The development of local long-term renovation strategies in Flanders

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Abstract

Between November 2020 and August 2021 and in collaboration with eight pilot municipalities, the LIFE project "Belgium Renovates for Energy Efficient Living!" (BE REEL!) worked together with the company BUUR Part of Sweco (BUUR PoS) to develop general guidelines to support municipalities in Flanders (Belgium) to develop drafts for their own local long term renovation strategies (LLTRS). Besides these guidelines, they also developed eight inspirational roadmaps with the pilot municipalities to support thae development of their LLTRS. To ensure maximal diversity in the different cases, the pilot municipalities range from mid-sized and larger municipalities to towns and larger cities. This paper summarizes the key findings of the development process for governments and other organizations seeking to develop similar strategies.

This collaboration was a process consisting of multiple cocreation phases ranging from desktop research and surveys with local authorities, through in-depth interviews and workshops, to the development of the final output and lessons learned. In tandem with BUUR PoS's co-creative process, a visualization and monitoring tool was developed by Climact, an engineering consultancy firm, to support the development of the LLTRS with robust data and clear information. This tool served to map out and clearly indicate the zones with maximal energy reduction potential within a municipality's building stock. At the end of the co-creation process, each municipality received general guidelines, a specific draft roadmap for their municipality, data from the tool about their building stock, and a list of possible measures.

Introduction

Local long term renovation strategies (LLTRS) are vital for local governments to get an idea of where their local renovation challenges lie and how to address their specific needs. Without a clear idea of where to focus their time and funds, many municipalities will never get their renovation efforts running in time to achieve the 2050 policy goals. In Flanders, the 2050 renovation goal is to get every residential building to at least a label A, having a theoretical primary energy consumption of 100 kWh/m²/year. This is quite ambitious so the work towards this goal has to start as soon as possible to be on the right track.

This paper brings the development process of LLTRS for residential buildings for eight municipalities in Flanders into view. Supported by two partners, BUUR part of Sweco (BUUR PoS)[1] and Climact[2], BE REEL! drew up roadmaps for the eight pilots to create LLTRS for the residential building stock on their territory. To ensure maximal diversity in the different cases, the eight selected pilot municipalities ranged from mid-sized and larger municipalities to towns and larger cities.

The process described in this paper is not the end point but rather the first step in the development process of an opera-

