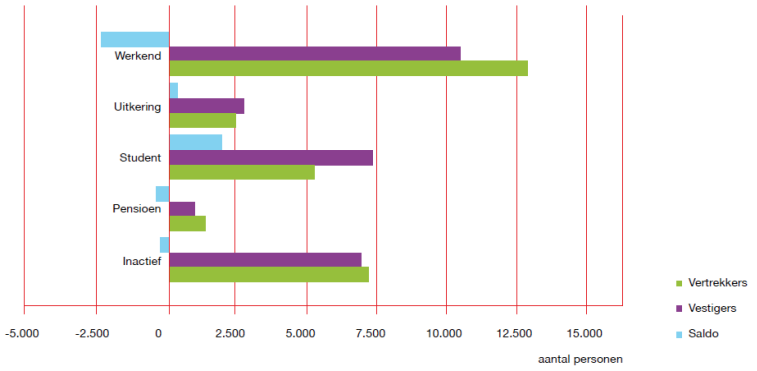
10

REFLECTION

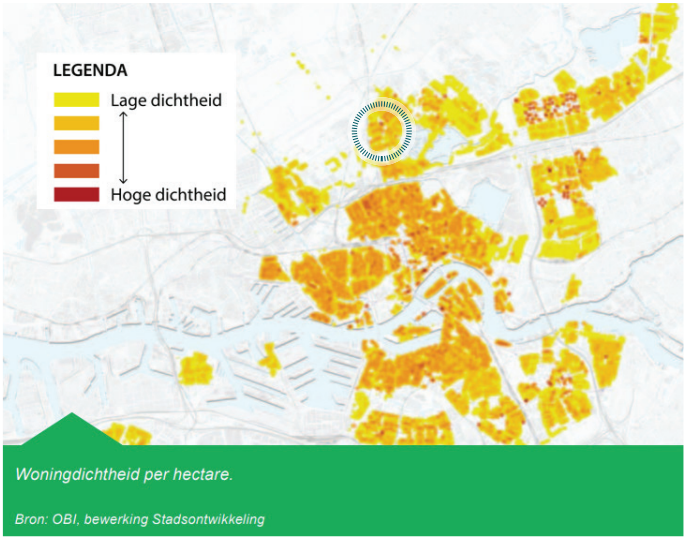
10.1. PERSPECTIVES OF REALIZATION

Overall, this thesis focuses on bridging the engineering and design gap by translating engineering solutions and renewable technologies not just in spatial qualities but also in design values. The case study has been an effort to show how this could be approached in a post-war neighbourhood. However all this process has been mostly viewed from the perspective of the designer. Indeed all the steps of the process as well as the final design method are meant to be handed to designers as a guide towards the urban energy transition. The realization part, though has not been explicitly addressed in the project. One of the most important realization factors for an urban project like this are the actors involved.

