The role of spatial development in the energy and climate transition

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1. Synopsis

This paper is focused on how spatial development can contribute to the energy and climate targets. Focus points will be defined to indicate the role spatial development can play and a research by design exercise will be discussed. To conclude, policy recommendations in general and specifically for Flanders are formulated.

2. Introduction

Themes like nature, housing, mobility and environment have been part of spatial development for many years now. An additional focus which is receiving more and more attention (Sijmons, 2014; S. Stremke, 2017; Sven Stremke & van den Dobbelsteen, 2012; Van Kann, 2015) is the theme of energy. Just like the other themes, a structural link between spatial development and energy is needed according to these authors. Energy policy has consequences regarding the spatial design of our environment and the other way around spatial design and spatial policy also determines the energy systems.

The white paper of the spatial policy plan Flanders (Vlaamse Regering, 2016) acknowledges the challenge of the energy transition and links it to strategic objectives of contributing to a robust European energy network, living environments with a high quality of life generating a surplus of energy, reducing mobility by concentrating new developments near collective transport nodes, safeguarding energy services provided by open spaces and facilitating the generation of renewable energy in every type of land use. The spatial development principles as defined in the whitepaper are based on using less energy by avoiding wasting energy, increasing the energy efficiency by spatially stimulating the exchange of energy, facilitating the localization of renewable energy sources and bundling energy infrastructure.

This paper wants to contribute to already existing knowledge on the role of spatial development in the energy and climate transition. It aims to clarify and illustrate the possibilities and opportunities of spatial planning in Flanders to contribute in reaching the international long term targets regarding energy and climate on different scale levels from neighborhood to region. This is done by analyzing how spatial planning can contribute in an integrated way to the three energy targets: minimizing the energy demand, maximizing the energy efficiency and promoting the generation of renewable energy. At the same time, the overall goal of Flemish spatial development to stop further land take of green fields and even reduce the amount of land take is taken into account. The overall spatial strategies of doing more with less space, reusing space and reversible use of space are used as a framework to formulate concrete policy recommendations regarding space and energy. Its conclusions are based on a research project commissioned by the Spatial Development Department Flanders and the Environment, Nature and Energy Department and executed by Tractebel – Engie (Wauters, Dhondt, Fremault, & Corens, 2017).

3. Energy and space, what are the challenges?

Here, an overview will be given of the most recent insights regarding the relationship between spatial elements on the one hand and energy demand and generation on the other hand, with a specific focus on small scale energy generation, mobility and buildings. Existing literature and good practices are explored and analyzed in order to be able to indicate what the role of spatial development is. By confronting policy intentions concerning the spatial development with the desired developments on climate and energy, we can look further than a mere one-way approach in which spatial development is dependent on the objectives of energy and climate policy. This means we also explore the reverse connection: in what way can climate and energy policy contribute to the objectives of spatial policy. In order to concretely link the energy targets to the spatial context, the most important spatial elements for each sub target is analyzed.

3.1 Reducing the amount of energy used

Following the Trias Energetica (Duijvestein, 1998; Lysen, 1996) and the new step-strategy (Van den Dobbelsteen & van der Grinten, 2008) the first sub target is to reduce the amount of energy used, because the less energy we use, the less (renewable) energy needs to be generated. Within this sub target four elements should be addressed. First of all, the demand for transport should be reduced. In order for spatial policy to contribute to lowering the demand of transport, a location policy focusing on reducing the need for transport by concentrating different types of activities (like logistical centers, office and industrial areas, recreational zones and housing areas) in each other's proximity. The location of these activities influences the number of movements and the distance. The highest gains are achieved when daily activities are located close to each other. A second element would be to stimulate the use of sustainable transport options by either reducing the amount of motorized transport (by walking or biking) or using collective transport. Again location policy is an important factor. If activities are in each other's proximity walking or using a bike would become more attractive, while a smoothly operating collective transport systems relies on enough critical mass to be efficient. Moreover, facilitating sustainable transport options also requires providing the right type of space, like a network of bicycle lanes, parking spaces for car sharing, infrastructure for public transport and multimodal hubs. A third element is reducing the energy use in buildings. Energy use in buildings is mainly determined by the size of the building, the surface volume ratio and insulation. Focusing on smaller and more compact buildings and less detached buildings combined with higher insulation standards would help to reduce the energy use in buildings. In certain cases, renovation of existing buildings will not be possible or wanted. Demolition and new development (with new typologies) will offer a better solution. Moreover, because of the dispersed ownership of buildings in Flanders it is challenging to renovate buildings on a larger scale. Facilitating collective approaches for renovations could offer opportunities. The fourth element, which is also crucial to realize the first three elements, is spatial efficiency. A high spatial efficiency is needed to offer a sufficient amount of services on a short distance to reduce the need for transport. Moreover, transport over short distances is more easily made sustainable. Higher densities facilitate the organization of public transport. Building more compact is an integral part of spatial efficiency. However, each area has its own challenges, therefore a place-based approach is crucial. Using higher densities will however only be accepted if the overall quality of life does not decrease. It is therefore crucial to not only look at the individual building, but also at a district or city level making connections between buildings and green and blue infrastructure (Wauters et al., 2017).

