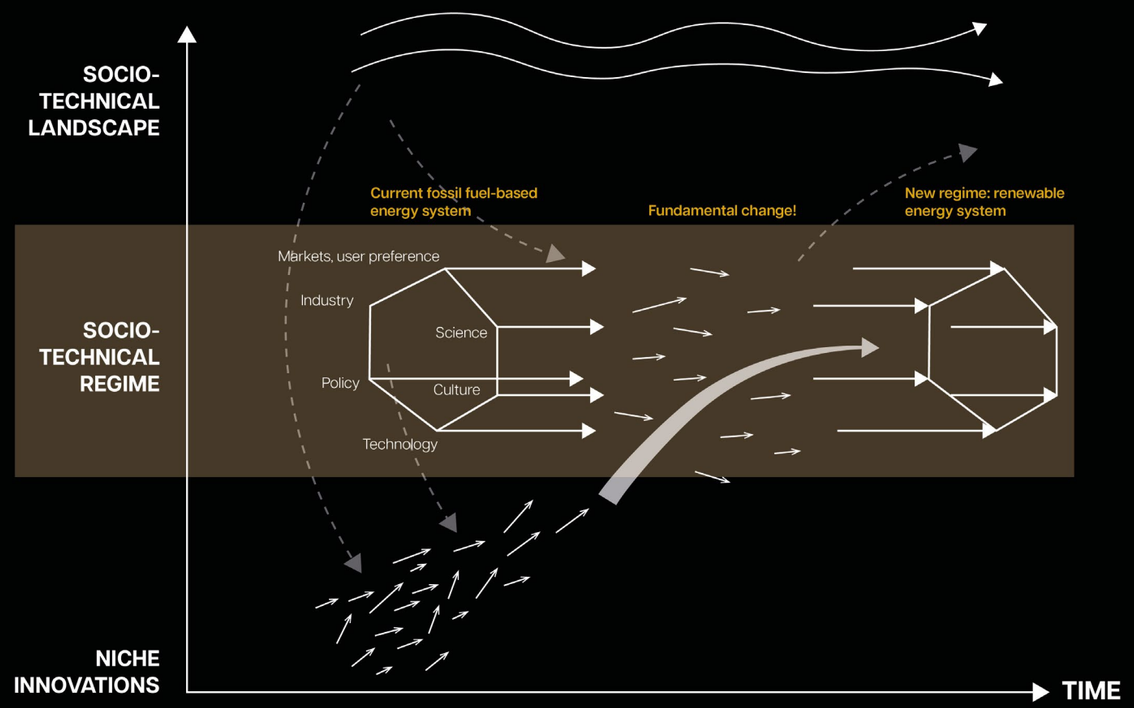
In order to understand the mechanisms behind transitions in general, transition theories are briefly explained.

A transition is a gradual shift from one system to another, involving many actors (Geels, 2011). A standard transition process for the implementation of a new, innovative system is divided into four phases (diagram 9): pre-development, take-off, acceleration and stabilization (Laes et al., 2014). The phases of destabilization, breakdown and phase out create the X-curve of the existing system (Silvestri et al., 2021).

The pre-development phase is concerned with small-scaled initiatives. Through disruptive events, opportunities open up for novel experiments or paradigms to arise against the dominant status quo. When these new ideas are slowly being accepted by the majority of dominant structures and actors, the transition enters the take-off phase. In the acceleration phase, large-scale systems change. Through changes in other systems like political agreements or changing social values, the transition ideas are reinforced and supported. The last phase is the stabilization phase where the novel pre-development ideas become the new norm.

The multi level perspective is an approach to transitions such as the energy transition given their highly complex nature and interconnection between actors. The perspective acknowledges the influences of both niche experiments and overarching socio-technical landscapes onto the dominant socio-technical regime. The approach also stresses that transitions are that of a whole system, the socio-technical regime, instead of specific sectoral ones (Geels, 2002).

The multi-level perspective consists of 3 main levels, namely the socio-technical landscape, socio-technical regime and niche experiments (diagram 10). These levels are in a constant and dynamic state of interaction with one another and it is of great importance for just, smooth socio-technical transitions that these dynamics are understood and considered.



> Diagram 10: Multi-level perspective
Source: (Geels, 2011)

The socio-technical landscape is the top most level consisting of large-scale structures like demographic trends, population growth or environmental issues (Geels, 2002). These factors have the slowest pace of transformation, but can present disruptive changes and in turn pressure change throughout the lower levels of transitions. In the energy transition, examples of landscape level trends or disruptive change are oil and gas prices, UN sustainability goals, or more recently, wars.

Geels (2002) refers to the socio-technical regime as the dominant set of social values and rules in cultures. Regimes usually follow dominant trajectories set out by the higher level socio-technical landscape (Nieminen et al., 2020). Innovations from lower, niche levels, can be implemented in societal regimes, but do so in an incremental way (take-off and acceleration phases) (Geels, 2002).

Lastly, the niche level is where 'radical' innovations occur most frequently. Niche level experiments kick start transitions as they introduce new rules to the regime (Ibid.). Examples are a new product, lifestyle or trend. In transitions experiments on the niche level are positive for the energy transition as they have the ability to challenge existing regime rules.

However, a gap is present between the socio-technical landscape and regime actors, especially individual actors or organizations (Shove & Walker, 2007; Pierick & Van Mil, 2009). The multi-level perspective is a good framework to understand dynamics between different socio-technical levels, but fails to recognize the management structure of these highly dynamic interaction (Shove & Walker, 2007; Morgunova, 2021) .

Transition Management

As the complexity of socio-technical transition is increasing, new governance compositions are needed. This is where the governance model of transition management is introduced.

"Transition management is a multilevel model of governance which shapes processes of co-evolution using visions, transition experiments and cycles of learning and adaptation." (Kemp et al., 2007, p.1)

Transition management is described as a way of steering urban transitions towards more sustainable futures (Kemp et al., 2007; Nieminen et al., 2020; Laes et al., 2014). Based on the three levels introduced in the multi-level perspective, different modes of governance are needed in each scale level of socio-technical transitions to steer together with clear interconnections between all levels. This interconnection between different levels of transition is called the co-evolution approach (Kemp et al., 2007). There is no one solution to these complex challenges, the importance of local contexts and capacities is thus needed to be incorporated and recognized in transition management structures (Laes et al., 2014).

To manage complex transitions, one has to be adaptive, open and innovative at all times. Instruments of change have to be applied in correct fashion in order for steering systems in the normative goals for the future (Loorbach, 2009). Loorbach (2009) categorizes transition management with 4 multi-level stages: (Kemp et al., 2007; Rotmans et al., 2001)

> Diagram 11: Transition management cycle
Source: (Loorbach, 2009)

1. Strategic - activities surrounding the culture, values and trend in societies. In this phase, issues are identified and the scope of the transition at hand is determined.

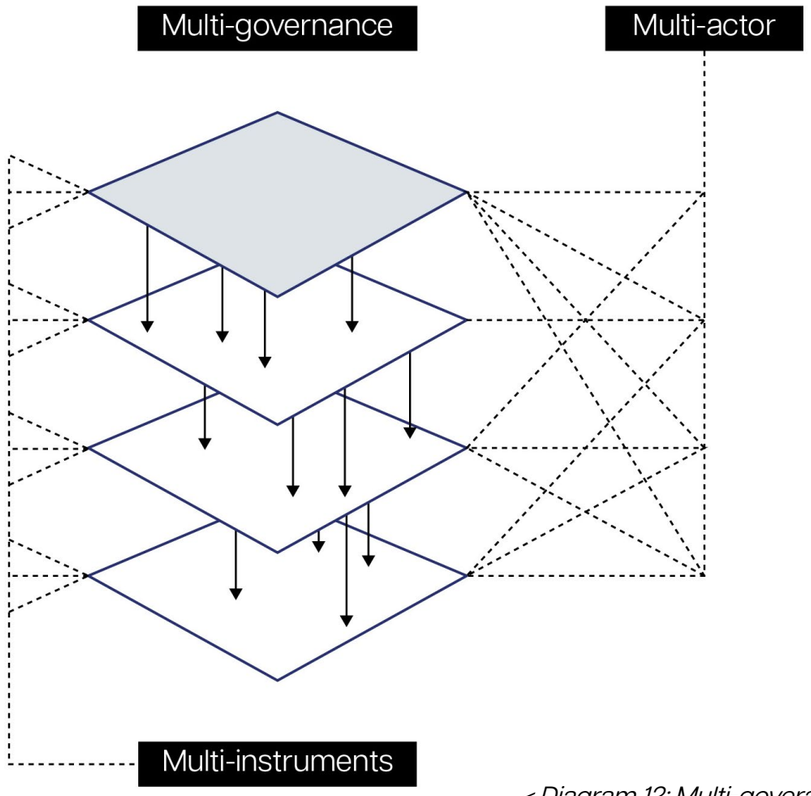
2. Tactical - In the tactical phase, the future vision and strategies towards it are formed. Stakeholders are appointed and networks are established.

3. Operational - In the operational phase, the previously formed visions are translated into actions and innovative experiments are supported.

4. Reflexive - the reflexive phase is important in the transition management process as it ensure the evaluation of the entire process. The iterative process keeps the managament from diverging away from the goals.

It is important that each step of transition management in different societal levels is properly supported by policies and regulations. However, as seen in dutch transition management practices regarding the energy transition, activities deployed are dominated by financial policy instruments (Laes et al., 2014). The neoliberal agenda and free market influences pose as the greatest barriers for real implementation and action towards sustainable energy futures (ibid.).

Transition management is inherently a political interplay of power (Shove & Walker, 2007). Governance in sustainability transitions still favor short-term profits over long-term, socially innovative and just visions (Nieminen et al., 2020; Laes et al., 2014). Again, the gap between sustainability visions, activities, strategies and individuals is highlighted in the shortcomings of transition management. The role of civil-society's input is overshadowed by dominant, unjust and profit-oriented sustainability paradigms (Shove & Walker, 2007).



< Diagram 12: Multi-goverance scheme
By author

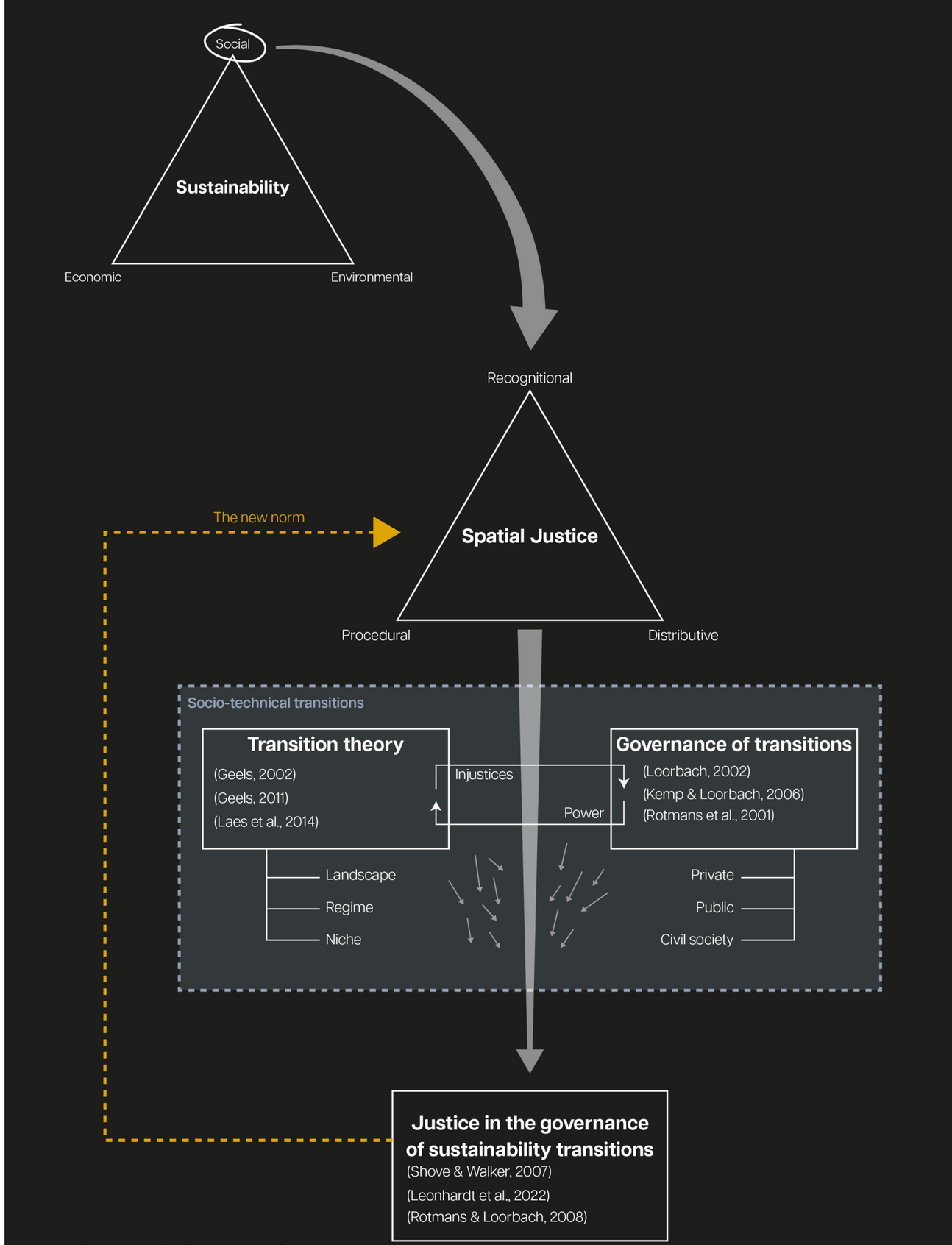
Justice in sustainability transitions

The ultimate goal in research on transitions is how to implement structural changes in a fair and just way, so everyone can benefit from the opportunities. However, defining what justice means in socio-technical transitions is a difficult, perhaps even unattainable, challenge. The recognition that transitions are a web of different interactions and dynamics, can be seen a step towards incorporating justice in steering towards socio-technical transitions for all.

“Just as there is no silver bullet solution to decarbonize the energy system, there is no single universal approach for transition governance towards a post-carbon society. As cultures, structures, and practices are context dependent, transition approaches will have to be tailored to the local circumstances.” (Laes et al., 2014, p. 1130-1131)

Different needs require different governance configurations, instruments and actor power dynamics. This way, a certain adaptiveness and reflexiveness can be established. Multi-level governance structures aim to incorporate every sector in transitions to produce real regime change (Medina-García et al., 2021). These multi-level structures help to empower communities over their own energy systems (Leonhardt et al., 2022). Multi-level governance structures each bring a set of policy instruments to use in order to steer local contexts to the desired aims. Current energy governance are too focused on economic policy instruments like subsidies or loans (Leonhardt et al., 2022). These financial instruments adversely are the greatest barriers for real implementation of clean energy policies (Laes et al., 2014). A combination of policy instruments is said to be a better and more just way of doing so (ibid.).

Multi-level governance structures bring about a broad array of different actor configurations. Hence the importance of a multi-actor network (Rotmans & Loorbach, 2008). Through multi-actor networks consisting of members of civil society, public and private realms, socially innovative activities can be empowered and fostered (Medina-García et al., 2021). This new configuration of actors gives previous misrecognized and underrepresented civil society a platform to experiment, innovate and join forces towards real change (Buijs et al., 2023).



> Diagram 13: Theoretical framework
By author

Conceptual frame

Energy justice

As the crossing of justice and energy research domain, the concept of energy justice stands. Looking back at the SDG 7 of 'energy for all', energy justice becomes an important concept in this project and overall trajectory towards cleaner energy futures globally, nationally and locally (Goal 7 | Department of Economic and Social Affairs, n.d.).

Energy justice has emerged from environmental and climate justice movements originating from the US in the 1970's. The movement stemmed from unequal distribution of environmental especially disadvantaging minority groups. The energy justice movement is tied into the transition towards renewables and ensuring the equal distribution of the cost and benefits thereof. (Cooper, 2022; Jenkins et al., 2016) On operational level, energy justice comprises of a multitude of dimensions e.g. energy burden, energy insecurity, energy poverty and energy democracy (Cooper, 2022). But the actual definition of these dimensions are used interchangeably.

A common misconception of energy justice is present in energy policy of Dutch government and that of the city of Rotterdam. The definition of energy poverty of 'having to set aside a large part of ones income to pay for energy bills' is dominant, creating a skewed definition of energy justice as a whole (Nationale Ombudsman, 2022). This monodimensional way of thinking about energy justice enables and justifies policies to deploy instruments that are usually financial in nature. As stated beforehand, these instrument often do more harm than good in already disadvantaged neighborhoods (Leonhardt et al., 2022). Purely focusing on energy poverty is not the only remedy towards real energy justice, we have to look deeper and really ask ourselves the questions of where, how and who are being disadvantaged. Sovacool (2014) stated that there is a need for a more human-centred approach to energy justice research and subsequently, practice as well. Månsson et al. (2014) analyzed different methodologies that aim to increased energy security. They concluded that it is needed and inherently just to critically review the energy system as a whole in order to uncover deeper causes of energy insecurities, from supply to use (ibid.). So instead of energy justice only being an aim in policy making, implementing energy justice principles can also be an analytical tool. Based on the tenets of distributional, recognition and procedural justice, disadvantaged communities can be identified and solutions can be thought of on how to engage them better in decision making processes (Jenkins et al., 2016). This redefining of energy justice as an analytical tool adds a level of evaluation to it, which can be combined with the normative goals of energy justice (ibid.)

Tenets	Evaluative	Normative
Distributional	Where are the injustices?	How should we solve them?
Recognition	Who is ignored?	How should we recognise?
Procedural	Is there a fair process?	Which new processes?

(Jenkins et al., 2016)

Participatory planning in sustainability transitions

Participation in planning practices aid the legitimacy (Smith, 1973) and acceptance of (Chilvers et al., 2018) new ideas. Participatory processes inform decision makers on local needs and knowledge from within the community, thus making plans more feasible when implemented (Nyamadzawo & The Wagner Planner, 2020). Participation can be separated into three main concerns for complex planning tasks: based on (Smith, 1973).

Rational: Rationality ensures a 'common sense' in the problematization, creation of option and feasibility of the proposed ideas. Rational thinking keeps the decision and actors involved making up-to-date with relevant information and adaptive to changes, which is especially important in modern socio-technical transitions.

Consensus: Mutual consensus is an important aspect when it comes to complex urban problems. Cities portray a high degree in diversity of its inhabitants, background, values and lifestyles. Unfortunately, in planning practices, not all concerns can be incorporated in the limited spaces given. However, participation leads to properly informed trade-off amongst decision makes and actors in order

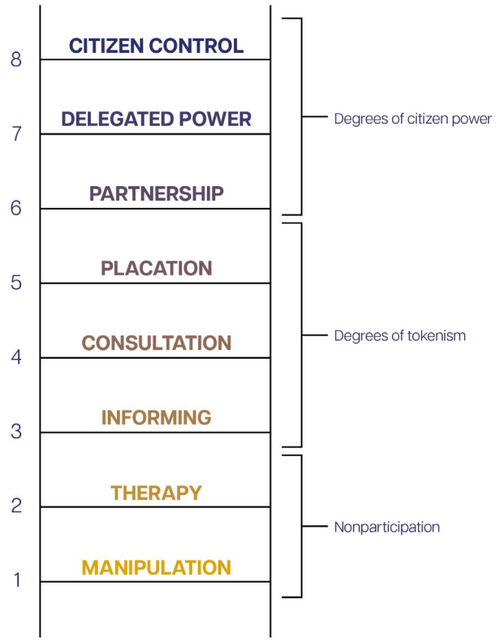
to mitigate resistance towards proposed plans.

Personal: Personal values and behaviour can be altered when citizen are given opportunities to participate in decision making processes.

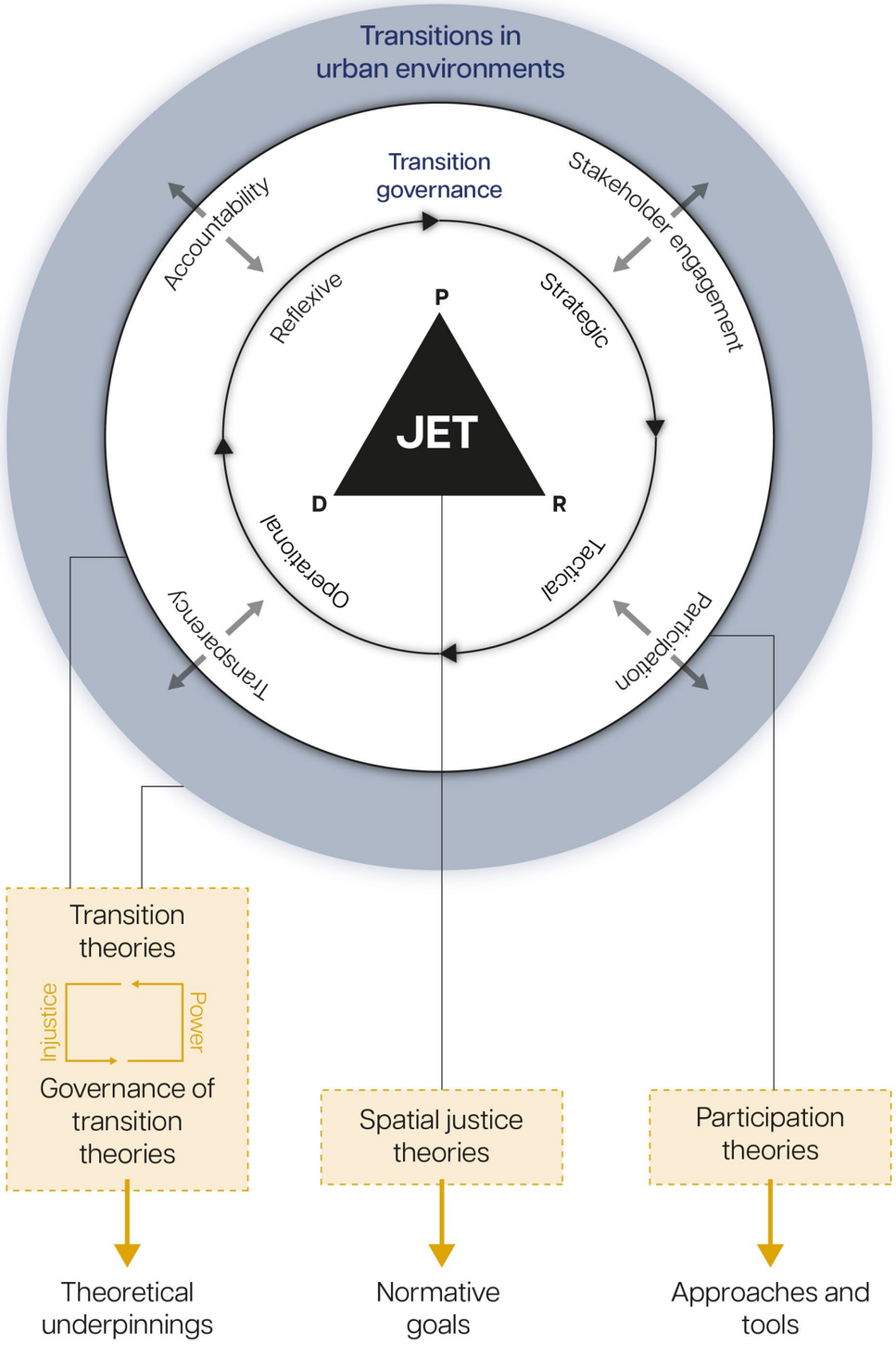
For socio-technical transitions, this aspect is becoming more and more relevant. Participation can enhance ones self-reflection on individual behavior. A platform to voice concerns empower communities and ultimately gives them tools to not only reach societal goals, but also envision and activate potentials that might have been kept hidden.

Citizen participation is a broad and layered concept. Arnstein (1969) defined participation in the famous 'Ladder of Participation', as the redistribution and enabling of, especially under privileged, citizen power (diagram 14). The ladder categorizes different levels of participation going from full citizen power, to acts of nonparticipation. There is however a difference between informing the public after the decision is made or actively engaging citizens in the entire decision process. This way of conceptualizing the topic, underprivileged and often unheard citizen groups can become actively included in decision making processes (ibid.). Participation processes have levels, meaning that proper participatory processes truly enables citizens to harness power to a certain degree which in turn aids the legitimacy of the decision that is made (Akerboom & Universiteit van Amsterdam, 2018). However, in many modern decisions, especially those regarding complex urban transitions, participation is still low on the ladder.

More human-centered views on the role of participation and thus the role of civil society in socio-technical transitions form new, more inclusive governance types (EEA, n.d.). Participation enables evaluating and learning for those in control (Smith, 1973). Innovation coming from niche settings such as citizen initiatives can become streamlined with sustainability aims at the higher socio-technical system levels through proper participatory processes (Schmitter, 2002). Participation can be risky, time consuming and disappointing when certain stakeholder ideas are deemed not feasible (Akkerboom, 2018). However, participation can aid the exchange of knowledge, redistribution of power and negotiations of wants and needs in multi-level stakeholder networks (ibid.). Which make the decision making processes in socio-technical transitions more just. Proper citizen participation is a cornerstone for spatial justice (Rocco, 2022). It views individual, civil society actors as key assets to socio-spatial transitions. Instead of external bodies to inform, citizens are crucial initiators for socio-technical transitions (Chilvers et al., 2018).



> Diagram 14: Ladder of participation
Source: Arnstein (1969)



> Diagram 15: Conceptual framework
By author

Methodology

The main research question is as follows:

“How can participatory planning practices facilitate multi-actor collaborations between people, policy and innovation towards a spatially just energy transition in Hillesluis?”.

This question is built up in three main parts which correspond to the three main categories of methods used in this project. A mixed methods approach of both quantitative and qualitative data is used where findings from one method feed into the results from another method.

Context analysis

First, the case area of Hillesluis is analyzed based on spatial and socio-economic elements. Quantitaive data from the municipality of Rotterdam is used in order to get a good understanding of the urban narrative of the neighborhood and showcase where energy vulnerabilities may occur. Based on the problem statement, it is also important to identify the socio-economic status of the neighborhood and its residents as an additional layer of analysis.

A spatial analysis of Hillesluis
To showcase possible spatial barriers and opportunities towards sustainable energy futures in the neighborhood through quantitative data.

A socio-economic analysis of Hillesluis
To identify the main socio-economic barriers towards sustainable energy futures through quantitative data.

Data sources
-Municipality of Rotterdam
-Centraal Bureau voor de Statistiek
-Historical maps
-Nationaal Programma Rotterdam Zuid
-Geodata (GIS)

Discourse analysis

A collaboration between people, policy and innovation is needed for a smooth and just energy transition (Bardazzi and Pazienza, 2023). In order to reveal where and how problems in this collaboration arise, it is important to analyze the current discourse in energy transition policies, strategies and initiatives through multiple sectors. A mix of qualitative and quantitative data is used.

Policy analysis using ETF policy analysis framework
A policy analysis is performed using the European Training Foundation (ETF) framework. This framework acts as a guide for multiple stakeholders in order to inform with the evaluation of creation of new policies (Milovanovitch, 2018). The framework recognizes the complex nature of decision making in current socio-economic challenges, such as the energy transition.

The policies that are analyzed are “De Rotterdamse Transitievisie Warmte” (Rotterdam Transition Vision Heating) and “Rotterdamse Energiesysteemvisie” (Rotterdam Energy System Vision). The first policy is based on the notion of completely phasing out natural gas supply and use in the city by 2050, in line with the Paris Agreement climate goals. Next the “Rotterdamse Energiesysteemvisie” (Rotterdam Energy System Vision) policy is analyzed. This policy document aims at diversifying the energiesystem as a whole: from supply to use. The documents include the different ‘sub-transitions’ that are present and needed in the city, namely the harbor and industry, built environment and mobility.

Data sources
-Municipality of Rotterdam

The ETF framework is an analytical tool to evaluate existing or expected policies. Step one encompasses the identification of the problem. What is the scope of the issue at stake and where should the policies intervene. Step two collects evidence to underpin, challenge or complement the problematization. Step three analyzes the findings from step two. The findings should be reflected upon based on the problem and given context. What does the evidence actually mean compared to the scope of the issue? Step 4 deduces policy recommendations in order to inform existing policy measures or create new ones.

Governance mapping
The energy transition is a complex process involving many stakeholder. However, it is difficult to identify who has the most power in decision making processes. There is a lack in simple mapping of the exisiting governance structure. Through the “organigraph” mapping method, this structure and relevant stakeholder relations are displayed. This mapping method uses several elements like: sets, chains, hubs and webs to break down organizational structures (Mintzberg and Van Der Heyden, 1999).