FIGUUR: SELECTIEVE MIGRATIE ROTTERDAM 2003



Bron: COS, nov. 2005



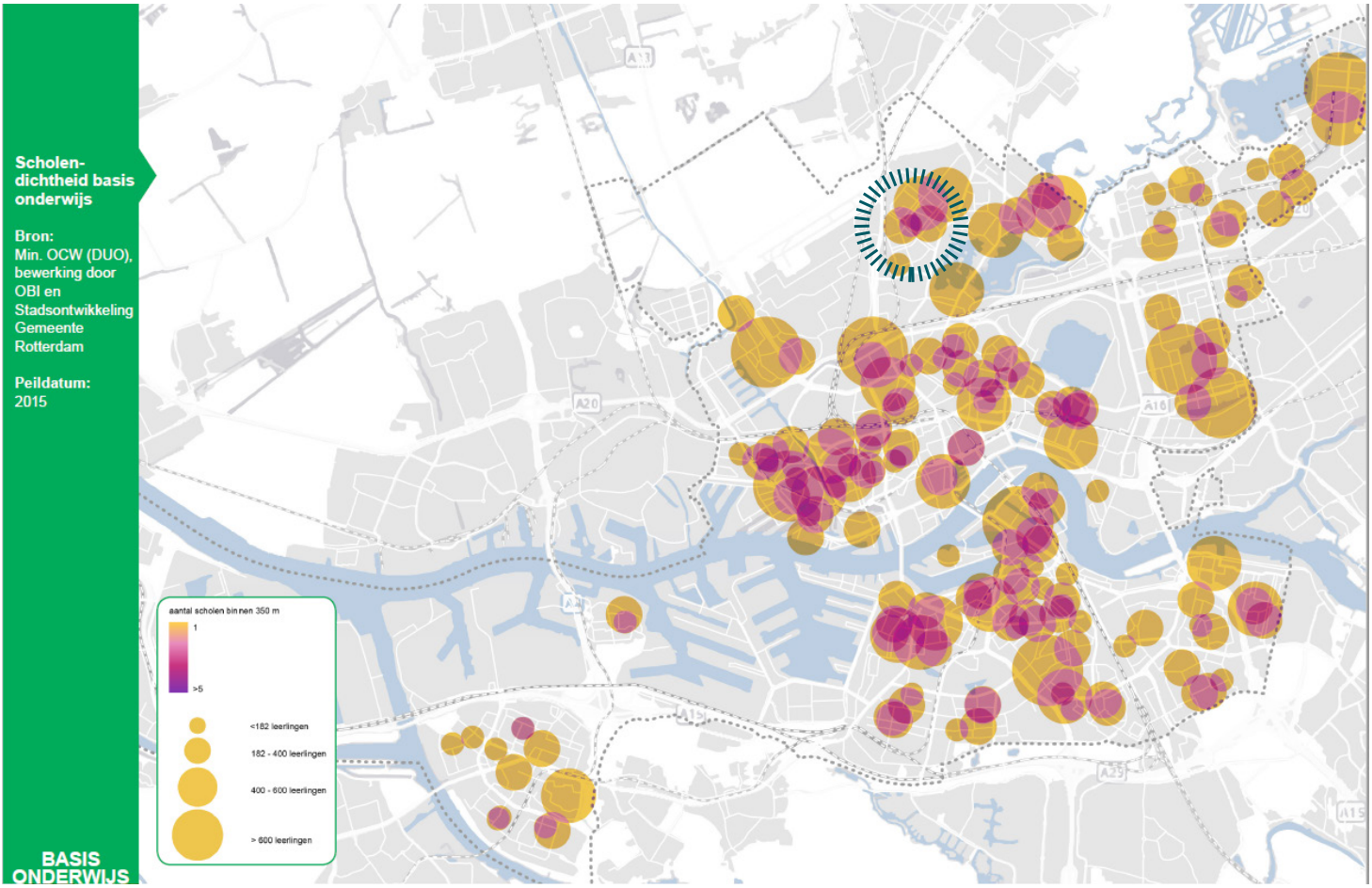
Woningdichtheid per hectare.

