Climate Plan 2030
Municipality of Zoersel

June 2020

Covenant of Mayors
for Climate & Energy

IGEAN

ZOERSEL

Preface

'The Earth is warming, and global warming is related to greenhouse gas emissions from human activities.'
Intergovernmental Panel on Climate Change (IPCC) (1)

This unambiguous conclusion is the central theme of the fifth assessment report of the Intergovernmental Panel on Climate Change (IPCC). Global warming is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. Increased temperatures may shift climate patterns on our planet and could affect the frequency and intensity of extremes in several regions, such as heat waves and prolonged droughts. Thermal expansion of seawater and (partial) melting of the ice caps on land will cause sea levels to rise and increase flood risk in low-lying areas. (2)

Local governments play a crucial role in the fight against global warming. Cities and towns are responsible for no less than 80% of global energy consumption and CO_2 is by far the most important greenhouse gas. The European Commission has therefore decided to involve local and regional authorities directly in achieving Europe's climate targets. This has never before happened in the history of Europe.

The instrument for this is the Covenant of Mayors. Signatory towns and cities commit themselves to taking concrete measures to reduce energy-related CO_2 emissions on their territory. Europe has developed a step-by-step plan to guide signatories, but each local authority decides autonomously which measures are feasible and viable. Local authorities are not left to cope alone: regional coordinators provide support and counselling.

More and more towns and cities therefore decide to take up the challenge, as evidenced by the growing number of signatories to the Covenant of Mayors. The signatories share a common vision for 2050: accelerating decarbonisation of their territory, strengthening their capacity to adapt to the inevitable impacts of climate change, and ensuring that their citizens have access to safe, sustainable and affordable energy.

The municipality of Zoersel also takes up this challenge and has signed the Covenant of Mayors 2030 with the ambitious goal to reduce CO_2 emissions by 40% by 2030 and build resilience to climate change.

Summary

Global warming is unequivocal. Many of the changes observed since 1950 are without precedent in the last tens or thousands of years. The atmosphere and oceans are getting warmer, the amount of snow and ice is decreasing, sea levels are rising, and concentrations of greenhouse gases are increasing. (3)

The increased concentration of greenhouse gases reinforces the natural greenhouse effect, thus leading to an increased average global temperature and global climate change. (4)

Human activity has already brought about a warming of 1°C above pre-industrial levels. The average global temperature is currently increasing by 0.2°C per decade due to past and present emissions. At this rate, global warming will well exceed 1.5°C between 2030 and 2052. Warming of 2°C will cause more damage to natural and human systems than 1.5°C warming. (5)

Fortunately, we are not alone in facing the challenge of mitigating global warming and we are getting support from other European towns and cities thanks to initiatives like the Covenant of Mayors.

The Covenant of Mayors is the world's biggest urban climate and energy initiative. The Covenant of Mayors was launched in 2008 in Europe with the ambition to gather local governments voluntarily committed to achieving and exceeding the European Union's climate and energy targets. The municipality of Zoersel signed the Covenant's 2030 objectives on 27 September 2016.

VISION AND AMBITION

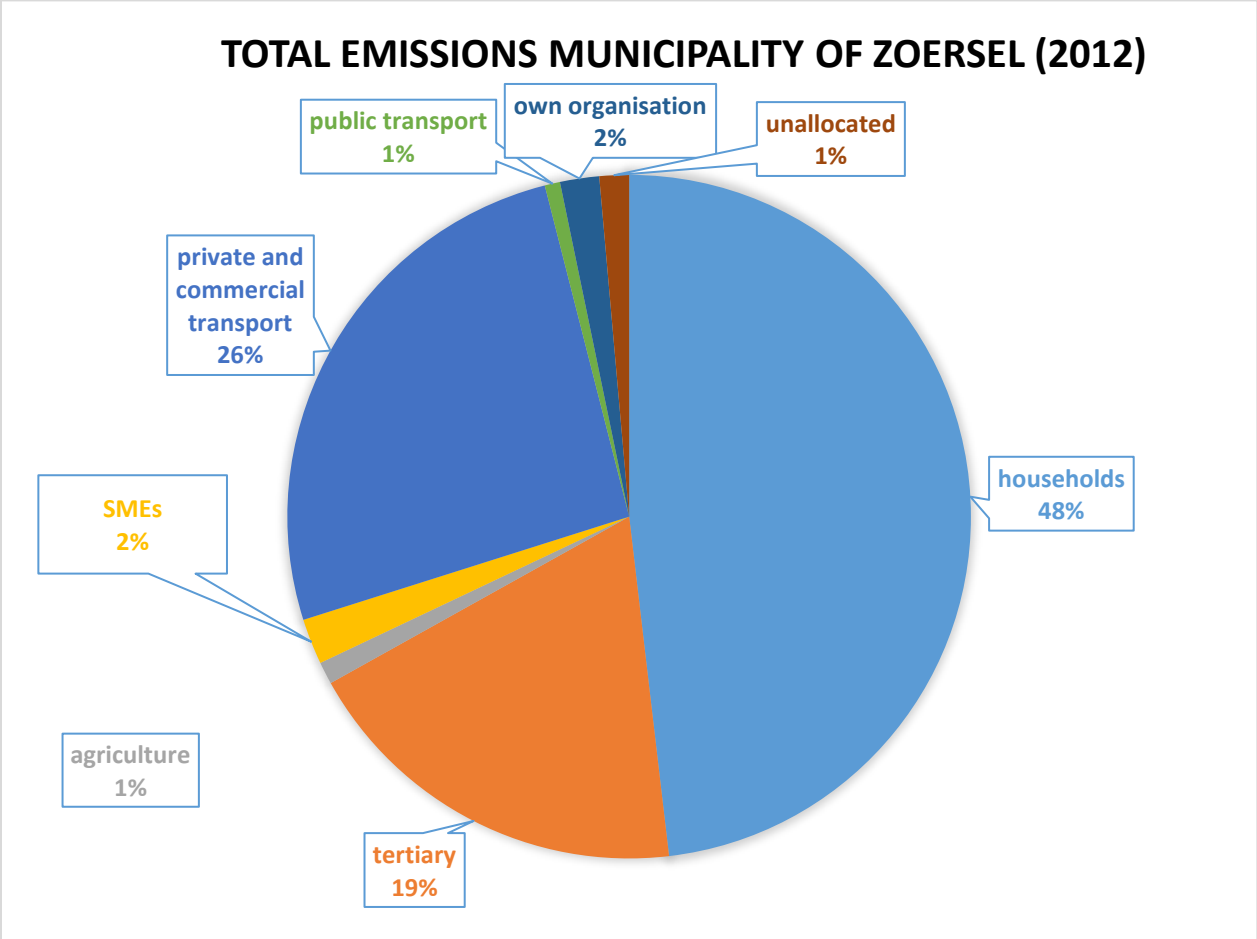
With this climate plan, the municipality of Zoersel commits to achieving a **CO_2 reduction of minimum 40%** on its territory by 2030 by enhancing energy efficiency and the use of sustainable energy sources. The municipality of Zoersel wants to evolve towards a sustainable and climate-neutral municipality that is **resilient** to the potential impacts of **climate change**.

The municipality of Zoersel pursues a dual strategy focused on mitigation and adaptation. **Mitigation** consists of actions to stabilise climate change as such. The IPCC defines mitigation as 'human actions to reduce the sources of greenhouse gases or to promote means to absorb greenhouse gases'. Examples of mitigation actions are the promotion of transport with reduced combustion of fossil fuels, better insulation of buildings, reducing meat consumption, etc. (6)

Adaptation is the adjustment of natural and human systems to cope with the impacts and risks of climate change, while endorsing possible opportunities. Examples of adaptation actions include the creation of more green areas and green roofs in an urban environment (e.g. to avoid heat stress and flooding), the construction of buffer basins along rivers and sewers, etc.

ENERGY CONSUMPTION IN THE MUNICIPALITY OF ZOERSEL IN THE 2012 BENCHMARK YEAR

The municipality of Zoersel has chosen 2012 as benchmark year because of its normal climatic conditions, i.e. no extreme heat or cold. This simplifies comparison with following years. In 2012, total energy-related CO_2 emissions from the municipality of Zoersel equalled **74,430 tonnes of CO_2** or **3.5 tonnes of CO_2 per inhabitant** (21,555 inhabitants in 2012). This corresponds to a final energy consumption of **371,380 MWh**.



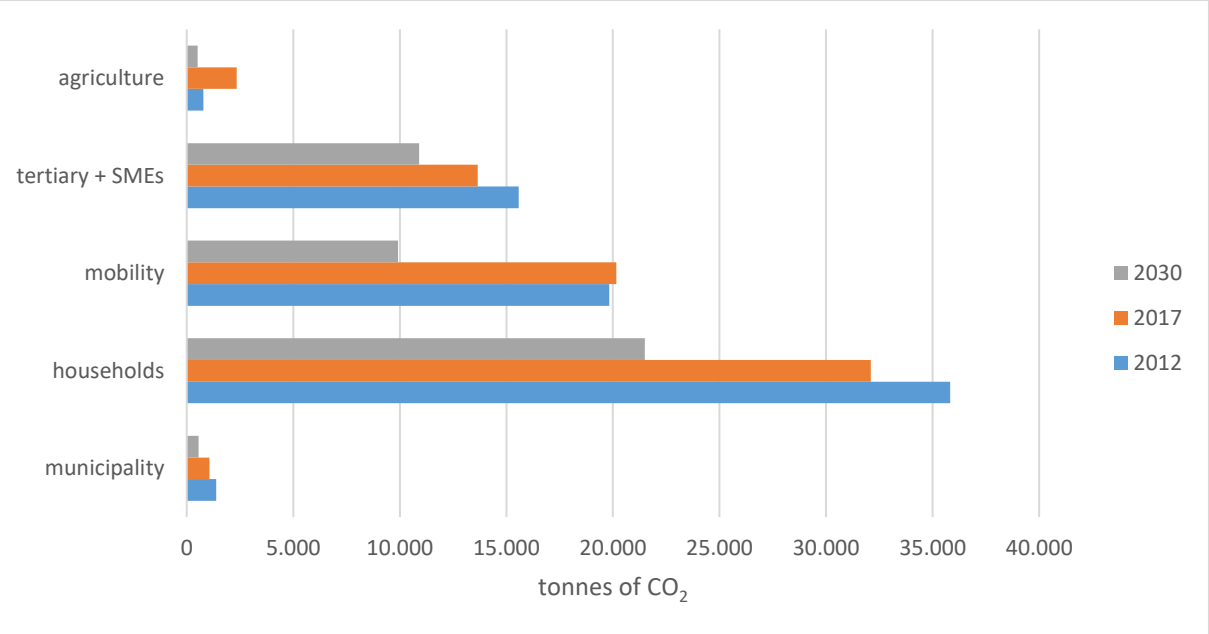
REDUCTION POTENTIAL OF THE CLIMATE ACTION PLAN

The overall goal of the climate plan for the municipality of Zoersel is to reduce total CO_2 emissions in the territory, motorways excluded, by **40% by 2030** in comparison with the 2012 benchmark. In concrete terms, this means a **reduction of 29,772 tonnes of CO_2** by 2030.