Data sources
-Municipality of Rotterdam
-Policy documents
-News and media
-Expert interviews (Appendix 1)
-Stakeholder analysis

Expert interviews
for further research into current energy transition discourse, experts of the field will be interviewed. As all expert will have a type of relation to the main topic, but each expert has a different perspective on the topic and problems, a semi-structured interview approach will be used (Jamshed, 2014). In order to elaborate on certain questions, probing, follow-up questions are implemented to find reasoning behind certain actions. Qualitative, emperical results are used to shape the context of current energy transition discourse and enhance the governance map. A draft of the interview questions can be found in Appendix 1.

Data sources
-Policy makers and advisors (municipal)
-NGO’s
-Neighbourhood initiatives

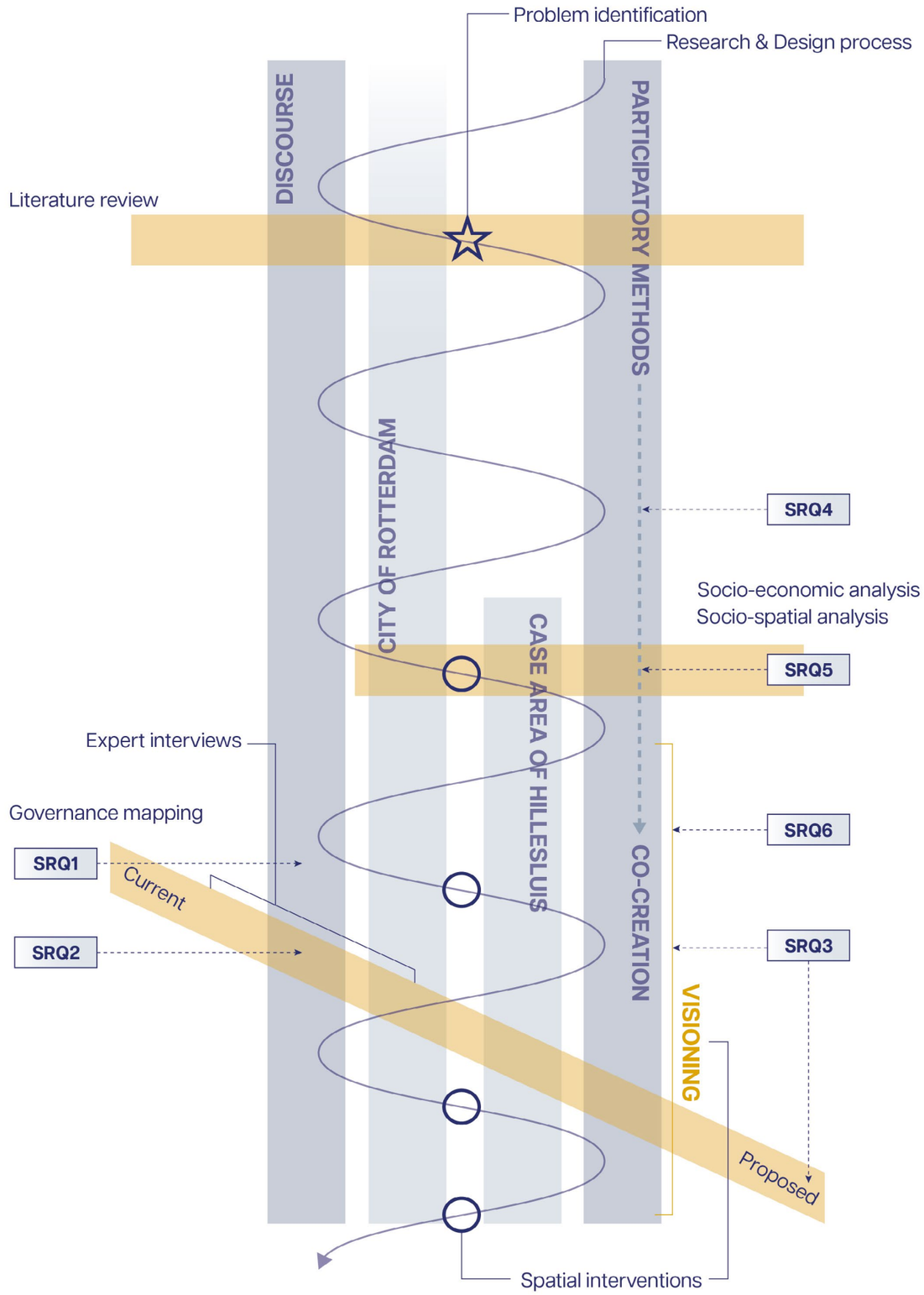
Stakeholder analysis
Mapping out which stakeholders are involved in the energy transition can give insights into who is most in control of making decisions. First, relevant stakeholders and their aims regarding the energy transition are summed up. Next, a power-interest matrix is formed. This way, the amount of power and the interest towards sustainable energy goals can be understood better (Olander & Landin, 2005).

Co-creation sessions

As the research aims to incorporate new ways of participatory processes and citizen engagement in the decision making of energy transitions, local co-creation workshops will be held. The workshops’ main objective is to create a future vision for the neighborhood of Hillesluis. The involvement of civil society in the formation of these plans, helps boost acceptance amongst residents as well.

A focus group of approximately six residents of Hillesluis are selected. Active participation in other, sustainable neighborhood initiatives is preferred, but not a prerequisite of the selection process. Digital posters were sent out in various neighborhood Whatsapp groups and residents were asked directly to participate during community events.

Data sources
-Municipality of Rotterdam
-Citizen focus group
-Case studies



> Diagram 15: Methodological framework
By author

Part 3

Case area analysis and governance

Case area: Uncovering energy transition vulnerabilities in Hillesluis, Rotterdam

Introduction to the neighborhood

Hillesluis is a working-class neighborhood (‘arbeiderswijk’) built around the 1920’s-1930’s, situated in the south of Rotterdam (image 10). Its demographic was mainly focused on workers of the growing harbor of the city. Currently, the neighborhood consists of relatively young inhabitants with multicultural backgrounds. 84% of which have a non-Dutch origin (Statistieken Buurt Hillesluis, 2023).

Historically, people living in the south were looked-down upon from people living in the north of Rotterdam. In current times, this rather negative social stigma is still present. Reasons as to why contain social, spatial and economical disadvantages. For example, due to high crime rates people feel unsafe (Gemeente Rotterdam, n.d.-a).

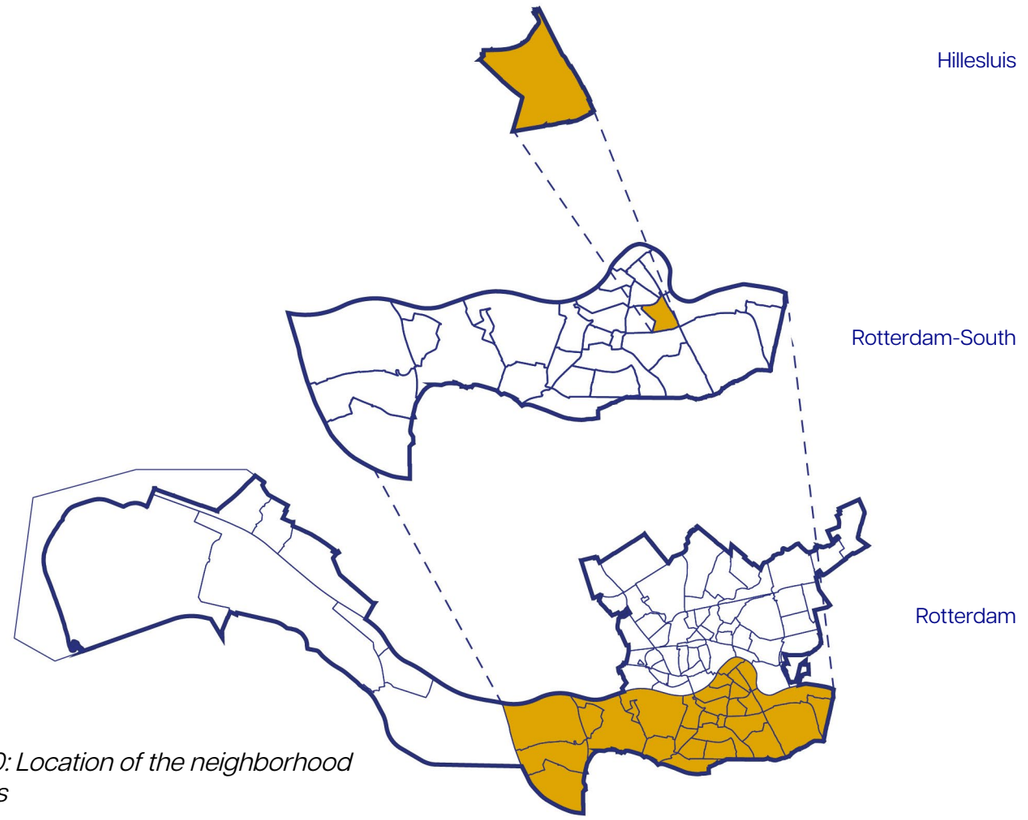
Currently, little to no activity regarding sustainability transitions are present in the neighborhood. This can form a risk especially keeping the current pace and pressures of climate related urgency in mind. However, when speaking to residents, many opportunities are present but not used to their full potential. Hillesluis has many, strong, informal networks. On a sunny day, streets are lively and people interact with one another.

Social aspects

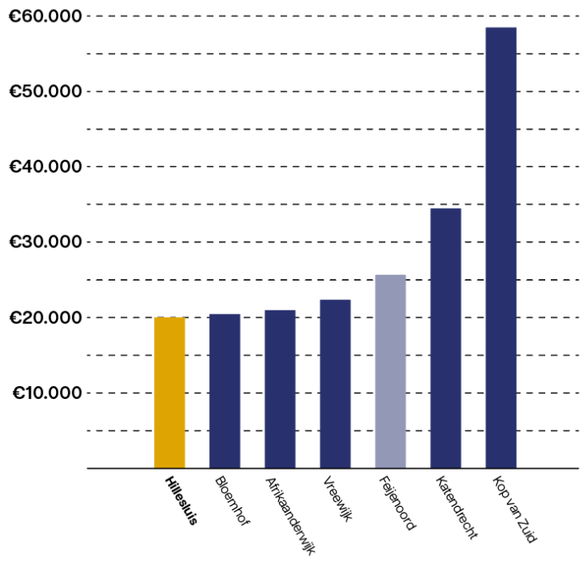
Social cohesion is present, but due to cultural differences, certain life perspectives have a higher potential of clashing with one another (Stadsontwikkeling, deelgemeente Feijenoord en Woonstad Rotterdam, 2013). These differences have to be embraced in future developments of the neighborhood and overall urban transitions. It can be seen as a strength as people learn from other people, but poses as a risk as well. New urban futures have to be designed and planned in a way that suits everyone, to not exclude or misinterpret lifestyle differences.

Economic status

Residents of Hillesluis have a low income rate (Statistieken Buurt Hillesluis, 2023). Current clean energy measures are focused on private homes and ask for a sum of investments



> Image 10: Location of the neighborhood of Hillesluis
By author



(Duurzaam010, 2022), putting residents who don't have much financial capacity in a disadvantaged position. The municipality of Rotterdam has financial aid programmes in place, but these require residents to take out loans (Duurzaam010, 2023). Which in turn makes the already disadvantaged groups even more disadvantaged.

Spatial characteristics

90% of homes in Hillesluis are multi-family apartments and only 24% of the total homes are privately owned (Statistieken Buurt Hillesluis, 2023). This can make residents living in rental or social housing heavily dependent on housing corporations or landlords to implement sustainable energy measures. So if private spaces are lacking, public spaces could form an opportunity for clean energy measures. However, due to the neighborhoods density and urban form, quantitative public space is lacking (Stadsontwikkeling, deelgemeente Feijenoord en Woonstad Rotterdam, 2013).
Rotterdam South is developing rapidly. Residential developments take the forefront with newly built apartment complexes rising from the grounds. Through infrastructural maintanance and upgrades, Hillesluis will be situated at a rich intersection of new developments and become attractive for the entire city.

> Image 11: Aerial photo neighborhood of Hillesluis
Source: PDOK

< Diagram 16: Income levels Hillesluis
Source: (Statistieken Buurt Hillesluis, 2023)

< Diagram 17: 'Het hoefijzer' (The horseshoe) of Hillesluis
Source: (Gemeente Rotterdam, n.d.-b; Gemeente Rotterdam, n.d.-c)

> Image 12: Spatial context of the neighborhood of Hillesluis
By author

Wilhelminaplein
Kop van Zuid
Rijnhaven
Rijnhaven
Katendrecht
Rotterdam Zuid station
Various residential developments
Afrikaanderwijk
Maashaven
Feyenoord City
Tarwewijk
Bloemhof
Rotterdam Stadion station
Zuidplein
Hart van Zuid
Vreewijk

LEGEND
Development
Train station
Metro station
Train tracks
Metro line
Neighborhood border
Building
Shopping streets

0 250 500 750 1000 m

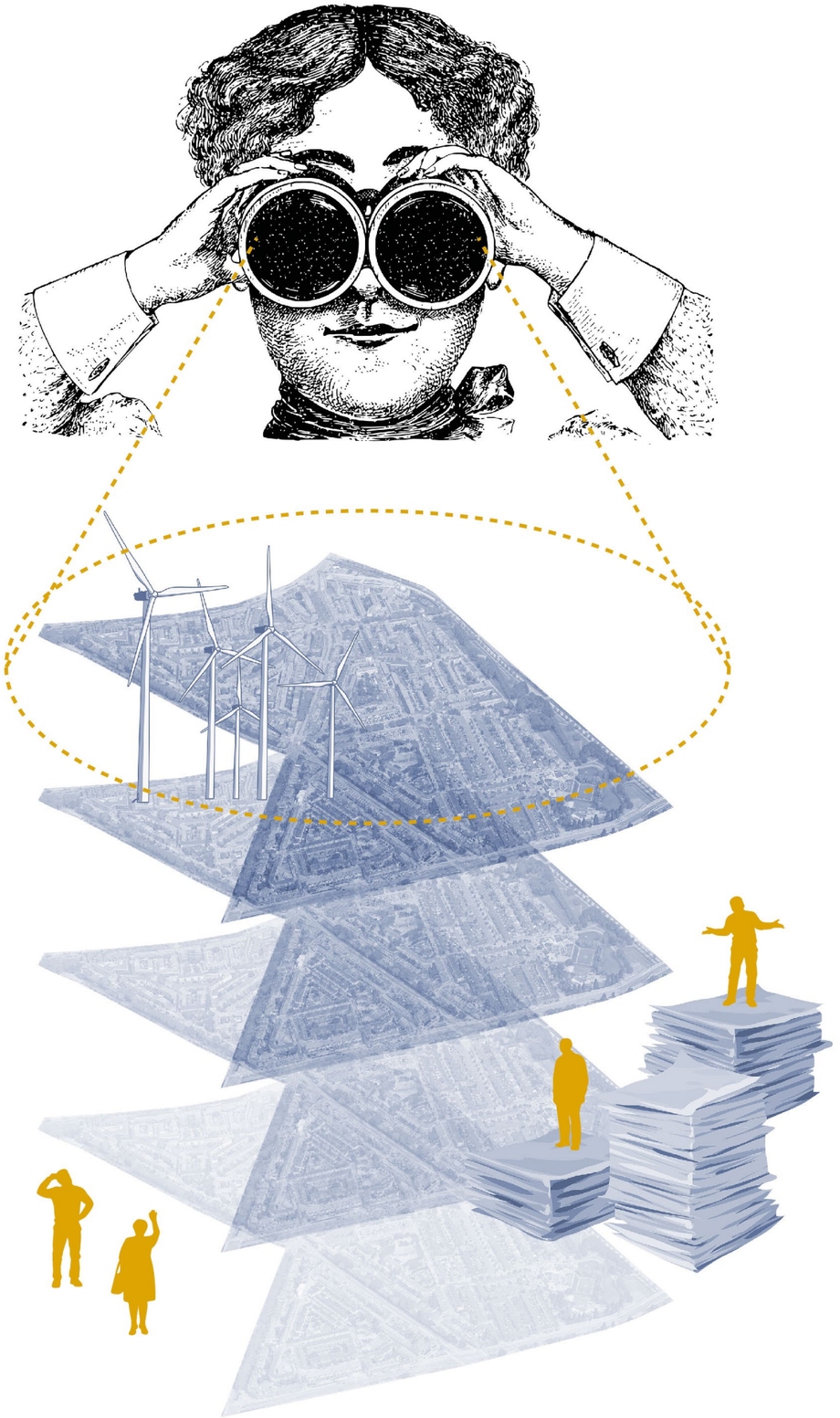
What makes the neighborhood vulnerable to the energy transition?

In order to analyze the neighborhoods and its vulnerabilities regarding the transformation towards cleaner energy futures, we need to establish what exactly a ‘vulnerable trait’ is. As mentioned in the problem field (page 20), energy vulnerabilities can be linked to aspects such as access to clean energy, the ability to afford new energy measures and the current energy efficiency of one’s home (Bouzarovski et al., 2017). However, these aspects are not autonomous and often persist in a mutually inclusive manner. Thus making the issues more difficult to tackle due to the complex and intertwined nature of the vulnerabilities at stake.

The average energy bill for Dutch households is rising from 125 euros per month in 2020 to 256 euros per month in 2022 (Mulder et al., 2023). Households are energy poor when they have to dedicate over 10% of their annual income to energy bills (Robinson et al., 2018). The annual income of Hillesluis is on average 20.000 euros (diagram 16). A simple calculation shows that, using these numbers, an average household in Hillesluis has to dedicate at least 15% of their annual income towards energy bills. Well over the 10% margin defined previously.

When policymakers misrecognize vulnerabilities, resulting policies will inherently become unjust. Spatial implementations built from these unjust policies will in turn have a higher risk of failure.

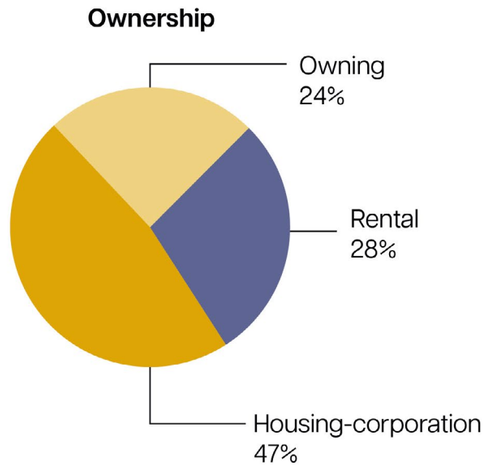
Aspects in the neighborhood of Hillesluis might not fit the theoretical understanding of energy vulnerabilities (Bouzarovski et al., 2017). The next part of this report explores social, spatial and economical aspects of Hillesluis that have a high chance of negatively affecting the sustainable development of the neighborhood.

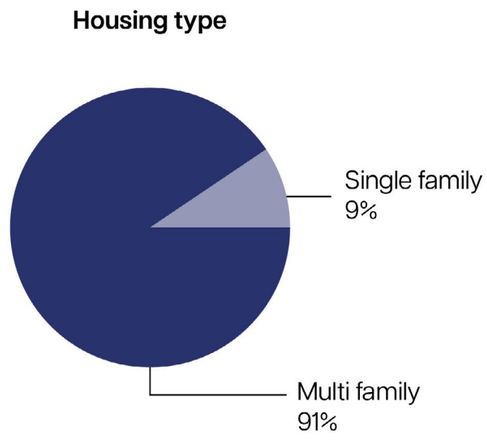


Homes, ownership and other spatial aspects

First, around 25% of homes are privately owned, while the other shares are divided accordingly: 47% social housing and 28% private rental. When one compares this to the proposed clean energy measures such as solar panels or smart batteries, we see that only a small part of the dwellers are thus able make these changes. The other 75% are dependent on either a housing corporation or private landlords to implement cleaner energy measures that are only 'accessible' for private ownership.

In Hillesluis, 91% of homes are multi-family type. This means that measures such as solar panels will have to be implemented in a shared manner. Peer-to-peer energy sharing or energy cooperatives are proposed solutions (Cui et al., 2020) , but are limited by political decisions and European level law processes (Binnenlands Bestuur, 2024). Laws regarding sustainable energy transitions on European level are not yet complete, meaning national and local governments cannot apply changes or steer towards energy sharing, resulting in multi-family homes being locked in the current situation.



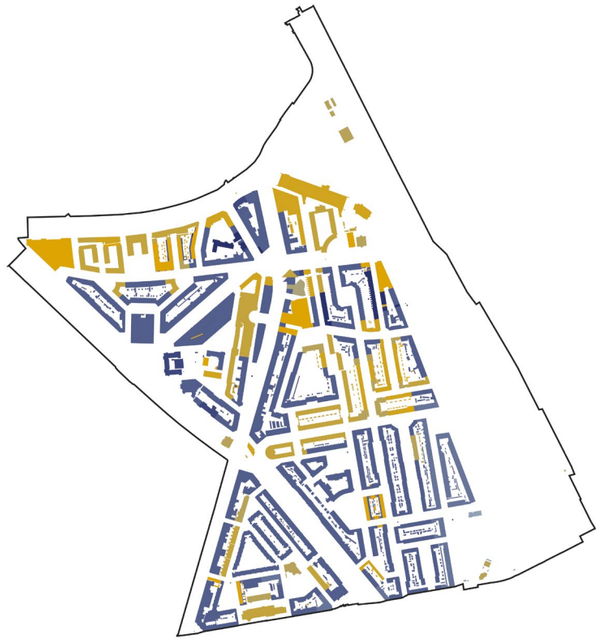


> Diagram 18: Home ownership and housing type in Hillesluis
Source: (Statistieken Buurt Hillesluis, 2023)

> Image 13: Basemap Hillesluis
By author

Building age and energy efficiency

New residential developments in Rotterdam are being built with energy efficient measures, according to energy neutrality laws for new buildings (RVO, 2017). Many new residential developments surrounding Hillesluis (image 12) can boost other homes to implement sustainability measures.



> Image 14: Building ages in Hillesluis
By author

> Image 15: Buildings from 1921-1930 in Hillesluis
By author

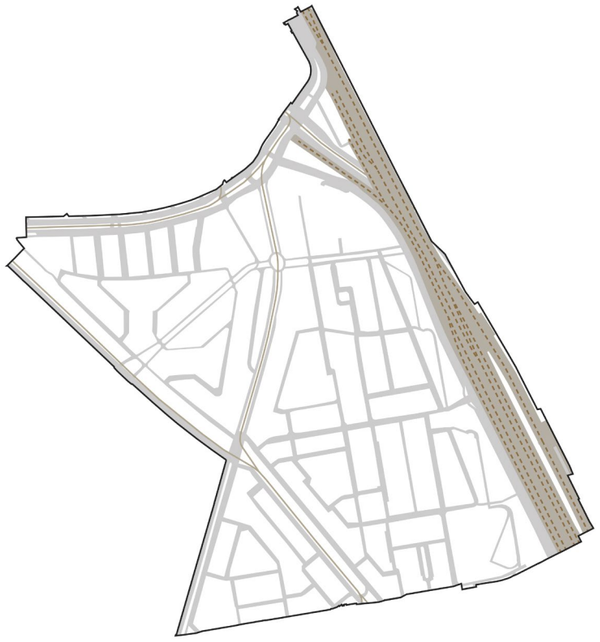
However, many buildings in Hillesluis are relatively old, dating back to the 1920's and 1930's (image 14). Older homes and buildings like this make up for a difficult task to retrofit newer technologies, while keeping costs low. Older homes inherently have a low energy efficiency, as insulation like double-paned windows is often lacking. In image 16 We see the energy labels in Hillesluis. While the overall image shows many buildings with low energy labels such as F and G, the selection of buildings from 1921 to 1930 showcases the exact phenomenon that was just explained. Older homes are more likely to have a low energy label, thus urging inhabitants to use up more energy to heat their home which in turn result in higher energy bills and so forth.

> Image 16: Energy labels in Hillesluis
By author

> Image 17: Energy labels of buildings from 1921-1930 in Hillesluis
By author

Public and green spaces in Hillesluis

The energy transition and new infrastructure to accommodate it demand space. When the proposed clean energy measures do not fit spatial typologies or socio-economic household characteristics, both in- and outdoor public space could present itself as an opportunity for shared or collective energy measures (Ozgun et al., 2015). However, in Hillesluis public space is scarce (Stadsontwikkeling, deelgemeente Feijenoord en Woonstad Rotterdam, 2013). Less than 10% is dedicated to green space, building blocks are densely placed together and innercourtyards are often reserved for the adjacent residents.



> Image 18: Main infrastructure in Hillesluis
By author

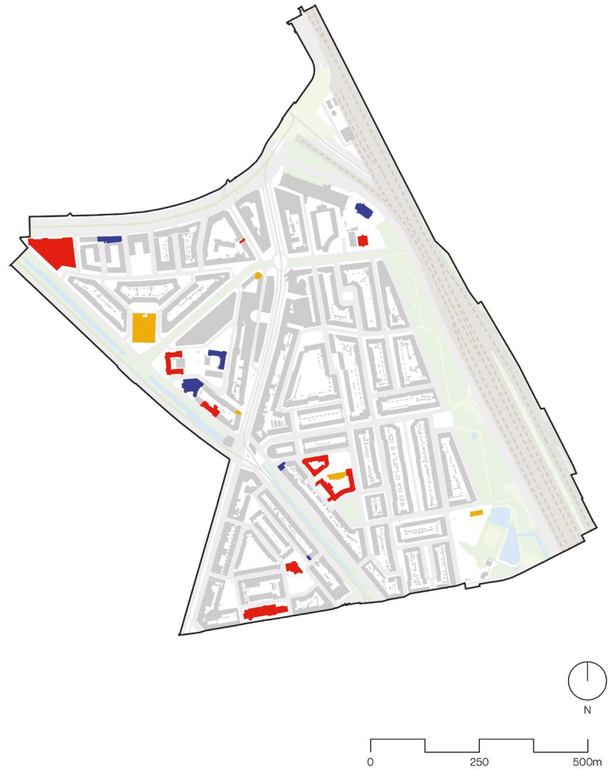
> Image 19: Green and water structure in Hillesluis
By author

Meeting places

Social innovation and the diffusion thereof towards cleaner energy futures, rely on the strength of existing and creation of new informal networks.

The map build upon spatial elements in the neighborhood like informal and formal meeting places. These meeting places can either be in- or outdoors. Schools, religious buildings or community centers are mapped as indoor meeting places, while playgrounds, outdoor sports facilities, parks and squares can be seen as outdoor meeting places (image 20 and 21 respectively).

In the south of Hillesluis, there is a lack of both in- and outdoor meeting places, which can be seen as a risk regarding the diffusion of sustainable ideas and lifestyles.



> Image 20: Meeting places outdoor in Hillesluis
By author

> Image 21: Meeting places indoor in Hillesluis
By author

Governance in the energy transition

Policy framework of the city of Rotterdam

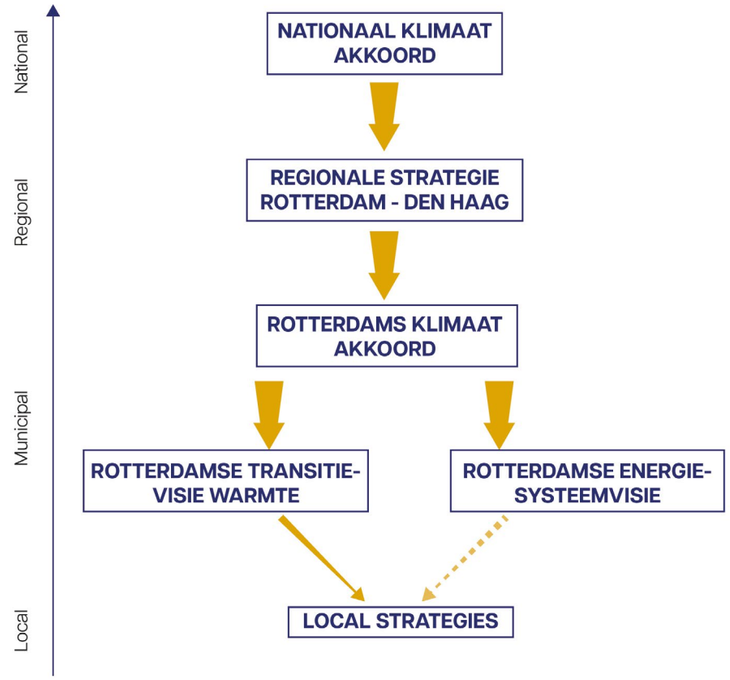
The main policies in place for the energy transition in the city of Rotterdam are the 'Nationaal and Rotterdams Klimaatakkoord', 'Regionale Energie Strategie (RES) – Rotterdam Den Haag ', 'Rotterdamse Energiesysteemvisie' and 'Rotterdamse Transitievisie Warmte'. The last two policies concern the energysystem from source to consumption and the transition away from natural gas use, respectively. The policies are all in line with one another. The national climate accords are set up with bigger, abstract goals towards sustainability. These larger scale accords also give authority to regional and local governments to build strategies that work for their specific city. The main aims of each policy are as follows:

Nationaal and Rotterdams Klimaatakkoord (Bonte & Gemeente Rotterdam, 2019)

- Keeping the energy transition affordable for everyone and tackle energy poverty.
- Aim for the maximum reduction of co2 with the lowest social costs.
- Create a fair playing ground; the ones who pollute will pay more.
- Use the energy transition as an opportunity for other developments and innovations.
- Use the energy transition to strengthen our position in the global workforce.
- Aim for a clean, safe and secure energy supply.
- Keep the decision making open and flexible for changes and new innovations.
- Ensure that our decisions do not create a waterbed effect in other places in the world.
- Evaluating decisions using energy transition aims and agreements.
- The municipality acts as an example and leader.
- Ensuring proper engagement and informing of citizens.
- Collaborate with local companies, social organizations and citizens to reach global and national climate goals.