Bron: OBI, bewerking Stadsontwikkeling

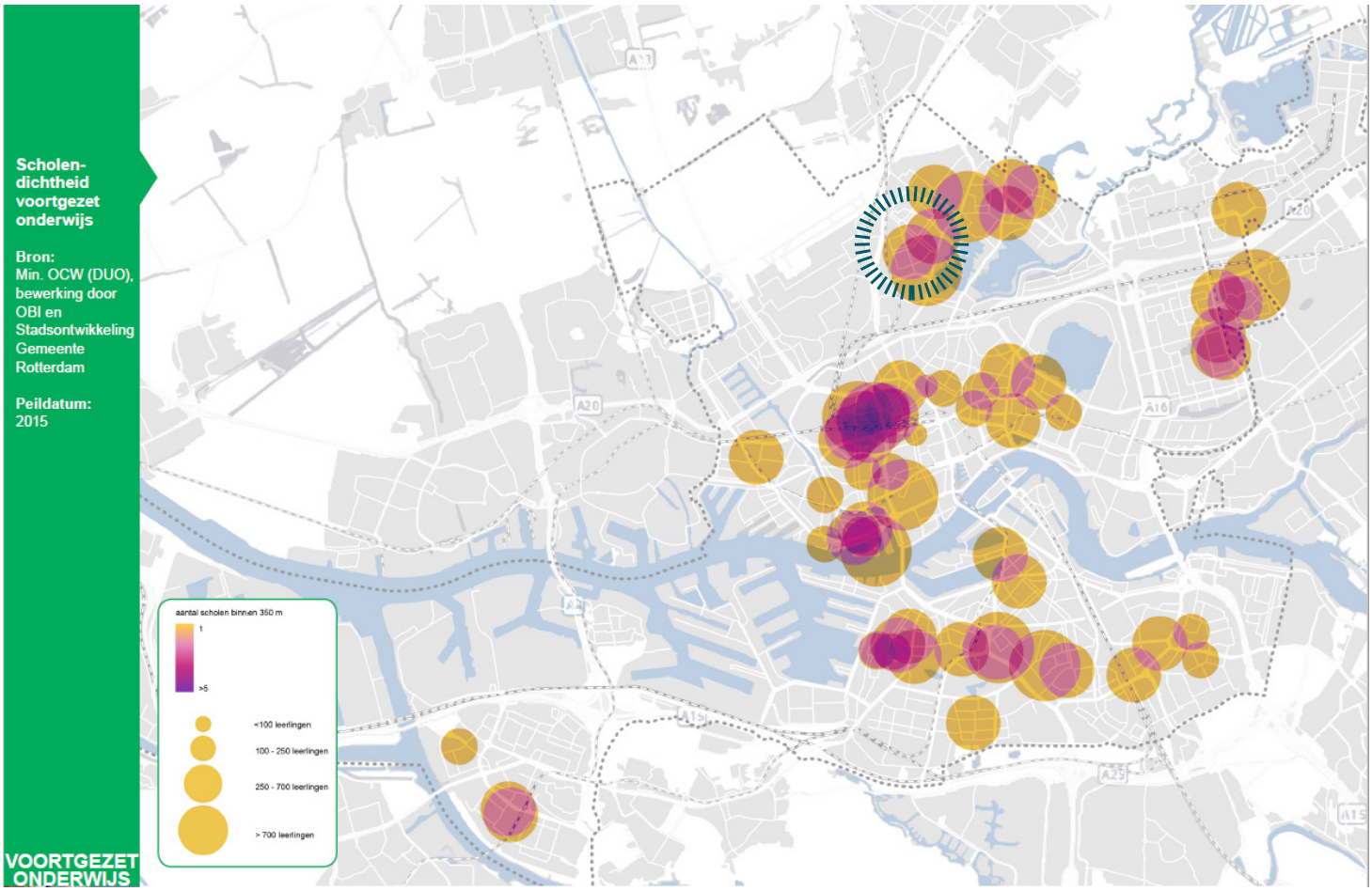
The role of the various actors will be seen from the perspective of municipality visions (documents on Schiebroek Zuid and Rotterdam), interviews held by me with people involved in the subject from different posts and on the social profile of Schiebroek Zuid. The actors examined are:

- the municipality of Rotterdam
- housing associations
- local energy initiatives
- residents of Schiebroek Zuid