3.2 Increasing the energy efficiency

The second sub target would be to increase the energy efficiency. First of all, the efficiency of buildings could be increased by improving the way energy is produced and transported within and between buildings. Examples are using collective installations both for generating energy (solar panels, geothermal energy) as well as distributing for instance heat (heat networks); replacing outdated installations; recover energy surpluses by introducing heat cascades and generating heat close to the place where it is used (Wauters et al., 2017). When individual energy end users are interlinked their energy need can be brought down to 1/5th of the need of independent users (Posad, 3E, Universiteit Gent, & Resourcedesign, 2016). Secondly, increasing the energy efficiency in transport is mainly a matter of technology and infrastructure. Spatial planning has only a small role to play here (Wauters et al., 2017).

3.3 Increasing the amount of renewable energy

The last sub target is to increase the amount of renewable energy. Two spatial elements within this sub target are put forward. This is first of all the use of renewable energy within buildings. The use of renewable energy can be subdivided into two components. First of all, there is the use of renewable energy generated elsewhere, the large scale renewable energy projects. Switching to renewable energy sources, like wind, sun, water and biomass, would require using more space compared to the conventional sources, because these renewable sources are a lot less energy intensive compared to fossil fuels (Sijmons, 2014; van Noordt, 2016). Moreover, the potentials of these different sources are much more place-based (Posad et al., 2016) with, for instance, the possibility to generate electricity with water power being dependent on the availability of water and a sufficient amount of height difference. On the other hand, renewable energy can also be generated on a smaller scale making it possible to integrate the generation into the built up environment, like solar panels, smaller wind turbines, biomass power plants and CHP. But although these smaller scale energy generating facilities and storage are more easily integrated into the buildup environment, they still need space and an intelligent integration. On the other hand, the great variety of landscapes in Flanders could also offer possibilities for different forms of local energy generation, local energy cycles and connecting producers with consumers (Architecture Workroom, Boeijenga, Vink, LIST/GRAU, & H+N+S Landschapsarchitecten, 2013). These opportunities could contribute to innovative spatial-energy strategies. Local renewable energy generation could also have adverse effects, like creating self-sufficient energy islands or supporting spatial developments in unwanted areas. A collective approach towards this local generation seems to be needed. Generating energy locally should not only be stimulated on the level of a building, but also on different scale levels. Generating, distributing and storing energy locally is however a very complex issue demanding expert knowledge, which is not always locally available. Spatial policy could play a facilitating role in tackling this complexity also paying attention to the three dimensional component. The second spatial element in increasing the amount of renewable energy is the use of renewable energy in transport. Again, transport can use renewable energy generated elsewhere, like explained above. Secondly, clean fuels could be used for transport. Although this is not influencing the direct spatial needs of transport itself, it does influence the location and type of distribution points. At the moment it is still very uncertain which fuel source will break through, whether these are electric vehicles, vehicles on natural or biogas or vehicles on hydrogen or even some other type of fuel. Spatial planning therefore needs to be flexible and able to quickly respond to changing trends to facilitate these new developments. New forms of transport also enable new mobility concepts; this could also have an impact on the spatial configuration. A system where cars are shared would for instance need a different type of parking facilities (Wauters et al., 2017).