1. https://buur.be/
2. https://climact.com/en/

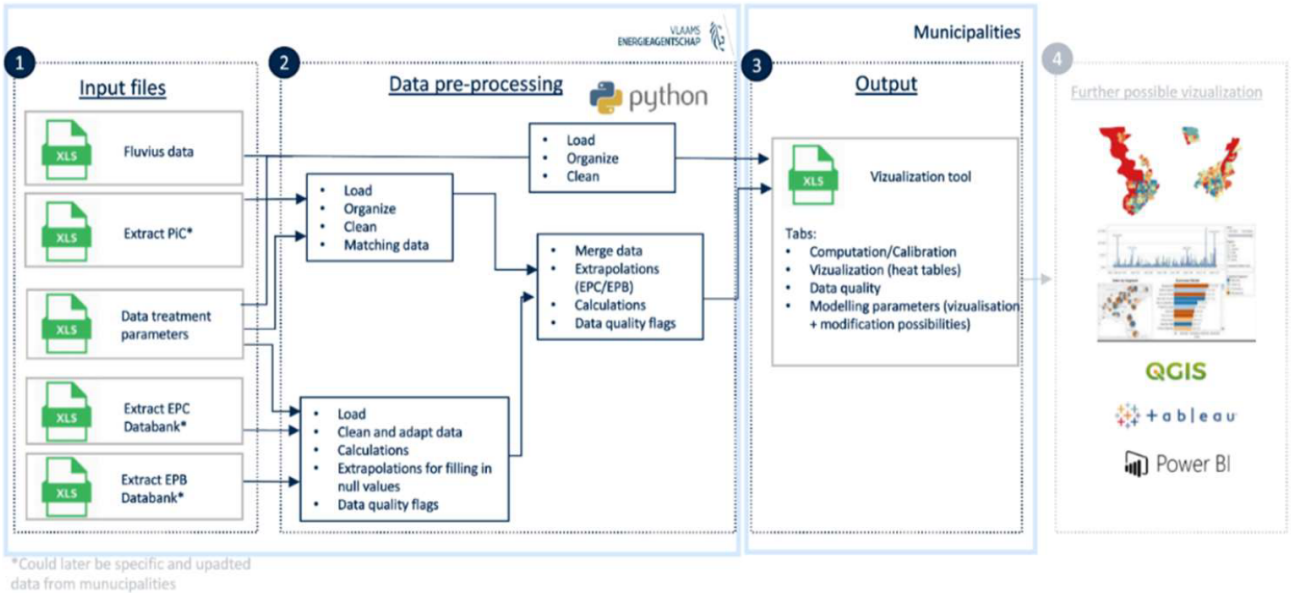


Figure 1. Overall model structure (Climact, 2021).

tional LLTRS. To ensure maximal replication by other municipalities, we describe the main lessons learned in this paper, in the hope that other organizations can replicate our work while taking the hurdles into account. In the next section, a concise description of the proceedings of the development process will be given. After that, the different output types will be shortly touched upon. The next section is about the practical steps that were followed to come to the actual eight draft roadmaps. Next is the section about the lessons learned which is the most important as it will maximize efficient replication by other municipalities. Finally, there is a conclusion to touch upon the next steps and further needs to develop an operational LLTRS.

The development process

Below you can find an overview of the eight pilot municipalities:

- Eeklo (20,890 inhabitants)
- Hoogstraten (21,333 inhabitants)
- Harelbeke (27,886 inhabitants)
- Heist-op-den-Berg (42,478 inhabitants)
- Mechelen (86,304 inhabitants)
- Genk (66,110 inhabitants)
- Ghent (260,341 inhabitants)
- Antwerp (523,248 inhabitants)

Originally, there were nine municipalities involved, but unfortunately Oud-Heverlee (11,099 inhabitants) was unable to complete the whole process. As it was the only small municipality in the mix, it would have brought valuable insight to the table regarding the potential hurdles for smaller municipalities. It was however a first important attention point that setting up a LLTRS is a complex and time-consuming process, especially for a small municipality. In any case, the development process started on November 17th 2020 with a first meeting between all the involved parties (BE REEL!, Climact, BUUR, 9 municipalities).

VISUALIZATION AND MONITORING TOOL

The visualization and monitoring tool is an Excel prototype tool indicating the energy savings potential for a municipality in terms of their residential building stock. To build the tool, three steps were defined (see Figure 1). In the first step, data was extracted from three sources: the Provinces in Numbers (PiN) database[3], the Energy Data Platform[4], and user data from Fluvius[5], the Flemish grid operator. In the second step, this data was processed to make it usable. The PiN database is a collection of datasets about the Flemish municipalities. Its data is detailed until the level of the statistical sectors. The Energy Data Platform is a database managed by the Flemish Energy and Climate Agency. It contains data specific to the level of the municipality (postcode). 20 % of this data was put through several correction steps to ensure it is usable in the tool. 80 % was used to extrapolate new data so it could be used in the tool. The data from both sources was aggregated together which resulted in an average surface area and specific energy usage per statistical sector, building type, and construction year. Based on this average surface area and specific energy usage a total energy usage was calculated. These numbers are then further calibrated in several steps based on the data from the third data source. The user data from Fluvius, the Flemish grid operator, is available at the level of statistical sectors. In the third and final step, output is visualized in the different tabs of the tool. It can also be exported for further visualization in secondary programs such as QGIS or Power BI.

3. https://provincies.incijfers.be/dashboard/dashboard
4. https://www.energiesparen.be/energiedataplatform
5. https://www.fluvius.be/nl

Aantal wooneenheden

	gesloten	halfopen	open	appartement	andere	Totaal
voor 1900	271	145	128	26	4	574
1900-1918	363	71	25	24	3	486
1919-1930	620	161	17	31	7	836
1931-1945	786	161	31	44	6	1.028
1946-1960	957	796	123	46	7	1.929
1961-1970	439	679	330	216	3	1.667
1971-1980	260	606	605	411	5	1.887
1981-1990	147	323	494	272	2	1.238
1991-2000	72	284	436	308	7	1.107
2001-2010	224	278	157	550	8	1.217
2011-2020	192	241	87	611	2	1.133
onbekend			1	14	16	31
Totaal	**4.331**	**3.745**	**2.434**	**2.553**	**70**	**13.133**

Figure 2. An example of a heatmap with the darker colors indicating hotspots. This heatmap is about building types (gesloten=terraced, halfopen=semi-detached, open=detached, appartement=apartment, andere=other). This municipality has the most building units (957) in terraced houses built between 19461960 (Climact, 2021).