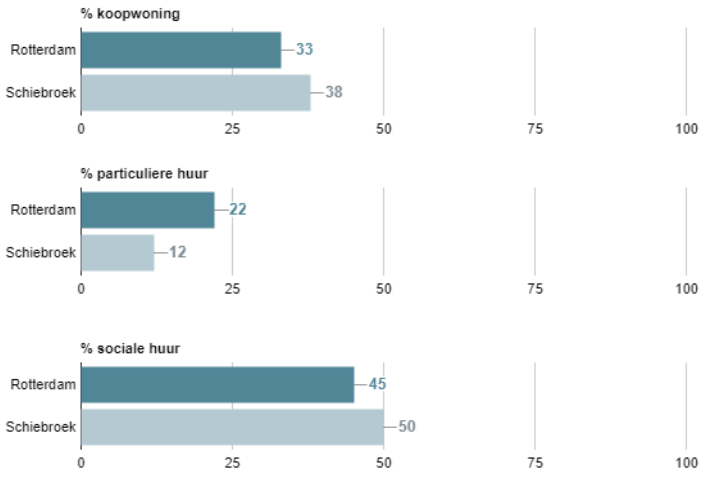
The *municiplaity of Rotterdam* is interested in two things that could potentially make them an ally for this kind of project. Firstly, it is facing the pressing issue of *selective migration* out of the city. Namely, many young educated people that have studied in Rotterdam and have found their first job there, when they decide to have a family they choose to leave from Rotterdam. The reason for this selective migration is a shortage in quality houses for families within the city. This phenomenon is negative for the city since these educated and higher income social groups can work in benefit of the 'roltrapfunctie' (gemeente Rotterdam, 2007). This is a social mechanism that improves the social status of the whole city, since it works as a "draging" force for the lower social and income groups. It is therefore the desire of the municipality to create quality houses appropriate for young families and the according urban environment. Schiebroek Zuid as a post-war neighbourhood could be densified in order to welcome young families and additionally, it seems to have a sufficient number of schools for primary and higher general continued education (the three maps of this and the opposite page).
Secondly, the municipality has exhibited a clear direction towards sustainability on all levels. Specifically, by 2025 Rotterdam wants to have *sustainable electricity* with energy from wind, solar and biomass (Gemeente Rotterdam, 2007).



the density of schools of primary educational level (Bron: Min. OCW (DUO), bewerking door OBI en Stadsontwikkeling Gemeente Rotterdam)



the density of schools of secondary educational level (Bron: Min. OCW (DUO), bewerking door OBI en Stadsontwikkeling Gemeente Rotterdam)



source: wijkprofiel.rotterdam.nl

Indeed there are ways to provide with an energy efficient housing stock without neither demoliting the existing post-war buildings nor insulating them highly which skyrockets the expenses. Urban morphology and designing for a synergy between newlly built highly efficient buildings and post-war buildings – as part of the densification that has been pursued throughout the project – can protect buildings from climatic related energy losses. Therefore this project replies both to the emotional needs of people to remain in their homes, as well as the sustainability goals of housing associations which stem from the municipality and beyond.

However since the mid 90s that *housing associations* became independent (ICOMOS, 2003) most post-war neighbourhoods, such as Schiebroek Zuid, belong to them while some houses are privately owned. This complex ownership status makes the role of individual actors less clear and therefore actions are less possible to take place. In the case of Schiebroek – statistics show the bigger area of Schiebroek, not just the Zuid – 50% of property belongs to housing associations. The data does not allow certain conclusions about the ownership percentages of Schiebroek Zuid, however the number of visions from housing corporations on the neighbourhood shows that social housing isa substantial part of the overall housing. Indeed plans and visions have been made, especially from Vestia for the area. The main focus of these visions are: new higher quality residences and sustainability. As it is visible in their visions, housing associations prefer to demolish existing buildings and erect new ones – especially since this is part of national policy for post-war residential areas (Priemus, 2006). In contradiction to that, tenants commonly insist on maintenance of their houses instead of demolition.

In reference to *sustainable energy*, housing associations are facing certain issues due to lack of insulation. Poor insulation means huge amounts of money in order to renovate and add insulation to post-war buildings. Therefore what associations try to do is to connect their residential areas to district heating systems. However district heating is not (yet) available everywhere and the cost of connecting its residence to it is stil quite high (Schrederhof, 2018). So according to two interviews I had with Karin Schrederhof (Woonbron) and Paul Broekhuisen (urban designer in the municipality of Rotterdam), housing associations are therefore looking for solutions that could help lower the energy bill without having to heavily insulate old buildings. In the words of Karin Schrederhof "*(...) if there are solutions that have a relation with our housing I think you have a partner in the housing association.*" This kind of logic could perhaps make housing associations interested in applying design solutions related to densification as well as energy use and production when it comes to te residential buildings. Indeed there are ways to provide with an energy efficient housing stock without neither demoliting the existing post-war buildings nor insulating them highly which skyrockets the expenses. Urban morphology and designing for a synergy between newlly built highly efficient buildings and post-war buildings – as part of the densification that has been

"I think how better the ideas are, how more able we are to change the system of the nets in Holland. If you have good solutions maybe we think about another system."