4. Focus points for spatial policy

Integrating the energy and climate challenge into spatial development is more than only taking certain specific measures or using specific instruments. Climate and energy goals need to be an integral part of spatial policy. Based on the insights explained above on the relationship between space and energy, and on the analysis of several successful international examples, five aspects are put forward in which spatial policy has a clear role to play and these aspects should therefore become focus points for spatial policy when regarding energy. All of these aspects are illustrated by good practices to elaborate them into more detail and to inspire policy measures.

4.1 Active spatial policy

At the moment spatial planning connected to the theme of energy is mainly following the needs put forward by energy policy, acting merely reactive. But, in order to achieve the ambitious goals of climate policy, it will not be sufficient to only play a facilitating role. Upgrading the existing urban structure and mitigating the adverse effects of previous measures will demand a more pro-active type of policy. Moreover, the actions needed from an energy transition point of view could be used as a lever to realize spatial quality. Examples would be to support large scale renovation projects, actively supporting new housing typologies with a higher spatial efficiency, investigating how the local potential for generating renewable energy could be improved by increasing the spatial efficiency and extending energy networks to enable local energy generation. At the moment most examples of an active spatial policy are connected to mobility projects. Reorganizing (car) mobility plays an important role in both small and large scale projects. The overall goals are twofold: on the one hand an increase of the quality of live is pursuit by reducing noise, enhancing air quality and reducing spatial impact, on the other hand more space is dedicated to alternative forms of transport (Wauters et al., 2017). In Barcelona, for example, so called ‘Super Blocks’ are created with large car-free zones for bicycles and pedestrians and ring roads with good public transport and other facilities. This project proves that large changes or investments are not always necessary to achieve improvements (Joanneum Research & UNDP, 2017). In a new brownfield development in Amsterdam, Buiksloterham, developers are obliged to take a number of sustainability measures regarding energy, resources, climate and mobility. Only those project proposals that reach a high level of sustainability are selected. Moreover, the municipality of Amsterdam regards geothermal energy as one of the most important renewable energy sources. In order to facilitate the use, an underground energy plan is made. This plan offers a framework for new geothermal systems with the goal to avoid negative interferences and to use the potential available to the fullest (Metabolic, Studioninedots, & DELVA Landscape Architects, 2016).

4.2 Collectivizing interventions

Challenges in both the housing and in the transport sector are asking to be tackled in a more collective way, especially on a lower scale level. Examples could be local energy initiatives, collectively improving the sustainability of the housing stock, extending collective types of transport and providing collective facilities for new sustainable types of fuel. For certain energy projects, collectivizing is essential in order to make the project profitable (Wauters et al., 2017). For other cases, like in the example of Vauban, Freiburg, collectivizing interventions is a way to reach sustainability goals that go beyond the scale of the district itself. In Vauban collectivizing certain measures goes hand in hand with participation. Collectivizing could also be a way to involve larger groups of residents with the energy and climate policy, reducing the resistance towards certain projects at the same time. Executing projects in a collective way can be done on many different scale levels. On the level of one building, on the level of a building block, a district or even a whole city several examples can be put forward like cohousing, exchanging renewable energy, heat networks and so on. An important issue to be able to collectivize projects is a clear framework from the government that facilitates collective action. This could be done by either administrative simplification or active policy. Governance is also needed in order to align different initiatives. When looking at the case of Freiburg, collectivizing, in the form a citizens building assemblies, has proven to be the key to reach higher densities without decreasing the quality of life. On the one hand less space is used by providing collective facilities like collective heat production, collective forms of transport and collective outdoor areas, while at the other hand energy use is reduced and housing becomes more affordable. The revenues and added value are used to finance the greater investments in insulation and energy generation (Salomon, 2009). Another example of a collective project is a new housing development in Naaldwijk, The Netherlands. In this district 146 houses and a nursing home are heated by residual heat from the adjacent green houses in summer. This residual heat is stored underground and used during the winter, while the cooled down water can be used in summer to cool the houses (KAW Architecten, 2017).