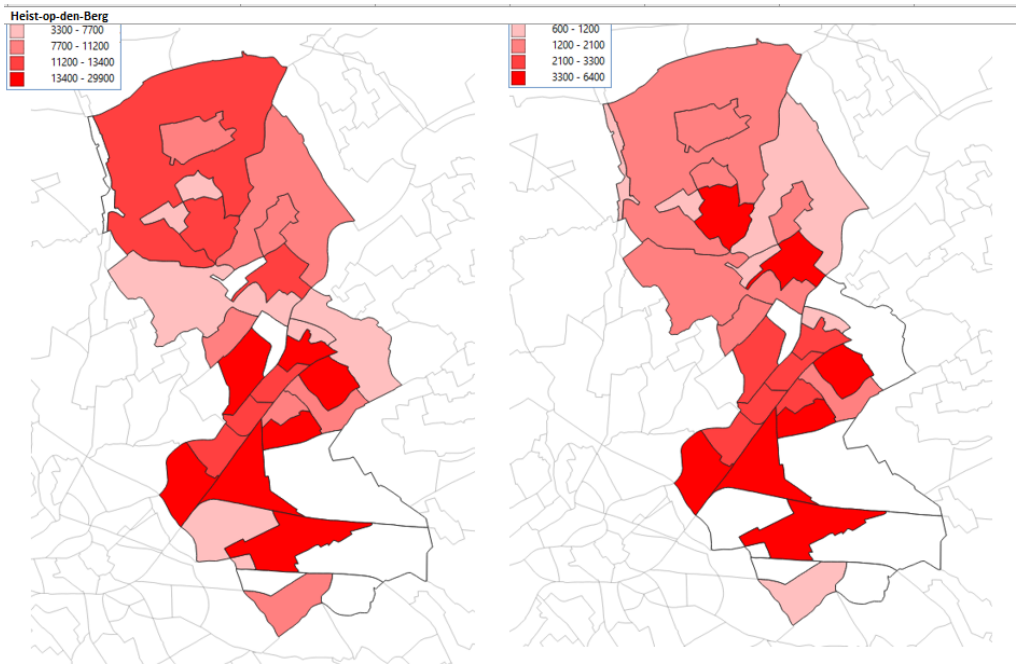


Figure 3. Basic map for the municipality of Heist-op-den-Berg. On the left is the total energy usage (calibrated) in MWh/year. On the right is the reduction potential (corrected) in MWh/year (Climact, 2021).

Figure 2 visualizes the results of the tool as a heatmap with colours indicating hotspots. Heatmaps were automatically generated for the entire municipality, each neighbourhood, and each statistical sector. They visually present the different building types, total energy usage, average specific energy usage, total energy reduction potential, and energy reduction potential per building unit. The neighbourhood level of visualization was especially useful for the towns and cities that had many statistical sectors in their territory. It allowed them to keep a better overview.

Throughout the development process, needs and issues were identified and addressed. Initially, the tool would not produce any maps, but, later on, the choice was made to add a basic map (Figure 3) as output. This would make its results clearer for the staff working in the municipalities by providing extra insights. The maps served to further visualize the wealth of information in the tool. To further develop maps, the municipalities would need basic knowledge of QGIS, an open source geographic information system program. To simplify this step, there is a tab in the tool that produces the basic input data for QGIS. There are three filters that will select certain datasets and produce different input data for QGIS (Figure 4). The filters are 'bewonerstype' or type of inhabitant (owner, renter, unknown), 'bouwvorm' or building type (apartment, terraced, detached, semi-detached, other) and 'bouwjaar' or construction year (10 groups for the years 1900–2020 and one group for the buildings before 1900).