Karin Schrederhof, Woonbron (2018)

Sustainable Schiebroek-Zuid

Social housing neighborhood redevelopment

pursued throughout the project – can protect buildings from climatic related energy losses. Therefore this project replies both to the emotional needs of people to remain in their homes, as well as the sustainability goals – the energy related of course – of housing associations which essentially stem from the municipality and beyond.

Local energy initiatives are currently collaborating only with house owners that can invest in sustainable energy, so higher income groups. People of lower income and people on rental they are not interested in generating sustainable energy because they don't have the initial capital to invest (Schrederhof, 2018; Boejinga, 2018). So even though, post-war neighbourhoods heve a significant number of non-residential buildings that could be used for installation of solar panels with the help of energy initiatives, it might not be feasible. Inhabitants of many of the post-war neighbourhoods are of low income so they probably wouldn't have enough capital to invest. It is my personal belief that energy initiatives show great potential not only in assisting people to lower their energy bills but also in contributing to a decentralized sustainable energy network. Nevertheless it seems that in the case of rented social houses in post-war neighbourhoods with low income population there is no fertile ground in the current phase for local energy initiatives to actively contribute.

Finally, *local residents* as aforementioned they couldn't probably invest in any of these design solutions. But, as it is also suggested in literature (Sijmons et al., 2014; Janda, 2011), my personal belief is that users' engagement is of crucial importance for the transition to sustainable energy. Therefore in this project it is attempted to view public energy generation solutions as a type of sustainable energy pedagogy (ENORME STUDIO, 2018). Most of the public space design solutions are, as aforementioned, not meant to provide the houses with energy but to provide various public activities – cafes, repair cafes, community centres, markets, play spaces, etc. – with the energy they need. In this way it is hoped that the sharing of these spaces and the visibility of renewable technologies can stimulate people to care about the source and use of energy in their lives. There is however growing concern that this kind of interventions in a neighbourhood with many financial and social issues will not be welcomed. In particular in an interview with Rolf Bleeker (Schiebroek wijkmanager), it was clearly stated that interventions such as energy producing urban furniture could face vandalism. Therefore there has been an effort for cheaper and easily replaceable technologies (such as solar fabric or the low-cost vertical wind turbine) but there is no answer as to hoe actions like these would be actually perceived. In conclusion residents in this case is not an actor that could be held as main players in this kind of project.

10.2. PERSONAL REFLECTION

The graduation project is a process that seems like a walk through the fog, even though you might start with a clear idea of where you are and where you want to go, the things that will unexpectedly appear on your way will eventually change it. And even the destination in the end will not be the same as this first image that made you set out towards it. This allegory describes briefly my personal experience through this project.

The starting point was the idea of a design language that would manage to incorporate renewable technologies in cities, in a way that they could both contribute to the energy transition but also a new urban landscape would be formed. This new urban landscape would spatially embrace renewables – in contrast to what has been happening so far – which could happen with the help of designers both to create aesthetic value to technologies as well as the added value of giving them a role in the city and making it possible for people to use them and accept them. This idea didn't cease to be a significant part of my final destination but by delving deeper into the subject of the energy transition, new aspects were revealed. Energy systems in my understanding until then had to do with technical possibilities and infrastructure, getting acquainted with notions such as fossil dependency, invisible energy, carbon lock-in and energy equity, changed my perception of the energy transition. This, for me, was a desirable and necessary change that didn't stop me from moving towards my destination but made the final result more grounded to reality and more multifaceted.

Processing the information and complexity of energy systems and their transitions has been the hardest part of this project. The ideas about the connection of energy to financial and social justice, to the form of the city, to people's lifestyles, etc. created a troublesome but wonderful journey that added depth and value to my actions and design. After overcoming the chaos that some of the vaguest or the most theoretical notions created, this framework helped me understand the roots of the fossil dependency and the areas of action, as well as how to start dealing with them. The effort to ground those notions to urban design led me to trace the spatial manifestations of the fossil dependency within the city which then led me to one of the pillars of this project: post-war neighbourhoods and the need for their densification. The second part of this grounding effort has been to locate within theories the reasons that led to this lock-in state. The search for reasons actually led me to understand not only what the factors were but also to what I should address with my project. The new, much more specified, notions that came out of this process – climate and energy use and production, post-war neighbourhoods and densification – were based on an in-depth study of energy systems but also an intuitive approach that became more organized and conscious through time.