4.3 Place-based policy

Demographic and geographical differences need to be taken into account within a place-based approach to be able to use local opportunities and neutralize local obstacles. Rural areas with a shrinking population need other approaches compared to suburban districts with young families. Moreover, the efficiency of renewable energy sources knows important regional differences. Most of the existing energy projects take site specific characteristics into account. Custom made solutions are applied in order to tackle local challenges. A one size fits all solution is not possible regarding energy projects (Wauters et al., 2017). A special example of place based policy is Geneva where planning of energy production and consumption is directly combined with spatial planning. A total integration of energy aspects within spatial development projects is achieved by adjusting the regulations. This approach recognizes the need to not only focus on the individual level of buildings to achieve the climate targets, but instead to focus on the whole territory of Geneva and its land use. In this canton energy concepts are developed at a district level. Based on an analysis of the locally available resources, the needs, the actors and infrastructure a strategy for sustainable energy supply is developed at region, city, district, quarter and neighborhood level. Part of the strategy is also to inform individual residents, based on the above mentioned analysis, about the most suitable heating system like geothermal, heat network and so on (Favey, 2013). Rotterdam as well has a clear place based approach. The Rotterdam Energy Approach and Planning (REAP) offers a scheme with which each neighborhood can sustainably be redeveloped. The REAP methodology is a newly developed practice to become climate neutral for both new developments as well as existing neighborhoods. It is based on the principle already explained above: to first of all reduce the energy demand, secondly to reuse residual energy and lastly to apply sustainable energy sources. Originally there was a fourth step to meet the remaining energy demand by using fossil fuels as efficiently as possible, but the first three steps should make this last step unnecessary. Based on the different types of housing typologies recommendations are made to undertake actions for each of the three steps (Tillie et al., 2009).

4.4 Tuning different policy levels and policy fields

There needs to be a higher degree of alignment between spatial policy at the one hand and other policy fields at the other hand. Prospective studies and investment plans for improvements on existing infrastructure or extension of infrastructure for instance, needs to align spatial opportunities. Connecting energy generation with a clustering of different functions could increase the energy efficiency, while existing heat sources could facilitate development of new functions with a heat demand. When (inter)national good examples are analyzed one of the conclusions is that they do not focus only on the energy- and climate transition. Often these projects also want to realize other goals like city-development. By combining diverse goals, the project also gets interesting for other users or initiators (Wauters et al., 2017). For example, in Gent Dampoort a project on building block renovation took other goals besides reducing the use of energy into account, like security (fire safety, reducing the risk of CO-intoxication), health and the quality of the environment. In the end the project produced a manual in order to inspire and guide other possible projects towards building block renovation. Forging alliances is one of the crucial elements to guarantee success. Existing instruments were integrated into a unique partner cooperation (Canfyn, 2013). The case of ‘Hammerby’ in Stockholm, Sweden is another good example of how different sectors need to be integrated. In Hammerby the goal is to close all the cycles (of water, waste, materials, etc.) This necessitates the cooperation and adaption between many stakeholders and government institutes. On the other hand, synergies can be achieved by this type of interdisciplinary planning of energy, water and waste flows (Gaffney, Huang, Maravilla, & Soubotin, 2007). At the moment most of the newly developed projects have no relationship with other projects or with their direct environment. In order to facilitate an integrated approach, regarding both energy consumption and energy generation as well as water management, traffic policy and so on, different scale levels need to be included. Moreover, combining or even integrating spatial planning with other sectors, like mobility, housing or energy has also proven to result in more effective policies.