Reduction potential of the climate plan by sector by 2030 (motorways excluded)

Reduction potential (tonnes of CO_2)	2012	2017	2030	Reduction potential by 2030
own organisation	1,377	1,067	551	60%
households	35,829	32,102	21,497	40%
mobility	19,822	20,164	9,911	50%
tertiary and SMEs	15,578	13,661	10,904	30%
agriculture	784	2,345	509	35%
unallocated	1,041	904	625	40%
sum of the targets	**74,430**	**70,243**	**43,998**	**41%**
Covenant of Mayors' target			44,658	40%

Reduction potential of the climate plan by sector by 2030



Own organisation

Despite the small share of total CO_2 emissions (2% in 2012) from the municipality, Zoersel leads by example and fully focuses on reducing emissions from its own organisation. The municipality aims at achieving an additional 38% CO_2 reduction for its own operations by 2030 in comparison with 2017, thus achieving a total reduction of 60% over the entire benchmark period.

Households

If all dwellings are fitted with roof insulation, wall insulation and high-efficiency glazing by 2030, this means a reduction potential of 20,681 tonnes. Zoersel aims to have 70% of the dwellings fitted with roof insulation, wall insulation and high-efficiency glazing by 2030, resulting in a 40% CO_2 emission reduction.

Mobility

The maximum reduction potential in the mobility sector is 63% by reducing transport demand by 10%, realising a 50/50 modal split for short trips, and using electricity as source of energy for transportation. Zoersel wants to make road safety measures a priority. In combination with awareness-raising actions, these measures should ensure a shift from car to bicycle for short trips. The switch to electric vehicles will, in any case, reduce CO_2 emissions. The municipality aims to reduce CO_2 emissions in the mobility sector by 50% by 2030.

Tertiary (healthcare institutions) and SMEs

The healthcare institutions in Zoersel have already implemented a whole range of sustainable measures in recent years. The reduction potential for the tertiary sector and SMEs is estimated at 30% by 2030.

Agriculture

The agricultural sector only accounts for a small share of total CO_2 emissions (1% in 2012). There is no demonstrable reason for the evolution between 2012 and 2017. The farmers in Zoersel indicate that they have made many sustainable investments in recent years. Taking this into account, the reduction potential by 2030 is set at 35%.

OVERVIEW OF RISK ANALYSIS

The main risks for the municipality of Zoersel are floods, heat and drought. These secondary effects will increase both in intensity and in frequency. They are summarised in the table below.

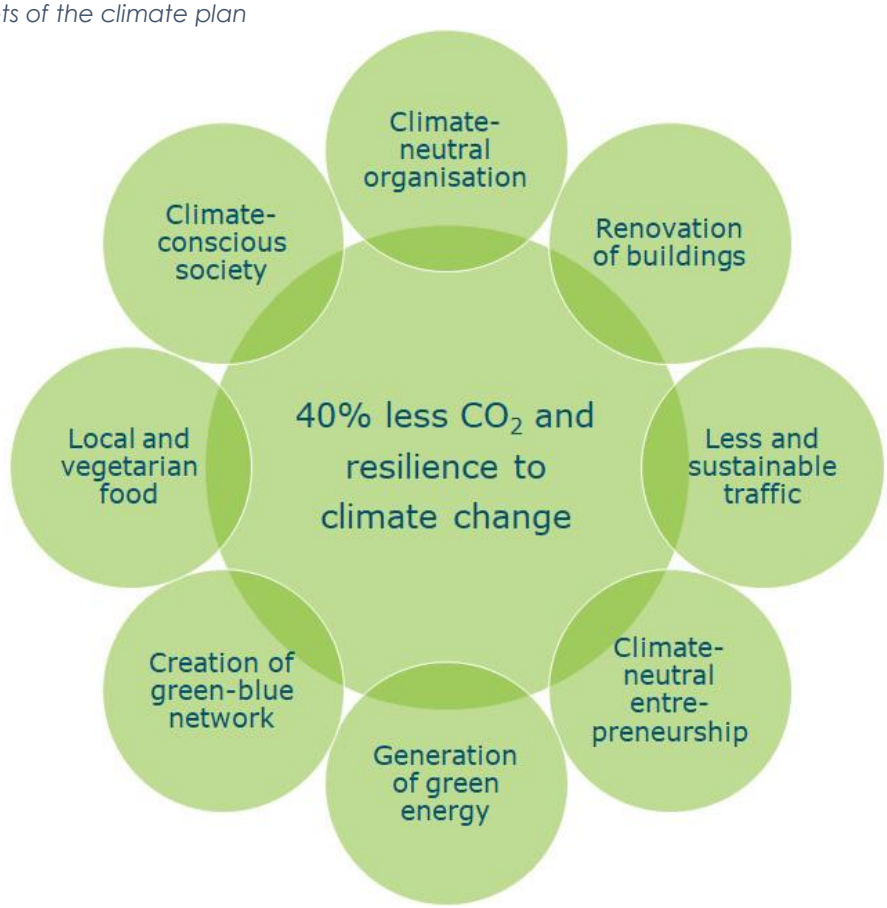
Risk analysis for the municipality of Zoersel

Type of climate risk	Current risk level	Expected change in intensity	Expected change in frequency	Time frame	Risk-related indicators
Floods	Moderate	Increase	Increase	Present situation	Total precipitation
Heat wave	Low	Increase	Increase	Present situation	Number of heat wave days (> 30°C)
Drought	Low	Increase	Increase	Present situation	Number of days with precipitation

TARGETS OF THE CLIMATE PLAN

With its climate policy, the municipality of Zoersel wants to set eight targets to achieve the goals by 2030 (7) (8) (9). Each target is further elaborated in the plan and discussed under its specific theme.

The eight targets of the climate plan



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1 Introduction

1.1 CLIMATE CHANGE, NO LONGER A QUESTION

1.1.1 Global warming recapitulated

Global warming is unequivocal. Many of the changes observed since 1950 are without precedent in the last tens or thousands of years. The atmosphere and oceans are getting warmer, the amount of snow and ice has decreased, sea levels have risen, and greenhouse gas concentrations have increased. (3)

Gases in the atmosphere allow the incoming radiation from the sun to pass through, but absorb the heat that is radiated back from Earth's surface. Life on Earth owes its existence to this greenhouse effect: the average global temperature would otherwise be -18°C instead of +15°C now. The main natural greenhouse gases are water vapour (H_2O), carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). The concentration of these gases in the atmosphere is the result of numerous interacting dynamic processes and cycles. (2)

Since the beginning of the industrial era, greenhouse gas concentrations in the atmosphere have increased substantially. This increase is due to human activities such as the use of fossil fuels, lifestock farming, waste processing and chemical processes in industry. Global deforestation and associated burning convert large carbon sinks in wood and soil into greenhouse gases (mainly CO_2). (2)

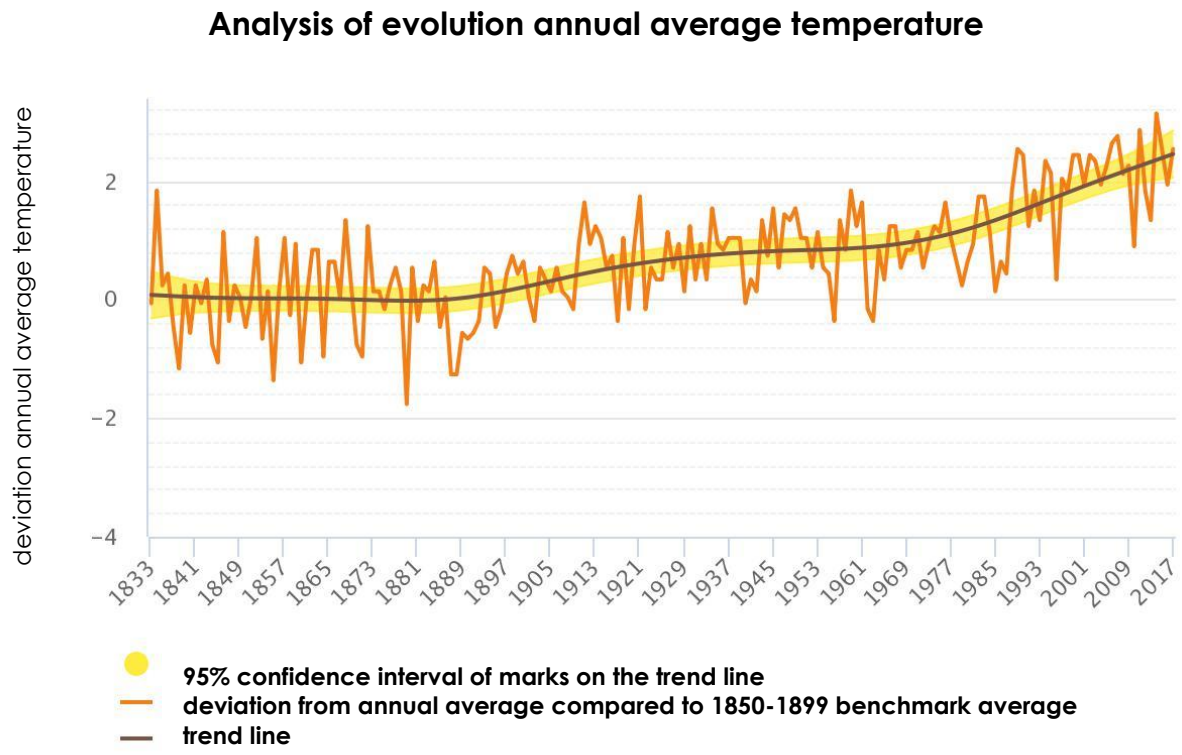
The increased concentration of greenhouse gases reinforces the natural greenhouse effect, thus leading to an increased average global temperature and global climate change. (4)

Human activity has already brought about a warming of 1°C above pre-industrial levels. The average global temperature is currently increasing by 0.2°C per decade due to past and present emissions. At this rate, global warming will well exceed 1.5°C between 2030 and 2052. Warming of 2°C will cause more damage to natural and human systems than 1.5°C warming. (5)

In Belgium, too, measurements show a clear upward trend (Figure 1). Statistical analysis of the annual average temperature in Uccle indicates a significant rise since the end of the 19th century. In the mid-20th century, the rise almost came to a halt, but since the 1960s temperature started to increase rapidly by up to 0.4°C per decade. Since the end of the 1990s, the rate of temperature increase has slowed down: the trend line of the annual average temperature has risen by more than 0.3% per decade since then. The trend line of the annual average temperature indicates that Uccle is now almost 2.5°C warmer on average than it was during the pre-industrial period.