After having fitting the different notions into different parts of the process and figuring out the method in which they would come to bind, came a period of concentrated knowledge that has been perhaps the most interesting for me. Learning about different climates and how they affected the form of human settlements and cities before fossil as well as the physics behind the behaviour of wind and how the designer can influence its behaviour with the structure of space and built form, has been inspiring for me. The first moment of excitement for the success of the method came after I had gained a good understanding of the optimum morphological qualities in relation to climate, and I started studying modernism and post-war neighbourhoods. The comparison that first happened in my head while reading and then became specific when the design patterns and sub-patterns were designed, made me realise that intervention is indeed needed and could improve the existing situation without demolitions needed. The second most exciting moment was when the application of the patterns on Schiebroek Zuid came. Firstly, because the morphological qualities of dutch post-war neighbourhoods actually applied in the specific neighbourhood. Secondly, because by the application the Matrix, the Typology of dutch post-war neighbourhoods and the Design Patterns – the 3 pillars of the project – fell in place and the links between them became much clearer.

The expected destination of the project has been since the very beginning to create a method for designers that – based on the knowledge I gained through the process – would guide them in applying urban design solutions towards conservation and generation of energy in relation to climate. This can hopefully assist in making the urban energy transition a reality. The complexity that was evident when applying the design patterns on the case study shows that there are social, financial and other location-specific parameters that perplex the step-to-step method. In the end the design method is firstly a set of instructions on how a designer can use the knowledge gathered in the project and secondly a set of design ideas that can be an inspiration for the designer to incorporate in his/her own design. After all, what is needed for this transition, apart from the knowledge, is the ability to imagine the future and then share the images of the future with the world. This is in the end my modest contribution to urban design, searching and combining information of different disciplines and the latest technological advances in order firstly to make a framework and then providing with design ideas that can use this knowledge and make the urban energy transition imaginable.

10.3.. LINK WITH RESEARCH GROUP

The current graduation project is located in between 'Smart City and Urban Metabolism" and "Complex cities" research groups. The subject links future transformation of urban areas – especially connected with urbanization – with the energy transition and explores the design tools that can assist urban designers towards the urban energy transition. This transition is much needed towards our way for sustainable living environments, and in this project attempts to show a path that can *accelerate the transition without compromising our quality of life*. Because as stated in one of the research questions of the Urban Metabolism group, urban metabolism should be influenced by our strategies in such a way that not only the transition will be accelerated but the resulting sustainable living environment will be characterized by a high quality of life (urbanmetabolism.weblog.tudelft.nl).

In the process of searching for possible answers, the micro-climate – as a factor affecting heat losses/gains of heat (aka energy), in buildings – became increasingly important. Wind patterns, solar radiation and other climatic conditions are explored in reference to urban morphology in order to come up with design solutions concerning energy use as well as production. Literature or existing examples are used in order to discover the optimum characteristics of urban morphology in relation to each climatic condition. Ultimately the purpose is to explore how we could redefine current practices in lines of climate-responsive and energy-active urban design. The correlation of the urban morphology with the micro-climate, constitute essentially the study of flows of energy from the open to the urban environment to the exterior and eventually the interior of a building, as well as the other way around. The in depth study is directly linked with the understanding of the flows of energy in the city and it should be therefore a core part of urban metabolism in relation to the energy circle.

In the same line, to address the energy circle there also needs to be a clear understanding of the existing energy "feeding" system. Namely, the infrastructures that are currently providing with energy and not only their physical dimenisions but also the political and economical. This project has been exploring these subjects in order to sed light on varying aspects that relate to the transition and its obstacles. A research that I believe is both relevant and extremely important in order to successfully tackle the energy transition.