4.5 Awareness & training

Spatial policy only has a limited impact on the way projects are executed. Creating awareness with all the involved actors like architects, therefore remains a crucial aspect in developing climate and energy friendly projects. Good practices are needed in order to show how certain changes can be achieved in the field. Furthermore, a change in attitude and behavior is needed to fully realize the energy transition. A shift from private to collective transport, from dispersed to dense urban areas and from energy wasting to energy saving attitudes is not only a matter of spatial development, people using that space are the most important factor. Communication and direct knowledge support is needed. Many of the cases already mentioned invest a great amount of their attention towards participation and communication. By involving a high number of participants in an early stage knowledge can be exchanged and build up (Wauters et al., 2017). The example of ‘Leuven low traffic inner-city’ combines participation with awareness raising. The project started with an initiative of local residents wanting to convince people of the advantages of a car free inner-city. Through a website an awareness campaign is being conducted by informing residents, visitors, merchants, restaurants, schools, businesses, service providers and the local government and motivating them to participate (Platform Autoluwe Binnenstad, 2017). One of the most known international examples of climate and energy friendly cities is Copenhagen, it aims to become the world’s first CO2 neutral capital by 2025. Although Copenhagen is already scoring high points on mobility (mostly by bike and public transport), housing (space saving apartments) and energy efficiency (using district heating), still more can be done concerning saving energy, the modal split and reuse of waste. This is why one of the six action areas is focused on ‘Copenhageners and Climate’ in which 9 initiatives are dedicated to information, consulting and training (City of Copenhagen, 2009).

5. Research by design, case of Veurne, Flanders

To further specify and evaluate the role of spatial development within the energy transition a research by design exercise was executed on a concrete case. By applying some of the insights derived from literature and international examples, further insight can be achieved into the possibilities, limitations and conditions of measures in a Flemish context.

The case of Veurne deals with a typical Flemish allotment area from the second half of the 20th century. This neighborhood, ‘Voorstad’, is an example of the dominant living environments in Flanders in the second half of the 20th century. The neighborhood itself developed between 1970 and 2000 and is characterized by an aging population, low population density and houses which are no longer adjusted to the current living standards. Moreover, the projections for demographic developments predict a shrinking population by 2030. It’s location, however is relatively good, with a close proximity to the city center, although the connections towards this center are rather poor, resulting in a high use of the car for all movements. Due to the good location and changing population, it is expected that the neighborhood will enter a period of high dynamics. The goal of the research by design exercise is to analyze how this neighborhood can transform towards a more sustainable neighborhood, keeping the existing local specificities into account, but also the energy challenges and focus points like explained above.

5.1 Using densification as a principle for energy transition in a neighborhood

The first principle that is applied to the neighborhood 'Voorstad' is densification. Densification principles have been investigated from different angles the last years like affordable housing and landscape, but less from the energy and climate point of view. Many new principles regarding densification have been put forward, but at least in Flanders, not much is moving. The different principles regarding densification have been put together in a matrix in figure 1. The x-axis represents the scale of densification and the number of involved owners. Starting with one plot, over several plots to a small building block. The y-axis represents the intensity of the extension. From small extensions using the existing footprint to a complete renewal of a building block.