Regionale Energie Strategie (RES) – Rotterdam Den Haag ("Regionale Energiestrategie Rotterdam Den Haag," 2020)

- Derived from national agreements to lower



> Diagram 19: Policy framework in Rotterdam
Source: (Kurvers & Gemeente Rotterdam, 2021)

co2 levels by 50% in 2030.
- Create and implement strategies that fit the context of that region.

Rotterdamse Energiesysteemvisie
(Rotterdam, 2021)

- Prioritizing public interests and concerns. In order to achieve a clean, healthy, smart and just energy system.
- Taking responsibility and collaboration.
- Adopting an adaptive, integral and digital approach.

Rotterdamse Transitievisie Warmte (Kurvers & Gemeente Rotterdam, 2021)

- The city has to be natural gas free by 2050.
- Switch of main heating source to a more sustainable one.
- Use the heating transition as an opportunity for other developments.
- Acts as a guide for local, neighborhood strategies.

> Table 1: Relevant stakeholders in Rotterdam
Source: Various

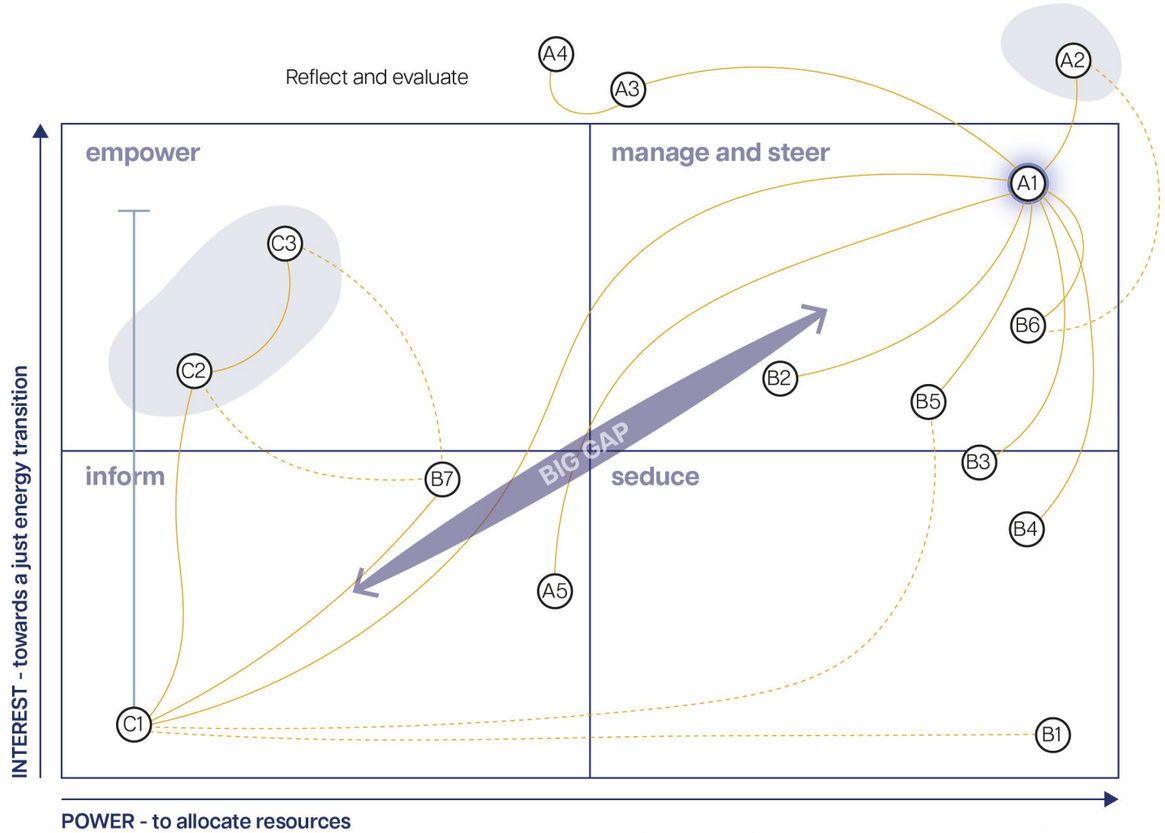
		STAKEHOLDERS	AIMS
A - PUBLIC	A1	Municipality of Rotterdam	Transition towards cleaner energy systems in order to decrease CO2 production by 50%
	A2	National government	Transition towards cleaner energy systems in order to decrease CO2 production by 50%
	A3	National Ombudsman	To ensure accountability of governmental actions and goals
	A4	Central audit office	To ensure that public expenses are allocated fairly
	A5	Network Operator (Stedin)	To find and implement new and cleaner energy sources
	A6	Water Authority (Hoogheem-raadschap van Schieland en de Krimpenerwaard)	To find and implement new and cleaner energy sources
B - PRIVATE	B1	Real estate owners	Implement clean energy measures in line with national and local governmental goals
	B2	Developers	Build energy efficient buildings to combat both the energy and housing crises
	B3	Energy suppliers	To find and implement new and cleaner energy sources
	B4	Energy producers (mostly harbor)	To find and implement new and cleaner energy sources
	B5	Housing associations (Woonstad)	Implement clean energy measures in line with national and local governmental goals
	B6	Banks	Implement clean energy measures in line with national and local governmental goals
	B7	Companies	To innovate work methods and increase competitativeness status
C- CIVIL SOCIETY	C1	Consumer (Individual citizen)	The ability to live in cleaner and healthier neighbordhoods
	C2	NGO's/Citizen groups	That everyone is involved in the energy transition
	C3	Energy cooperatives	Starting a generation of decentralised, community owned energy systems.
	C4	Educational and research bodies	To explore methods of just sustainability transitions

Stakeholders

To understand the mechanics behind the energy transition in Hillesluis, it is important to identify which stakeholders are leading in making decisions towards cleaner energy futures. Many stakeholders are involved in complex problems like the energy transition, but some have more power to make crucial decisions that eventually flow down to spatial transformations in neighborhoods. However, as mentioned in the problem field (page 20), perspectives on the energy transition differ between those who make the decisions and those who have to 'deal with' social, financial and/or spatial consequences.

In order to understand the different perspectives, roles and collaborations in the energy transition, expert interviews were conducted (Appendix 1 and 2).

Table 1 gives a brief overview of some of the main stakeholders involved in steering our urban environments towards cleaner energy futures.



< Diagram 20: Power Interest matrix of stakeholders in the current energy transition in Rotterdam
By author

Power and interest

Identifying main stakeholders gives us more insight in who is involved the decision making process of complex energy transitions. However, the question still rises which stakeholder has the most influence, defined as power to allocate resources, towards the common cause/goal of cleaner energy environments. A power-interest matrix is used to map out and group stakeholders in order to understand the different relationships between them (Olander & Landin, 2005).

Each stakeholder has their own goals and perspectives on the energy transition. The amount of power a stakeholder has decides the amount of influence on the trajectory and outcome of the transition (Júnior et al., 2015). Thus, when certain stakeholders have large amounts of power, but low interest in boosting citizens and thus societal innovations, divisions and unjust is created.

Diagram 20 showcases the power interest matrix of the situation in Rotterdam. This matrix is made with the current perspective of profit oriented and politically driven processes of the energy transition and policies in mind.

Mapping out the current governance structure of the city of Rotterdam

Complex urban transitions require fitting, multi-level governance structures in order to steer projects towards just directions and empower communities in decision making processes (Medina-García et al., 2021; Leonhardt et al., 2022). A good governance model ensures legitimacy, responsibility and the delivery of sustainability aims (European Commission & Roche, 2020).

The organigraph method, conceptualized by Mintzberg and Van Der Heyden (1999) , aims to break down organizational structures using element such as ‘sets’, ‘chains’, ‘hubs’ and ‘webs’.

Sets: the stakeholders, programs or policies as loose units which are part of the energy transition.

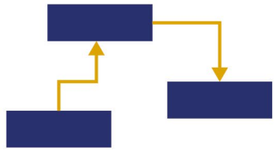
Chains: the connections between different actors. Chains can be seen as a logical succession of a resource through different actors.

Hubs: are parts of the system that house different chains, directions or stakeholders. Multiple information or resource flows end up, start or pass through a hub.

Webs: connections between actors can sometimes be direct or indirect. A web showcases more complex relations that are often indirect in nature. One chain could have effect on another chain. This is showcased in a web structure.

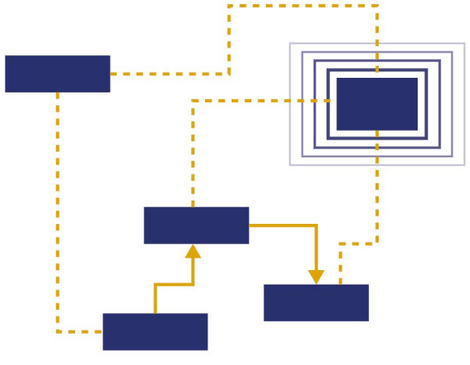
The abovementioned organigraph method is based on a model built for organizations. As the energy transition is a challenge that transcends a single organizational structure, scales and societal actor levels, different modes of governance are present. So, by adding different types of socio-technical governance modes, namely: hierarchical, market and network (based on Nieminen et al., 2020; Tenbensel, 2005), a deeper understanding of which governance modes are currently dominant is reached.

Sets



Chains

Hubs



Webs

With these methods and elements defined, the current governance structure of the energy transition in the city of Rotterdam is mapped out in diagram 21:

LEGEND

GOVERNANCE TYPE

- Hierarchical
- Market
- Network

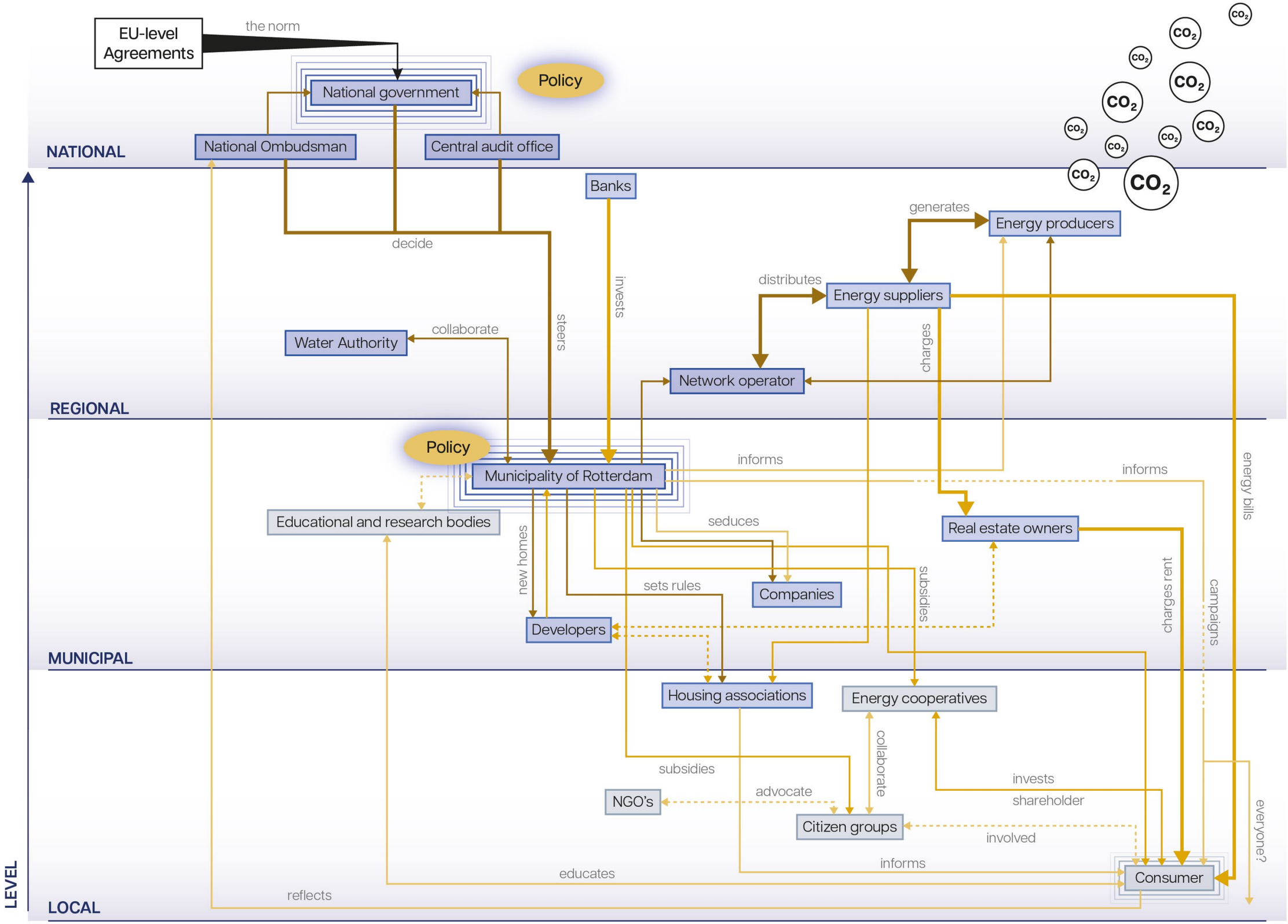
STAKEHOLDER TYPE

- Public
- Private
- Civil society

STRENGTH

- Strong
- Intermediate
- Weak/Novel

> Diagram 21: Governance map of Rotterdam
By author



Shortcomings

As Leonhardt et al. (2022) argue, financial policy instruments are dominant in current energy transition governance structures. In the governance map we see many relations between actors that are indeed based on market governance modes with policy instruments such as subsidies, funding or feed-in tariffs (Nieminen et al., 2020). As concluded in the case of Hillesluis (see page 56), many people do not have the financial means to adopt these proposed measures.

Civil society

There are many information and resource flows directing towards the individual citizen, thus putting pressure on this group to change their ways based on decisions and programs made by higher-up power. The European Commission and Roche (2020) defined why it is ever more important to include actors of civil society in socio-technical transitions. By involving actor of civil society, legitimacy can be increased, unjust can be identified from different perspectives and local knowledge can be provided (ibid.).

Transition perspectives

What can be seen in the power interest matrix (diagram 20) is that some stakeholders do have power, but little interest to change their ways of operating. This is mainly driven by monetary values and profit oriented objectives (Leonhardt et al., 2022). Stakeholder relations based on market governance modes are still too dominant (diagram 21). In transition management configurations established in the theoretical framework (page 43), reflexivity and room for experimentation is crucial in socio-technical transitions (Kemp et al., 2007).

The current governance structure in Rotterdam does not allow for levels of learning, experimentation and flexibility. Local contexts and capacities can aid this major shortcoming as these act as real life labs for experimenting with innovations that can boost society towards real, sustainable change (Laes et al., 2014).

How can we go towards a more just governance structure in Rotterdam?

Suggestions can be given in order for the current governance structure to change to a more just one.

Public realm

- Can become and is a main stakeholder in transitions.
- Should be willing to bridge gaps and reach citizens actively.
- Incorporating local knowledge as a key asset, not as an external body to inform afterwards.
- Set aside public money to transition knowledge building and experimenting.
- Celebrate and highlight active citizens in city wide campaigns.

Private realm

- Should be seduced, encouraged and when necessary, coerced to put societal values first.
- Play an active role to encourage tenants or other companies to create a chain effect of implementing sustainable measures.
- Transparency in sustainability strategies and could be penalized when misconduct is detected.

Civil society

- Should be activated to think of sustainable futures using community building events.
- Trusted and active individuals in the neighborhood should be celebrated through city wide campaigns.

Part 4

Co-creation sessions

Co-creating a future vision for Hillesluis

The importace of a collective energy vision for Hillesluis

Thinking and talking about the future can be daunting. Especially when it comes to thinking of the changes that have to be made towards a common, in this case sustainable, goal. For many, this means changing your ways of working, consuming, spending and overall living (Shostak & Bell, 1998). However, futuring methods aid people to shape, envision and respond to proposed future ideas (ibid.). Large scale socio-technical transitions such as the energy transition will bring about major changes and futuring can help to make it more understandable for citizens (Vähäkari et al., 2020).

The Multi-Level Perspective, S- and X-curves, and other visioning practices of transition management (page 38) are all examples of methods to visualize possible futures. Hancock and Bezold (1994) explained their conceptualization of possible futures using a cone (diagram 22). This diagram showcases different perspectives on the future namely based on Hancock and Bezold (1994):

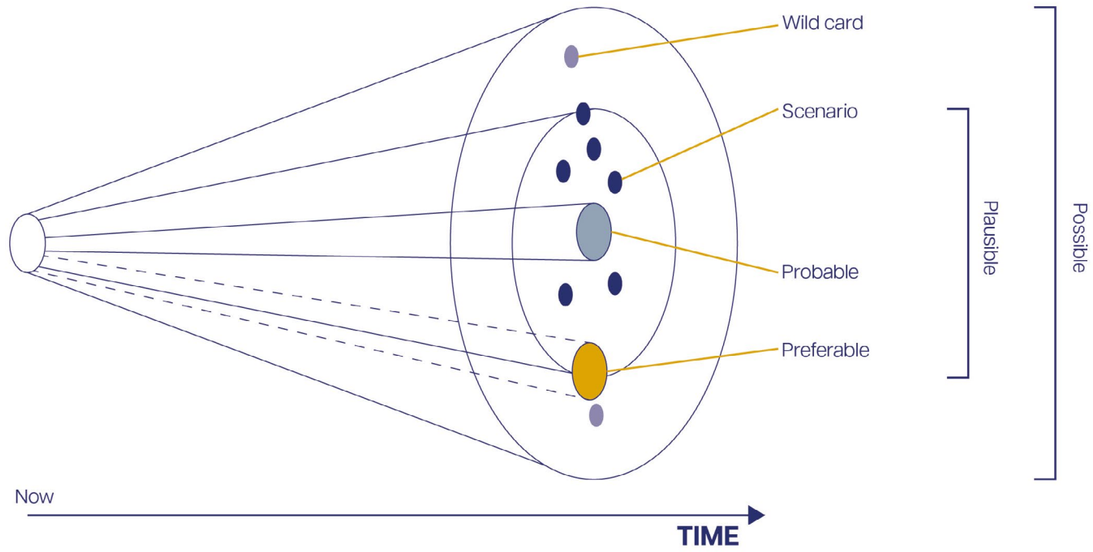
> Diagram 22: Futuring cone
Source: (Hancock and Bezold, 1994)

Possible
Where anything can happen. From extreme to slight changes, futures are not 100% certain. In theory, anything could possibly happen.

Plausible
What could happen. This perspectives keeps in mind certain limits that current trends or niches create. The niche innovations explained in the MLP framework (page 39), can develop further into a plausible future.

Probable
What is most likely to happen. This perspective takes on a ‘business as usual’ approach. We see that currently, transition policies still exhibit a certain element of this perspective as cycles of unjust still persist and manifest themselves as inequalities towards sustainability.

Preferable
What is wanted in the future. Shaping a preferred common future vision, together with citizens, can mobilize groups to actively pursue this route. Often times, in sustainable energy discourse, institutions create a vision using their projections of a neighborhood and its groups. There is a need to incorporate citizens’ perspectives regarding the identification and further envisioning of a cleaner energy future of the neighborhood.



Setting up co-creation workshops

The focus group

A group of five to seven citizens of Hillesluis were recruited to form a focus group for the co-creation workshop sessions. Because of the scope and timeframe of this project, focus group participants were mostly active to some degree in regards to sustainability lifestyles, either in their personal life and experiences or through work-related means. A good balance of gender, lifestyles and backgrounds was desired, but not a requirement for citizens to participate in the focus group.

Recruiting the participants

The recruitment of the participants started in February 2024 and lasted around two months. Online invitations were sent out in community group chats in order to recruit participants and the researcher joined several community events in order to engage and meet citizens of Hillesluis. Through word-of-mouth, the project got around in several community groups which aided the recruitment process.

> Image 22: Digital invitation for co-creation workshops
By author

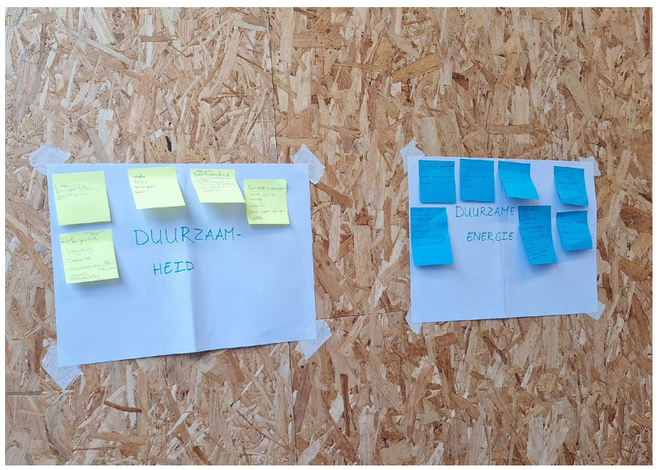
Session 1

Session 1 focusses on the defining of sustainable energy and appointed places of priority in Hillesluis. Before the focus group can dive into shaping a future vision for Hillesluis, the concepts of sustainability and sustainable energy need to be defined. As these are broad topics, every citizen can have different opinions on what it means to them and their neighborhood. In two rounds of 10 minutes, the focus group was asked to write down key words that crossed their mind when thinking of the term ‘sustainability’ and subsequently ‘sustainable energy’. The findings were then collected and the most interesting words were discussed.

During the exercise, participants found it very difficult to define the concepts of sustainability and sustainable energy as they are very broad. Also, the participants struggled to come up with ideas besides the ‘standard’ clean energy measures we see throughout municipal sustainable energy plans like solar panels, heat pumps or induction cooking for example.

The next part of the session focussed on indicated what areas of concern are present in Hillesluis. Subsequently, places of possible opportunities can be appointed as well.

This exercise showcased an interesting discussion regarding many elements of the neighborhood, such as cleanliness of public spaces or negligance of housing corporations, that did not immediately relate to sustainable energy measures. However, these findings do indicate that all aspects of one’s living environment are connected and intertwined. We can conclude that the focus group, and perhaps other citizens, will accept cleaner energy measures if other municipal problems are solved first. This intertwining of challenges makes it difficult for single energy measures to be implemented effectively.



> Image 23: Photos of co-creation session 1
By author

Image 23 and 24 depict the word webs created by the focus group in the first session. The most interesting findings were:

Simple solutions
Common citizens, especially those who are in socio-economic or spatial disadvantaged positions, are not prepared for grand transformative measures in their homes and outdoor spaces. Eventhough the energy transition is of high complex nature, people prefer simple but effective measures more. Simple measures can make the energy transition more accessible and understandable to the common citizen in Hillesluis. With simple measures we can think of using easy language and images as many residents of Hillesluis have lower proficiency of the Dutch language. The focus group stressed the fact that people in Hillesluis are usually not thinking about sustainability to the degree that is depicted in municipal policies and programs. Thus strengthening the divide between groups who can access these measures and those who are unable to.

Creating awareness
Informing people in their own ways is as important for the energy transition as the physical measures themselves. The group established, from their own wishes and experiences, that awareness surrounding the topics start at home. Through active informal networks, ideas surrounding a more sustainable lifestyle and kick-starting citizen initiatives, can flourish. However, questions were raised about how to achieve this awareness amongst everybody and if this is even needed.

Schools
Several participants of the group have children and expressed the ideas of teaching sustainability at schools. This can be achieved through integrating activities and knowledge sharing in the school curriculum or through simple design measures in schoolyards.

Some of the main barriers that were mentioned are:

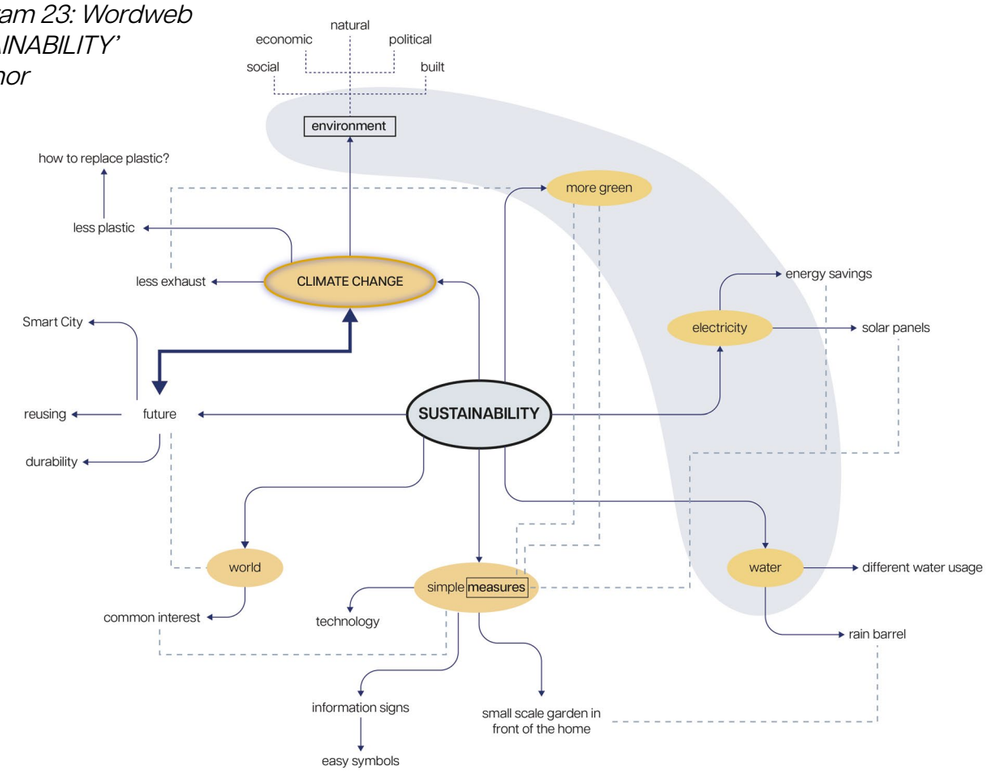
Lack of awareness
It is difficult to persuade people to think about sustainability when they are focused on day-to-day living, and in some cases survival. As income levels are generally quite low in Hillesluis, some residents will have their minds occupied by other pressing issues instead of a proposed future idea.

Neglect of outdoor spaces and streets
Many of the participants expressed concerns regarding the overall quality of the outdoor spaces and streets in Hillesluis. People will not be able to think of a sustainable future or cleaner energy use when they do not have respect towards the neighborhood to begin with. These issues manifest themselves spatially as littering, vandalism or causing nuisance. This suggests that implementing and thinking about cleaner energy measures is tied into the overall living quality of neighborhoods.

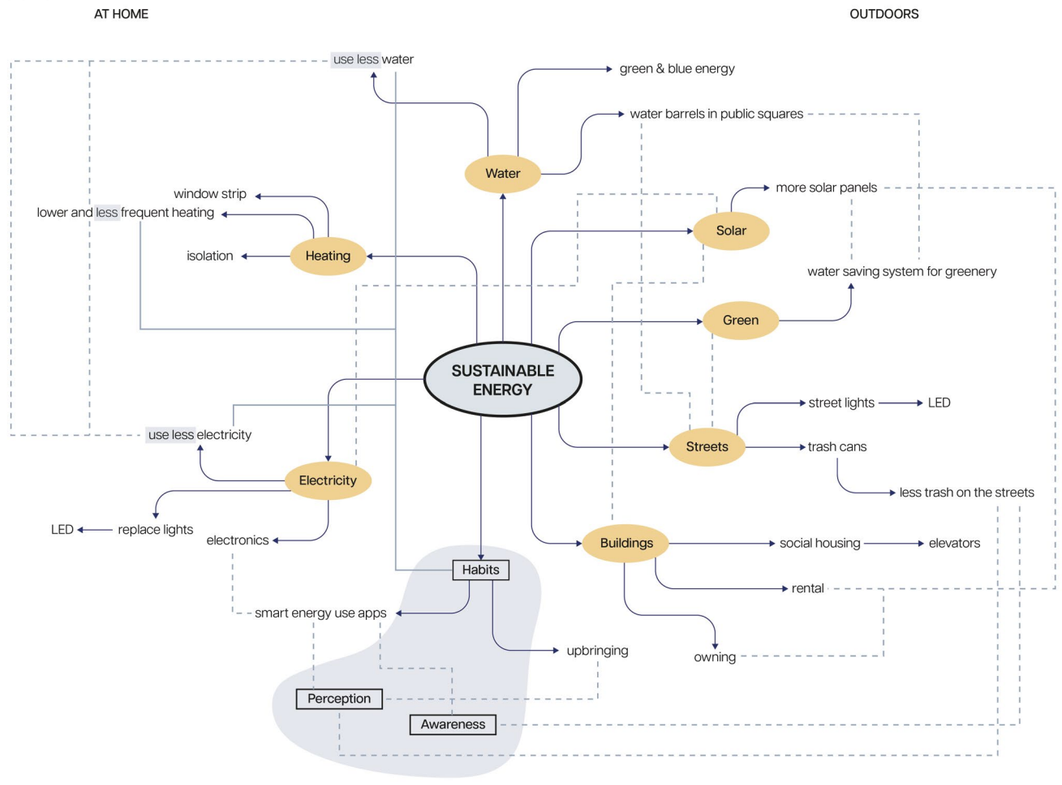
Municipality
The municipality needs to take up a great exemplary role in the energy transition, not only for the city but the neighborhood as well. The group concluded that the energy transition is too complex for the citizens to tackle on their own, so the help of bigger institutions is needed. However, as the problem statement (page 23) suggested, the proposed sustainable energy tools and programs are not in line with the needs of the citizens of these neighborhoods. Citizens expressed their difficulty in reaching larger, public institutions such as the municipality. The group suggested a middle party or person that represents the neighborhood or a specific street to bridge this gap.