ROADMAPS

At the same time, BUUR PoS developed the roadmaps for the eight pilots. The development process is divisible in three phases. In the first phase, the working field was explored through desktop research and an online survey conducted within each pilot municipality. Based on these results, a first draft of the

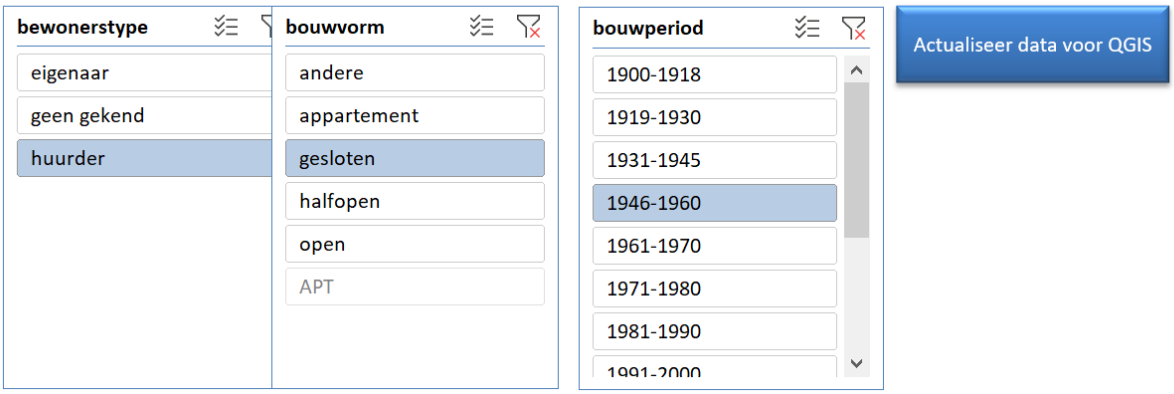


Figure 4. Filters for QGIS data (Climact, 2021).