The 21 warmest years since the beginning of measurements in Uccle (1833) are all in the period 1989-2017. Moreover, the absolute record year was 2014 with an annual average of 11,9°C. In Belgium (Uccle), the top three warmest years are completed by 2011 (11.6°C) and 2007 (11.5°C). 2015 and 2017 fall within the top five with 11.3°C. (10)

Figure 1 Analysis of the evolution of the annual average temperature



1.1.2 What is the present impact of climate change in Flanders?

- The average annual temperature has risen significantly (+2.5°C).
- More tropical days (≥ 30°C) are recorded and heat waves occur more often.
- The average annual precipitation has increased.
- Winters are getting wetter and there is an increase in the intensity and frequency of summer thunderstorms.
- The sea level is rising and seawater is getting warmer.

These climate observations (4) are based on direct measurements and remote observations from satellites and other platforms. This provides a comprehensive overview of the variations and long-term changes in the atmosphere, the oceans, the ice caps and the land surface.

Fortunately, we are not alone in facing these challenges and we are getting support from other European towns and cities thanks to initiatives like the Covenant of Mayors.

1.1.3 Europe launches the Covenant of Mayors

The Covenant of Mayors is the world's biggest urban climate and energy initiative. The Covenant of Mayors was launched in 2008 in Europe with the ambition to gather local governments voluntarily committed to achieving and exceeding the European Union's climate and energy targets.

Not only did the initiative introduce a first-of-its-kind bottom-up approach to energy and climate action, but its success quickly went beyond expectations.

In 2014, the European Commission launched Mayors Adapt. Based on the same principles as the Covenant of Mayors, this sister initiative mainly focuses on climate change adaptation. Mayors Adapt engages governments in taking action to adapt to climate change and supports them in the development and implementation of local adaptation strategies.

During a ceremony in the European Parliament on 15 October 2015, the Covenant of Mayors and Mayors Adapt initiatives were consolidated. The resulting new Covenant of Mayors for Climate & Energy – whose objectives and overall direction were determined in consultation with the cities – is not only more ambitious, but also has a wider scope. Signatory cities and towns pledge action to support implementation of the EU 40% greenhouse gas reduction target by 2030 and the adoption of a joint approach to tackling mitigation and adaptation to climate change, and to ensure access to sustainable, secure and energy for all.

The initiative now gathers over 8,800 local and regional authorities across 57 countries drawing on the strengths of a worldwide multi-stakeholder movement and the technical and methodological support offered by dedicated offices.

In the meantime, the Covenant of Mayors has grown beyond the borders of Europe. The Global Covenant of Mayors – launched on 1 January 2017 – is capitalising on the experience gained over the past years in Europe and beyond, and is building upon the key success factors of the initiative: its bottom-up governance, its multi-level cooperation model and its context-driven framework for action.

1.1.4 Time for global action

In December 2015, world leaders signed a historic climate agreement in Paris. This signaled the end of the fossil fuel era. This 'Paris Agreement' can safely be considered ambitious and lays a good foundation for international and national policies for the coming decades.

The objectives are:

- holding the global average temperature rise to well below 2°C above pre-industrial levels and even aiming at limiting temperature increase to 1.5°C;
- increasing the ability of countries to adapt to climate change (adaptation) and building climate resilience;
- aiming for the transition to a low-carbon society;
- making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

In addition, the United Nations launched the Sustainable Development Goals (SDGs). These are the goals the world is setting out on the path towards sustainable development by 2030. The 17 goals and their related 169 targets form the main international sustainability framework for the next 15 years to lift our planet out of poverty and back on course towards sustainability.

The SDGs can be divided into five major themes: people, planet, prosperity, peace and partnership. They approach sustainable development from an economic, social and ecological point of view.

In the context of this climate plan, the following SDGs apply (Figure 2):

- SDG 13 Climate action: take urgent action to combat climate change and its impacts;
- SDG 7 Affordable and clean energy: ensure access to affordable, reliable, sustainable and modern energy for all;
- SDG 11 Sustainable cities and communities: make cities and human settlements inclusive, safe, resilient and sustainable;
- SDG 16 Strong public institutions: promote policies for sustainable development;
- SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation;
- SDG 15 Protect, restore and promote sustainable use of terrestrial ecosystems;

- SDG 17 Partnerships to achieve the goals.

Our policymakers have a major task ahead of them: to turn the agreement into a renewable and sustainable society.

The municipality of Zoersel actively implements the sustainable development goals by coherently integrating them into the local policy plans. In doing so, each action is linked to a specific sustainable development.

Figure 2 The Sustainable Development Goals of the United Nations

1.2 VISION AND AMBITION

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Adaptation is the adjustment of natural and human systems to cope with the impacts and risks of climate change, while endorsing possible opportunities. Examples of adaptation actions include the creation of more green areas and green roofs in an urban environment (e.g. to avoid heat stress and flooding), the construction of buffer basins along rivers and sewers, etc.

No matter how strongly we engage in mitigation, an adaptation policy is already needed today. Climate change is already having an impact and continues at a rapid pace, so we need to adapt to this. At the same time, the more we engage in mitigation, the smaller the effects and consequences of climate change will be in the future, thus increasing our capacity to adapt. Ideally, we aim for a win-win situation in adaptation and mitigation strategies, whereby one reinforces the other. For example, a well-insulated house requires less heating energy (mitigation) and ensures that its occupants are less impacted by heat waves (adaptation). (6)

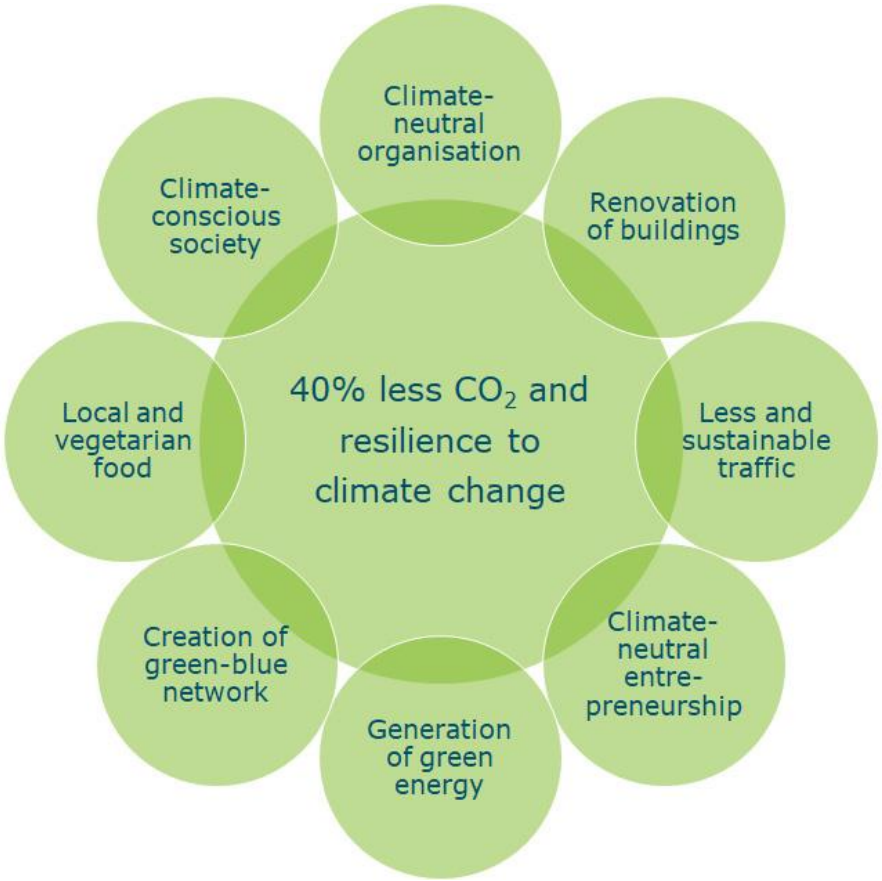
1.3 TARGETS OF THE CLIMATE PLAN

With its climate policy, the municipality of Zoersel wants to set eight targets to achieve the goals by 2030 (Figure 3) (7) (8) (9). Each target is further elaborated in the plan and discussed under its specific theme.

Figure 3 The eight targets of the climate plan

1.3.1 Make municipal operations climate-neutral

Municipal operations account for a limited percentage of total CO_2 emissions. Emissions are related to the heating and operations of the municipal patrimony, the municipal vehicle fleet and public lighting. Each of these energy consumers still has reduction potential. The municipality sets an example for its citizens and aims at climate-neutral operations. Investments are needed to achieve greenhouse gas reduction. Besides investments, the municipality should give sufficient staff time and space to implement the climate plan.



1.3.2 Use the reduction potential for homes and buildings

The municipality's housing and office stock is still insufficiently insulated. Combined efforts to reduce energy demand and to implement appropriate technologies should reduce greenhouse gas emissions in this sector. This requires an increase in the renovation percentage of existing buildings and the replacement of fossil fuel heating systems with eco-friendly alternatives. The installation of heating systems in new districts or neighbourhoods should always be examined.

1.3.3 Make shorter, sustainable trips

Mobility contributes significantly to CO_2 emissions in the municipality. The challenge lies in changing transport demand per capita by replacing long journeys by car with more yet shorter trips. Shorter distances encourage sustainable mobility. This requires proximity to various functions (shopping, sports, school, work, …). We will then make a modal shift from cars to other and more sustainable transport modes.

For freight transport, a shift from trucks to trains and ships is being considered. Shared mobility will be introduced step by step. In busy centres, mobihubs will link various sustainable modes of transport. By 2050, the shift towards sustainable transport will be almost complete.

1.3.4 Make businesses and services in the municipality sustainable

SMEs and the tertiary sector together account for a significant share of CO_2 emissions in the municipality. Raising awareness among entrepreneurs, providing good practices and facilitating networking are actions that can be supported by the local authority in close cooperation with the trade associations.

1.3.5 Use the production potential of renewable energy

Renewable energy production has been growing in recent years, although at a moderate pace. However, the potential for locally produced renewable energy is high. Focusing on the production of renewable energy will make us less dependent on fossil fuels. In 2050, solar and wind energy will represent a substantial share of the electricity mix. The municipality actively encourages and facilitates investments by citizens, businesses and the tertiary sector in this field.