The findings of session 1 are summarized into 3 seperate risk and opportunity maps:

> Diagram 23: Wordweb 'SUSTAINABILITY'
By author



> Diagram 24: Wordweb 'SUSTAINABILE ENERGY'
By author



Risk and opportunity map 1: Social aspects

LEGEND

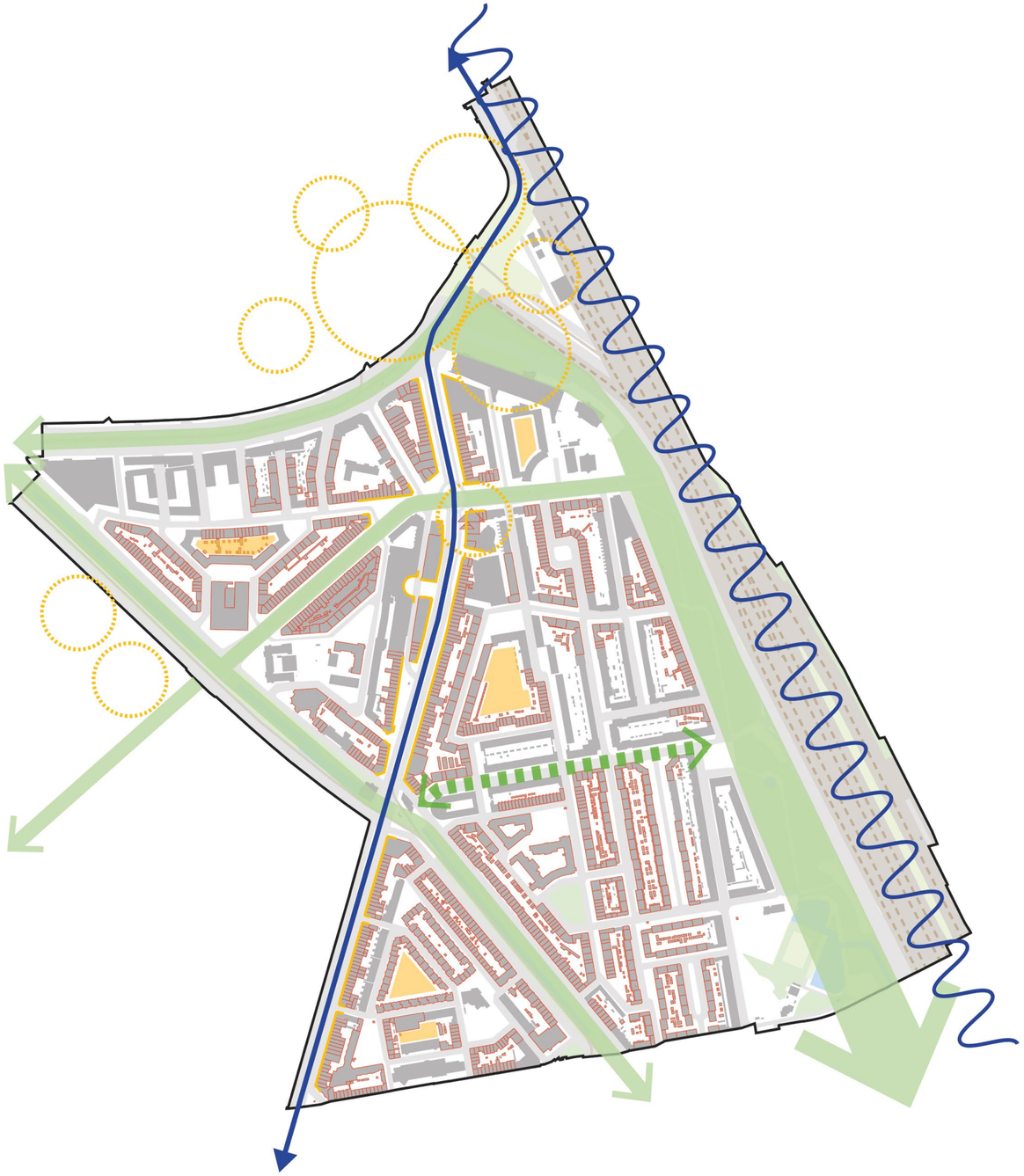
- Connecting line
- Informal primary connection
- Informal sub connection
- Potential social cluster
- ‘Beijerlandselaan’ + ‘Groene Hilledijk’
- High activity plinth
- Religious places
- Schools
- Community centres
- Risk: lack of meeting places (indoor + outdoor)

Through the experiences from the focus group and informal conversations with other residents, we conclude that indoor meeting places are of great importance for neighbors to meet one another in Hillesluis. Hence why religious buildings and community centres are highlighted on the map. Regarding the energy transition and new sustainable living ideas, these places can be appointed as clusters that act as leading examples. For example, these building can house informative events, have physical sustainable measures like solar panels and act as a space to learn and share ideas amongst residents.

The neighborhood is home to the Beijerlandselaan and Groene Hilledijk, which are high activity streets that connect Hillesluis to the rest of Rotterdam South. Along these streets, shops and restaurants are situated. The active plinths are highlighted as these high activity functions can aid diffusion of sustainable ideas through casual meetings of residents.

> Image 24: Risk and opportunity map 1: Social aspects
By author

Risk and opportunity map 2: Spatial characteristics



> Image 25: Risk and opportunity map 2: Spatial characteristics
By author

The energy transition brings about many spatial transformations as well. Hence why it is important to acknowledge spatial differences in public spaces, dwellings or infrastructure in order to find the most fitting approach and solution to these transformations towards sustainability.

Hillesluis has a preferable location in Rotterdam South. With main connecting lanes and streets running through the neighborhood, Hillesluis is well connected to the main city center of Rotterdam in the North and acts as a gateway to other neighborhoods in the South. The railway and adjacent stations acts as a physical barrier. One has to cross in order to get to the South-East parts of the city. As stated in the previous map (image 24), long lanes/streets with active plinths connect the neighborhood and its inhabitants.

However, buildings in Hillesluis are old. As explained on page 64, many old buildings also have low efficiency in regards to the energy label. The map highlights these older buildings as a risk; meaning any improvements regarding energy efficiency should start here. Hillesluis is surrounded by many new housing and infrastructural developments as shown on the map. This can kick start other sustainable developments in Hillesluis as well.

Hillesluis is a dense neighborhood, space is thus very scarce. This is a major risk and barrier when it comes to cleaner energy solutions as these demand space. The neighborhood is thus faced with certain trade-offs that need to be made. For example, Hillesluis has little, but high quality green spaces. If solar panels or other clean energy measures can't be implemented in private spaces such as homes, public spaces can act as solutions. But, green spaces would have to be sacrificed.

Risk and opportunity map 3: Clean energy potentials

> Image 26: Risk and opportunity map 3: Clean energy potentials
By author

This map shows highlights of current energy vulnerability risks and opportunities for further development. As stated before, Hillesluis has a lot of older buildings that have low energy efficiency and thus a low energy label. The buildings that are both over one hundred years old combined with a low energy label are highlighted. These buildings are thus running high risks in regards to higher energy costs, bills and overall pose as a great task for change.

However, the map also shows the current solar panels in the neighborhood. Through VVE's (owner associations), certain building blocks are equipped with solar panels. However, as many homes in Hillesluis are not owned, but either social housing or private rental, this level of collectiveness can be hard to achieve. Policy incentives or pressure from higher up institutions are thus needed to support inhabitants of these homes. However, the VVE's that succeeded in placing solar panels can become an example for or inspire other home owners in Hillesluis.

As solar panels can be a large investment for some, shared solar panels are available through energy corporations such as 'Zon op Zuid' (Zon op Zuid, n.d.). These organizations work through a collective approach where citizens can purchase a share of a collective solar roof that are placed on social real estate such as schools or community spaces. the way in which profits are used is decided upon by the shareholders, which are citizens of the neighborhood. However, these resources and organizations are still novel and people are still hesitant when it comes to cooperatives like 'Zon op Zuid'. However, campaigns, for example, can make these resources more accessible. Other examples are online tools, where one can calculate the solar potential of one's roof. These tools cannot be mapped, but collected, summarized and selected by and for citizens.

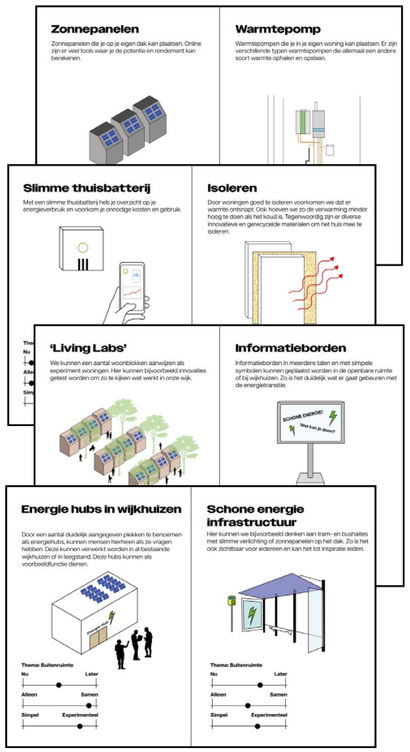
Session 2

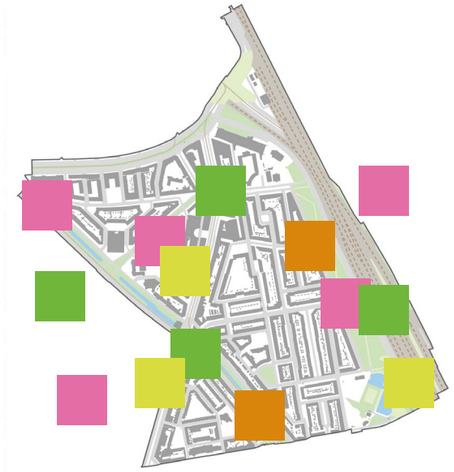
The second session was aimed at shaping a future vision for the neighborhood of Hillesluis. Initially, three rounds of brainstorming were planned using three seperate themes: ‘homes’, ‘public spaces’ and ‘behaviour’. Using examples of other community energy efforts throughout Europe and small pattern cards, the focus group was nudged to think ‘out of the box’ for the future vision. Afterwards, the collected ideas were to be reflected upon and a main theme was to be deduced. A main concept where the vision could rely back on and to make it understandable for other neighbors.

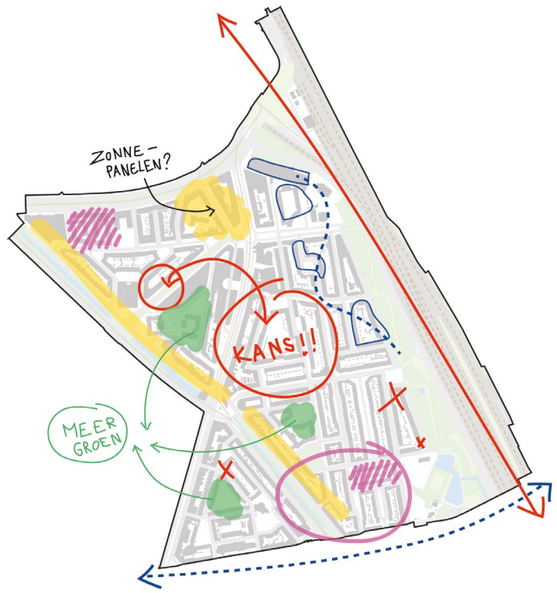
Unfortunately, many of the focus group were unable to attend the second workshop, making the results limited and vision incomplete. However, the results that were collected are summarized below:

We concluded that citizens in Hillesluis are largely not interested in bigger sustainability vision creation. Meaning, citizens of Hillesluis do not want to participate in a participatory process if it does not immediately benefit them. Citizens can be divided into two groups, namely active or passive citizens. Active citizens are the ones who do want to participate and have a certain perspective on sustainability regarding the future of the neighborhood. Passive citizens are more concerned with day-to-day life. Both ‘groups’ have valid standpoints and we concluded that efforts will never reach the entire citizen group of Hillesluis. Ideally, for the goals of a just energy future, the numbers and support for the group of active citizens can grow. This could manifest itself as more power in decision making processes, subsidies or certain responsibilities.

The project continues using the data that is collected form the first session, previous theoretical and emperical research into the topic and case area.







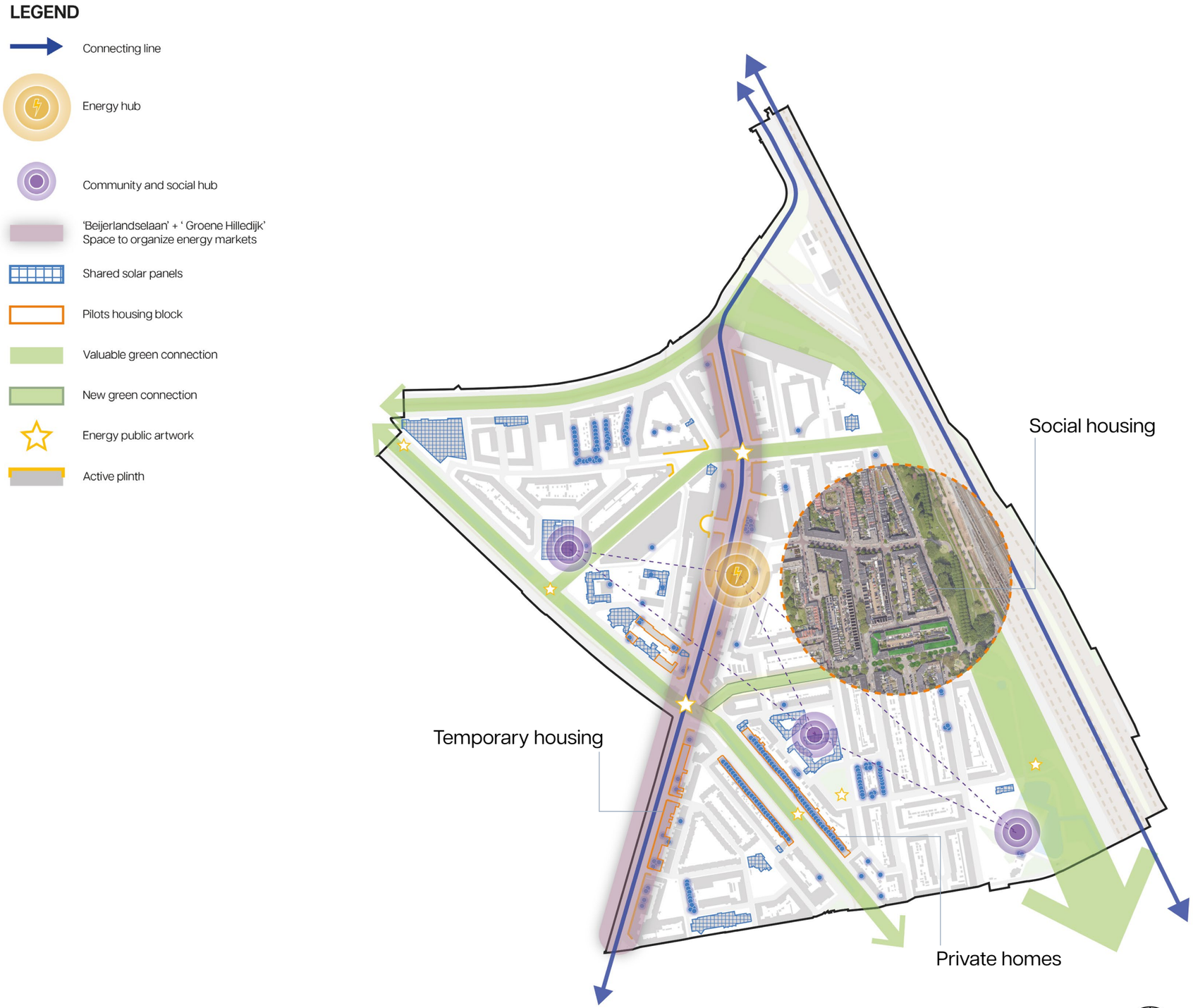
> Image 27: Materials for co-creation session 2
By author

Envisioning a sustainable future for Hillesluis

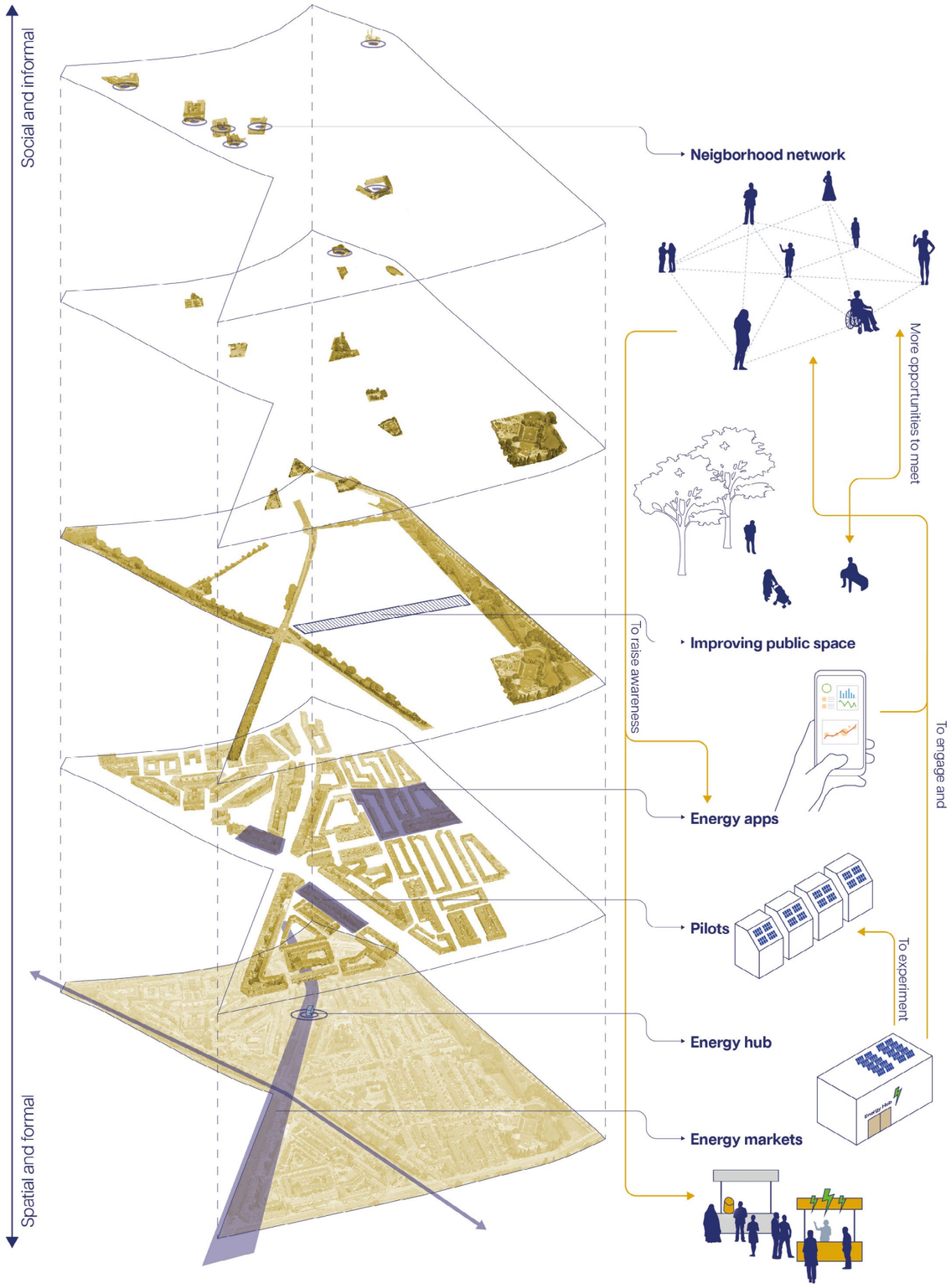
A future vision for Hillesluis can be proposed using the three elements of people, policy and innovation as shown in diagram 25. A proposed vision as shown in image 27 can aid the process of imagining future scenarios for citizens. Using simple ideas such as pilots, shared solar panels and increasing the importance of community spaces, it aims to enhance already exisiting characteristics of the neighborhood instead of proposing large transformations.

Image 28 showcases how the proposed vision is built up through different layes and realms. Spatial interventions like an energy hub, monthly sustainability markets or pilot housing blocks are connected to social changes such as raising awareness and increasing inforal neighborhood networks.

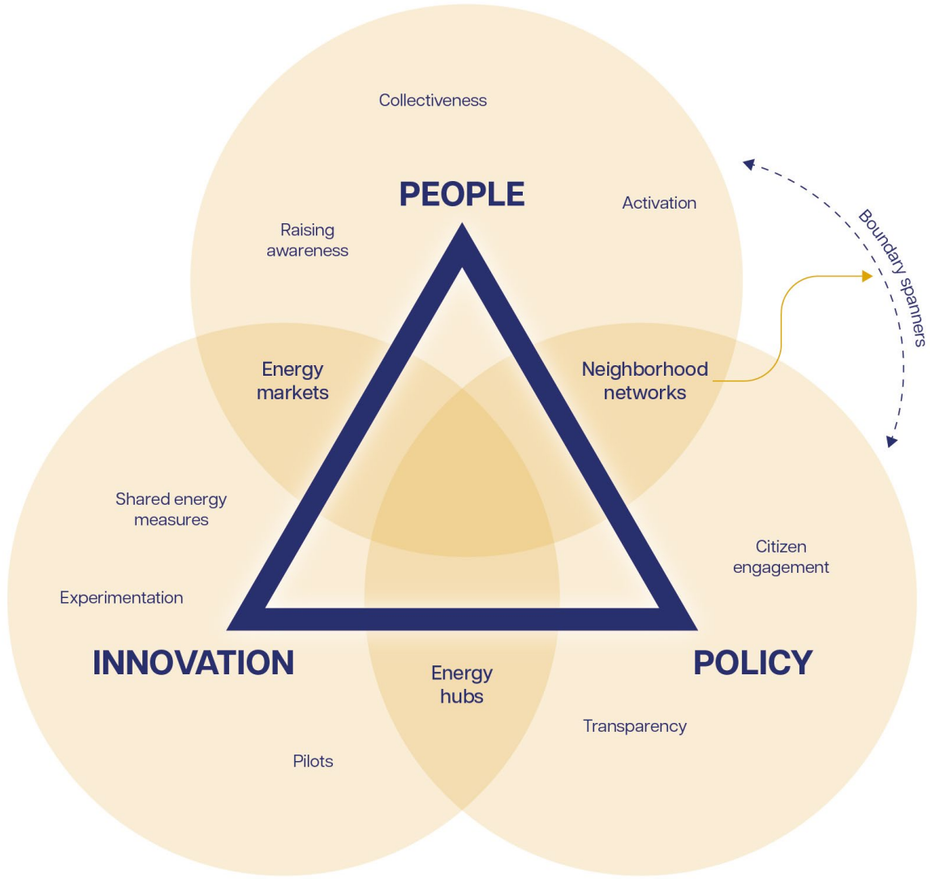
The vision allows for experimentation of different innovative energy measures to be implemented and tested to see what works and what does not.



> Image 27: Proposed future energy vision for Hillesluis
By author



> Image 28: Interconnecting future vision elements
By author



> Diagram 25: Interconnecting co-creation findings
By author

“Decisions about our neighborhood are made by those who do not live here”

-Citizens of Hillesluis

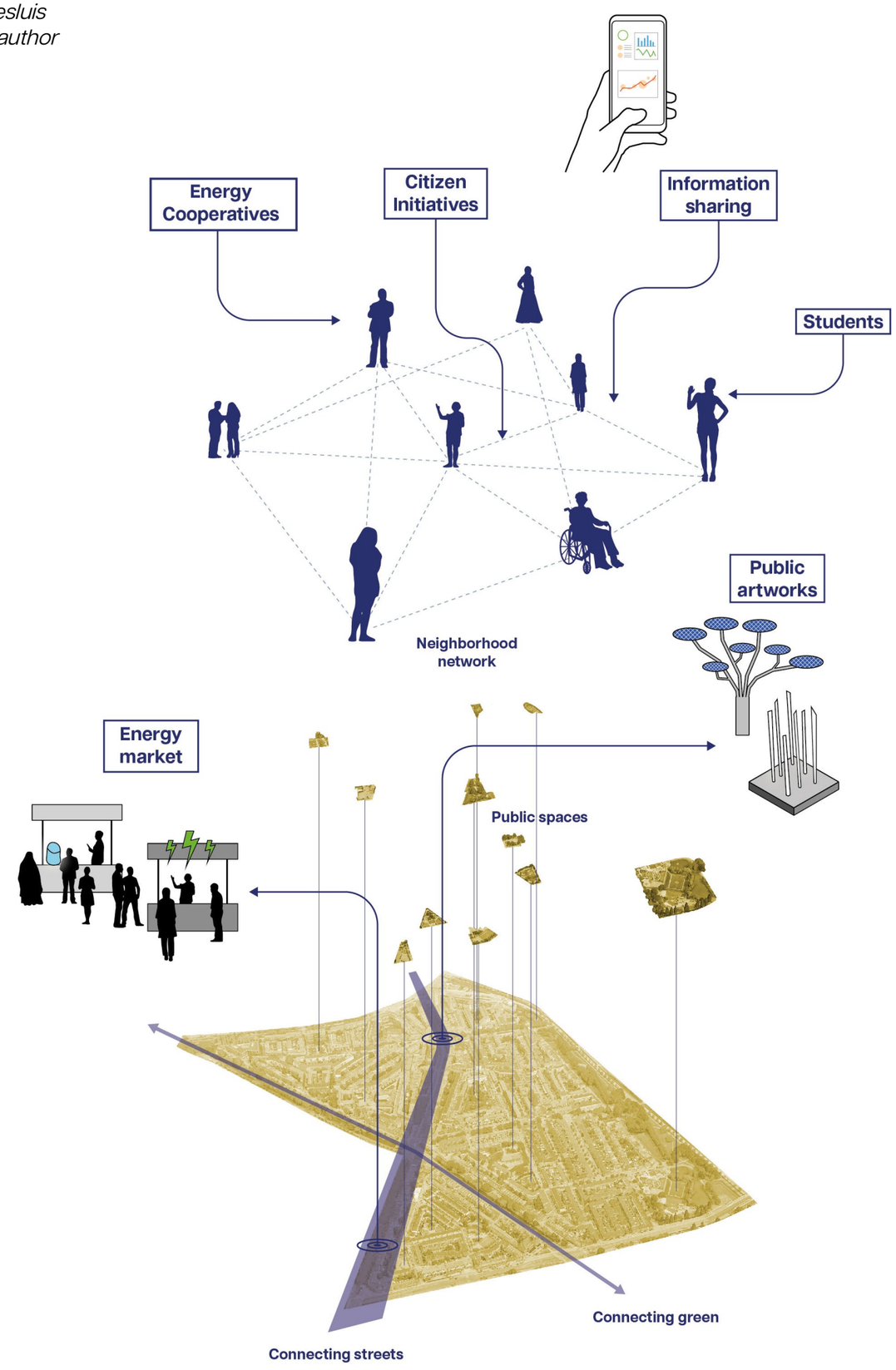
> Image 29: Visualization of an energy hub in the streetscape of Hillesluis
By author

People – social networks, experiences and collective action

The first part of the vision describes the need for increasing awareness around the topic of sustainability and sustainable energy in Hillesluis. Findings from the workshops and conversations made it clear that citizens in Hillesluis are often unaware of transformations towards sustainable futures, albeit imposed from the municipality or larger scaled climate pressure. In part, this unawareness stems from informative efforts not reaching certain citizen groups or an unwillingness to engage due to deeper, systematic distrust towards governments. However, informing those who will be affected and activating them to engage is an important tenet of a just energy transition, so efforts to create awareness will need to continue. The methods through which this awareness can be raised should become more adapted towards local capacities and lifestyles. Through familiar platforms such as social media, flyers or posters placed in busy places, information can reach citizens.