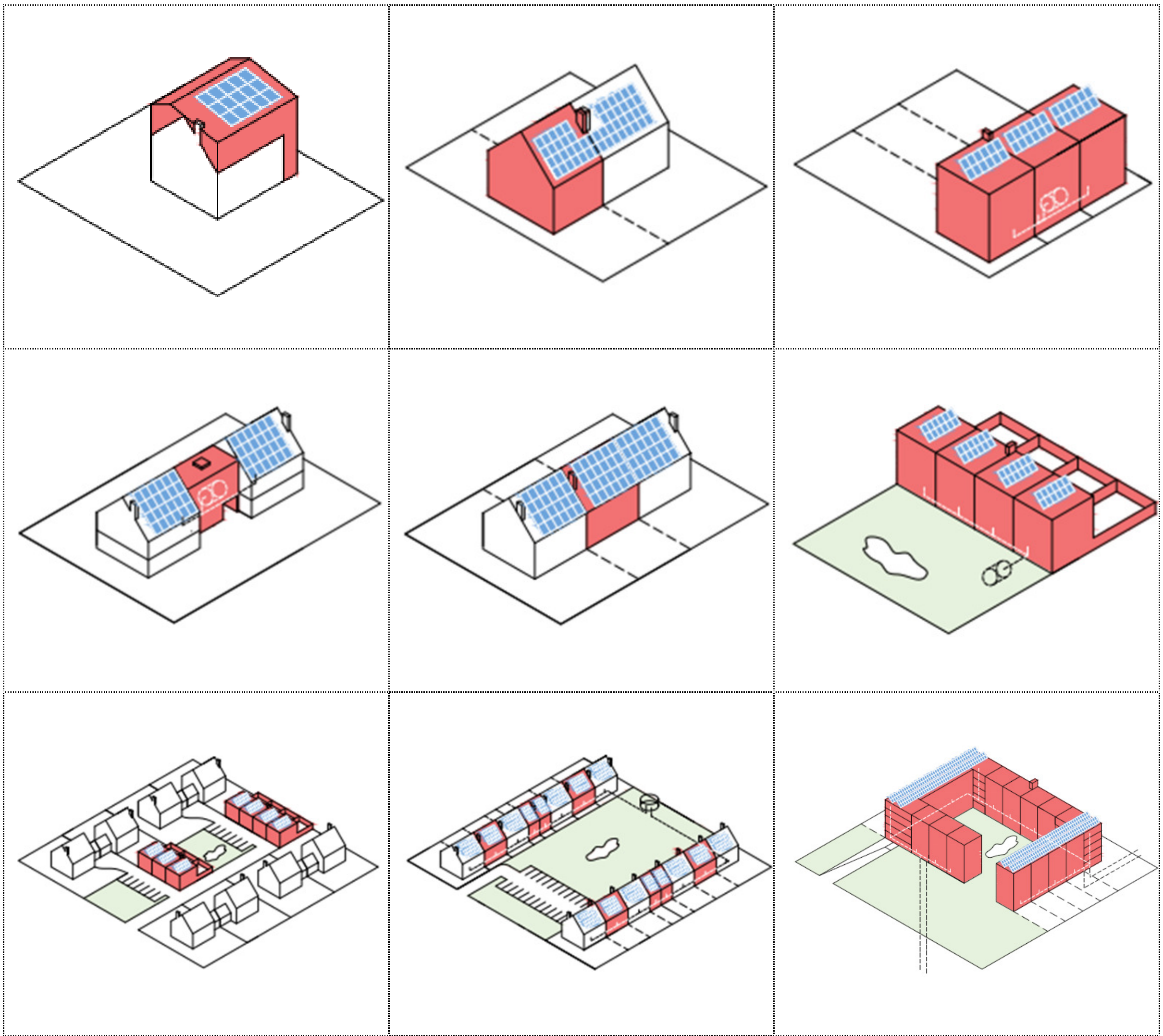


Figure 1: Principles of densification

Based on these principles a scenario exercise has been done that analyzed each individual building on its quality. By using a decision tree choices can be made not only for individual buildings, but also for neighboring houses and the whole block. This analysis made it possible to decide which interventions were needed for each building. Each plot realized progress concerning sustainability. Every densification strategy achieved either higher compactness, a better orientation, higher densities or collective energy production, or a combination of these components. Profits are not achieved by one large investment but by combining several small scale interventions, that enabled residents to take their own initiative.

5.2 Reducing car dependence to minimize energy needs

The second principle is focused on mobility and encouraging walking, cycling and using public transport (in that order) instead of the car. By adding more fine-grained connections for walkers and cyclists and by paying attention to the organization of the infrastructure, for example the width of a footpath, walking and cycling can be encouraged while using the car discouraged. Figure 2 shows the design principles. Most research on applying these principles has been done in newly developed, highly urbanized areas, while there is a lack of research on how to do this in existing allotments, like the neighborhood in Veurne.