1.3.6 Create a green-blue network

Densely built-up centres already experience problems caused by the heat island effect and flooding due to heavy rainfall. Another problem is poor air quality. Climate change is expected to make this worse. To mitigate these problems, a green-blue network of trees, neighbourhood parks, water features, allotments, etc. will be created. This green-blue network can (under the right conditions of scale, density, composition, management, connectivity, …) provide various ecosystem services that will contribute to climate adaptation.

1.3.7 Encourage consumption of local products and plant-based food

There will be a shift to local food production, sales and consumption. The transition to a more plant-based diet is at the core of a sustainable food policy. This is necessary for both health and environment. The most eco-friendly piece of meat still has six times the impact of vegetable proteins and uses 36 times more land. In order to drastically reduce the impact on our planet and to guarantee sufficient food production for present and future generations, a strong turnaround is needed. (11)

1.3.8 A climate-conscious and self-sufficient society

The municipality actively involves citizens in drawing up and elaborating a broad-based climate policy. This requires involvement of society and builds on what is happening in the community. Through discussion, debate and cooperation, 'the policy' is formed: what do we

tackle, how do we tackle it and who is responsible for what? Participation questions and influences people in their thoughts and actions.

Climate awareness of the citizens, businesses and organisations operating on the municipality's territory has increased in recent years. Projects such as *Curieuzeneuzen* and *Straatvinken* show that citizens are concerned about climate issues and want to take action. However, there is still insufficient information available to certain target groups in society and a great challenge lies ahead of us in creating a common sense of responsibility.

1.4 ORGANISATIONAL AND FINANCIAL APPROACH

1.4.1 Climate team

The municipality of Zoersel is setting up a climate team with the following active participants:

- Mayor;
- Alderman of Climate;
- General Director;
- Head of Land-Based Services;
- Sustainability Officer.

The climate team is responsible for the elaboration, proper implementation and follow-up of the climate plan. The climate plan is implemented across departments. The climate team meets at least every six months to review the implementation of the climate plan and to discuss new actions.

In addition, the following departments and councils are involved in the preparation and elaboration of the climate plan:

Departments:

- Human Resources/Administration
- Communication/ICT
- Finance
- Library
- Social Service/PCSW/Civil Affairs/Reception
- Leisure Services
- Land-Based Services

Councils:

- MINA Council
- Youth Council
- World Council
- Welfare Council
- Gecoro

1.4.2 Staff deployment

A strong climate policy requires a cross-departmental priority approach. Zoersel's climate vision must be an ambition shared by the council and all departments. It will then accelerate the impact of the initiated transition.

The municipality of Zoersel gives the following persons the mandate and associated time investment to prepare, follow-up, implement and report the climate plan to the college of aldermen and the municipal council:

- sustainability/environmental officer (1 FTE)
- north-south officer (1 FTE)

The sustainability/environmental officer is the contact person for the municipal energy and climate policy. In this capacity, the contact person works beyond local departments and coordinates the implementation of the climate policy in the field. For the implementation of the measures and actions included in this plan, the various internal departments each bear their own responsibility.

1.4.3 Financial resources 2020-2025

Besides existing resources, the municipality of Zoersel mobilises additional resources to implement the climate policy.

These resources are included in the multi-annual plan 2020-2025. The climate action plan, which contains the municipality's intended actions to implement the climate plan, lists the financial resources associated with each action as indicated in the multi-annual plan (see Annex 1). The total resources provided are 2,624,125 EUR (excluding sewerage works and replacement of public lighting with LEDs). The main actions for each target are described in the following chapters.

Besides budgets for the actions in the climate action plan, the municipality provides an overall budget for measures to achieve the climate plan targets. This budget amounts to 35,000 EUR per year for 2020, 2021 and 2022. It increases to 60,000 EUR per year for 2023, 2024 and 2025.

The multi-annual plan 2020-2025 provides the necessary resources for investments in own patrimony and fleet. Moreover, existing resources are reallocated or emphasis is shifted in the existing policy without financial consequences. The budget for the actions is included in the multi-annual budget and the annual policy notes.

The budget for the implementation of Zoersel 2030 includes:

- the deployment of municipal staff to coordinate the municipal climate policy;
- the deployment of municipal staff to implement measures and actions;
- municipal investments in own patrimony and fleet;
- the deployment of 1 FTE from IGEAN financed by the participating municipalities to specifically determine intermunicipal actions and support the municipality;
- any additional resources attracted by IGEAN in cooperation with partners and the municipality (e.g. Flemish or European resources);
- the deployment of staff from the various partners.

In addition, an annual (maximum) amount is provided, among other things, for:

- the execution of awareness-raising campaigns;
- the replacement of public lighting with LEDs;
- an allowance for district-specific sustainable projects.

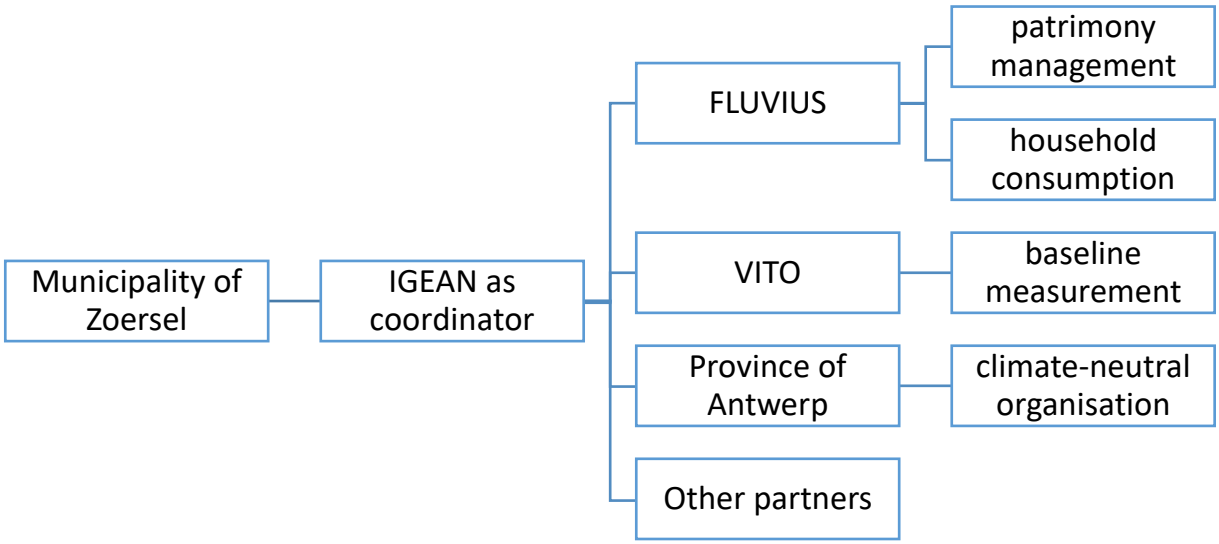
1.4.4 Coordination and organisational structures

Within the scope of the Flemish Development Cooperation Covenant, Zoersel has a partner in the south. Since 20 October 2011, Zoersel and Bohicon are twinned towns. The main lines of action are policy support, capacity building and local government reciprocity. Bohicon also signed the Covenant of Mayors and is working on a climate plan. Meanwhile, there have been several reciprocal visits, with the last one of Bohicon to Zoersel dating from November 2018.

The municipality is assisted by a broad external partnership, coordinated by IGEAN (Figure 4). The Fluvius System Operator, VITO, the Province and IGEAN have agreed with local authorities on a joint ambition and specific guidance for the regional Covenant of Mayors project. Each partner maintains an in-house relationship with the municipality. In order to streamline the

various actions within the regional project, the partners meet on a regular basis. Feedback on agreements made during partner meetings with municipalities is provided by IGEAN.

Figure 4 Coordination and organisational structures for the Covenant of Mayors



Moreover, particular attention is paid to consultation and cooperation with neighbouring municipalities by initiating joint projects and supporting citizens' initiatives, among other things.

1.4.5 Citizen participation

More and more citizens are aware of the climate issue and want to take action. This dynamic in society continues to grow and the municipality of Zoersel wants to encourage this further.

Various keys issues must always be considered when organising citizen participation:

- the voice of citizens must have an impact. It is pointless to ask for advice and then ignore it;
- citizens need to feel that their voices have an impact;
- a cross-section of the population must be reached;
- the organisation of such an event requires sufficient time and resources.

Citizens were involved in various ways when preparing the climate plan for the municipality of Zoersel. On 3 May 2018, a climate cafe was organised in which some 50 citizens reflected on a climate-friendly municipality. A brainstorming session was organised on the themes of energy, consuming less, mobility and housing.

From 19 September to 20 October 2019, the municipality conducted an on-line survey of residents via Google Forms with a link distributed via Facebook. The survey was based on the three pillars of the Covenant of Mayors: climate mitigation, climate adaptation and sustainable, safe energy. For each theme, respondents were asked what actions they had already taken, what actions they want to take in the future, what they thought the municipality could still do, and why no actions would be taken.

The municipality received 205 reactions to the on-line survey. A summary of the survey is given in Annex 2. When asked which actions the municipality could take, the following topics were mentioned most often:

- climate mitigation:
  - tackle vehicle fleet, focus on public transport, promote carsharing systems;
  - cover roofs with solar panels, better/more insulation, alternative forms of housing.

- climate adaptation:
  - better water management, less concrete, concrete stop;
  - plant more trees, no deforestation, keep greenery in municipality;
  - plant trees, closer monitoring of tree felling and replanting;
  - more communication and awareness raising.

- sustainable, safe energy:
  - allow wind turbines;
  - lead by example;
  - promote and increase public awareness of group purchases.

When preparing the climate plan, the citizens' suggestions and ideas were taken into account. The municipality of Zoersel also calls for more citizen participation by joining a citizen's cooperative in the region.

1.4.6 Monitoring and follow-up

Within the scope of the Covenant of Mayors, the municipality of Zoersel is required to issue regular interim reports – every two years after submission of the climate plan (SECAP) – indicating the degree of implementation of the action plan and the interim results of the actions. Table 1 below gives an overview of the monitoring and reporting requirements of the Covenant of Mayors.

Table 1 Overview of monitoring and reporting requirements of the Covenant of Mayors

	Upon signing Year 0	SECAP Within 2 years	Monitoring action report Within 4 years	Monitoring full report Within 6 years
strategy	optional	x	x	x
emission inventories	optional	x Baseline Emission Inventory (BEI)		X Monitoring Emission Inventory (MEI)
mitigation actions	optional	x	x (min. 3 actions)	x
adaptation scoreboard	x	x	x	x
risks and vulnerabilities	optional	x	x	x
adaptation actions		x	x (min. 3 actions)	x

1.5 ENERGY CONSUMPTION IN THE MUNICIPALITY OF ZOERSEL

1.5.1 Zoersel, a Kempen municipality

The municipality of Zoersel is located in the heart of the province of Antwerp, spread over three residential areas: Halle, Sint-Antonius and Zoersel.