The vision for Hillesluis recognizes the strength of informal neighborhod networks and the ability of active, selected individuals to connect citizens with higher-up institutions. These active, engages and willing citizens are so-called 'boundary spanners' who act as key figures to bridge the institutional levels with local organizations (Williams, 2002).

> Image 30: People in a future, more sustainable Hillesluis
By author



Policy – institutional power, steering transitions and decision making

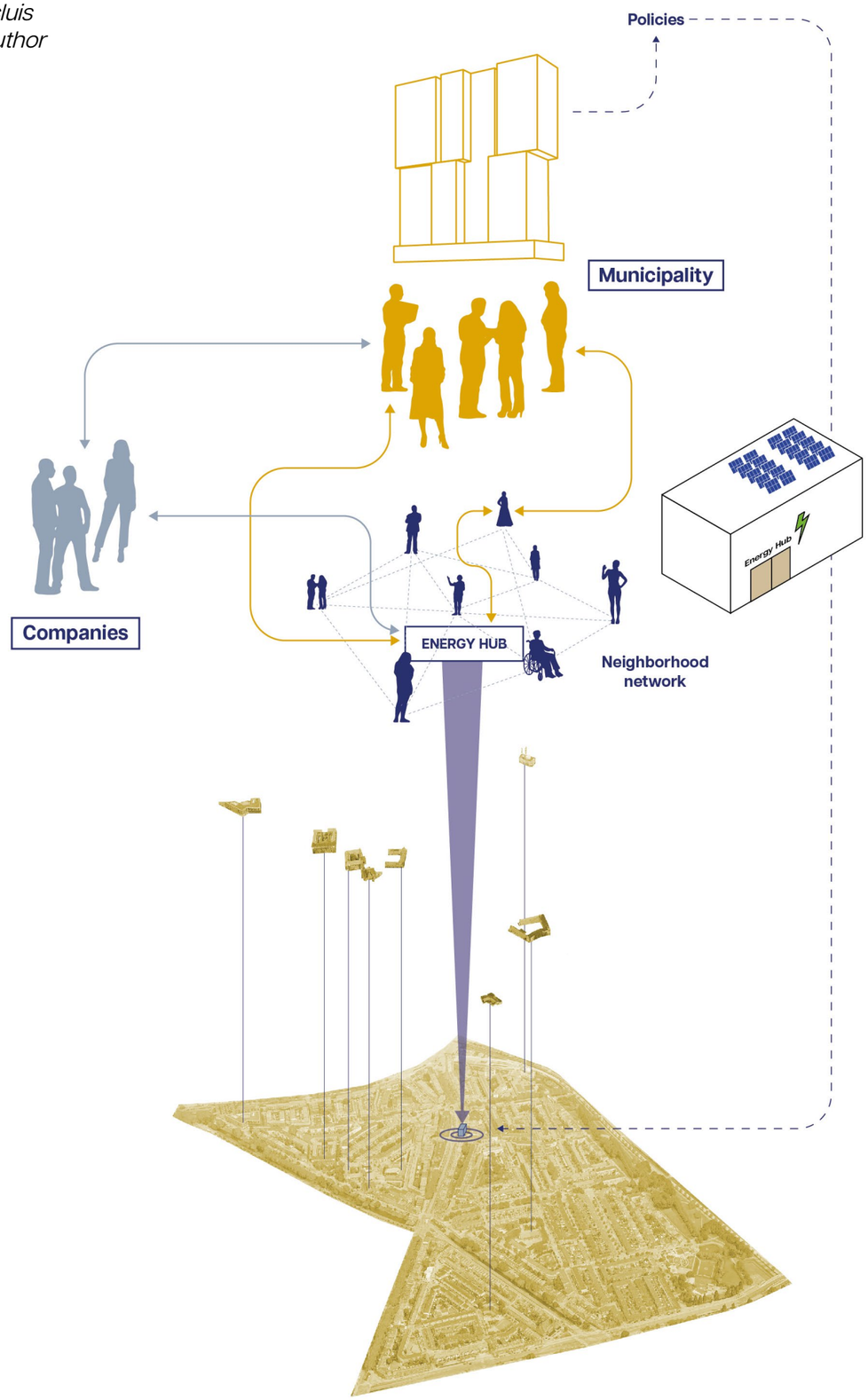
The energy transition is too complex for both institutions and citizens to tackle individually. Multi-actor collaborations have to be established in order to create just policies that recognize local qualities and needs, distribute the costs and benefits properly and play out through fair decision making processes (Medina-García et al., 2021).

The barriers that citizen face, namely a lack of institutional power can be bridged by collective visioning practices, citizen-led sustainability initiatives and transparent policy and strategy making.

Distrust towards municipalities is still a large barrier to cross. Many have been frequently let down by higher up institutions. In a neighborhood like Hillesluis, consistency is thus key. In large-scale socio-technical transitions, where many stakeholders are involved, reaching this level of consistency is still difficult.

Through the creation of an energy hub, citizens and the municipality have one physical space where all matters regarding the energy transition come together. Vacant buildings on busy streets can be transformed into energy or other sustainability hubs. Here, experimenting, informing and decision making can happen. As this energy hub can be situated on street level, the threshold to experience, observe and interact with sustainable energy processes is lowered for citizens.

> Image 31: Policy in a future, more sustainable Hillesluis
By author

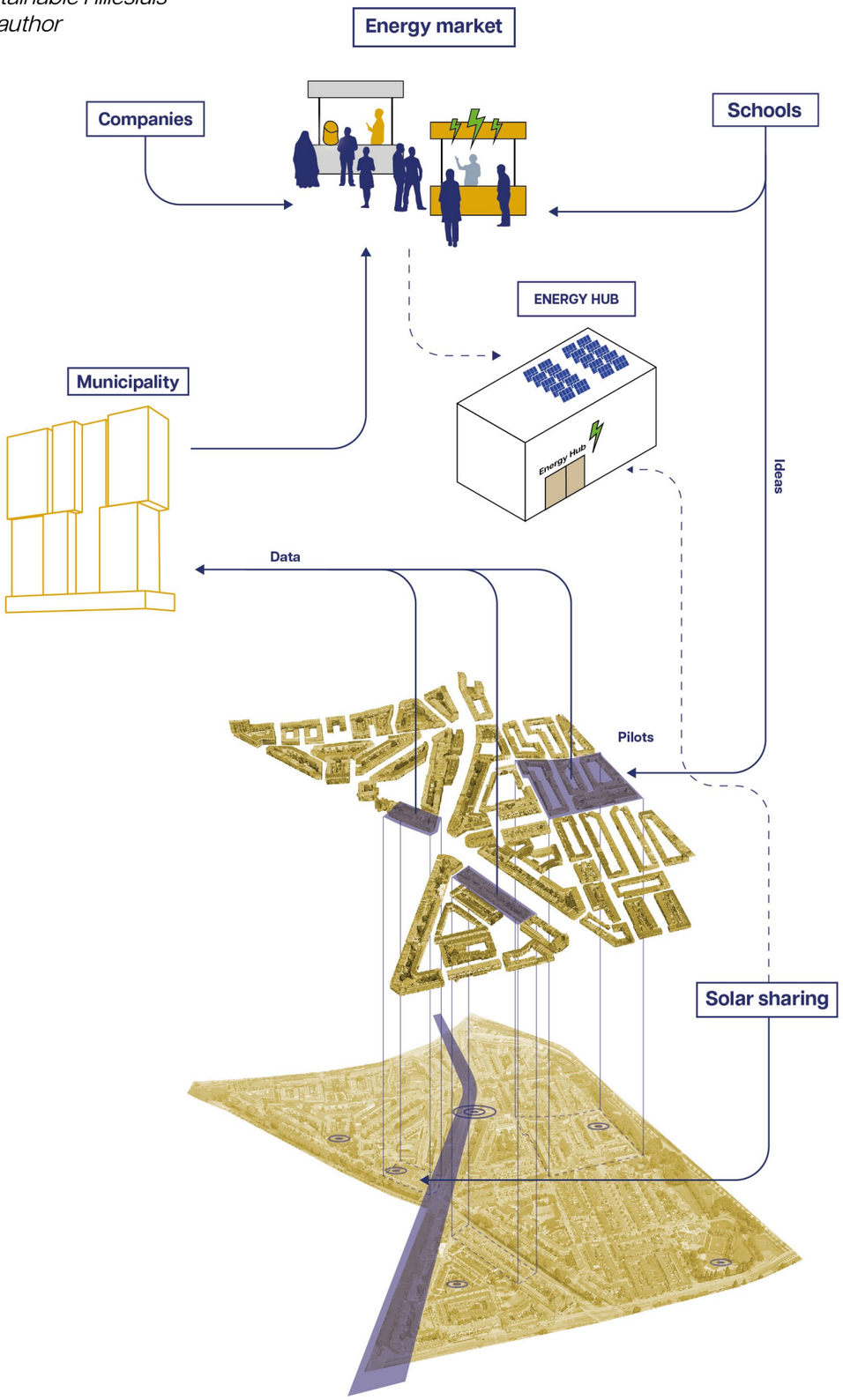


Innovation – cleaner energy measures in- and outdoors, towards more sustainable cities

Innovation is what drives socio-technical regime changes (Geels, 2002). Creating room for experimentation is thus key for transitions to develop. Space can be created through financial aid, social acceptance or physical spaces. In Hillesluis, the challenge lays in transforming many homes towards cleaner energy uses. In order to test if proposed measure work and to gain feedback from real life experiences, pilots can be initiated in the most vulnerable homes (page 61). This way, small-scaled living labs are created where direct information exchange happens. Those who live in these pilot homes can benefit from new and cleaner energy technologies and the municipality can incorporate real time feedback into policies or strategies. As there are differenced in home types, rental, social housing or owned, several small-scaled pilots can be appointed in order to create a proper reflection of the diversity in Hillesluis.

Hillesluis can become an exemplary neighborhood for shared and collective clean energy measures. Energy cooperatives can grow in neighborhoods where financial capacities are lower, like Hillesluis. Again, these cooperatives can establish a fixed position in the previous mentioned energy hubs.
The municipality can invest in short term infrastructure innovations like solar powered street lights or bus stops. Collaborations with educational bodies and start-up businesses can be established to think of and experiment with new innovations.

> Image 32: Innovation in a future, more sustainable Hillesluis
By author



Next steps for Hillesluis

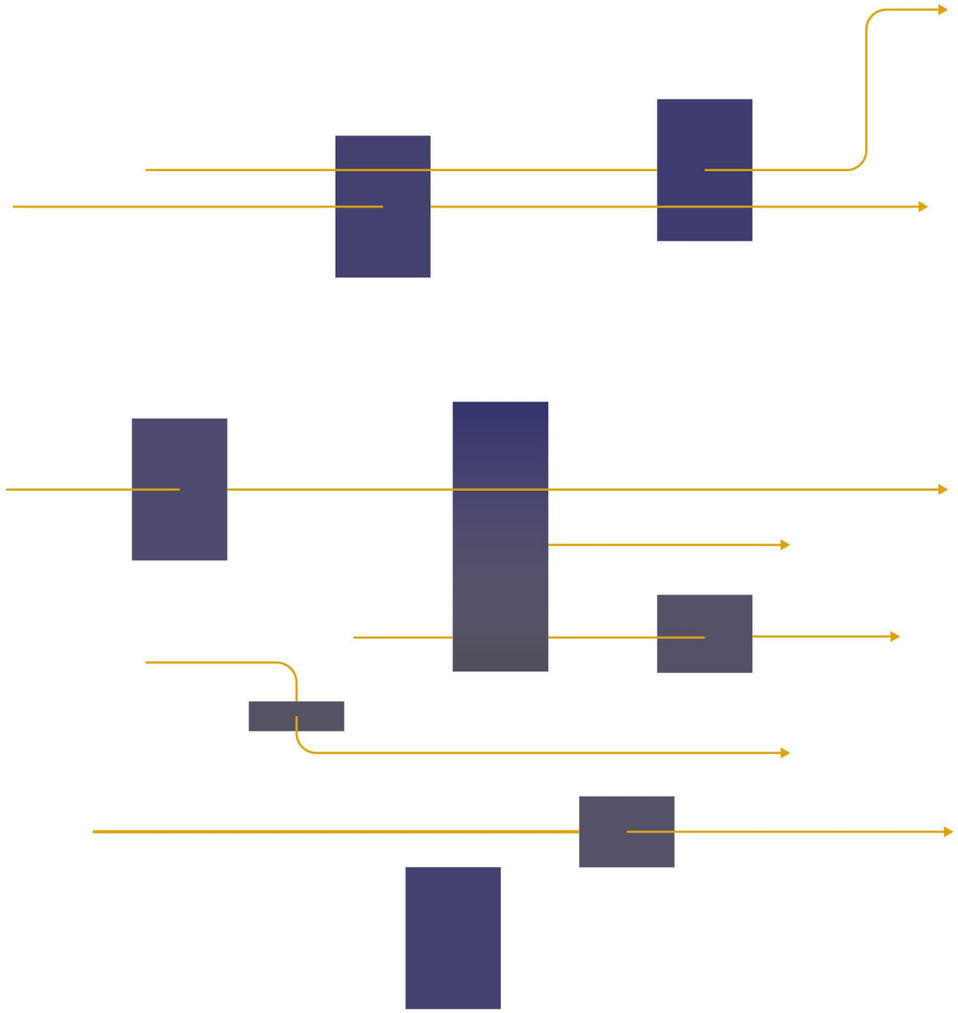
As stated before, the co-creation session in the neighborhood of Hillesluis did not play out according to the intended research design. However, several participants and neighborhood initiatives verbally expressed their desire to continue the efforts of this thesis project and methods used. If more time was provided, the co-creation session of envisioning a future for sustainability in Hillesluis could be successfully executed.

However, during the sessions and especially afterwards, it became apparent for all the involved parties that the topic of sustainable energy and transformations is still very underdeveloped in Hillesluis. The experienced barriers are important to map, analyze and incorporate into the participatory process.

To ensure proper recognition of local input, a new governance structure can be suggested in order to enable citizens voices to be heard and effectively incorporated into decision making processes. By introducing multi-level and multi-actor governance strucures, built upon participatory and transition perspectives, this aim can be achieved. This new, participatory and multi-level governance structure is showcased in the next part of this report.

Part 5

Results and recommendations

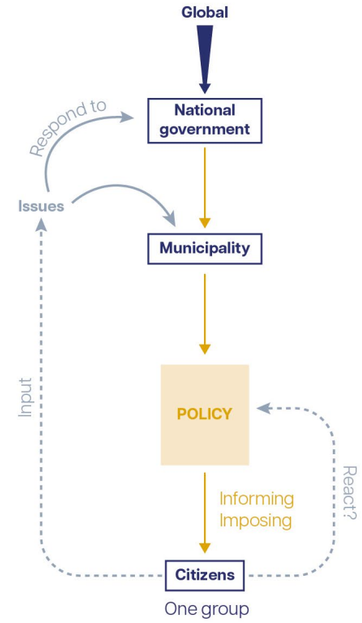


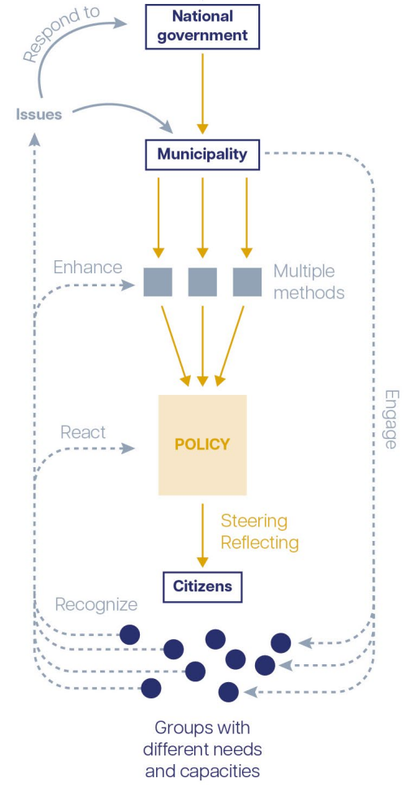
Designing a new participatory approach

Current participatory practices in transition policy making are too focused on informing, rather than actively allocating power to civil society (Arnstein, 1969). Not all decisions can be made by one sector of society. Considerations have to be made according to the issues at stake, legal issues can be tackled by local governments and socio-spatial context input can be provided by citizens. Current discourse and accompanying participation should be shifted more towards the redistribution of certain decision making powers, recognition of different needs and perspectives and an open, transparent and most importantly fair decision making process (Rocco, 2022).

As shown in the co-creation sessions, visioning together with citizens can be a good approach to implement (Vähäkari et al., 2020). It encourages people to not only reflect on their current living situations, but enables them to freely and openly discuss future possibilities according to their experiences (Barendregt et al., 2024). However, these practices do require a certain willingness to participate. Nonetheless, the fact that a platform was created in the first place, was greatly appreciated.

Just like there is no one way forward in socio-technical transitions, participatory practices should follow suit. No singular method of participation and citizen engagement will fully address the lack of local input (Cornwall, 2008). Different citizen groups require different methods. Hence why it is important that policies and public expenses reserve room to experiment with different methods of participation, all with the common goal of social improvement and innovation in socio-technical transitions. Having the ability to choose which method works best, people can feel more recognized and appreciated. By diving into the characteristics of the neighborhood, legitimacy of policies and local acceptance can increase, and an overall deeper understanding of vulnerabilities can be incorporated into new policies (CORDIS, 2016).





> Diagram 26: Participation diagrams
By author

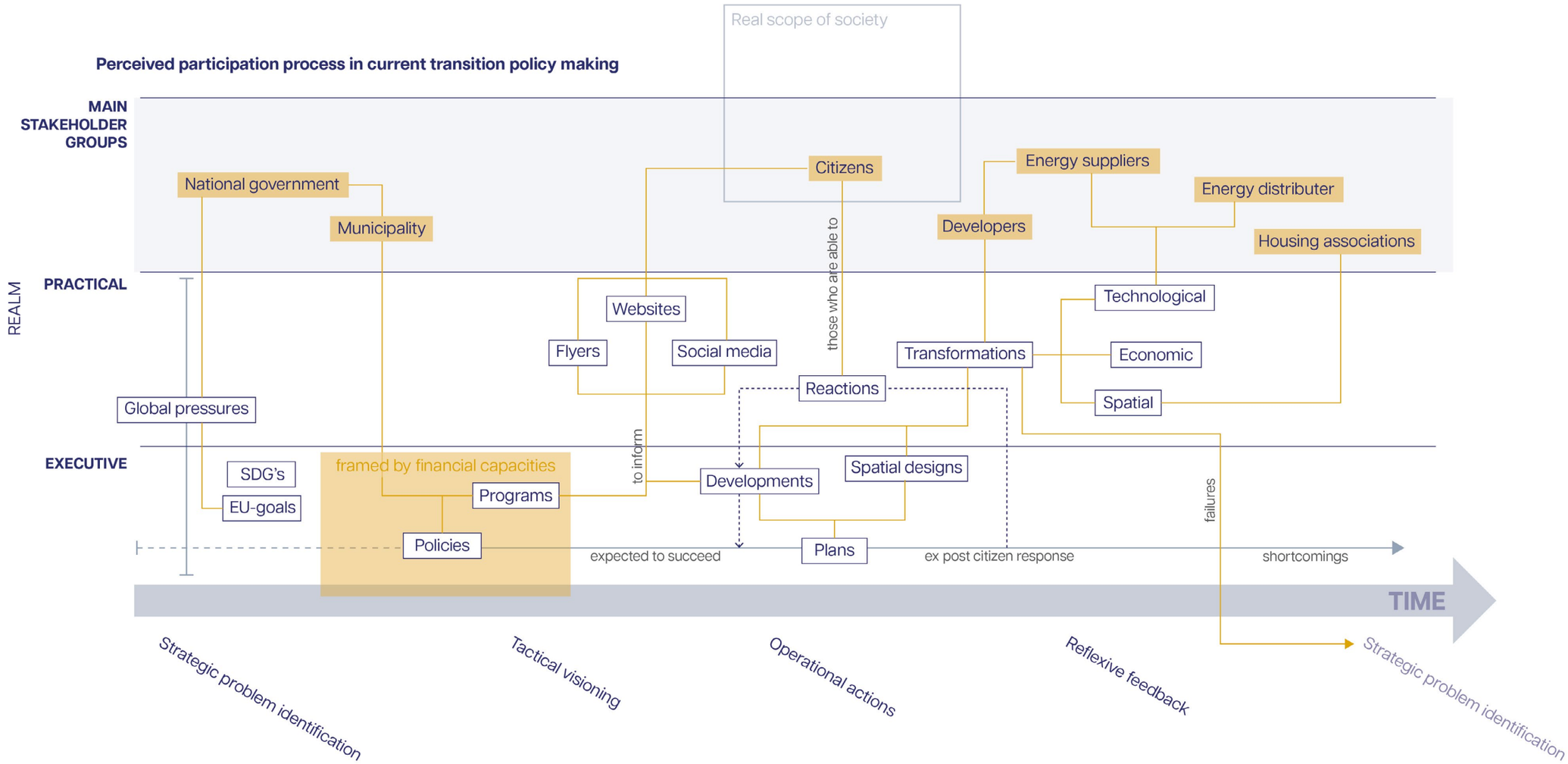
Participatory process timelines

Parallel to experimenting with co-creation methods, the process of participation in itself is critically observed and analyzed. In order to understand, summarize and propose flaws and solutions in regards to participation in sustainability transitions, three timelines are made. These timelines reflect the processes of citizen participation, in this case with methods like co-creation sessions, and tangible products that could result from this. The timelines also feature executive decisions and policies that steer the overall sustainable energy transition that could subsequently lead to social, economic or spatial transformations. Lastly, the diagrams attempt to identify which stakeholders are involved or have the most influence in each step derived from previously defined governance and stakeholder analysis.

Reflecting, evaluating and discussing about proposed ideas for the future of one's neighborhood is an important aspect of socio-technical transitions. Participants of both co-creation workshops expressed their appreciation towards the efforts of setting up workshops regarding citizen input in sustainability transitions. They expressed their needs for more efforts like this as an important aspect for the development of their neighborhood.

The first timeline consist of the current situation regarding citizen participation in sustainability transitions. Information is collected through current energy transition policies, interaction with neighborhood residents over time and personal observations. Currently, most citizens could believe that this is how participatory processes play out. Due to the lack of accessible, fitting and diverse methods and platforms for citizens to respond to policy development and decisions (see policy cycles of diagram 4, p. 24), proper citizen engagement is often misunderstood from the perspective of executive parties and actors. As Arnstein's ladder of participation described, only informing those who are affected by the proposed plans is a form of non-participation and thus, inherently, unjust (1969). This timeline and perception of unjust participation are in line with the definition of functional participation models, as defined by Pretty (1995, as cited in Cornwall, 2008). They state that larger decisions are made by external parties, in this case governmental bodies, and citizens are included by participating purely to meet the beforementioned goals. Usually, these goals are already shaped through predominantly politically or financially driven, agenda's.

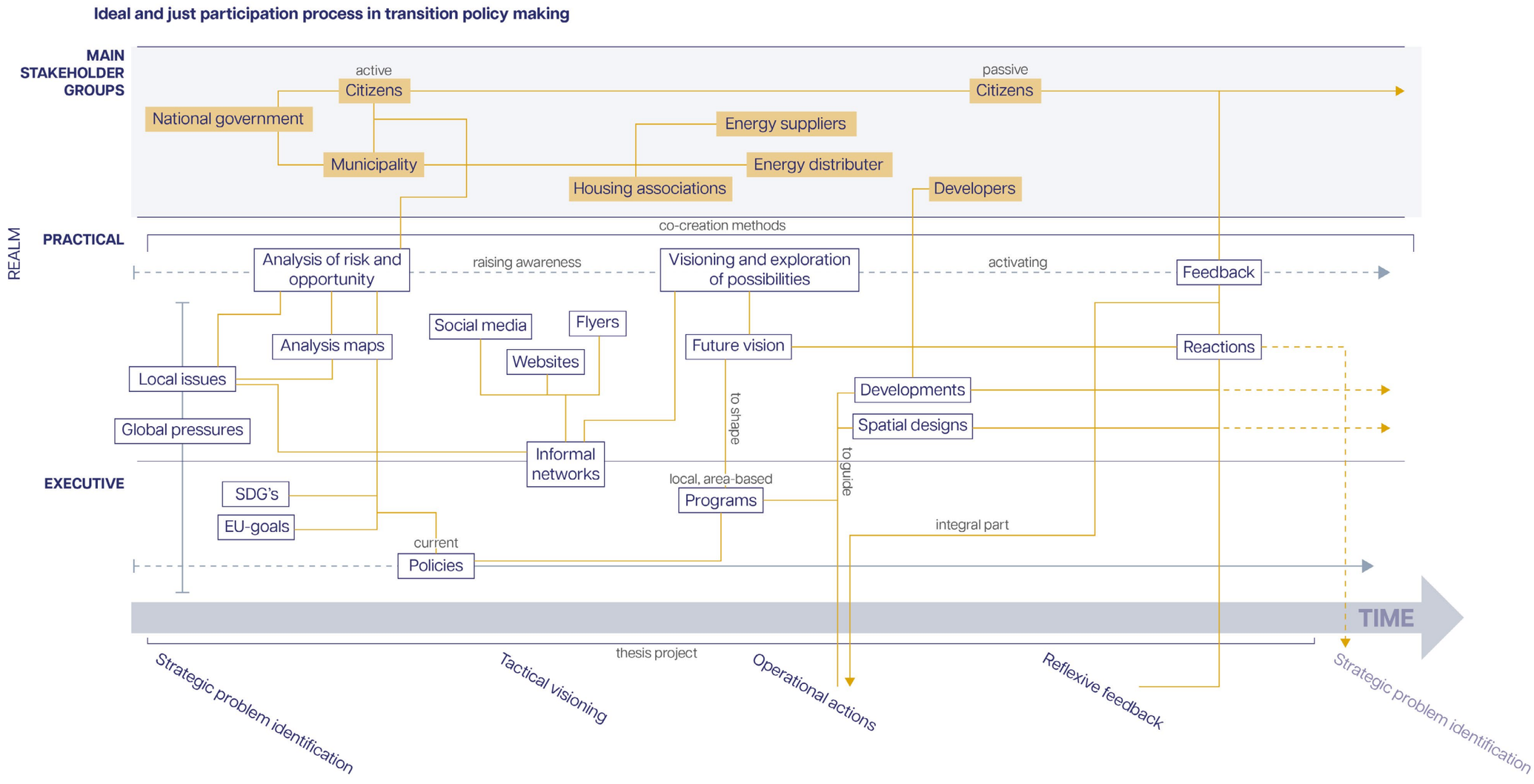
< Diagram 27: Perceived participation timeline
By author



The second timeline showcases what this research project designed initially; a just, multi-stakeholder participatory process for energy transitions. Based on the methodology, co-creation sessions were used as a main method for citizen participation. From theoretical research, the stages of transition management are used as the four main phases of socio-technical transitions. By combining participatory methods, like co-creation, a more just and inclusive process was designed. Through this, the executive and practical realms are streamlined (diagram 28). By engaging stakeholders from different societal levels through participatory governance structures and policy instruments, gaps are bridged and collaborations can be achieved. This way, citizen engagement and local implementation is not an afterthought anymore, but becomes a crucial pillar to not only kick-start, imagine and critically reflect the future scenarios for sustainable energy transformations in neighborhoods.

This timeline is labelled as an ideal situation, where citizens are properly included and engaged in every step of the process, it automatically can be perceived as more just. However, in reality, this process and other participatory methods often times do not play out as they are designed. This is not a negative aspect of participation, but rather an opportunity to learn and suggest recommendations to mitigate these fragilities of participation especially in socio-technical transitions.