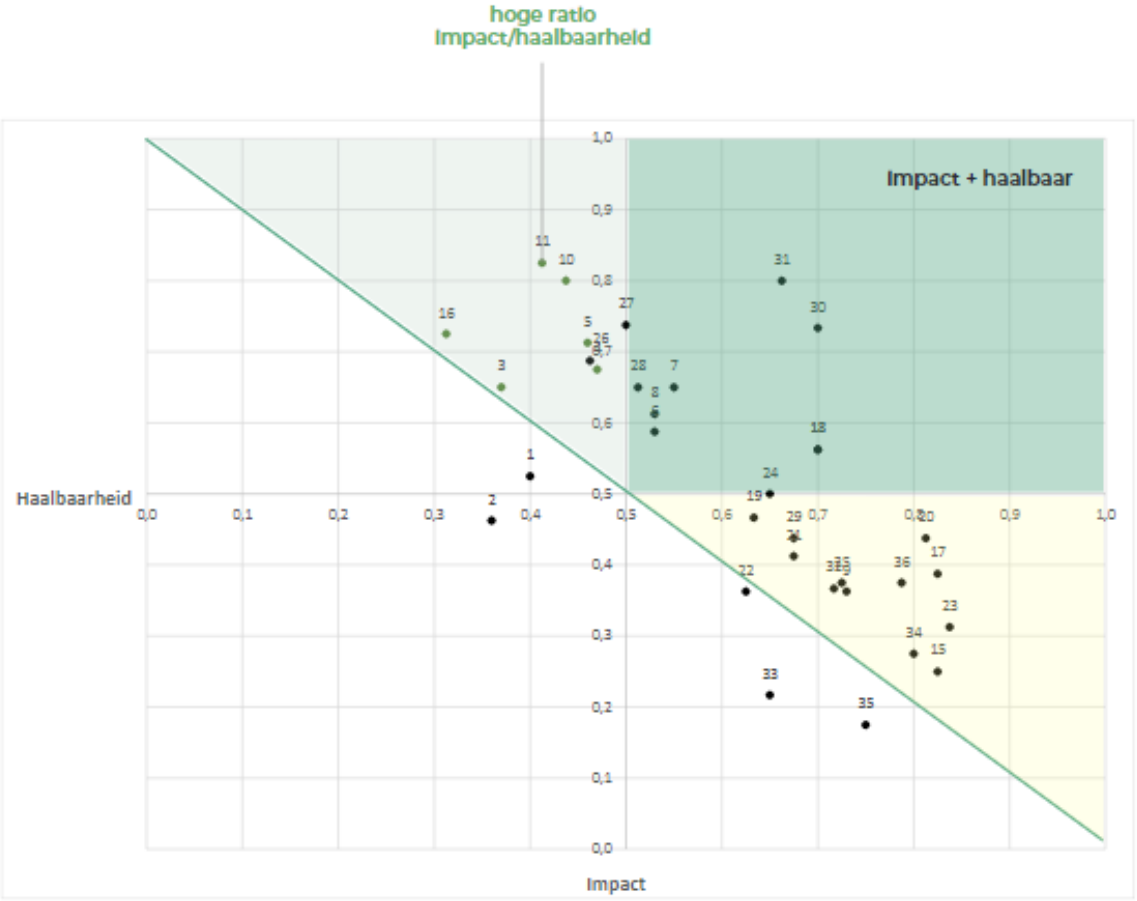


Figure 5. Graph of selected measures. The x-axis represents the feasibility (haalbaarheid) and the y-axis the potential impact. Each point represents a specific measure. The measures above the green diagonal scored well on both impact and feasibility (BUUR PoS).

roadmaps was created. One of their first focuses was the importance of a database of measures which could lead to upscaled energy savings. To get a clear view on the possible measures, they organized a first digital workshop on January 28 2021 using an online whiteboard. The participants were challenged to define and select possible measures. During the next steps after the workshop, feedback was gathered on the selected measures. They were given scores and placed on a graph (Figure 6). Measures that were both feasible and impactful appeared in the upper righthand quadrant and were especially desirable.

The measures were also categorized in one of the following five categories: financial, technical, communication, policy, and innovation. Next to those categories, the measures were also categorized based on the step in the renovation process (creating awareness, advice and enhancing action, execution and support, aftercare and monitoring) and the type of citizen. This resulted in a broad list of measures to speed up renovation. Because of these different categories, municipalities could in later phases cherry-pick which measures they wanted based on their specific local challenges.

In the second phase, BUUR PoS elaborated the process for each pilot municipality. They started off with two municipalities, Hoogstraten and Mechelen, as test cases. Through information from the tool and from bilateral interviews and surveys with staff from each municipality, they managed to come to a draft roadmap for both of them. During a second workshop on March 3th 2021 the draft roadmaps of Hoogstraten and Mechelen were presented to the other municipalities. Based on the feedback, the same analysis was later done for the 6 other pilot municipalities.

In the final phase, all the input produced during the entire process was integrated into the final output. During a final workshop on May 7 2021 BUUR PoS & Climact presented the output that had been produced so far (tool, list of measures, drafts of eight roadmaps) and gathered final feedback from the municipalities. In the rest of this third and final phase, they would focus on improving and finalizing the tool and the roadmaps and developing general guidelines that could guide other cities and municipalities seeking to replicate this process.

This pilot project ended with a meetup on June 28 2021 with other interested Flemish cities and municipalities that were not involved in the project, as well as interested stakeholders. The development process was concisely presented and the instruments that had been developed (guidelines with eight inspiring roadmaps, tool, list of measures) were demonstrated.

Output

The output of this development process is the following documents or files.

1. Visualization and monitoring tool and data per municipality: Each of the eight municipalities received the tool, the output information for their building stock., and several datasets including one with QGIS input data for generating maps.
2. General guidelines to inspire and guide other municipalities along the same process of developing LLTRS.
3. Eight draft roadmaps: Each pilot municipality received a draft roadmap tailored to their specific situation. These documents illustrate the different steps they need to take to develop a fully operational LLTRS. Based on the different size, experience and challenges of the cities and municipalities, these documents serve as case studies of the different situations that local governments could find themselves in when developing LLTRS. Next steps include adding cost-benefit analyses to the measures, matching the needs with the measures, adding milestones, etc.
4. List of measures that a local government can implement in order to stimulate and enhance the renovation wave.

All this output has been uploaded onto LearnWorlds[6], BE REEL!'s online learning platform.

6. LearnWorlds will be used intensively in the future as a central hub for all the findings of the BE REEL! project as well as for other relevant files such as recordings of events. Feel free to access the documents (in Dutch) of this study on the platform via https://be-reel.getlearnworlds.com/course?courseid=br-leernetwerk-steden-and-gemeenten

Development of a roadmap in practice

The methodological steps to develop a LLTRS for residential buildings were developed during the co-creation process and resulted in a three-step approach (Figure 6):

1. general analysis of the current situation
2. screening of the renovation challenges and potential
3. development of an operational LLTRS.

During the current development process with the pilot municipalities, steps one and two have been completed. Step 3 has to be completed in the next phase. An exact timeline for this final step is unknown.