Zoersel covers an area of 3,865 ha. The residents of Zoersel live – besides the village centres – in quiet neighbourhoods where living and green go hand in hand. Zoersel lies within a stone's throw of Antwerp and Turnhout. Moreover, Zoersel has good connections with various main traffic arteries: E34 (border Zoersel and Zandhoven), E19 (Sint-Job) and E313 (Zandhoven).

1.5.2 Energy consumption in the municipality of Zoersel in the 2012 benchmark year

The municipality of Zoersel has adopted 2012 as benchmark year because it presented normal climatic conditions, i.e. no extreme heat or cold. This simplifies comparison with following years. In 2012, total energy-related CO_2 emissions from the municipality of Zoersel equalled **74,430 tonnes of CO_2** or **3.5 tonnes of CO_2 per inhabitant** (21,555 inhabitants in 2012). This corresponds to a final energy consumption of **371,380 MWh**.(Table 2, Figure 5)

On behalf of the Flemish government (LNE department), VITO helps cities and towns in Flanders prepare the CO_2 inventory or Baseline Emission Inventory (BEI). This tool contains all data and calculations needed to determine a CO_2 emission benchmark for the territory in accordance with the minimum reporting requirements of the Covenant of Mayors.

Each year, the new inventories for each Flemish municipality are placed online at http://www.burgemeestersconvenant.be/co2-inventarissen. The inventories are based on public data, completed with municipality-specific data, and are approximately 1.5 years behind reality. This means that when drawing up a climate plan or report, the year for which inventories are already available should always be checked. For example, a report for 2020 cannot be drawn up until 2022.

The CO_2 inventory gives an indication of the energy-related emissions on the territory of the municipality of Zoersel, expressed in tonnes of CO_2. The figures and tables about CO_2 emissions in this plan are all based on this CO_2 inventory.

This plan was drawn up on the basis of the 2012 CO_2 inventory of the municipality of Zoersel (update of 13 August 2019). In a first step, the energy consumption based on the number of vehicle kilometres travelled by light and heavy vehicles on motorways through the municipality was removed from the 'transport' tab. In a next step, the 2012 data of the own organisation regarding the energy consumption from 'own buildings', 'own public lighting' and 'own fleet' were added in the respective tabs. Finally, the amount of green electricity purchased by the municipality was recorded in the tab 'own information GE and heating system'.

The same method was used to calculate CO_2 emissions in 2017.

The CO_2 inventory gives an insight into:

- direct CO_2 emissions related to fuel consumption on the territory of the municipality of Zoersel in buildings, equipment/facilities/industrial installations and of transport;
- (indirect) CO_2 emissions from the production of electricity, heating or cooling used in the municipality of Zoersel (regardless of the production location).

Which sectors are included in the inventory?

- Municipal patrimony (own buildings, public lighting, own fleet)
- Households
- Tertiary sector
- SMEs
- Agriculture
- Private and commercial transport
- Public transport
- Unallocated: some natural gas and electricity consumptions cannot be allocated to a specific sector by the Fluvius System Operator (e.g. for privacy reasons with 3 or less consumers per subcategory). These consumptions are directly included in the sector 'unallocated'.

What is not included in the inventory?

- Energy consumption of ETS companies (ETS = Emission Trading System)
- Emissions from livestock such as nitrous oxide and methane
- Transport kilometres travelled on motorways
- Rail transport

Table 2 Energy consumption and CO_2 emissions in the municipality of Zoersel (2012)

2012 benchmark	MWh	Tonnes of CO_2
households	202,507	35,829
tertiary	67,782	13,970
agriculture	3,259	784
SMEs	7,631	1,607
private and commercial transport	76,349	19,283
public transport	2,107	539
own buildings	4,630	938
own public lighting	1,247	255
own fleet	728	185
unallocated	5,139	1,041
total	**371,380**	**74,430**

Figure 5 CO_2 emissions by sector in the municipality of Zoersel (2012)

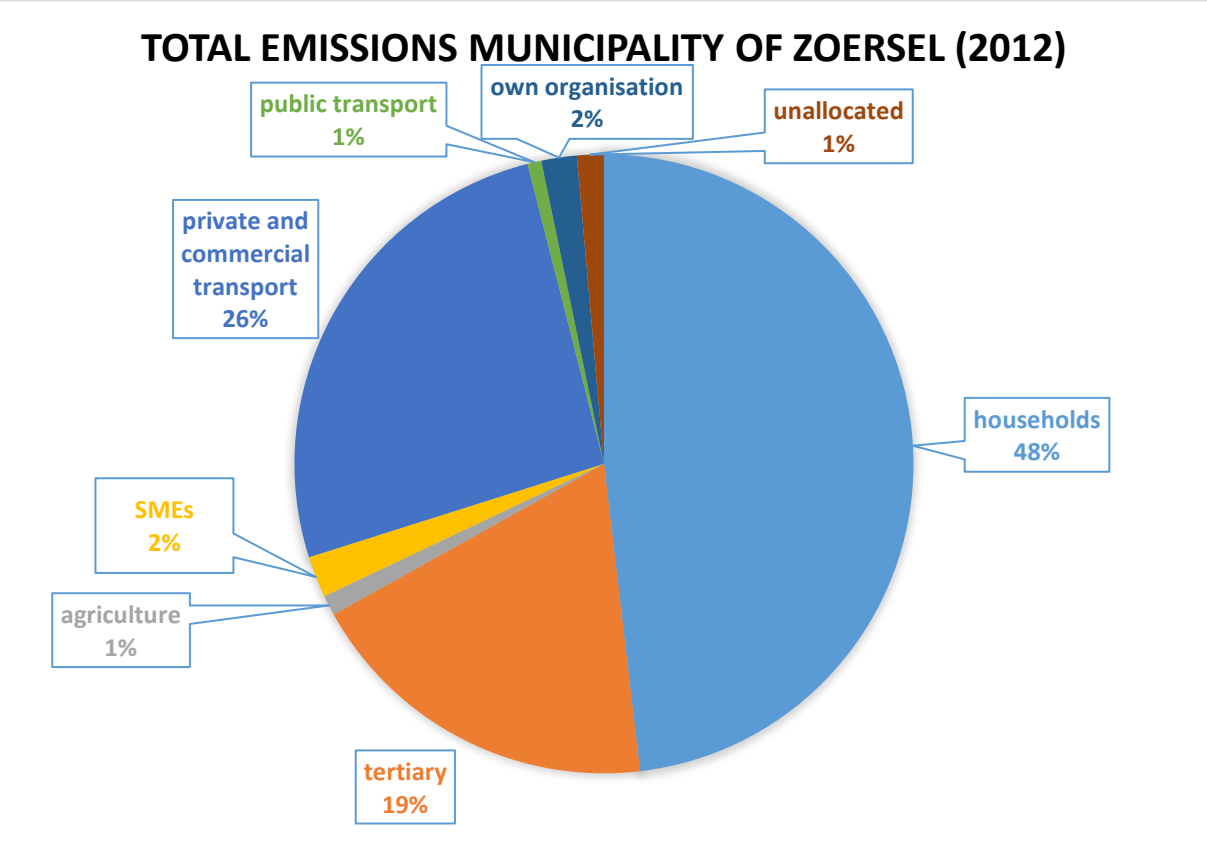


Figure 5 shows that households represent the largest share of total CO_2 emissions with 48%, followed by the private and commercial transport sector with 26%. The tertiary sector has a 19% share of total emissions and SMEs account for 2%. Emissions from agriculture and public transport both account for 1%. Municipal services (own buildings, own public lighting and own fleet) together account for 2% of total CO_2 emissions.

The climate plan discusses in detail the emissions, reduction potential and actions to be taken to reduce CO_2 emissions in each sector of the municipality of Zoersel.

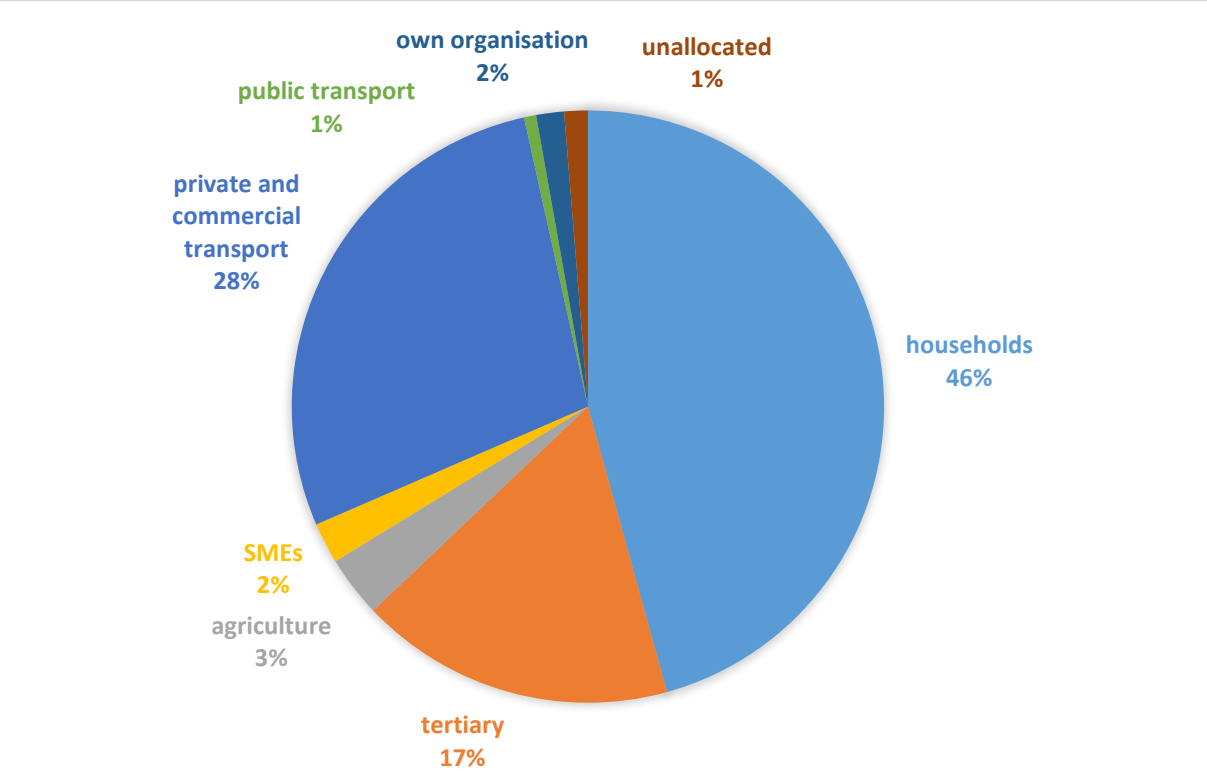
1.5.3 Energy consumption in the municipality of Zoersel in 2017

When drawing up this plan, the last known figures for energy consumption in the municipality of Zoersel are those for 2017. Table 3 and Figure 6 provide an overview of energy consumption by sector in 2017.