< Diagram 28: Designed participation timeline
By author

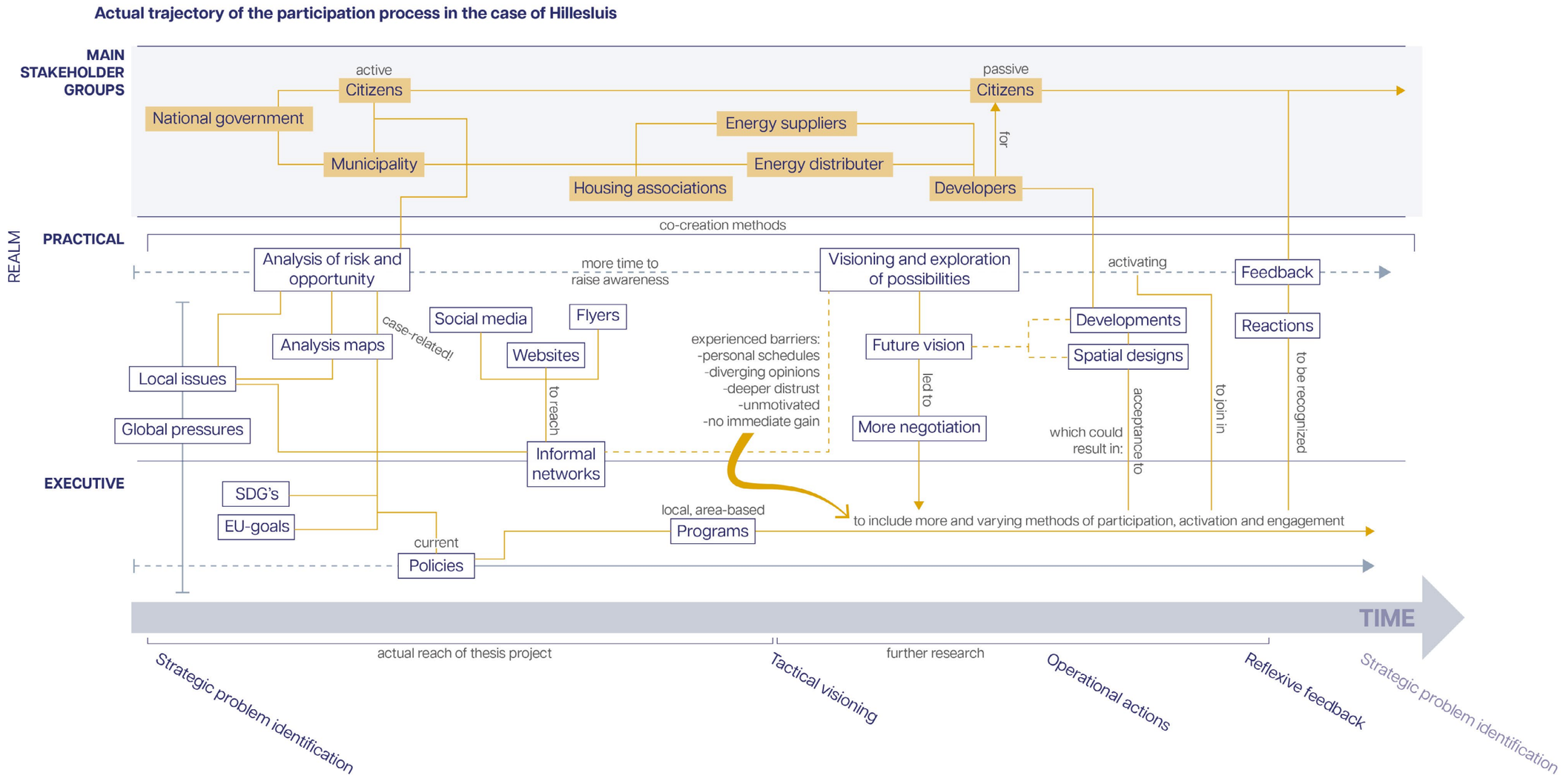


The final timeline reflects reality in regards to this specific research project, the chosen case area of Hillesluis and empirical observations. The results of this thesis project show that more time and efforts are needed in the beginning stages of socio-technical transitions in regards to raise awareness amongst citizens. Especially in disadvantaged neighborhoods, in this case citizens of Hillesluis, the topic of energy transition is not a common one to discuss with neighbors. Rightfully so, as the current policy aims and benefits thereof of the city of Rotterdam are not in line with local capacities and contexts in Hillesluis. This research attempted to kick-start the discussion and experiment with co-creation to see if this participatory method is effective for the citizens of Hillesluis. The first co-creation session played out successfully, but the project quickly ran into obstacles common to citizen participation. As Cornwall (2008) summarized in her paper on participation models, obstacles like self-exclusion, where people's daily lives do not line-up with the scheduled meetings to participate, or participation fatigue, where people do not see the immediate gain for themselves by participating, were present in this projects' trajectory.

Implementing measures such as dedicating more time and efforts to raise awareness, developing platforms to reach communities and aiming for more negotiation between citizens and stakeholders from other sectors, the experienced barriers could be mitigated.

The ideal participation model for the case of Hillesluis, together with the experienced barriers and suggestions on how to mitigate these could lead the neighborhood towards cleaner and just energy futures. However, it is important to also change the current underlying governance structures in order to support this new participatory process and approach. The next chapter will dive into newer forms of governance and stakeholderr relations to support and manage the proposed participation process.

< Diagram 29: Encountered participation timeline
By author



Fitting and supportive governance structures towards neighborhood-level energy transitions

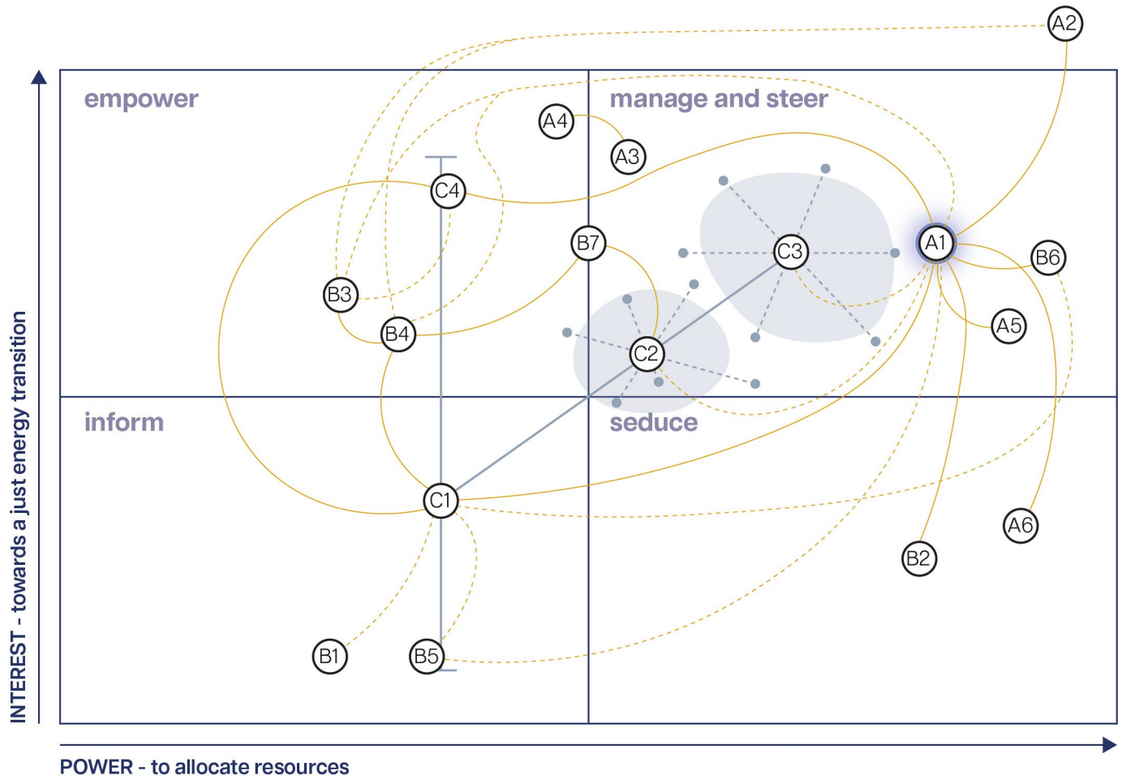
Multi-level and multi-actor governance

Socio-technical transitions need to establish both multi-level and multi-actor collaborations in order to tackle the level of complexity that is at stake (Medina-García et al., 2021). Multi-level governance structures can define the overall, inter-sectional collaboration between different levels of society or actors (Leonhardt et al., 2022). For neighborhood level energy transitions, this means to not only establish bridges between citizens and municipal institutions, but strong networks between citizens as well. In diagram 30, a power-interest matrix can be proposed where actors of civil society have more reach into the institutional realm. This can create institutional legitimacy for citizens' voices and concerns to be heard and incorporated into public policy. This way, actors of civil society can play an active part in policy making instead of having to deal with consequences afterwards (Palumbo, 2017)

> Diagram 30: Power Interest matrix of stakeholders in a desired future energy transition in Rotterdam

By author

	STAKEHOLDERS	
A - PUBLIC	A1	Municipality of Rotterdam
	A2	National government
	A3	National Ombudsman
	A4	Central audit office
	A5	Network Operator (Stedin)
	A6	Water Authority (Hoogheem-raadschap van Schieland en de Krimpenerwaard)
B - PRIVATE	B1	Real estate owners
	B2	Developers
	B3	Energy suppliers
	B4	Energy producers (mostly harbor)
	B5	Housing associations (Woonstad)
	B6	Banks
	B7	Companies
C- CIVIL SOCIETY	C1	Consumer (Individual citizen)
	C2	NGO's/Citizen groups
	C3	Energy cooperatives
	C4	Educational and research bodies



Implementing Transition Management as a main model for change

In socio-technical transitions, effective combinations of governance modes are needed to establish a consensus in decision making processes (Nieminen et al., 2020). In Dutch transition policy making, the governance modee of Transition Management is dominant. Briefly summarizing the four phases of Transition Management:

1. Strategic
Activities surrounding the culture, values and trend in societies. In this phase, issues are identified and the scope of the transition at hand is determined.

2. Tactical
In the tactical phase, the future vision and strategies towards it are formed. Stakeholders are appointed and networks are established.

3. Operational
In the operational phase, the previously formed visions are translated into actions and innovative experiments are supported.

4. Reflexive
The reflexive phase is important in the transition management process as it ensure the evaluation of the entire process. The iterative process keeps the management cycle from diverging away from the goals.

The essence of transition management is for decision making processes and sustainability strategies to be transparent, reflective and based on local capacities and knowledge (Laes et al., 2014). Participatory practices can thus be utilized to guide and enrich transition management models with local knowledge and perspectives.

Participatory governance

Shifting focus towards governance structures that inherently support participatory practices can support more fair and just public policies. In turn raise the chances of spatial and social implementation to render successful. A governance model that can help to bridge the gap between local citizens and higher up institutions is participatory governance (Palumbo, 2017). Matthew (n.d.) argues that participatory governance structures aim to empower citizens in decision making processes and have identified nine categories of methods and tools regarding participatory governance in their ‘ Participatory Governance Toolkit’:

A. Public information
Access to relevant information and decisions.

B. Education and deliberation
Making civil society actors aware of their rights and aid learning about public concerns.

C. Advocacy and citizen voice
Improving advocacy, forming platforms to voice needs and concerns.

D. Public dialogue
To increase dialogue efficiency and accessibility.

E. Electoral transparency and accountability
To ensure fair processes and accountability of political bodies.

F. Policy and planning
Enhance the task of governments to formulate just policies for public benefit.

G. Public budgets and expenditures
Fair and transparent expenses for public policy goals. Gives insight in where and how public money is spent.

H. Monitoring and evaluating public services
Essential public services are constantly evaluated for proper effectiveness.

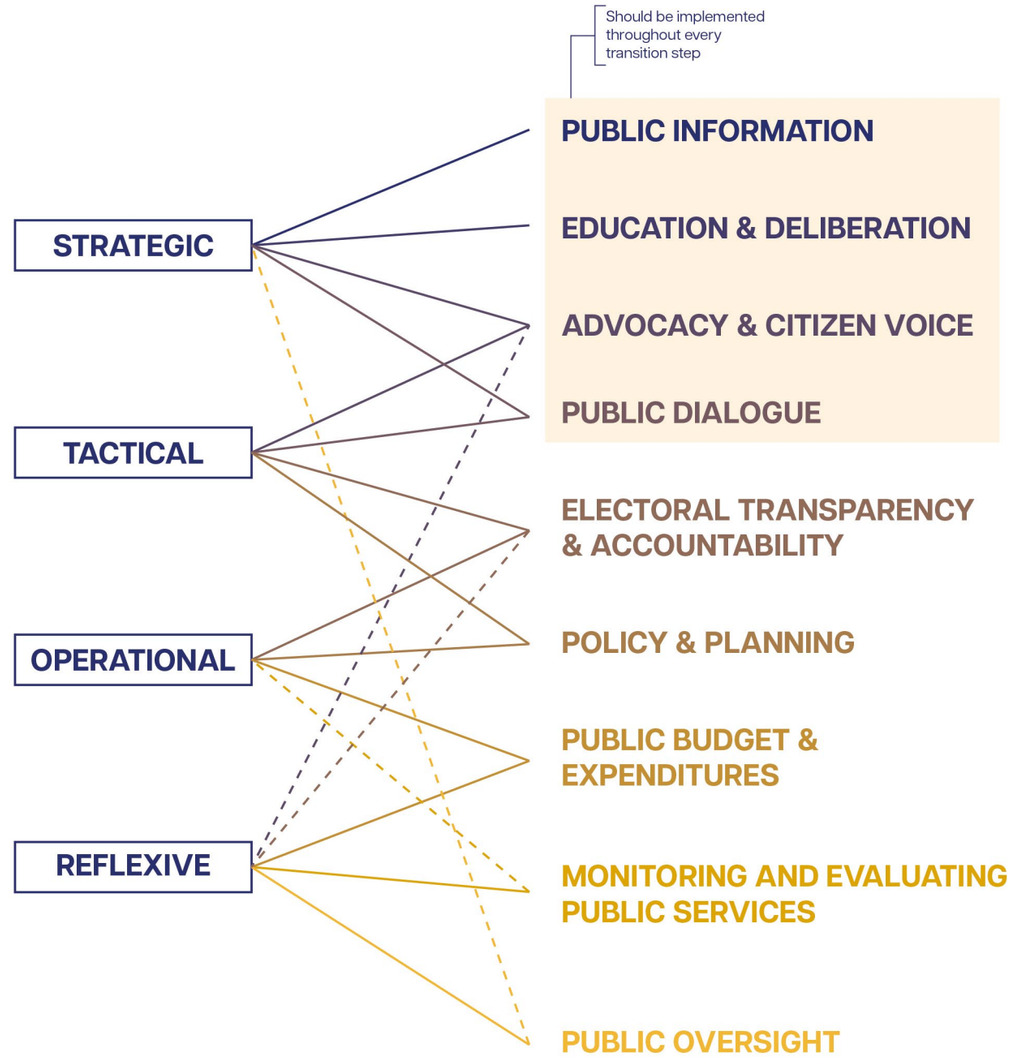
I. Public oversight
Create methods that gives citizens insight of unjust decision making processes.

Combining Transition Management and Participatory governance

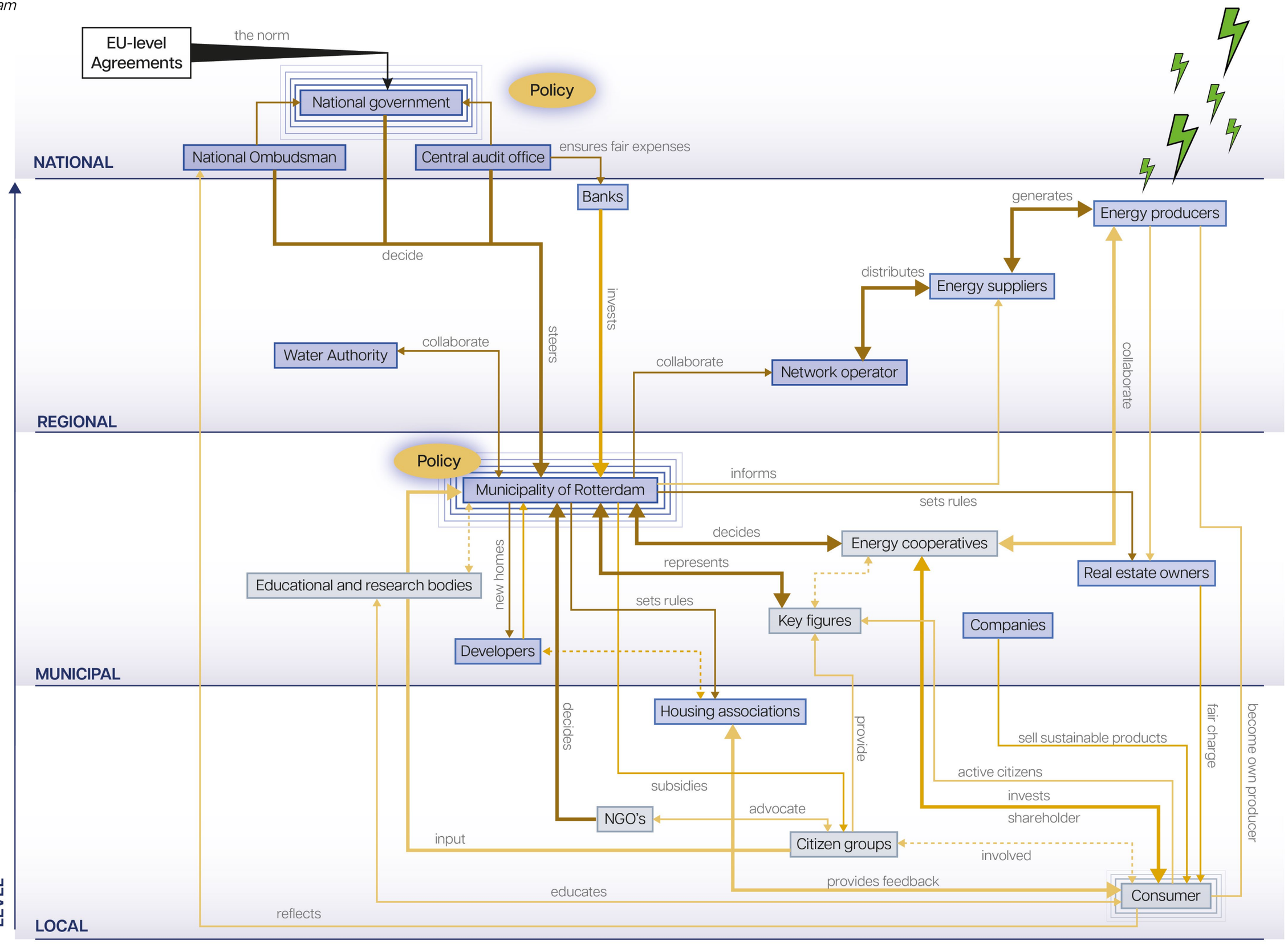
By combining both transition management and participatory tools, a multi-level and multi-actor governance structure can be proposed. The four phases of transition management are enriched using participatory tools and methods, derived from the participatory governance model (Matthew, n.d.), in order to steer our urban environments towards engaging, equal and just energy futures.

These new, participatory and transition oriented governance configurations can lead to a new governance map shown in diagram 32:

< Diagram 31: Combination of Transition Management and Participatory governance
By author



> Diagram 32: Proposed new governance map of Rotterdam
By author



Recommendations for policy towards inclusive and just participatory processes

As the results of this project show, critically analyzing current energy transition discourse and policies is as important as experimenting with innovative methods towards a just future for everyone. However, current transition policies will not be able to properly support the proposed participation methods and exploration thereof in local neighborhood contexts.
New energy laws and policies are currently being developed by Dutch national and local governments (Ministerie van Economische Zaken en Klimaat, 2024). A window of opportunity has opened up to implement new, more just measures into policies. This chapter will sum up recommendations for new transition policies, practical actions and overall discourse.

Transition policies
In the problem field it was identified that transition policies lack socio-spatial exploration an recognition of differences, especially in local contexts. Not only does this lead to the unfair distribution of burdens and benefits, but local capacities are not properly recognized and utilized for future transformations. Participation could become a solution for these issues, but is not yet implemented correctly into decision making processes. Policies regarding energy, but other urban transitions, should thus:

- recognize the diversity of social, financial and spatial capacities of different neighborhoods.
- integrate the use, experimentation and legitimization of participation methods as a major pillars for sustainable transformations.
- aim for socially innovative ideas and initiatives instead of private, financial gain.
- create space for informal neighborhood networks to gain legitimacy in decision making processes.

Practical actions
Experimenting with co-creation methods and other empirical observations through conversations resulted into uncovering the potential that citizen engagement and participation can hold towards just socio-technical transitions. Practical, strategic actions leading from just transition policies and the exploration of participatory methods could lead to:

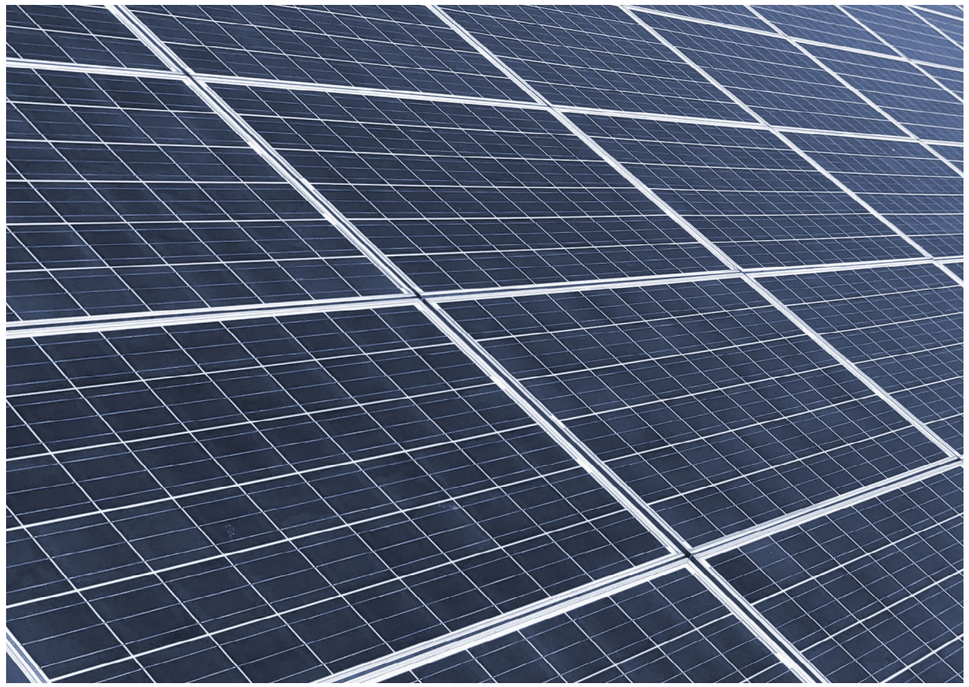
- creating places for citizens to start dialogues and feel seen, that are integrated into their daily lives and routines.
- socio-spatial sustainable energy transformations according to local contexts and capacities.
- implementing and developing tools for design, policy and decision processes to aid imaginative powers of citizens regarding sustainable futures.
- forming sustainability programs that use local skills and celebrate active members of informal neighborhood networks to boost trust and raise awareness amongst less active members.

The participatory process
The definition of proper participation and citizen engagement is still blurry and is thus susceptible to failures if not organized correctly. Especially when the processes deal with many different citizen groups, each having their own opinions, wants and needs. The results and reflection of the current, proposed and actual participation methods used in this research alongside case-related analysis, revealed certain socio-spatial barriers that could hinder participatory efforts in the future. In order to mitigate some of these experienced barriers, governments, citizen groups and urban planners or designers could collaborate and:

- organize multiple participatory moments on fixed moments in time (weekly, monthly or yearly).
- create large-scale, multifunctional events or campaigns on city-level that reach bigger masses.
- increase efforts to inform, activate and engage citizens in the beginning steps of the participation process instead of afterwards.
- continue researching what participation means for the given scope of the issue, those who are involved and ultimately affected.

Part 6

Discussion, conclusion and reflection



Source: gopvsolar.com

Discussion

Initial findings and interpretations
This research projects' findings stress the importance of critically examining current transition policies and aims in cities. Through mapping socio-economic and socio-spatial neighborhood characteristics, compared to current transition discourse perspectives, vulnerabilities can be identified. Governance structures and policies that steer the energy transition are too dominated by financial or profit oriented incentives, thus undermining innovations regarding social means (Nieminen et al., 2020; Laes et al., 2014). As these unjust discourse practices are still occurring today, the gap between policies and local implementation still persist.

Comparison to other studies
Several studies towards citizen initiatives and engagement in sustainability transitions conclude a similar importance to include participation in policy and decision making processes (Teladia & Van Der Windt, 2024; Lennon et al., 2019)

However, participatory practices in order to boost citizen empowerment and engagement in the energy transition are still highly complex matters and often highly dependent on local contexts. If citizen initiatives and thus willingness towards sustainable energy narratives is already present in the neighborhood, results are most likely to render successful (ibid.).

This research project as aimed at kick-starting the sustainable energy in a neighborhood where very little citizen empowerment and awareness is present. It stresses the importance that citizen engagement and thus participatory processes should be adapted not only to local socio-spatial and financial capacities, but to the current state of qualitative sustainability activity amongst civil society.

Limitations
As co-creation methods with a focus group of citizens from Hillesluis were used in this project, limitations do occur. As a selection was made based on willingness to participate, the result of the co-creation workshops will automatically be a reflection of the perspectives of actively involved citizens. The methods used did not portray a perfect representation of all citizens in Hillesluis. However, the citizens who did participate have a level of embeddedness in the neighborhood either through formal or informal networks, which can aid diffusion of sustainability ideas and discussions.

Another imitation to the research methods and results is the willingness to participate in workshops. If participants are unable to attend, results will reflect this absence of input. Participatory processes are time-consuming and difficult to organize. Every neighborhood has different compositions both spatially, economically and demographically. These aspects do have to be taken into account when recreating the participatory methods that work for that specific context.

On the level of transition policy making of the city of Rotterdam, the results are limited by larger scale national and global climate laws and agreements. Currently, new environmental laws are being formed in the Netherlands. These laws are a reflection of our current political powers and their agendas. Cities, like Rotterdam, are thus limited to these political frameworks set by the national government. So, suggesting new governance configurations, policy structures or visionary design ideas are thus more difficult and complex to actually implement.

Future research
Further research on the intersection of spatial justice and the energy transition could build upon the main findings of this research: how to strengthen the position of the insights into actual discourse and political realms.

The proposed, participatory governance arrangements do require more research into what forms of power are to be allocated and how these arrangements will function into the current political landscape. However, these research suggestions could venture out towards fields like political science, instead of urban research.

Further research could delve into the limitations that were experienced in this project. Mainly concerning the barriers identified during the participatory processes. Suggestions could thus be made for research towards why certain groups were not willing to participate and which methods could adverse this. Fields like social and behavioral sciences could enrich these knowledge gaps even more.

As discussed before, the methods and findings of this research are predominantly case-bound, meaning that the case area chosen affects the results greatly. To compare and explore possible other findings, other case areas together with different participation methods can be used. When different participation methods and different socio-economic contexts and scales meet, many new research opportunities open up.

This project has taken up the topic of the energy transition. However, this is not the only socio-technical transition cities face. Housing, ecological or economic transitions each bring about many challenges and possible injustices to certain communities. Thus opening up many new research opportunities.

Conclusion: proposing a new, human-centred direction towards just energy futures

This thesis project stems from the large pressures of climate change and the energy transition that are looming over our cities. socio-technical transition, like energy, cannot be tackled by a selection of stakeholders alone. Many different parties and collaborations need to be set-up, managed and fostered. Where currently, higher-up institutional stakeholders take the lead, citizens and other actors of civil society will have to be incorporated and engaged into these newer collaborations for a just and effective energy transition.

Citizens should be at the forefront of sustainability transitions, as behaviour and consumption patterns towards sustainable innovations could greatly influence the shift of society towards cleaner energy futures.

However, many social, spatial, financial and political injustices persist. The energy transition is, and should become, inherently a social transition (Lennon et al., 2019). Transition policies set up by both national and local governments do not match to actual, local capacities (Nieminen et al., 2020). This gap repeats cycles of injustices, and it is often our most vulnerable citizen groups who are disadvantaged (Energiearmoede Voorkomen | TNO, n.d.). Citizens are often not recognized, proposed clean energy measures are financially not accessible and decision making processes are unfair and not transparent.

This project thus aimed to propose a new, human-centered direction towards just energy transitions, with a focus on empowering citizens and exploring innovative governance structures and participatory methods. So, to answer the main research question of this project:

How can participatory planning practices facilitate multi-actor collaborations between people, policy and innovation towards a spatially just energy transition in Hillesluis?

Results have shown that participation can aid just transition processes towards sustainable energy transformations. The case-study analysis identified vulnerabilities that, predominantly socio-spatial and socio-economically disadvantaged, neighborhoods face in regards to current energy transition discourse and policy. This calls for a better understanding of local contexts and layered characteristics of communities. One way to achieve this understanding is to set up and allow multi-actor collaborations to flourish. By actively approaching and engaging citizens in transition processes, instead of merely informing them, municipalities and the policies they enact become more legitimized, enriched and socially accepted.