The first step is to conduct a general analysis of the current situation. In order to understand the context, the influence of the municipality's current (and future) spatial composition, current building stock, and the socio-demographical composition of its inhabitants must be researched. Next, the policy level needs to be researched and defined. Policies from all levels (EU, national, regional, municipal) can influence the LLTRS, but also intermunicipal policies could impact the LLTRS. In any case, there needs to be a focus on the policies concerning energy and heat, as well as other related policy fields such as housing, water, education, circular economy, urban and spatial planning, urban resilience, etc. Furthermore, through stakeholder mapping, potential public and private partners must be brought into focus. Finally, information has to be gathered about the current renovation rate of residential buildings, (available) personnel in the local administration, existing measures and budget.

The second step is to screen the 2050 challenges and the energy reduction potential of the residential building stock of the municipality. First of all, the tool can be used to get a clearer idea of where the greatest energy reduction potential can be realized. This can be done for the entirety of the municipality, per neighbourhood or per statistical sector. Next, the tool can be used to get insight in the type of buildings (terraced, detached or semi-detached single-family home, condominium, construction year) that have the largest energy reduction potential. Finally, it must become clear which inhabitant groups (owners, landlords) have the largest reduction potential. There must be special attention for the diversity of individual challenges that make up the broader local challenge. Armed with this knowledge, an approach can be selected to address the local challenges. This approach can vary depending on the situation and the municipality's choices. Some possibilities are to focus on certain areas, building types, inhabitant groups, or a combination of several factors.

In the final step, the LLTRS has to be developed. For the eight pilot municipalities, this step will be conducted in a follow-up project. Starting from the knowledge about the local challenges generated in the last step of where, what and who to focus on, an analysis has to be carried out to evaluate and select policy measures to address the specific local needs. This development must be a participatory process as the strategy will need to be carried by a group of motivated stakeholders: experts must be involved to give feedback, the political level needs to validate the strategy, citizens can be involved, etc. In any case, this will be a process that is different in every municipality. When developing the final strategy, there are many secondary requirements that have to be fulfilled. Efforts should be undertaken to re-