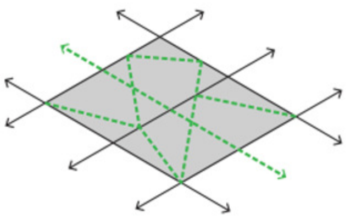
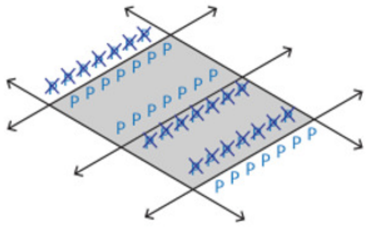
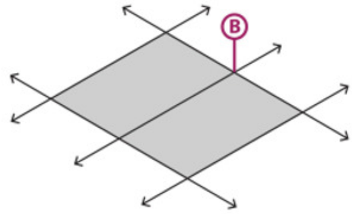
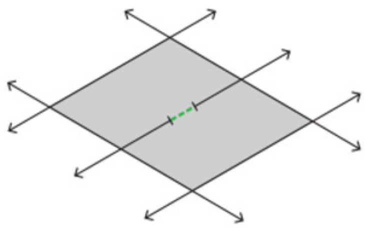
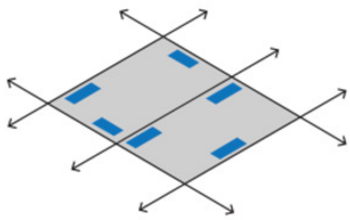
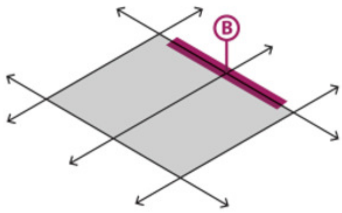
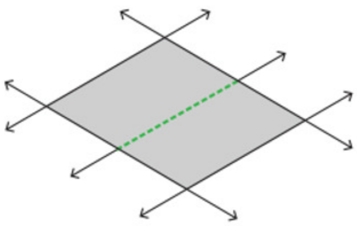
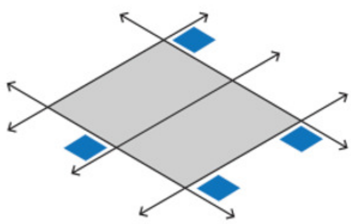
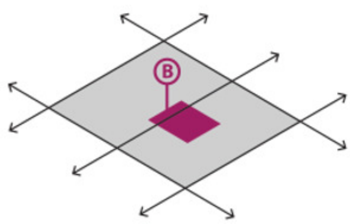
Increasing the comfort of pedestrians / cyclists	**Discouraging car-use**	**Improving public transport**
 Fine-grained network for pedestrians and cyclists	 Less parking lots	 Public transport stop next to neighborhood
 Car-free streets	 Collective parking & car sharing	 Public transport stop & amenities next to neighborhood
 Car-free neighborhoods	 Collective parking & car sharing outside neighborhood	 Public transport stop & amenities in neighborhood

Figure 2: Principles for mobility

By analysing and categorizing the existing road network in Veurne a differentiated strategy for each road can be developed based on the above principles. Three main road loops could provide sufficient accessibility, while roads outside these loops could be downgraded to infrastructure for bicycle and pedestrians on which cars are not allowed. Collective car parks farther away from the houses are introduced to further minimize the amount of cars in the neighbourhood. To increase the accessibility by foot and bicycle to the city centre new connections for this type of transport is added.

5.3 Spatial instruments

When analyzing the existing instruments for spatial development in Flanders, it becomes clear that these instruments are adequate to accomplish the measures like indicated above. Most larger and middle sized towns are already using these instruments with success. However, smaller towns and 20th century allotments are not. They could use support in creatively implementing a variety of proposed measures to create more sustainable neighborhoods. When doing this they should first of all examine the location of the neighborhood: does it have enough potential to further develop? A second step is to analyze the urban planning structure: is this robust enough? The third step would be to zoom into the buildings themselves: are they still qualitative enough to keep or adjust? (Wauters et al., 2017).

6. Policy recommandations

An active, place-based approach that takes local specificities into account and makes use of local opportunities seems to be needed to facilitate the energy transition. In this part several recommendations towards spatial planning in Flanders at different policy levels are given.

6.1 Location policy

First of all, a smart location policy is needed (Wauters et al., 2017). Structural improvement of the performance of the urban system is only possible when spatial policy in Flanders drastically changes its course towards reduction of mobility. Allowing developments like housing areas and business parks to take place on sites which are not suitable undermines all other efforts. This issue is also deeply connected to the subject of land take. Flanders has one of the highest built up and sealed up areas of the world, stopping a further increase of land take would therefore greatly facilitate increasing the spatial efficiency and redevelopment of brownfields. Selecting suitable sites for future developments is crucial and could be based on the study recently executed by VITO on the value of nodes (Engelen et al., 2016). This “node-value” is based on accessibility by public transport and the availability of services. Further research however is still needed to elaborate on this ‘node-value’. Should it for instance also need to include aspects of renewable energy availability or other aspects like quality of life, safeguarding flood prone areas and so on. An integral assessment framework is therefore needed.