Table 3 Energy consumption and CO_2 emissions in the municipality of Zoersel (2017)

2017	MWh	Tonnes of CO_2
households	186,278	32,102
tertiary	60,259	12,092
agriculture	9,730	2,345
SMEs	7,521	1,569
private and commercial transport	79,332	19,700
public transport	1,833	464
own buildings	3,714	748
own public lighting	851	170
own fleet	596	149
unallocated	4,490	904
total	**354,602**	**70,243**

Figure 6 CO_2 emissions by sector in the municipality of Zoersel (2017)

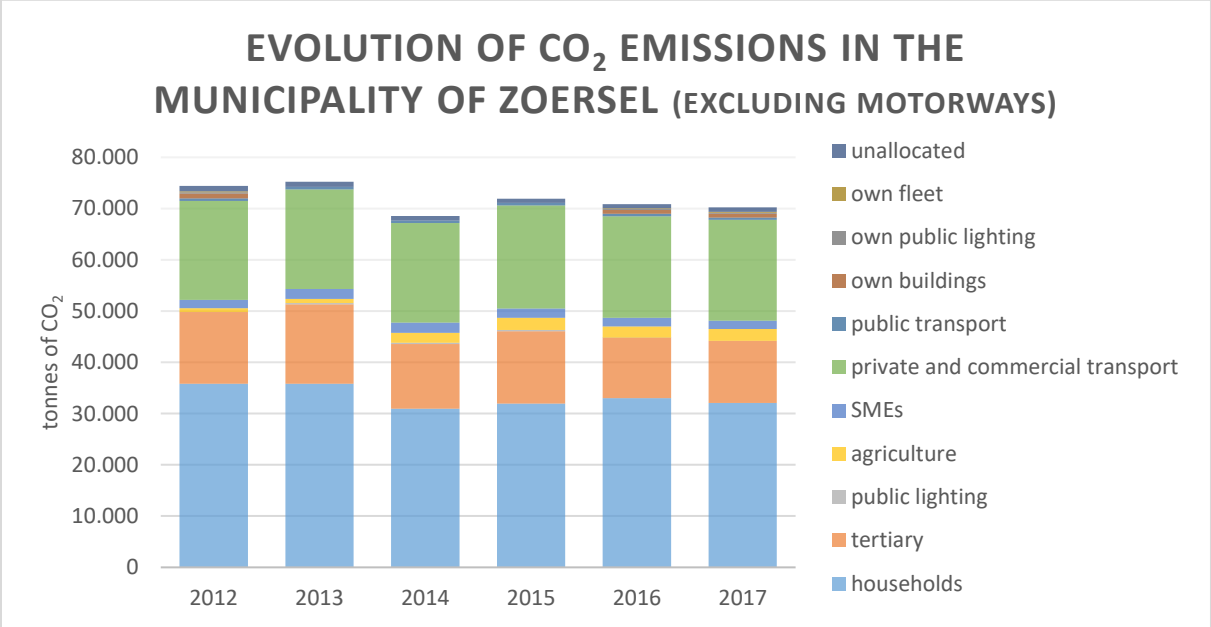


1.5.4 Evolution of CO_2 emissions between 2012 and 2017

Figure 7 shows the evolution of CO_2 emissions in the municipality of Zoersel between 2012 and 2017. The small fluctuations shown on the graph can be partially explained by temperature variations. The plan further discusses the evolution of CO_2 emissions by sector.

The year 2014 was extremely hot. It is the warmest year recorded in Brussels-Uccle since the beginning of climate monitoring in 1833. The annual average temperature was 11.9°C, or 0.3°C above the previous record of 2011 and 1.4°C above the annual normal value (10.5°C). (12) During warm years, the energy used for heating buildings decreases, which results in a slight decrease in CO_2 emissions.

Figure 7 Evolution of CO_2 emissions in the municipality of Zoersel between 2012 and 2017



1.5.5 Forecasts for the future (BAU scenario until 2020)

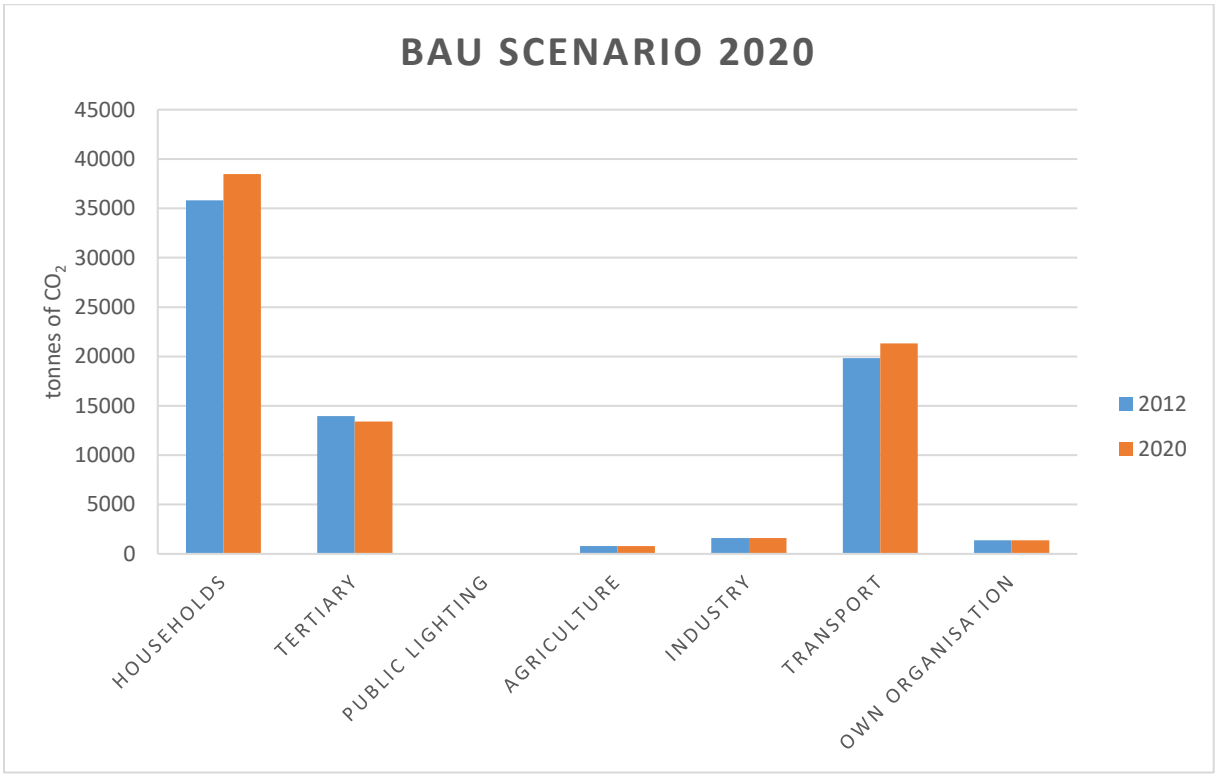
The BAU ('business-as-usual') scenario gives an estimate of energy consumption and associated CO_2 emissions by 2020, if no further actions are taken by the local authorities. The scenario takes into account autonomous evolutions (e.g. demographic evolution, autonomous replacement of heating installation, evolution of vehicle kilometres, expected blending of biofuels, etc.) and decides on European policies such as the Ecodesign Directive, Euro standards for cars, energy performance policy and renewable energy policy. This model assumes that the emission factors (to convert energy consumption into associated CO_2 emissions) will remain the same and that local production of renewable energy in 2020 will therefore be equal to 2012. A BAU scenario towards 2030 has not yet been elaborated.

According to the BAU scenario for the municipality of Zoersel, it is expected that household consumption will increase by 7% by 2020 and the tertiary sector will decline by 4%. Transport will increase by 8%. No forecasts have been made for the agricultural sector, SMEs and the own organisation. Based on the BAU scenario, total emissions in the municipality of Zoersel will increase by 3% to **76,978 tonnes of CO_2 in 2020**. The results are shown in Table 4. Figure 8 shows the emissions from the various sectors in 2012 compared to the emissions based on the BAU scenario in 2020. The BAU scenario gives a forecast for 2020 if no further action is taken.

Table 4 Comparison of energy consumption and CO_2 emissions according to the 2012 benchmark and the BAU scenario in 2020

BAU scenario	Final energy consumption (MWh)		CO_2 emissions (tonnes)	
	2012	2020	2012	2020
households	202,507	218,633	35,829	38,462
tertiary	67,782	65,267	13,970	13,417
agriculture	3,259	3,259	784	784
SMEs	7,631	7,631	1,607	1,607
private and commercial transport	78,456	83,378	19,822	21,331
own organisation	6,605	6,605	1,377	1,377
unallocated	5,139	-	1,041	-
total	**371,380**	**384,774**	**74,430**	**76,978**

Figure 8 CO_2 emissions in 2012 compared to CO_2 emissions according to the BAU scenario in 2020



1.6 EMISSION REDUCTION POTENTIAL OF THE CLIMATE ACTION PLAN

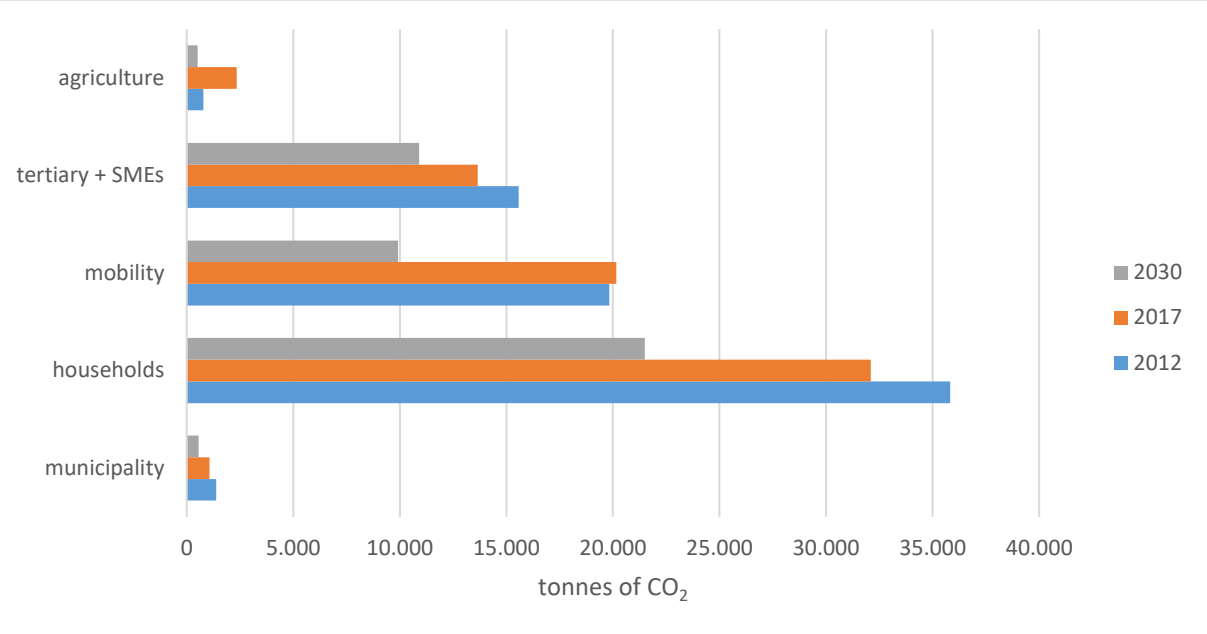
The overarching objective of the climate plan for the municipality of Zoersel is a **40%** total CO_2 emission reduction of the territory **by 2030** in comparison with the 2012 benchmark. In concrete terms, this means a **decrease of 29,772 tonnes of CO_2** by 2030.