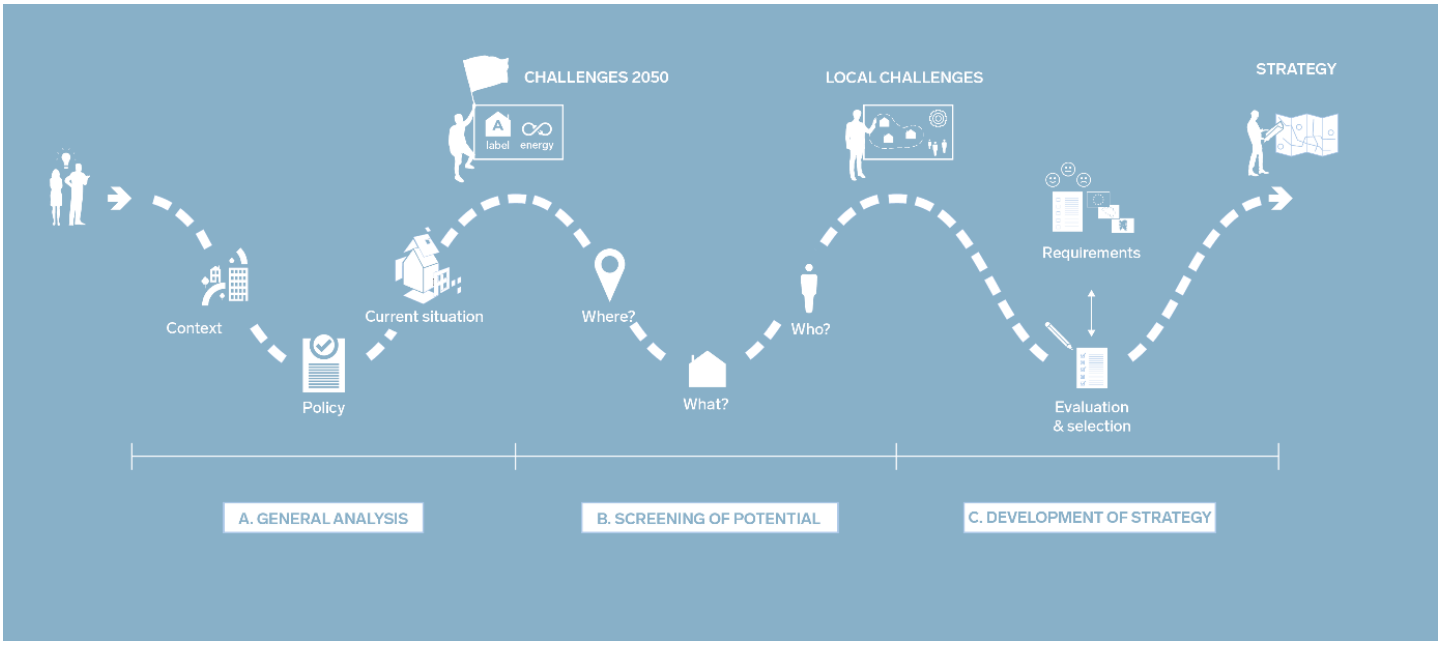


Figure 6. Three-step methodology to develop an LLTRS.

search and minimize barriers for citizens and the local government and to maximize accelerators such as focusing on trigger moments in the life-cycle of a building.

Lessons learned

SUPPORT FROM HIGHER LEVELS OF GOVERNMENT AND EXPERTS IS VITAL

Renovations to increase energy efficiency levels of residential buildings take place in a multidisciplinary landscape. Theoretically, an array of people are necessary when developing a LLTRS. To start, there needs to be a catalyst and a supporting base to kickstart the process. Then, data has to be gathered. Data requires experts of databases and data analysis. To interpret the output information and clearly define the steps to address the local challenge requires people with a strong methodological background able to develop a strategy based on the results of the analysis. However, even with all the data available and a clear vision of the technical challenge, political choices must be made, taking into account the broader local policy plans, necessary and available funding, the availability of partners and stakeholders, …. To lighten the load for municipalities, higher levels of government must aid them. They can be especially helpful in the first two steps of the development process (general analysis, screening of the challenges/potential) by being the catalyst, gathering a supporting base of stakeholders, identifying the local challenges/potential, analysing data, and giving municipalities a push in the right direction. In short, the chances of developing a successful LLTRS are the highest when a municipality is supported by a broad and diverse coalition of experts and stakeholders, especially the higher levels of government.

DATA IS KEY

To develop a strategy, the data is key: it must be available and reliable. Garbage in is garbage out. In Flanders, the correct raw data about buildings and users was all publicly available, but it had to be gathered from several sources and then put through some calibration and correction steps to ensure its quality. This quality was an attention point throughout the entire development process. In the end, the tool has an automatic data quality checker built into its architecture to increase the output reliability. Nevertheless, even if data is available and reliable, this does not necessarily mean that a good strategy can be made. It must also be usable in analyses to produce actionable results. In this case, these results were acquired through the two external partners that designed the tool, the guidelines, and the roadmaps. They linked the building and socio-demographic data together, created easy-to-read maps, and ensured that useful conclusions could be drawn from the results for each pilot municipality.

Data privacy is also an important lesson learned. Special care has to be taken to ensure that the data is used in a responsible way. In the EU, the General Data Protection Regulation (GDPR) stipulates that personal data cannot be shared without the consent of the person in question. When developing a local strategy, this complicates the matter as, for example, building data could be traced back to individuals. The information must be bundled in such a way that it cannot be linked to individuals or their homes.

INCREASE CAPACITY OF MUNICIPALITIES TO MAXIMIZE NUMBER OF ABLE MUNICIPALITIES

In every nation and region in the world, there will be a broad distribution of different cities and municipalities. Flanders is no different. In Flanders, each and every municipality has to ensure they are on route for the 2050 renovation goals. However, many local governments often lack the people, funds, time and/or knowledge to effectively do this. For example, some staff members of the pilot municipalities did not have the technical background necessary for interpreting the data from the tool or for producing maps themselves with the data. To counter this, the tool is largely automated and has a user-friendly interface to automatically produce input data for maps in QGIS and ta-

bles with easy-to-understand data. These maps and tables can be directly used in the final LLTRS document as illustrations. Furthermore, guidelines, specifically geared towards people without a technical background, were designed to clearly illustrate the successive steps to develop an LLTRS. Another issue is the availability of personnel. To ensure that all municipalities, especially the small ones that do not have a large number of staff members, can remain on board and develop a good LLTRS, special attention must go to minimalizing the workload in each of the three steps. A situation where small municipalities (like Oud-Heverlee) have to bow out because their staff simply lacks the time, must be avoided at all costs. With proper support to increase the capacity of municipalities, the number of able municipalities can be maximalised.