6.2 Interventions within existing urban fabric

Serious energy reductions can only be achieved when the attention of spatial development is shifted from new green field projects towards transforming the existing built up areas (Wauters et al., 2017). Special attention needs to be given to frequently occurring situations in Flanders like the 19th century belt and the 20th century allotments. Transforming and redeveloping housing types which are difficult to upgrade should not be treated as a sacred cow. For some badly located sites the only solution is to demolish the buildings and relocate them. This strategy is not only beneficial from an energy perspective, but will also have other benefits like creating more open space for other functions like green-blue infrastructure. These type of actions will only be possible if there is a high sense of urgency both within the general population and within policy makers and should mainly be applied within those sites with a low ‘node-value’. This also necessitates the development of policies for shrinking regions, where demographic scenarios are predicting a decreasing population. People are leaving because there are no jobs, low services or a bad connection towards other places. This leads to a downwards spiral, where lower population densities trigger those services which are still there to close down. Shrinking areas could demonstrate important potentials as well to realize the goals towards climate and energy. In these areas the existing spatial structure could be changed by focusing on strengthening the cores, increasing urban densities in those cores and clustering services.

6.3 Urbanize

Although most attention in the last decades has been put on urban areas resulting in many urban interventions, the challenges remain, particularly when focusing on mobility. In Flanders urban areas are regarded with anxiety by most inhabitants as places which are lacking green spaces and privacy. The administrative boundaries of urban areas do not coincide with the functional boundaries, resulting in a suboptimal (collective) transport system and lack of investments in bicycle highways. But besides the transport system, a change in the mindset towards housing typology within the functional urban areas is also needed. Within cities, neighborhoods are mixed and vibrant places where several functions and typologies exist side by side, whereas in the 20th century suburban sprawl a mono-functional organization dominates. Transforming from a mono-functional 'housing area' towards a 'city neighborhood' will decrease the need for transport, increase the spatial efficiency and reduce depopulation (Wauters et al., 2017). Cities are highly dynamic environments, where innovations are tested, also regarding new energy solutions like new ways of living together (co-housing), exchanging energy or collaboration (circular economy). Facilitating these types of dynamics by giving them space to experiment could support the discovery of new spatial solutions.

6.4 Space for renewable energy

The urban sprawl greatly influences the possibilities to realize larger scale energy projects. Although Flanders has a similar density as Denmark and Germany, the share of renewable energy generated by wind turbines is remarkably lower. Open spaces are scarce, reducing the opportunities for wind turbines and increasing the amount of people negatively affected by wind turbines. The spatial structure of Flanders can however be changed, like examples from the past show. In the SIGMA-plan, large areas were designated as 'overflow' areas for rivers, preventing other, more populated areas to be flooded. The new spatial policy plan Flanders also focuses on a structural change within the built up area: by intensifying built up area around well connected nodes and reducing the built up space in other areas, space is opened up for other functions like placing wind turbines. Prioritizing the energy transition, also in spatial policy, needs long term visions and the development of financial instruments to support the already existing instruments (Wauters et al., 2017). Active policy can be supported by mapping renewable energy potentials and using these potentials in a place-based approach.

6.5 Supporting local governments

At the moment many local governments in Flanders are struggling to make the right choices regarding energy and spatial development. The region of Flanders, but also the provinces can play an important role in supporting those governments. First of all, Flanders could serve as a knowledge broker towards local governments. Much research has already been done at the regional and provincial level that could be beneficial for local governments, making sure these insights also reach the lower levels should be one of the tasks. This could be done by supporting the development of concrete projects either by providing ready to use instruments like assessment frameworks or energy potential maps or by providing a pool of experts that could give input. Second of all, the local level can be supported by providing new types of collaboration and financing models, which can be used within new developments. Lastly, there is a need in Flanders to start experiments which can inspire other municipalities. The existing good practices are mainly located in foreign countries, with other spatial specificities and planning practices. Starting innovative experiments which are representative for the Flemish context and take local specificities into account are therefore crucial. Moreover, these experiments should not stop at just providing a masterplan, they should follow the project towards realization and even beyond (Wauters et al., 2017).

7. References

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