To achieve these savings, the emission reduction potential is calculated for each sector. The potential savings are calculated on the basis of the 2012 benchmark. The proposed reduction is a theoretical approach to what we believe is feasible for each sector. The municipality can then have the greatest impact on its own organisation and achieve a larger reduction percentage. As the municipality has less impact on the agricultural, tertiary and SME sectors and savings are less straightforward, fewer major objectives are set here. Figure 9 shows the reduction potential of the climate plan by sector by 2030.

Table 5 Reduction potential of the climate plan by sector by 2030

Reduction potential (tonnes of CO_2)	2012	2017	2030	Reduction potential by 2030
own organisation	1,377	1,067	551	60%
households	35,829	32,102	21,497	40%
mobility	19,822	20,164	9,911	50%
tertiary and SMEs	15,578	13,661	10,904	30%
agriculture	784	2,345	509	35%
unallocated	1,041	904	625	40%
sum of the targets	**74,430**	**70,243**	**43,998**	**41%**
target Covenant of Mayors			44,658	40%

Figure 9 Reduction potential of the climate plan by sector by 2030



1.7 RISK ANALYSIS FOR THE MUNICIPALITY OF ZOERSEL

The Province of Antwerp has developed a climate action plan (9) with strategies and measures to mitigate the effects of climate change in the province. The first part contains an analysis of climate change and regional impacts. This section examines the expected climate changes in the province for the periods 2030, 2050 and 2100. As these estimates involve an uncertain future, two possible future climate scenarios are used. The changes apply to the whole province of Antwerp and therefore also to the municipality of Zoersel.

1.7.1 Two possible climate scenarios

Two climate scenarios are used to analyse the potential impacts of climate change for the province of Antwerp. A climate scenario describes what the future climate will probably be like. The scenarios contain assumptions about the amount of greenhouse gases emitted.

Moderate climate change scenario

This scenario assumes a drastic reduction of greenhouse gas emissions by 2100. To achieve that goal, various technologies and strategies, including bio-energy, carbon capture and storage, are used worldwide to reduce greenhouse gas concentrations in the atmosphere. The scenario takes into account that around 9 billion people will live on Earth by 2100. It assumes compliance with the national pledges to reduce emissions made in Paris in December 2015.

Severe climate change scenario

This scenario is based on a 'business-as-usual' model in which fossil energy is used and greenhouse gas emissions continue to increase. In this scenario, energy consumption remains high. Technological development is 'slow' worldwide and it is assumed that 12 billion people will live on Earth.

1.7.2 Primary effects

The effects are calculated based on both scenarios. Climate change is divided into primary and secondary effects. Primary effects are changes in meteorological variables. For example, changes in temperature, precipitation and solar radiation are expected. Secondary effects are the effects of these changes in a given context (floods, heat, drought) which in turn have an impact on various sectors (buildings, mobility, agriculture, SMEs, …). The impacts for these sectors are discussed per theme further in the climate plan.

The primary effects on climate in the province of Antwerp are predicted on the basis of the two possible climate scenarios. The same effects are expected in both scenarios, but the extent to which these effects will occur will differ. For example, in the severe climate change scenario, it will get even warmer on average than in the moderate climate change scenario.

It gets warmer on average

Although it can still snow and freeze due to natural fluctuations, climate change will cause an increase in the annual average temperature in the province of Antwerp. This temperature rise occurs with both moderate and severe climate change. With severe climate change, the temperature will increase more than in case of moderate climate change. With moderate climate change, it is assumed that the monthly average temperature will increase by a minimum of 0.5˚C in 2030 to a maximum of 4˚C (in August) by 2100. With severe climate change, the monthly average temperature may increase by 0.8˚C in 2030 up to 6.5˚C (in July) by 2100. The smallest rise in temperature can be found in spring. The largest rise in summer.

Compared to the temperature for Belgium, the temperature rise in the province of Antwerp appears to be less pronounced than the figures applying to the whole of Belgium. This is the case for all months of the year. Because it is getting warmer, a trend can also be observed in

the number of frost days. It is expected that there will be fewer frost days in the province over the years. With moderate climate change, the number of frost days may decrease by a minimum of 2 days in 2030 to a maximum of 18 days by 2100. With severe climate change, the number of frost days may decrease by a minimum of 3 days in 2030 to a maximum of 25 by 2100.

It gets wetter in winter and drier in summer

Climate change will also affect precipitation patterns. Under conditions of both moderate and severe climate change, the number of showers is expected to increase slightly during the winter months and to decrease in the months of April to November. There may be up to 38% less showers in summer and autumn by 2100 in the severe climate change scenario. In winter, up to 5% more showers than today may occur by 2100 in the severe climate change scenario. Whether there will be more showers in spring is still uncertain.

So, less showers on the one hand, but on the other, the results also indicate that showers might intensify. This change is particularly noticeable in spring, autumn and winter in both scenarios of moderate and severe climate change. The increase may be as high as 40% in autumn by 2010 in case of severe climate change. There is still great uncertainty about the change in shower intensity in summer, but for this season as well, showers are expected to intensify.

The precipitation rate will also change. There is a clear decrease in summer precipitation by more than 40% by 2100 in the severe climate change scenario. Precipitation will increase in spring and winter. In the severe climate change scenario, the precipitation rate may increase by about 28% in winter. In the moderate climate change scenario, the maximum increase is 17%. The severe climate change scenario will lead to even wetter winters and drier summers compared to the moderate climate change conditions. In spring and autumn, the difference between moderate and severe climate change is limited.

These changing precipitation patterns lead to a progressive annual precipitation deficit of 200 mm in summer. When comparing the figures for the province of Antwerp with the figures for Belgium, it can be noticed that the increase in precipitation in winter is slightly higher in comparison with Uccle, while in summer the decrease in precipitation is slightly lower.

Solar radiation intensifies

Solar radiation reflects the intensity of the sun. Solar radiation is expected to intensify in spring, summer, autumn and winter. Especially in summer, solar radiation is likely to increase. In the moderate climate change scenario, solar radiation may increase by 12% by 2100. In the severe climate change scenario, it will increase as much as 21% by 2100.

Wind intensity barely changes

It is expected that wind intensity will barely change in comparison with to the current climate.

Sea levels are rising

Data on sea level rise has been collected on the basis of previous studies and analyses. The MIRA Climate Report (2) indicates that since the beginning of the 20th century, sea levels have been rising by 1.7 mm a year due to the thermal expansion of seawater and the melting of ice caps (10). An acceleration has been noticed since the 1950s and sea levels have been rising by 3.4 mm annually. Sea level rise is expected to accelerate further by 6 mm to 9 mm per year, leading to a rise of 60 cm or 90 cm by 2100.

Sea level rise is relevant in the context of flooding, it increases flood risk in low-lying areas and complicates water discharge from tidal rivers like the Scheldt during storms. Sea level rise lowers the initially intended safety level by dikes and controlled flood areas.

The impacts of sea level rise will obviously be felt throughout Belgium.

1.7.3 Secondary effects (4)

In simple terms, global warming will cause 'more heat waves, drier summers, wetter winters and sea level rise' in Flanders. Recent research results allow us to further refine this image. The Climate Portal Flanders provides information on climate change in Flanders and possible climate scenarios. At local level, the effects of climate change on heat, drought, floods, … become visible. The various effects relevant to the municipality of Zoersel are discussed below.

Heat

Temperature increase leads to an increasing number of heat wave days. According to the definition of the FPS Public Health, these are periods of at least 3 consecutive days in which the temperature rises above the health thresholds of 29.6°C during the day and 18.2°C at night. Health problems in our country occur especially when the night-time minima remain above 18,2°C for at least 3 consecutive days.

Higher temperatures may have a significant health impact, especially in urban agglomerations that retain a relatively high amount of heat. The effect of extreme air temperatures manifests itself, among other things, in heat stress. Heat-sensitive population groups, young children and the elderly in particular, experience nuisance and negative health effects as a result.

In the current climate, we have an average of 4 heat wave days per year in Flanders. In Zoersel, in the high-impact climate scenario, this number may increase to an average of 53 heat wave days per year in 2100. The vulnerable population (children up to 4 years and elderly people aged 65+) will then experience long periods of heat stress.