In Hillesluis, many citizens distrust municipalities due to the feeling of not being heard. However, some citizens did suggest that if municipalities were to engage citizens properly and give them power in the decision making processes, trust could be rebuilt. When the municipality implements cleaner energy measures in for example community spaces, these spaces could become leading for the communities that use them and social changes could slowly enter the daily lives of the residents of Hillesluis. The municipalties and policies should rather support change, instead of coerce it.

There is an abundance of local skills and knowledge that are still hidden on neighborhood levels. Policy makers of the city of Rotterdam expressed the need for the input of local knowledge, but struggle to reach certain groups. Thus, many potential collaborations are not present. By setting up participatory activities, in this case co-creation workshops, these potentials can be uncovered and collaborations between people, policy and innovations achieved.

The results showcased that citizens of Hillesluis were prepared to engage in collaborations with municipal actors, but many prerequisites and barriers still stand. This research also emphasized the need for changing underlying governance structures from an excessively financially driven perspective to expanding citizen knowledge and participatory arrangements. Next, participation and the definition thereof are still difficult to understand and streamline by stakeholders involved.

Participatory planning practices can aid the establishment of multi-actor collaborations when the entirety of these planning practices, including underlying governance dynamics

and local socio-spatial analysis, incorporate explorative characteristics and citizen education as crucial tenets to move towards cleaner, more sustainable futures.

Energy transition discourse and distributional justice
Financial incentives are still too dominant in energy transition policies. Proposed programs often only benefit those who have the financial capacities, disadvantaging those who do not (Agterbosch, Wentink & Paenen, 2020 & Nationale Ombudsman, 2022). Policies lack in incorporating local knowledge and fail to empower citizens. This can in turn lower social acceptance towards cleaner energy measures.

Transition decision making processes, participation and procedural justice
Current decision making processes regarding the energy transition relies on participatory processes which are informing citizens. This is inherently a good method, but informing is not enough to properly engage local citizens. The challenge comes from both sides as municipalities can not reach certain groups which are in turn not willing to engage due to deeper, systematic distrust towards governments. Current governance structures showcase a lack in bottom-up engagement and institutional power of actors of civil society. For fair, equal and transparent decision-making processes, the role of civil society should become more established in governance models in socio-technical transitions.

Co-creation of future visions and recognitional justice
Through co-creation methods tested in the case area of Hillesluis, local citizen needs were mapped and ideas for a proposed future vision collected. The results show that co-creation methods can combine futuring methods like visioning with participatory practices in order to reach recognition and transparent decision making processes. The vision and ideas for the future of Hillesluis showed a need for easy and accessible information sharing from institutions to citizens and vice versa. The co-creation method revealed that when citizens are indeed given a platform where needs are recognized and space is reserved to experiment, citizens are more willing to engage.

SDG 7 aims for an accessible, affordable and reliable energy system for all (Martin & United Nations, 2018). It is thus our collective responsibility as spatial designers, policy makers, citizens and many other involved to transform our living environments. This task is not easy, neighborhoods that are systematically disadvantaged suffer the most due to proposed ideas from governments not matching with local capacities. It is exactly these places and groups who exhibit the most potentials for creative solutions and local knowledge as observed in the co-creation workshops. A small group with simple ideas already resulted into a future vision for the neighborhood of Hillesluis.

Hillesluis is a neighborhood where bottom-up sustainable energy transformations are not common yet. Throughout this project this debate has started and will hopefully continue afterwards. Empowering citizens, celebrating those who are active and willing to engage in sustainability initiatives, and designing fitting and supportive governance structures, collective action can be formed towards a participatory, cross-scalar, multi-actor and most importantly just energy transition for all.

Reflection

Research project and graduation studio
The graduation studio Planning Complex Cities dives into intersections of spatial disparities, societal complications and underlying political dynamics. The topic of this research aimed to uncover the broader and deeper injustices of the energy transition by combining spatial justice principles and participatory planning practices as key approaches.

This research has taken up a position where the energy transition is recognized as not just a technical or economical one, which in current practical discourse is still dominant. The project aimed to explore the perspectives that are thus lacking in current discourse, namely social and political ones. The results reveal that the social perspective, and thus the accompanying social changes such as citizen empowerment and awareness needed for the energy transition, are lacking the most. This finding is in line with the problems identified that motivated this project. Transitions towards sustainability are inherently political, but this aspect is usually not known in society. Meaning regular citizens will not think of the political system, such as governance structures, behind the energy transition in the first place. This creates a lack in critical view of political instruments steering the energy transition amongst residents. The project aimed to do just that by first uncovering socio-spatial injustices and by linking these to the underlying and deeply rooted political systems of the energy transition. Through imaginative, co-creative methods, this project showcased the capabilities of citizens to not only think critically of the current energy transition discourse in their neighborhood, but what future possibilities could be. The methods used have given citizens a platform to express concerns and wishes, which they have not gotten before.

The research project and the master track
The master track Urbanism aims for students to explore and combine social, spatial, political and cultural phenomena with the built environment (TU Delft, n.d). Even though the focus lies on social and political aspects, spatial implications are suggested as a result of proposed new socio-political configurations. Especially in neighborhoods that can be appointed as vulnerable against current transition discourse, it is important to uncover socio-political dynamics that critically undermine the spatial opportunities this neighborhood has to offer. Through combining the four tenets of the master track Urbanism, these neighborhood level and institutional power connections can be explored and understood.

The master program Architecture, Urbanism and Building Sciences puts its emphasis on the multi-disciplinary nature of modern urban challenges. My project topic and research methods aim for a multi-disciplinary approach, even when the focus is put on spatial justice in underlying socio-technical dynamics.
The project recognizes different scale levels and proposes multi-actor networks and participatory multi- level governance structures that are involved, and needed, in order to propel our built environment towards sustainable futures.

The role of research and design
The project utilizes and approaches design as an important aspect throughout complex socio-technical transitions. As a gap between local citizens and higher-up institutions is established, design can be used to craft a ‘common language’ in order to bridge this. The project uses a mix of design approaches. Process design, of both governance and participatory processes, are central. In this thesis project, the act of design is utilized as a tool, rather than an end product.

Design is often understood as a tool for spatial transformations, but can be used for research and exploratory purposes as well. Design as research aided to uncover spatial shortcomings, to visualize research findings and reshape underlying governance systems.

Through bottom-up participatory practices, this project revealed the need for design to visualize complex socio-technical transitions for a better understanding of it amongst citizens. Design tools such as visualizing possible interventions also supported citizens to experiment with future options for their neighborhood. Visualizing proposed policies and programs through design options also aids the understanding of spatial implications towards policy makers. The project establishes that policies often lack spatial exploration of their aims, and, design can

aid to enrich this shortcoming. Design can help find a middle ground in complex decisions, aid transparency of governmental bodies and boost imaginative powers of civil society.

Designing is an iterative process, when obtaining new information, albeit through desk research or design interventions, adaptations can be made. Designing spatial environments, but also governance or participatory processes, inherently contain a reflecting character which is key in socio-technical transitions.

The role of the urbanist

Perceptions of urban designers are often bound to spatial designs or plans. But those who actually use those spaces are citizens, which includes many urban designers themselves. We all make use of the city, we all change alongside urban transitions, thus we are all the city. The interplay between the built environment and those who make use of it is exactly the domain of the field of Urbanism (TU Delft, n.d). In regards to the energy transition, this thesis project and results show that this challenge is not just a spatial one. Many transformative processes intertwine and it is up to those who are concerned with city developments to ensure that no user of the city is left behind.

Urbanists can be a strong asset in complex socio-technical transition as we bridge physical, social and technological realms. The nuances one integrates in their work is based on many different reasons. This project can be described to lean more towards advocacy and social aspects, rather than physical and spatial designs. This is done because of many personal reasons, but also the newly found importance and insights of having a good societal base for any spatial transformation to work out properly. In regards of the energy transition, society will have to make a large transformation. Our lifestyles, homes and habits will be different than before. We, as urbanists, thus have to start here. Spatial analyses can be done, but these often lack the crucial layer of urban users. Through this project, these societal layers and exposed injustices therein showcase how an urbanist can intertwine themselves with these forgotten layers of analysis by simply putting oneself into the daily lives, spaces and routines of others. The stereotypical idea of urbanists, urban designer and even urban planners is the top-down views over cities and their dynamics. Using masterplans, the urban planner can control how a city functions and how it can transform to a different, more efficient state. As this research showcased, certain urban policies for example, are largely expected to work. Often, the ones who notice failures in policies are those who also deal with the burdens thereof. No urban policy is perfect, but we, as urban designers and planners, need to become aware of who is affected by our decisions, where the burdens and benefits land and reflect if the process taken played out in a fair way.

Value of work methods

Overall, the research approaches used in this project are factual and evidence-based, albeit empirical or theoretical. However, empirical methods such as interviews and co-creation are more difficult to organize and risks of failure are higher. These implications do not take away that empirical methods such as the ones used in this project are important when researching social aspects of transitions.

For the co-creation workshops, the methods unfortunately did not garner the desired results as many of the focus group could not attend the second session. However, after the first workshop, many of the participants expressed their desire to join if the workshops were repeated. Due to time constraints of this research project, this is not possible. This goes to show that implementing participatory practices into policy making and socio-technical transitions is very difficult and time consuming.

Even when the proposed research design and methods did not play out accordingly, the results and conclusions of these “failures” showcase the fragility of participatory processes. It is thus evermore important to continue efforts and research into these methods and overall topic to steer our urban environments towards just socio-technical transitions. Instead of conducting research beforehand, research should be done before, during and after the entirety of the transition process.

Transferability

The practical results of my project are twofold: first, the results from the discourse analysis, governance and second, the results from the co-creation workshop. In general, results from the discourse analysis and governance mapping can be generalized on city-level conclusions. As many cities throughout the Netherlands work with similar policies, stemming from national government policies, the shortcoming and suggestions can be transferred to other Dutch cities. However, as the results from co-creation workshops heavily relied on local, case-related characteristics, transferability of these results to other neighborhoods of Rotterdam and even the Netherlands is much more difficult. Analysis of socio-economic and socio-spatial neighborhood traits is also difficult to generalize for other neighborhoods, as this data differs per area. The method of separating socio-economic and socio-spatial characteristics in order to explore layers of possible vulnerabilities can be replicated in other neighborhoods. However, and this counts for the large scale issues regarding socio-technical transitions, local context should always be recognized, analyzed and implemented in discourse.

The analysis of the overall participation procedures in this project can be repeated with other neighborhoods and methods other than co-creation. It is always valuable to compare the current situation, to what was intended and eventually what actually happened. It is a good way to identify opportunities but also barriers. If multiple neighborhoods and participation methods are evaluated as such, patterns could possibly arise. This will give even more insights in where participatory processes stagger and where they could flourish.

Academic and Societal relevance

New perspectives on socio-technical transitions are needed and this project contributed by experimenting with a more human approach in socio-technical transitions (Torrens et al., 2021; Sovacool, 2014). This perspective is lacking in current socio-technical transition discourse (Garvey et al., 2022; Adil & Ko, 2016). Sector specific innovations towards sustainability may be present, which are positive changes, but the co-evolution of all sectors is under researched (ibid.). This project contributes by combining participatory visioning methods and proposals of changes in underlying institutional, governance dynamics.

Societal issues regarding the energy transition, such as the energy crisis, rising energy prices and overall polarizing views regarding sustainability are becoming more and more prevalent in our daily lives. Spatial and social injustices are deeply embedded into current political dynamics and decision making processes. This research delivered a deeper understanding of these systems of unjust and attempted to connect institutional processes to local levels of implementation. Participatory methods such as co-creation were used in order to bridge gaps between citizens and policy maker and by doing so, future imaginative abilities of citizens were unveiled.
For society as a whole, proper participation in important decisions is key for a fair and just socio-technical transitions. Societal actors are key player, but are still heavily underrepresented. This research project aimed to provide citizens with a platform to voice needs and explore different possibilities.

Ethical considerations

Ethical considerations were taken into account during this research project. Interviews and conversations with citizens are all used with the intent to enrich the other methods in this project. Personal data, like names, are anonymized and answers given are purely used for educational purposes. Personal data of participants in the focus group are also anonymized.

Due to the scope and timeframe of this research project, it is not guaranteed that the focus group of the co-creation sessions, is a perfect representation of the diverse groups (social, social, backgrounds, ages, genders etc.) of Hillesluis. This means that when the co-creation sessions are executed again, perspectives and subsequent result may differ.

During the project, the use of negatively charged language was minimized. When believed otherwise, the usage of certain language does not coincide with ill intent. Similarly, perspectives of expert in the energy transition fields or governmental bodies are recognized to be different than those of certain citizen groups. It has been considered that by pointing out this difference and shortcoming could shed a negative light on these institutions.

Part 7

Bibliography and appendix

Bibliography

AD & DPG Media. (n.d.). *Hoe gasvrij kun je zijn?* ad.nl. https://www.ad.nl/energie/hoe-gasvrij-kun-je-zijn~a1525fe1/

Adil, A., & Ko, Y. (2016). Socio-technical evolution of Decentralized Energy Systems: A critical review and implications for urban planning and policy. *Renewable & Sustainable Energy Reviews*, 57, 1025–1037. https://doi.org/10.1016/j.rser.2015.12.079

Agterbosch, S., Wentink, J. & Paenen, S. (2020). *Betaalbaarheid en haalbaarheid van de energietransitie in Utrecht.*

Akerboom, S. (2018). *Between public participation and energy transition: The case of wind farms.* [Thesis, fully internal, Universiteit van Amsterdam].

Alkemade, F., Hekkert, M. P., & Negro, S. O. (2011). Transition policy and innovation policy: Friends or foes? *Environmental Innovation and Societal Transitions*, 1(1), 125–129. https://doi.org/10.1016/j.eist.2011.04.009

Andrews, J. (2017, October 22). *The road after Paris*. Cities Today. https://cities-today.com/the-road-after-cop21/

Banerjee, A., & Schuitema, G. (2023). Spatial justice as a prerequisite for a just transition in rural areas? The case study from the Irish peatlands. *Environment and Planning C: Politics and Space*, 41(6), 1096–1112. https://doi.org/10.1177/23996544231173210

Bardazzi, R., & Pazienza, M. G. (2023). Vulnerable households in the energy transition: *Energy Poverty, Demographics and Policies*. Springer.

Barendregt, L., Bendor, R., & Van Eekelen, B. F. (2024). Democratizing the Future in Practice: A Literature Review of Public Participation in Futuring. *Futures*, 103346. https://doi.org/10.1016/j.futures.2024.103346

Bhutada, G. (2022, May 20). *The 200-year history of mankind's energy transitions*. World Economic Forum. https://www.weforum.org/agenda/2022/04/visualizing-the-history-of-energy-transitions/

Binnenlands Bestuur. (2024, February 15). *Direct energie delen is ook met Energiewet nog niet mogelijk*. https://www.binnenlandsbestuur.nl/ruimte-en-milieu/direct-energie-delen-ook-met-nieuwe-energiewet-nog-niet-mogelijk

Birol, F., & Bocca, R. (2022, February 2). Clean energy transition must be for the many, not the few. *World Economic Forum*. https://www.weforum.org/agenda/2021/06/clean-energy-transition-must-be-for-the-many-not-the-few/

Bonte, A. & Gemeente Rotterdam. (2019). *Rotterdamse klimaataanpak*. https://vng.nl/sites/default/files/2019-11/rdam-klimaatakkoord_plan_van_aanpak.pdf

Bouzarovski, S., Herrero, S. T., Petrova, S., Frankowski, J., Matoušek, R., & Maltby, T. (2017). Multiple transformations: theorizing energy vulnerability as a socio-spatial phenomenon. *Geografiska Annaler. Series B, Human Geography/Geografiska Annaler*. Series B. Human Geography, 99(1), 20–41. https://doi.org/10.1080/04353684.2016.1276733

Buijs, A., De Koning, S., Mattijssen, T., Smeding, I., Smits, M., & Steins, N. A. (2023). Civil society for sustainable change: strategies of NGOs and active citizens to contribute to sustainability transitions. *Journal of Environmental Planning and Management*, 1–22. https://doi.org/10.1080/09640568.2023.2205571

Campbell, S.D. (2013). Sustainable development and social justice: Conflicting urgencies and the search for common ground in urban and regional planning. *Michigan Journal of Sustainability*, 1(1), 75-91.

Chilvers, J., Pallett, H., & Hargreaves, T. (2018). Ecologies of participation in socio-technical change: The case of energy system transitions. *Energy Research & Social Science*, 42, 199–210. https://doi.org/10.1016/j.erss.2018.03.020

Climate-neutral and smart cities. (2023, October 12). *Research and Innovation*. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en

Cooper, J. (2023, July 26). Decentralization and the energy transition. *Market Insights*. https://eepower.com/market-insights/decentralization-and-the-energy-transition/#

Cooper. (2022, May 17). *Section 1 - Defining Energy Justice: Connections to environmental justice, climate Justice, and the Just Transition - Initiative for Energy Justice. Initiative for Energy Justice*. https://iejusa.org/section-1-defining-energy-justice/

CORDIS. (2016). European Network for Research, Good Practice and Innovation for Sustainable Energy. *ENERGISE*. https://doi.org/10.3030/727642

Cornwall, A. (2008). Unpacking "Participation": models, meanings and practices. *Community Development Journal*, 43(3), 269–283. https://doi.org/10.1093/cdj/bsn010

Cui, S., Wang, Y., Shi, Y., & Xiao, J. (2020). A new and fair Peer-to-Peer energy sharing framework for energy buildings. *IEEE Transactions on Smart Grid*, 11(5), 3817–3826. https://doi.org/10.1109/tsg.2020.2986337

Dawson, P., & Daniel, L. (2010). Understanding social innovation: a provisional framework. *International Journal of Technology Management*, 51(1), 9. https://doi.org/10.1504/ijtm.2010.033125

Drozdz, M. (2014). Spatial inequalities, " neoliberal " urban policy and the geography of injustice in London. *Justice Spatiale | Spatial Justice*, 6. https://halshs.archives-ouvertes.fr/halshs-01232566

Duurzaam010. (2022, January 14). *Wat kan ik doen - Duurzaam 010*. Duurzaam 010. https://duurzaam010.nl/wat-kan-ik-doen/

Duurzaam010. (2023, November 29). *Energietransitielening woningeigenaren en verhuurders - Duurzaam 010*. Duurzaam 010. https://duurzaam010.nl/subsidie/energietransitiefonds-particuliere-woningeigenaren-en-verhuurders/

Edwards, C., & Imrie, R. (2015). *The short guide to urban policy*. Policy Press.

EEA. (n.d.). *The case for public participation in sustainability transitions*. European Environment Agency. https://www.eea.europa.eu/publications/the-case-for-public-participation

Energiearmoede voorkomen | TNO. (n.d.). tno.nl/nl. https://www.tno.nl/nl/duurzaam/systeemtransitie/sociale-innovatie/energiearmoede-voorkomen/

Energy Transition | TNO. (n.d.). tno.nl/en. https://www.tno.nl/en/about-tno/organisation/units/energy-transition/

Energy union. (n.d.). *Energy*. https://energy.ec.europa.eu/topics/energy-strategy/energy-union_en

European Commission. (2021a, July 14). T*he European Green Deal*. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

European Commission. (2021b, November 23). *Innovation and technology – key enablers for transition to climate neutrality*. https://iri.jrc.ec.europa.eu/. Retrieved December 13, 2023, from https://iri.jrc.ec.europa.eu/news/innovation-and-technology-key-enablers-transition-climate-neutrality

European Commission, & Roche, M. Y. (2020). Toolkit Design of governance structures and stakeholder engagement processes for coal regions in transition. In *Platform for Coal Regions in Transition.*

Feenstra, M., Middlemiss, L., Hesselman, M., Straver, K., & Herrero, S. T. (2021). Humanising the Energy Transition: towards a national policy on energy poverty in the Netherlands. *Frontiers in Sustainable Cities*, 3. https://doi.org/10.3389/frsc.2021.645624

Foundation Abbe Pierre. (2023). *Manifesto for a Ban on Energy Disconnections in Europe.*

Garvey, A., Norman, J., Büchs, M., & Barrett, J. (2022). A "spatially just" transition? A critical review of regional equity in decarbonisation pathways. *Energy Research & Social Science*, 88, 102630. https://doi.org/10.1016/j.erss.2022.102630

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy*, 31(8–9), 1257–1274. https://doi.org/10.1016/s0048-7333(02)00062-8

Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24–40. https://doi.org/10.1016/j.eist.2011.02.002

Gemeente Rotterdam. (2021). *Rotterdamse Energiesysteemvisie*. In duurzaam010. nl. Retrieved November 25, 2023, from https://rotterdam.raadsinformatie.nl/document/10928786/1/s21bb012776_3_62826_tds

Goal 7 | *Department of Economic and Social Affairs*. (n.d.). https://sdgs.un.org/goals/goal7#progress_and_info

Harichandan, S., Kar, S. K., Bansal, R., Mishra, S. K., Balathanigaimani, & Dash, M. (2022). Energy transition research: A bibliometric mapping of current findings and direction for future research. *Cleaner Production Letters*, 3, 100026. https://doi.org/10.1016/j.clpl.2022.100026

Hearn, A. X., Mihailova, D., Schubert, I., & Sohre, A. (2022). Redefining energy vulnerability, considering the future. *Frontiers in Sustainable Cities*, 4. https://doi.org/10.3389/frsc.2022.952034

Hoppe, T., & De Vries, G. (2018). Social innovation and the energy transition. *Sustainability*, 11(1), 141. https://doi.org/10.3390/su11010141

Hughes, S., & Hoffmann, M. J. (2020). Just urban transitions: Toward a research agenda. *WIREs Climate Change*, 11(3). https://doi.org/10.1002/wcc.640

IEA. (n.d.-a). *Global Energy Transitions Stocktake – Topics* - IEA. https://www.iea.org/topics/global-energy-transitions-stocktake

IEA. (n.d.-b). *Russia's war on Ukraine – Topics* - IEA. https://www.iea.org/topics/russias-war-on-ukraine

Jamshed, S. Q. (2014). Qualitative research method-interviewing and observation. *Journal of Basic and Clinical Pharmacy*, 5(4), 87. https://doi.org/10.4103/0976-0105.141942

Jenkins, K., McCauley, D., Heffron, R. J., Stephan, H. R., & Rehner, R. W. M. (2016). Energy justice: A conceptual review. *Energy Research & Social Science*, 11, 174–182. https://doi.org/10.1016/j.erss.2015.10.004

Jessop, B. (1998). The rise of governance and the risks of failure: the case of economic development. *International Social Science Journal*, 50(155), 29–45. https://doi.org/10.1111/1468-2451.00107

Júnior, A. C. P., Porto, G. S., Pacífico, O., & Júnior, A. P. S. (2015). Project Stakeholder Management: A Case Study of a Brazilian Science Park. *Journal of Technology Management & Innovation*, 10(2), 39–49. https://doi.org/10.4067/s0718-27242015000200004

Kandachar, P. (2014). *Materials and social sustainability*. In Elsevier eBooks (pp. 91–103). https://doi.org/10.1016/b978-0-08-099359-1.00007-2

Kemp, R., Loorbach, D., & Rotmans, J. (2007). Transition management as a model for managing processes of co-evolution towards sustainable development. *International Journal of Sustainable Development and World Ecology*, 14(1), 78–91. https://doi.org/10.1080/13504500709469709

Koundouri, P., Devves, S., & Plataniotis, A. (2021). Alignment of the European Green Deal, the Sustainable Development Goals and the European Semester Process: Method and Application. *Theoretical Economics Letters*, 11(04), 743–770. https://doi.org/10.4236/tel.2021.114049

Krlev, G., & Terstriep, J. (2022). Pinning it down? Measuring innovation for sustainability transitions. *Environmental Innovation and Societal Transitions*, 45, 270–288. https://doi.org/10.1016/j.eist.2022.11.005

Laes, E., Gorissen, L., & Nevens, F. (2014). A comparison of energy transition governance

in Germany, the Netherlands and the United Kingdom. *Sustainability*, 6(3), 1129–1152. https://doi.org/10.3390/su6031129

Lennon, B., Dunphy, N., & Sanvicente, E. (2019). Community acceptability and the energy transition: a citizens' perspective. *Energy, Sustainability and Society*, 9(1). https://doi.org/10.1186/s13705-019-0218-z

Loorbach, D. (2009). Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework. *Governance*, 23(1), 161–183. https://doi.org/10.1111/j.1468-0491.2009.01471.x

Månsson, A., Johansson, B., & Nilsson, L. J. (2014). Assessing energy security: An overview of commonly used methodologies. *Energy*, 73, 1–14. https://doi.org/10.1016/j.energy.2014.06.073

Martin & United Nations. (2018, June 20). United Nations sustainable development agenda. *United Nations Sustainable Development*. https://www.un.org/sustainabledevelopment/development-agenda-retired

Meuleman, L. (2019). *Metagovernance for sustainability: A Framework for Implementing the Sustainable Development Goals*.

Miller, C. A., & Richter, J. (2014). Social planning for energy transitions. Current Sustainable/*Renewable Energy Reports*, 1(3), 77–84. https://doi.org/10.1007/s40518-014-0010-9

Milovanovitch, M. (2018). *Guide to Policy analysis*.

Ministerie van Algemene Zaken. (2023, October 27). *Duurzame energie*. Rijksoverheid.nl. https://www.rijksoverheid.nl/onderwerpen/duurzame-energie

Ministerie van Economische Zaken en Klimaat. (2019). *Klimaatakkoord*. Rijksoverheid. Retrieved November 5, 2023, from https://www.rijksoverheid.nl/documenten/rapporten/2019/06/28/klimaatakkoord

Ministerie van Economische Zaken en Klimaat. (2024, June 4). *Brede steun voor nieuwe energiewet*. Nieuwsbericht | Rijksoverheid.nl. https://www.rijksoverheid.nl/actueel/nieuws/2024/06/04/brede-steun-voor-nieuwe-energiewet#:~:text=De%20nieuwe%20Energiewet%20biedt%20meer,een%20faillissement%20van%20de%20energieleverancier.

Mintzberg, H., & Van Der Heyden, L. (1999). Organigraphs: Drawing how companies really work. *Harvard Business Review*.
Morgunova, M. (2021). The role of the socio-technical regime in the sustainable energy transition: A case of the Eurasian Arctic. *The Extractive Industries and Society*, 8(3), 100939. https://doi.org/10.1016/j.exis.2021.100939

Mulder, P., Batenburg, A., & Dalla Longa, F. (2023). *Rapport Energiearmoede in Nederland 2022*. https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2023/01/27/tno-rapport-energiearmoede-in-nederland-2022/tno-rapport-energiearmoede-in-nederland-2022.pdf

Nationale Ombudsman. (2022). *Ongelijke toegang tot de energietransitie*. In https://www.nationaleombudsman.nl/ (No. 2022/201). Retrieved December 17, 2023, from https://www.nationaleombudsman.nl/system/files/bijlage/Ongelijke%20toegang%20tot%20de%20energietransitie.pdf

Nieminen, J., Salomaa, A., & Juhola, S. (2020). Governing urban sustainability transitions: urban planning regime and modes of governance. *Journal of Environmental Planning and Management*, 64(4), 559–580. https://doi.org/10.1080/09640568.2020.1776690

Nyamadzawo, L. & The Wagner Planner. (2020, December 14). The paradox of participatory planning in urban planning – *The Wagner Planner*. https://wp.nyu.edu/wagnerplanner/2020/12/14/the-paradox-of-participatory-planning-in-urban-planning/

Olander, S., & Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. *International Journal of Project Management*, 23(4), 321–328. https://doi.org/10.1016/j.ijproman.2005.02.002

Ozgun, K., Weir, I., & Cushing, D. F. (2015). Optimal electricity distribution framework for public space: Assessing Renewable energy Proposals for Freshkills Park, New York City. *Sustainability*, 7(4), 3753–3773. https://doi.org/10.3390/su7043753

Palumbo, R. (2017). *Participatory governance*. In Springer eBooks (pp. 1–6). https://doi.org/10.1007/978-3-319-31816-5_1834-1

Pierick, E. T., & Van Mil, E. (2009). *Multi-level perspective nader beschouwd: aangrijpingspunten voor transitie richting biobased economy?*
Prieto, C. (2023, April 5). *The NZC project* - NetZeroCities (By NetZeroCities). NetZeroCities. https://netzerocities.eu/the-nzc-project/).