A TAILORED APPROACH TO TACKLE THE DIVERSITY OF INDIVIDUAL CHALLENGES IS NECESSARY

As mentioned before, the field of energy efficient renovations is a multidisciplinary one and necessitates a tailored approach per municipality as this is where the implementation must happen. Municipalities have an extremely varied building stock due to the different building types, construction ages, demographic needs, social challenges, etc. Local administrations need to be aware that people stumble upon different hurdles linked to their financial situation, their ownership status, the type of home they are living in, the degree of heritage involved, … To address these diverse individual challenges properly, a municipality must provide an equally diverse array of measures. To tackle these challenges, guidelines and varying, inspiring examples of roadmaps can be developed so that local governments can develop a LLTRS tailored to the specific needs of their citizens.

Conclusion

To be on route to achieve the renovation goals of 2050, Flemish municipalities bear the crucial responsibility to accelerate the development and continual improvement of their renovation strategies. This work must supported on all levels of society, especially the local level. Local long term renovation strategies (LLTRS) must become the baseline of each municipality to ensure they can achieve their 2050 goals.

In this paper, the development process of roadmaps that enable municipalities to delineate their own renovation strategy for 2050 is described. The lessons learned were given to ensure that interested parties could replicate these efforts with the eight pilot municipalities. The lessons learned were: support from higher levels of government and experts is vital, data is key, increase the capacity of municipalities to maximize the number of able municipalities, and a tailored approach to tackle the diversity of individual challenges is necessary.

These roadmaps are an important first step in a broader process. Next steps need to be undertaken: cost-benefit analyses have to be conducted to select the best and most effective measures and get an idea of the total necessary budget, partnerships need to be discussed and decided to ensure the strategy can be implemented, the local administration has to validate the final strategy politically, a timeline with milestones needs to be agreed, etc.

For the BE REEL! project, the next steps are to gather data on other municipalities to allow them to start the same process that the eight pilots went through. A partnership has been started with Netwerk Klimaat (Network Climate), a part of the Flemish Association of Cities and Municipalities, to upscale this development process for all Flemish municipalities. This partnership addresses the first lesson learned (support from higher levels of government). BE REEL! will also organize several masterclasses about developing LLTRS to spread the knowledge and enable other municipalities to already start the process themselves if they want to. These masterclasses are planned in 2022. This addresses the third lesson learned (increase the capacity of the local administrations).

Two challenges are identified concerning the next steps. First is the challenge concerning data availability. Data is available for each of the 300 Flemish municipalities but it is unprocessed. It would take a significant amount of time and money to upscale to more municipalities and ensure the data is ready for the tool and the development of other LLTRS. A solution here could be to automate this processing step to save time and money. Second, not all municipalities are (yet) willing to develop a LLTRS. The eight pilots were very motivated partners, but other municipalities may not be as open to the entire process. This group of less motivated municipalities could potentially cause delays in reaching the 2050 goals. A solution could be that the Flemish government mandates all municipalities to write a strategy by a certain deadline.

In any case, this process must be followed through to the end for each of the 300 Flemish municipalities. There is lots of political pressure to ensure that residential buildings in the EU become more energy efficient. Local long-term renovation strategies are a vital step to translate European and regional policies into actual impact on the ground. The renovation challenge is significant, but if local administrations have a clear vision of where they are going and have the instruments to attain that vision, then we could cause a true renovation wave in the coming decades.

References

BUUR, 2020. Kick-off 17/11/2020 (ppt).
BUUR, 2021a. Workshop 1 28.01.2021 (ppt).
BUUR, 2021b. Workshop 2 03.03.2021 (ppt).
BUUR, 2021c. Workshop 3 07.05.2021 (ppt).
BUUR, 2021d. Begeleidingstraject steden & gemeenten: meetup 28 juni 2021 (ppt).
BUUR, 2021e. Draaiboek voor de opmaak van een lokale langetermijn renovatiestrategie.
Climact, 2020a. Kick-off meeting met 9 gemeenten (ppt).
Climact, 2020b. Analyse- en visualisatietool v1: Methodologie (pdf).