Raco, M. (2009). *Governance, urban*. In Elsevier eBooks (pp. 622–627). https://doi.org/10.1016/b978-008044910-4.01089-0

Regionale energiestrategie Rotterdam Den Haag. (2020). In *Regionale Energiestrategie Rotterdam Den Haag.*

Richard Warren Smith. (1973). A Theoretical Basis for Participatory Planning. *Policy Sciences*, 4(3), 275–295. http://www.jstor.org/stable/4531532

Rijnmond. (2021, December 20). Hoogleraar kritisch op klimaatplannen Rotterdam: "Zo gaat het nog 100 jaar langer duren." *Rijnmond*. https://www.rijnmond.nl/nieuws/198939/hoogleraar-kritisch-op-klimaatplannen-rotterdam-zo-gaat-het-nog-100-jaar-langer-duren

Robinson, C., Bouzarovski, S., & Lindley, S. (2018). 'Getting the measure of fuel poverty': The geography of fuel poverty indicators in England. *Energy Research & Social Science*, 36, 79–93. https://doi.org/10.1016/j.erss.2017.09.035

Rocco, R. (2022). Spatial Justice: A crucial dimension of sustainability. In R. Rocco, G. Bracken, C. Newton, & M. Dabrowski (Eds.), *Teaching, Learning & Researching Spatial Planning* (pp. 276-287). TU Delft OPEN Publishing.

Rotmans, J., & Loorbach, D. (2008). Transition management: reflexive governance of societal complexity through searching, learning and experimenting. *Erasmus Research Institute of Management*. https://repub.eur.nl/pub/37236/Metis_133337_B.pdf

Rotmans, J., Kemp, R., & Van Asselt, M. (2001). More evolution than revolution: transition management in public policy. *Foresight*, 3(1), 15–31. https://doi.org/10.1108/14636680110803003

Rotterdams Klimaat Alliantie. (2019). Rotterdams Klimaatakkoord. In *rotterdamsklimaatakkoord.nl.* Retrieved November 26, 2023, from https://www.rotterdamsklimaatakkoord.nl/klimaataanpak/het-akkoord

Rotterdam. (2021). Rotterdamse energiesysteemvisie. In *Rotterdamse Energiesysteemvisie*.

RVO. (2017, July 12). *Energieprestatie - BENG.* RVO.nl. https://www.rvo.nl/onderwerpen/wetten-en-regels-gebouwen/beng

S&P Global. (n.d.). https://www.spglobal.com/en/research-insights/articles/what-is-energy-transition

Schmitter, P. C. (2002). Participation in Governance Arrangements: Is there any reason to expect it will achieve "Sustainable and Innovative Policies in a Multi-Level Context"? In *VS Verlag für Sozialwissenschaften* eBooks (pp. 51–69). https://doi.org/10.1007/978-3-663-11003-3_3

Shostak, A. B., & Bell, W. (1998). Foundations of Futures Studies, Vol. 1: History, Purposes, and Knowledge. *Contemporary Sociology*, 27(4), 387. https://doi.org/10.2307/2655498

Shove, E., & Walker, G. (2007). Caution! Transitions Ahead: Politics, practice, and sustainable transition management. *Environment and Planning A: Economy and Space*, 39(4), 763–770. https://doi.org/10.1068/a39310

Soja, E. (2009). The City and Spatial Justice. *Justice Spatiale/ Spatial Justice*, 1 (September 2009).

Sovacool, B. K. (2014). What are we doing here? Analyzing fifteen years of energy scholarship and proposing a social science research agenda. *Energy Research & Social Science*, 1,

1–29. https://doi.org/10.1016/j.erss.2014.02.003

Stadsontwikkeling, deelgemeente Feijenoord en Woonstad Rotterdam. (2013). Handelingsperspectief wijk Hillesluis. In *Nationaal Programma Rotterdam Zuid*. https://www.nprz.nl/over-nprz/onze-documenten/handelingsperspectieven

Statistieken buurt Hillesluis. (2023). AlleCijfers.nl. https://allecijfers.nl/buurt/hillesluis-rotterdam/

Strategic Planning | Local Energy Communities. (n.d.). *Local Energy Communities*. https://localenergycommunities.net/strategic-planning/

Teladia, A., & Van Der Windt, H. (2024). Citizen participation gaps and challenges in the heating transi-tion: Learning from Dutch community initiatives. *Renewable & Sustainable Energy Reviews*, 189, 113975. https://doi.org/10.1016/j.rser.2023.113975

Tenbensel, T. (2005). Multiple modes of governance. *Public Management Review*, 7(2), 267–288. https://doi.org/10.1080/14719030500091566

The World Needs a Swift Transition to Sustainable Energy. (2021, January 19). *United Nations Climate Change*. Retrieved November 23, 2023, from https://unfccc.int/news/the-world-needs-a-swift-transition-to-sustainable-energy

Thomas, G., Cherry, C., Groves, C., Henwood, K., Pidgeon, N., & Roberts, E. (2022). "It's not a very certain future": Emotion and infrastructure change in an industrial town. *Geoforum*, 132, 81–91. https://doi.org/10.1016/j.geoforum.2022.04.003

TNO, Mulder, P., Dalla Longa, F., & Straver, K. (2021). *DE FEITEN OVER ENERGIEARMOEDE IN NEDERLAND*. In tno.nl.

TU Delft. (n.d.). Track: Urbanism. https://www.tudelft.nl/onderwijs/opleidingen/masters/aubs/msc-architecture-urbanism-and-building-sciences/master-tracks/urbanism

UNFCCC. (n.d.). *The Paris Agreement*. United Nations Climate Change. Retrieved November 24, 2023, from https://unfccc.int/process-and-meetings/the-paris-agreement

Universiteit Leiden. (n.d.). *Opposition to energy projects*. Retrieved December 18, 2023, from https://www.universiteitleiden.nl/wetenschapsdossiers/duurzame-energie/weerstand-tegen-energieprojecten

Vähäkari, N., Lauttamäki, V., Tapio, P., Ahvenainen, M., Assmuth, T., Lyytimäki, J., & Vehmas, J. (2020). The future in sustainability transitions - Interlinkages between the multi-level perspective and futures studies. *Futures*, 123, 102597. https://doi.org/10.1016/j.futures.2020.102597

Van Den Brand, P. (2021, May 18). *'Burgerforum energietransitie niet zaligmakend'* Gemeente.nu. https://www.gemeente.nu/bestuur/participatie/burgerforum-energietransitie-niet-zaligmakend/

Voytenko, Y., McCormick, K., Evans, J., & Schliwa, G. (2016). Urban living labs for sustainability and low carbon cities in Europe: towards a research agenda. *Journal of Cleaner Production*, 123, 45–54. https://doi.org/10.1016/j.jclepro.2015.08.053

What do we mean by energy transition? (n.d.). https://www.enelgreenpower.com/learning-hub/energy-transition

Wierling, A., Schwanitz, V. J., Zeiß, J. P., Bout, C., Candelise, C., Gilcrease, W., & Gregg, J. S. (2018). Statistical evidence on the role of energy cooperatives for the energy transition in European countries. *Sustainability*, 10(9), 3339. https://doi.org/10.3390/su10093339

Williams, P. (2002). The competent boundary spanner. *Public Administration*, 80(1), 103–124. https://doi.org/10.1111/1467-9299.00296

Wittmayer, J., De Geus, T., Pel, B., Avelino, F., Hielscher, S., Hoppe, T., Mühlemeier, S., Stasik, A., Oxenaar, S., Rogge, K. S., Visser, V., Marín-González, E., Ooms, M., Buitelaar, S., Foulds, C., Petrick, K., Klarwein, S., Krupnik, S., De Vries, G., . . . Härtwig, A. (2020). Beyond instrumentalism: Broadening the understanding of social innovation in socio-technical energy systems. *Energy Research & Social Science*, 70, 101689. https://doi.org/10.1016/j.erss.2020.101689

Zon op Zuid. (n.d.). Zon op Zuid - *Duurzame Energie voor iedereen op Zuid*. Zon Op Zuid. https://zonopzuid.nl/

Zhang, Y., Shan, Y., Zheng, X., Wang, C., Guan, Y., Jin, Y., Ruzzenenti, F., & Hubacek, K. (2023). Energy price shocks induced by the Russia-Ukraine conflict jeopardize wellbeing. *Energy Policy*, 182, 113743. https://doi.org/10.1016/j.enpol.2023.113743

IMAGES

Bokern, W., & Croon, T. (2021, June 2). Opinie: *'Kwetsbare wijken verdienen maatwerk zonder ideologische blik.'* Het Parool. Retrieved December 19, 2023, from https://www.parool.nl/columns-opinie/opinie-kwetsbare-wijken-verdienen-maatwerk-zonder-ideologische-blik~b6db08a1/

De Hulster, D. (2023, January 11). *Domper voor minima: nieuwe energietoeslag pas later dit jaar uitgekeerd*. AD. Retrieved December 19, 2023, from https://www.ad.nl/waterweg/domper-voor-minima-nieuwe-energietoeslag-pas-later-dit-jaar-uitgekeerd~a078733e/

Het Parool. (2023, September 15). *Ministerie: Jaarlijks minstens 40 miljard euro subsidie naar fossiele industrie*. Retrieved December 19, 2023, from https://www.parool.nl/nederland/ministerie-jaarlijks-minstens-40-miljard-euro-subsidie-naar-fossiele-industrie~b8bb177d/#:~:text=naar%20fossiele%20industrie-,Ministerie%3A%20Jaarlijks%20minstens%2040%20miljard%20euro%20subsidie%20naar%20fossiele%20industrie,en%2046%2C4%20miljard%20euro.

Gemeente Rotterdam. (n.d.-a). *Leefbaarheid & veiligheid (wijk)*. Onderzoek010.nl. Retrieved December 9, 2023, from https://onderzoek010.nl/dashboard/onderzoek010/leefbaarheid-en-veiligheid--wijk-

Gemeente Rotterdam. (n.d.-b). *Uitleg Wijkprofiel | 2022 | Wijkprofiel Rotterdam*. https://wijkprofiel.rotterdam.nl/nl/2022/uitleg

Gemeente Rotterdam. (n.d.-c). *Wijkprofiel Hillesluis | 2022 | Wijkprofiel Rotterdam*. https://wijkprofiel.rotterdam.nl/nl/2022/rotterdam/feijenoord/hillesluis/trend?year=2016

Hickson, A. (2022, February 12). *Cost of living protest at Parliament Square, London.* https://commons.wikimedia.org/. https://commons.wikimedia.org/wiki/File:Cost_of_living_protest_at_Parliament_Square,_London.jpg

Koldewey, O. (2021, April 9). *Rotterdam: in kwetsbare wijken is stapeling opgaven onbetaalbaar*. IVVD. https://www.ivvd.nl/rotterdam-in-kwetsbare-wijken-is-stapeling-

opgaven-onbetaalbaar/

Liukku, A. (2022, January 21). *Onzekerheid rond Warmtebedrijf treft Rotterdam-Zuid: projecten 'van het gas af' liggen stil.* ad.nl. Retrieved December 19, 2023, from https://www.ad.nl/rotterdam/onzekerheid-rond-warmtebedrijf-treft-rotterdam-zuid-projecten-van-het-gas-af-liggen-stil~ab199e2e/

Mandias, S. (2023, February 13). *Individueel, collectief of coöperatief: hoe pakken we de energietransitie aan?* Vers Beton. https://www.versbeton.nl/2018/07/individueel-collectief-of-cooperatief-hoe-pakken-we-de-energietransitie-aan/

Naafs, S. (2023, February 13). *Energietransitie in Bospolder-Tussendijken: "De meeste mensen hebben geen idee wat ze boven het hoofd hangt."* Vers Beton. https://www.versbeton.nl/2019/05/energietransitie-in-bospolder-tussendijken-de-meeste-mensen-hebben-geen-idee-wat-ze-boven-het-hoofd-hangt/

OPEN Rotterdam. (2022, December 15). *Twijfels over kosten en duurzaamheid van warmtenetten.* https://openrotterdam.nl/twijfels-over-kosten-en-duurzaamheid-van-warmtenetten/

Rijksoverheid. (n.d.). Waar staan en komen de windparken op zee? *windopzee.nl.* https://windopzee.nl/onderwerpen/wind-zee/waar/

Silvestri, G., Diercks, G., Matti, C., SATURN, MOTION EIT Climate-KIC, Irene Vivas Lalinde, Jose Manuel Martin Corvillo, Carlos Delgado, & Christoph Brodnik. (2021). X-Curve. In DRIFT & EIT Climate-KIC Transitions Hub (Reds.), *DRIFT Transitions Hub Climate-KIC EU.* https://drift.eur.nl/app/uploads/2022/02/X-Curve-booklet-DRIFT-EIT-Climate-KIC-2022.pdf

SP. (2023, February 11). *VOLKSPROTEST OP HET BEURSPLEIN IN AMSTERDAM.* https://amstelveen.sp.nl/. https://amstelveen.sp.nl/nieuws/2023/02/volksprotest-op-het-beursplein-in-amsterdam

Van de Weijer, B. (2021, July 12). *Burgers en kleine bedrijven betalen de prijs van de energietransitie, terwijl grootverbruikers worden ontzien.* De Volkskrant. Retrieved December 19, 2023, from https://www.volkskrant.nl/nieuws-achtergrond/burgers-en-kleine-bedrijven-betalen-de-prijs-van-de-energietransitie-terwijl-grootverbruikers-worden-ontzien~b4719f67/

Voermans, T. (2023, January 27). *Geen verwarming aan en koud eten: 600.000 huishoudens leven in energiearmoede.* Retrieved December 19, 2023, from https://www.ad.nl/economie/geen-verwarming-aan-en-koud-eten-600-000-huishoudens-leven-in-energiearmoede~ad7222ea/

Appendix 1

Expert interview questions

Interviewee name: Anonymous
Interviewee organization:
Interviewee role/position:

Perspective
Question 1:
How would you define the energytransition from your position/role/organization?

Objective of the question:
To get the idea of what scope the interviewee is familiar with and to gain insights in how the interviewee views the energytransition in their work/organization.

Question 2:
What are the main objectives of sustainable energy futures in your position/role/ organization?

Objective of the question:
To get an idea of which objectives their organization is working on towards sustainable energy futures.

Question 3:
Which strategies does your role/position/ organization adopt to work towards these objectives?

Objective of the question:
To identify workflow/process towards objectives.

Probing question 3.1:
Are there any examples? If so, did they work?

Probing question 3.2:
Why did it work or why did it fail?

Question 4:
What are the main barriers faced when working on sustainable energy futures in your position/ role/organization?

Objective of the question:
To see what barriers are faced in work-related processes.

Probing question 4.1:
If so, what could be the causes?

Collaborations
Question 5:
Which other organizations/roles/people do you work with in the strategies towards sustainable energy futures?

Objective of the question:
To find out what relations are happening in order to build and execute sustainable energy strategies.

Probing question 5.1:
How do these relations work and how are they sustained?

Question 6:
Would you like to see more collaborations between different organizations towards sustainable energy futures?

Objective of the question:
To figure out if there is a need for more collaborations between different sectors or organizations.

Probing question 6.1:
Why yes or why no?

Citizens participation
Question 7: (institutional interviewee)
How does your organization work with citizens on implementation level?

Question 7: (non-institutional interviewee)
How does your organization work with institutions on governmental level?

Question 8:
Whats do you think the strengths are of these existing collaborations?

Question 9:
What are barriers to these existing collaborations?

Question 10:
Does your organization see any future opportunities for collaborations towards sustainable energy futures?

Appendix 2

In this appendix, notes of the expert interviews are displayed.

Legend and color scheme

Policy Advisor Municipality of Rotterdam	Researcher at Ombudsman	Central Audit Office	Energy cooperative (city-level)	Community organization for inclusive energy transitions	Energy cooperative (neighborhood level)

-INTERVIEWS EXPERTS-

Perspectives on the energy transition

1. **Could you introduce your role/organization briefly?**

Policy Advisor Municipality of Rotterdam	-Municipality does have a large role; they reach close to people/citizens. -Organizational body. -The role of the municipality is quite unclear.
Researcher at Ombudsman	-Timeframes and financial aspects are of big importance. -Ensures that communication and participation around matters run smoothly. -More executive functions, but put more focus on citizens.
Central Audit Office	-What happens to that one euro and where does it end up? Is their main question to ask. -Ensures if financial aspects and public expenditures are allocated to the goals that they were intended for. -More executive functions, but put more focus on the institutional level. -Also a reflective role of financial elements of institutions and what effects it has on, e.g., citizens and companies
Energy cooperative (city-level)	-Very process oriented. -Acts as an umbrella organization for other energy cooperatives, aims to strengthen the position of energy cooperatives in the city. -Originated from the need for a more solid collaborative club for neighborhood energy cooperations.
Community organization for inclusive energy transitions	-Social organization/alliance, focused on Dutch citizen with migration backgrounds. -Founded the alliance because it became apparent that people with a migration background struggle more with energy prices. -Acts as a platform to raise awareness of energy poverty and the individual transition through key figures and trusted individuals for communities.
Energy cooperative (neighborhood level)	-Chairman of an energy cooperative on neighborhood level.

2. How would you define the energy transition from your position/role/organization?

Policy Advisor Municipality of Rotterdam	-Based on the national climate accords. -Shift away from gas use in homes by using neighborhood specific approach. -The energy transition is divided into 'sectors' (regional but also street level).
Researcher at Ombudsman	-The citizen as starting point. -Utilize a human perspective on the energy transition.
Central Audit Office	-Focus mostly on heatpumps. -Evaluate if subsidies and other financial instruments are allocated correctly.
Energy cooperative (city-level)	-
Community organization for inclusive energy transitions	-The energy transition is a socio-cultural one. The energy transition is largely economic as well, because energy poverty plays a huge role.
Energy cooperative (neighborhood level)	-Not yet defined for the organization. -Take up a socio-economic perspective, the energy system cannot rely on the market anymore.

3. What are the main objectives of sustainable energy futures in your position/role/organization?

Policy Advisor Municipality of Rotterdam	-From national to local climate accords with multiple collaborations. -Finances: to ensure that living costs don't skyrocket for citizens. -Switch homes from natural gas to cleaner sources, especially homes with bad energy labels.
Researcher at Ombudsman	-Goals in line with EU, national and municipal programs. -Different scale levels and different cities have their own ombudsman, so the aims differ according to their goals. -To process complaints of citizens towards the executive route and program of the energy transition.
Central Audit Office	-Goals in line with EU, national and municipal programs. -Do not have specific rules or aims. This organization is in line with national goals for heating/energy transitions towards cleaner futures.
Energy cooperative (city-level)	-To shape a new generation that uses and own their own energy. -To create a decentralized energy system, without loss of profit and ownership. -To ensure that no one is left behind.
Community organization for inclusive energy transitions	-To aim for a better incorporation of peoples energy needs into policies. -Also in line with the main national goals of the energy transition, but stress the importance to tackle the underlying problems first, otherwise the energy transition goals will fail. -That system and daily life adapt to one another.
Energy cooperative (neighborhood level)	-By and through the members of this organization for an energy transition for all. -Aim to become autonomous in the generating, distribution and use of energy. -To ensure security and reliability. -To create more political power into decision making processes.

4. Which strategies does your role/position/organization adopt to work towards these objectives?

- Are there any examples? If so, did they work? Why did it work or why did it fail?

Policy Advisor Municipality of Rotterdam	-Through making policies and law. A steering role. -Lots of experimentation. -Vision building. -Create maps to show which measure works best in which locations. -To pick the most effective sustainable system, with the lowest costs.
Researcher at Ombudsman	-More executive functions and strategies. -Process related strategies. -The participatory process can definitely improve. Only certain groups of citizens show up, so strategies do not properly reach to everyone.
Central Audit Office	-Process and reflecting related strategies. -The participatory process can definitely improve. Only certain groups of citizens show up, so strategies do not properly reach to everyone. -To combat energy poverty: use of subsidies. Also transforming houses to cleaner energy sources.
Energy cooperative (city-level)	-Use a cooperative approach: ownership equals mandate/control/responsibility. -Aim to broaden the influence of citizens on the energy transition. -Creation of citizen support/base. -Shared solar roofs. -Collective profit for all.
Community organization	-No concrete strategies, but start with talking and discussing the topic. -Usage of their own, trusted, circles and communities.

for inclusive energy transitions	-Activate key figures who help train, coach people. -Using accessible and simple campaigns. -Setting good examples using socio-cultural, religious spaces.
Energy cooperative (neighborhood level)	-Aim to shape a new relationship with energy. -Use a cooperative approach: ownership equals mandate/control/responsibility. -Building social and physical infrastructure to become an energy community. -Shared solar roofs. -Collective profit for all.

5. What are the main barriers faced when working on sustainable energy futures in your position/role/organization?

-If so, what could be the cause?

Policy Advisor Municipality of Rotterdam	-Currently, certain policies and laws are not official yet, so the role of the Municipality is very constrained. Process is very lengthy. -They want 2 more laws: a law to change the market, so private heating/energy companies become public and a law for more policy instruments and power to change homes towards cleaner energy measures. -Held back because of large scale EU laws and regulation and the monopoly of big companies on the energy market. -The entirety of the heating transition is the biggest obstacle to face. The size, scale and complexity makes it a very difficult task. -Financial feasibility is a huge obstacle as well. -Some regions do not have a clear heat source, Rotterdam does have one. -Ther is a big space scarcity, above and below ground level. -Time pressures as barriers.
Researcher at Ombudsman	-Municipalities can make their own decisions, some have more trouble with this given power. -Municipalities give homeowners some financial aid, but there are also other groups like renters or social housing. -Methods and measures do not fit towards some citizen groups. -The threshold to participate is still too high. -Prioritizing financial instruments is not clear yet.
Central Audit Office	-Difficulties in reaching certain groups. -Methods and measures do not fit towards some citizen groups. -Clear goals about finances are lacking. Financial aid is not the only option.
Energy cooperative (city-level)	-There is usually a specific type of individual who would join in at the energy cooperation, the other are more difficult to reach. -There is still unawareness amongst people. -A big dilemma: rather slow and steady, but we don't have much time left.

	-Dependency on spatial context and how social networks are established.
Community organization for inclusive energy transitions	-Social dimension is insufficiently incorporated into municipal policy. -Citizen initiatives rarely originate from a group with a migration background. -Difficulties in reaching certain groups. -The goals are more than just a box to tick or numbers to reach, it is about shaping new sustainable bonds between groups and institutions, but that is still very difficult to achieve. -There is still bias to citizens groups who have better capacities. -Methods and measures from municipal policies do not fit towards some citizen groups. -People find it hard to follow information and there is a large distrust towards the municipality.
Energy cooperative (neighborhood level)	-Still a very new organization. -it is all still very political, every 4 years there are new people with new ideas and needs who have the power to decide -The energy system and thus transition is still very political and influenced by bigger, market influences. -Finding methods to engage people is difficult. -Building up citizen support takes time.

Collaborations

6. Which other organizations/roles/people do you work with in the strategies towards sustainable energy futures?

Policy Advisor Municipality of Rotterdam	-Housing corporations, energy cooperatives, banks, developers, ministries and national government. -Companies, harbor, logistics and mobility sectors.
Researcher at Ombudsman	-NGO's: citizen group input, organizations for needs of low educated etc. -Other public sector organizations
Central Audit Office	-Same as above.
Energy cooperative (city-level)	-Funded by the municipality, but is an autonomous club. -Mostly with individuals and active citizen initiatives. -With social real estate (schools, sports facilities and art foundations) for the roofscapes and spaces for shared solar panels. -Energie Bank (Energy bank). -Volunteering organizations. -Housing corporations.

Community organization for inclusive energy transitions	-Local citizen networks. -The organization is still new and small, so no financial and institutional instruments like municipalities or environment centers. -Work with other alliances as well.
Energy cooperative (neighborhood level)	-Other energy cooperatives. -Work with organizations to create campaigns, so social organizations for community building. -With social real estate (schools, sports facilities and art foundations) for the roofscapes and spaces for shared solar panels.

7. How do these relations work and how are they sustained?

Policy Advisor Municipality of Rotterdam	-The municipality wants a more coordinating/jurisdictional/process-oriented role. -The role of the municipality will shift a bit towards people who have lower transformative capacities in the future. -Currently more pushing/forcing relations instead of collaborative. -Stay selective on who can help themselves.
Researcher at Ombudsman	-Not a direct actor in the transition, stay more on the outside and have reflecting relations with other stakeholders. -Structural collaboration as mediator between stakeholders.
Central Audit Office	-Same as above.
Energy cooperative (city-level)	-Energy cooperatives become a reflection of the neighborhood. -Relations based on funding, negotiation or really executive and informative. -Some deals are really formal, especially when it comes to roof spaces. -The energy bank is also formal, but have similar levels of executive powers. -Negotiations with housing corporations.
Community organization for inclusive energy transitions	-Relations based on inspiring one another and learn from each other. -The municipality takes a really long time to communicate and make decisions.
Energy cooperative (neighborhood level)	-Relations through community groups and social organizations.

8. Would you like to see more collaborations between different organizations towards sustainable energy futures?

- Why yes or why no?

Policy Advisor Municipality of Rotterdam	-Yes, everyone is involves and has to reach the goals. -More relations depend on the issue at hand.
Researcher at Ombudsman	-More collaborations and information exchange with ombudsmen of other cities. -Definitely see more collaborations in the future when energy transition grows into something bigger.
Central Audit Office	-Independent so they are not involved with shaping new policies.
Energy cooperative (city-level)	-I really depends on level of urgency .In crises moments, social relations do go up. -If the issue become complex, more formal deals have to be made. -Cooperative networks on city scale are growing, still more collective than formal relations. -Energy cooperatives are still novel for formal relations with institutions.
Community organization for inclusive energy transitions	-Working together and building trust is the one main aspect of good democracy. -There can be more formal and informal relations in the future.
Energy cooperative (neighborhood level)	-Yes, but the institutional base is still missing. -Hopefully more relations to build more loyal members. -Different actor collaborations can aid each other and provide spaces for cooperation. -Still unsure if more formal collaborations are desired.

Participation

9. How does your organization work with citizens on implementation level?

Policy Advisor Municipality of Rotterdam	-Municipality has a more informing role towards citizens. -There are many negotiations happening.
Researcher at Ombudsman	-Not directly, only complaints and evaluations.

Central Audit Office	-Not directly.
Energy cooperative (city-level)	-This is the entire essence of the organization, but direct citizen relations not specifically. The organization is more the umbrella above it all. More support and formalities are needed first.
Community organization for inclusive energy transitions	-Not directly, more as an ‘umbrella’ organization.
Energy cooperative (neighborhood level)	-Not at this moment in time. -Still unsure about the type of relation towards citizens.

10. Whats do you think the strengths are of these existing collaborations?

Policy Advisor Municipality of Rotterdam	-Citizens are able to provide input.
Researcher at Ombudsman	-Involving citizens is important (information and perspectives).
Central Audit Office	-Involving citizens is important (information and perspectives).
Energy cooperative (city-level)	-Citizen collaborations are needed as the municipality can not tackle the energy transition on their own. -Joining a cooperative is already a strength.
Community organization for inclusive energy transitions	-Different citizen groups can come into contact with one another. -People inspire each other and follow examples set up by other individuals.
Energy cooperative (neighborhood level)	-In order to equally decide what to do with the money/profit. -Informal/social networks exhibit a sort of resilience that is important to foster.

11. What are barriers to these existing collaborations?

Policy Advisor Municipality of Rotterdam	-Municipality has to make more considerations for participation. Citizens can get more power but no complete autonomy. -There are many factors, depends on social network strength, education level, lifestyle etc. -Municipal power has to be there in order for collaborations to play out in a just and fair way for everyone. -People should be well informed but this is not yet a reality.
Researcher at Ombudsman	-It’s hard to reach certain groups. -Really depends on context of neighborhood and presence of active/involved groups. -So many different factors are involves which makes it hard for the municipality. -Large decisions should be made on that national/institutional level so people should comply to a certain extent.
Central Audit Office	-Same as above.
Energy cooperative (city-level)	-Unawareness and distrust as main issues. -Lack of strength and trust of citizens is another barrier.
Community organization for inclusive energy transitions	-Citizens miss a certain bureaucratic ability and the tools given are not enough. -People lack a sort of proudness of their neighborhood, they do not realize the strengths of their own neighborhood yet.
Energy cooperative (neighborhood level)	-It takes time to build up a strong community. -Communities are very powerful but also very fragile. -Difficult to show people the values that are hidden in their neighborhood.

12. Does your organization see any future opportunities for collaborations towards sustainable energy futures?

Policy Advisor Municipality of Rotterdam	-Through new laws, more participation can be stimulated. -Creation of representative citizen groups. -Hopefully, citizen initiatives will increase. There is an ambition to then raise their power in decision making processes.
Researcher at Ombudsman	-Participation and communication is important. -Use of words should be a focus point.
Central Audit Office	-To have a proper socio-spatial representation of the citizens in that neighborhood.
Energy cooperative (city-level)	-Hopefully the more we do, the more support will grow. -Younger generations have a more collective mindset and can be seen as an opportunity.
Community organization for inclusive energy transitions	-The municipality should aid disadvantaged citizens in the long run, not just small measures. We need to teach people how to do it themselves or maintain/sustain those habits. -In the long run, small measures will become useful and add up. -To raise the collective feeling and togetherness. -Make citizen initiatives more visible to increase pride. -Aim to connect different demographic groups as well.
Energy cooperative (neighborhood level)	-Yes and no, because there are other neighborhood with more economic power for example. -But yes, because the energy cooperative (city-level) organization acts as a connecting unit.