Drought

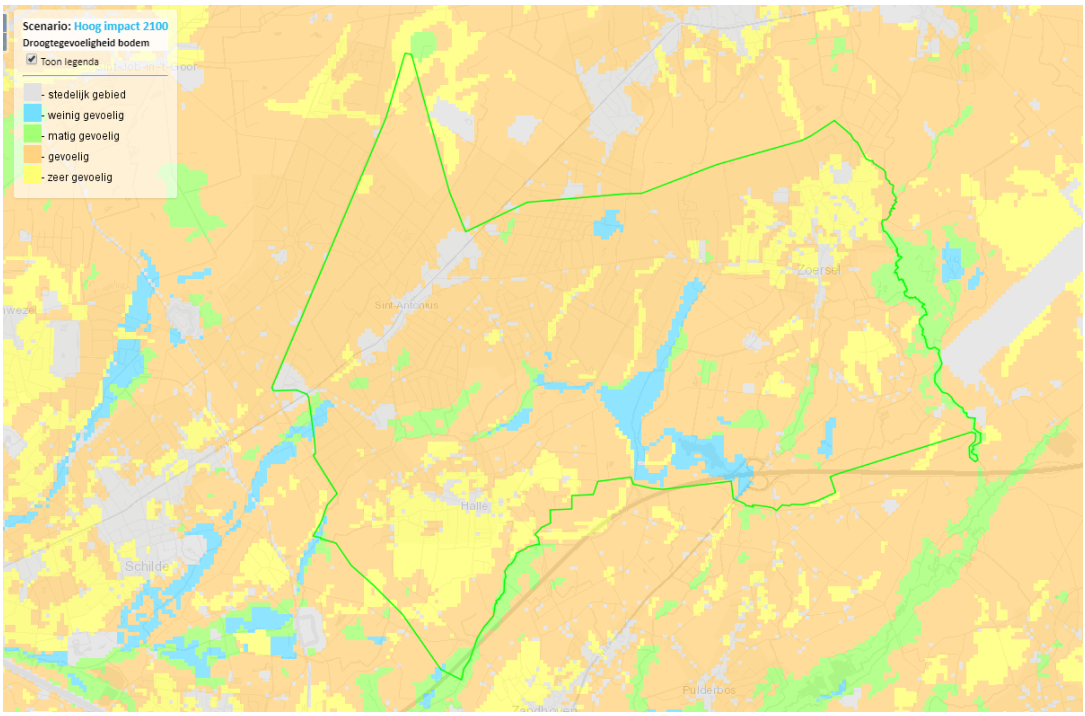
In 1976, 2011, 2017 and 2018, Flanders already had to deal with extreme drought. Rising temperatures increase evaporation. As it will rain less in summer, extreme drought may intensify and occur more often in Flanders in the future. In the current climate, there are on average 172 dry days per year. Based on the high-impact scenario, this may increase to 236 days in Zoersel in 2100.

Flanders has one of the lowest per capita water availabilities due to a combination of high population density and a relatively limited presence of surface and groundwater. Climate change will destabilise this fragile balance. Increasing impacts of drought on large parts of the water system and numerous sectors are expected.

Figure 10 shows that a large part of the soil in Zoersel is susceptible to drought, including parts of the Zoersel Forest, such as the nature reserve *Het Heiblok*.

However, more research is required to determine the exact groundwater level. In fact, the groundwater table can be influenced by numerous factors. Groundwater extraction nearby, climatic conditions, underground works and constructions, and surface water from the surrounding area all affect the groundwater level. Moreover, the groundwater level fluctuates throughout the year. The highest level is usually reached at the end of March, the lowest at the end of September. The groundwater level also varies from one year to the next. The water level reached at the end of March, for example, depends on the weather conditions in the preceding period.

Figure 10 Drought sensitivity of the soil based on the soil types from the soil map (4)



Floods

Climate change affects the hydrological cycle and increases flood risk. The infiltration of water into the soil is prevented by increased building and paving. Showers intensify and intense showers are more frequent, with peak discharge putting pressure on sewerage systems. Finally, rivers are also sensitive to climate change due to increased peak discharge.

The high-impact scenario shows that the likelihood of flood events in Flanders may increase by a factor of 5-10 by 2100 (4). Here we use the high-impact climate scenario by 2100 as there is no data available on the impact of floods by 2030.

- In concrete terms, this means that areas with a current medium risk of flooding (every hundred years) may be flood-prone every ten years.
- Areas that are currently flooded every ten years, may then flood almost every year.
- Flood events may also become more extreme as higher discharge causes a rise in peak water levels.
- On average, the maximum flood levels are expected to increase by 22 cm in Flanders. Locally, this may even increase to just over 1 m. Dense urban drainage systems are particularly sensitive to this.
- Peak discharge of rivers and streams may even increase at certain moments by as much as 35%.

There are several channels for rainwater drainage: infiltration, sewerage systems and watercourses. The extent to which these discharge channels are flood-prone is examined below.

1. Infiltration into groundwater

Soils with high infiltration capacity allow water to infiltrate quickly into the soil and seep through to deeper layers. This potential mainly depends on two factors: the groundwater level and the permeability of the soil texture:

- the shallower the groundwater table, the more infiltration will be limited. Wet soils with a shallow groundwater table are more difficult to infiltrate;
- the smaller the grain size of the soil, the more infiltration will be limited. Clay or loam soils are more difficult to infiltrate than soils of gravel, sand or sandy loam. The soil of Zoersel consists mainly of (wet) sandy soil.

2. Sewerage systems

The current sewerage level in Zoersel is 54.56%. This means that 1 in 2 homes is connected to the sewerage system. Over the next few years, efforts will be made to catch up, which will have positive effects on water management.

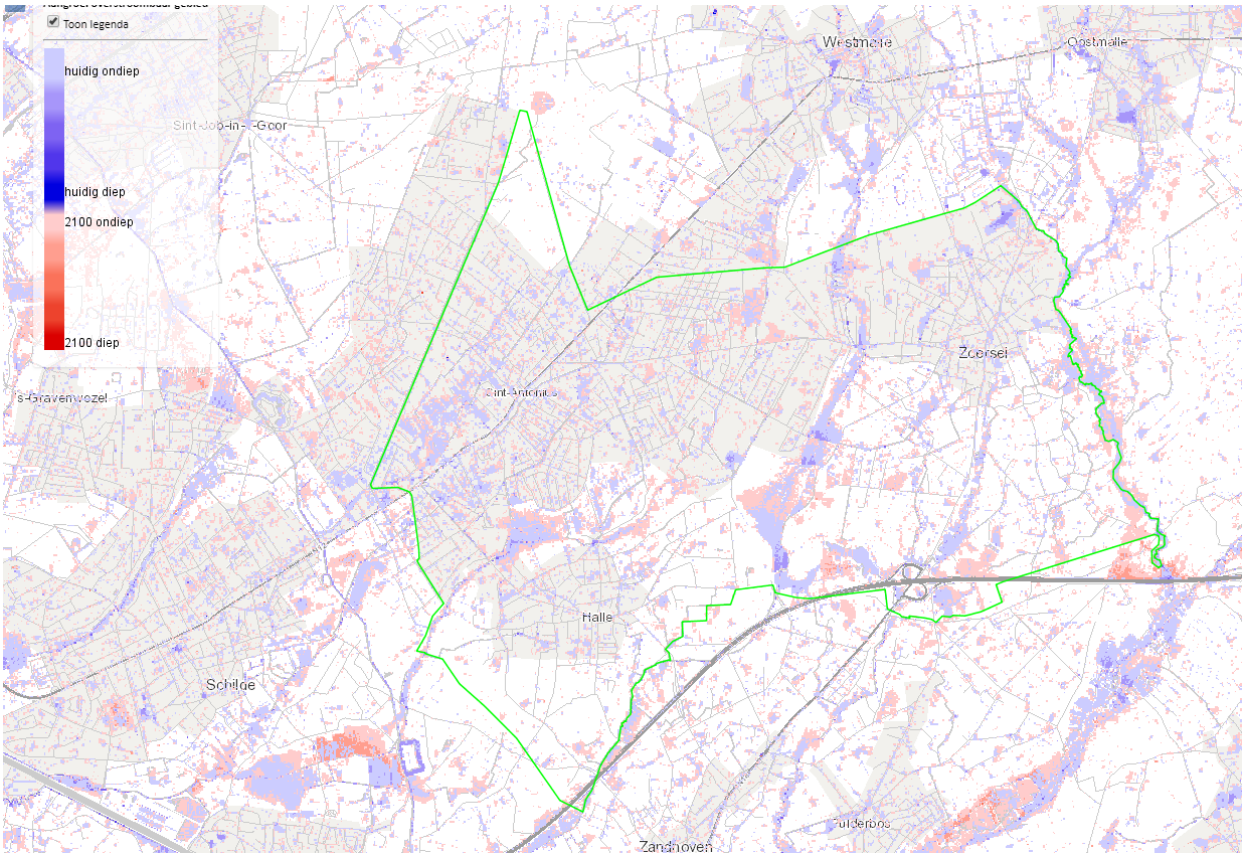
3. Natural watercourses

Zoersel has 2nd category watercourses, public canals and roadside canals. The basic rainwater plan is in preparation.

4. Recent flooding

The Climate Portal Flanders shows that the amount of flood-prone areas will increase by 2100 (Figure 11).

Figure 11 Increase of flood-prone areas in Zoersel in 2100 (4)



1.7.4 Overview of risk analysis

The main risks for the municipality of Zoersel are floods, heat and drought. These secondary effects will increase both in intensity and in frequency. They are summarised in the table below.

Table 6 Risk analysis for the municipality of Zoersel

Type of climate risk	Current risk level	Expected change in intensity	Expected change in frequency	Time frame	Risk-related indicators
Floods	Moderate	Increase	Increase	Present situation	Precipitation total
Extreme heat	Low	Increase	Increase	Present situation	Number of heat wave days (> 30°C)
Drought	Low	Increase	Increase	Present situation	Number of days with precipitation

1.7.5 Vulnerability assessment for the municipality of Zoersel

Table 7 below presents a summary of the socio-economic and environmental vulnerability to floods, heat and drought in the municipality of Zoersel. The indicators specified are vulnerability-related and allow to measure and follow up vulnerabilities year after year. The impacts for each sector are discussed at the end of each theme.

Table 7 Environmental vulnerability assessment

Type of vulnerability	Description of vulnerability	Vulnerability indicators
Socio-economic	Vulnerability of buildings to excess water and flooding	Number of buildings subject to excess water
	Vulnerability of people to heat	Number of heat stress victims during heat waves
	Vulnerability of economic sectors to water shortage	Number of days called for responsible water use
Environmental	Vulnerability of areas, animals and plant species to heat, drought and floods	Number of species with decreasing results of periodic counts

Table 8 gives an overview of the impact of climate change on the various sectors in the municipality of Zoersel. Further in the plan, the impact for each sector is discussed in more detail.

Table 8 Overview of impact assessment

Sector	Expected impact	Likelihood of occurrence	Expected impact	Time frame	Impact-related indicators
Buildings	Water damage Increased cooling demand	Likely	Moderate	Present situation	Number of buildings with water damage per year
Transport	Damage to infrastructure from floods, drought and heat Low canal water levels	Possible	Low	Medium-long term	Cost of repairs of damage cause by drought and floods
Water	Increased water shortage/drought	Likely	High	Present situation	Number of days called for responsible use of drinking water
Spatial planning	Increased use of controlled floodplains	Possible	Low	Medium-long term	Number of days on which controlled floodpains are used
Agriculture	Increased vulnerability to drought or floods Increased fire risk	Likely	High	Present situation	Loss of crops by drought or water damage Number of fires
Environment and biodiversity	Increased vulnerability by more frequent flooding and periods of drought Ecosystem degradation	Likely	Low	Short term	Species counts
Health	Increase in diseases, stress, poorer air quality, reduced labour productivity	Possible	Moderate	Present situation	Excess mortality in periods of heat
Civil protection and emergency services	Increase in disasters and precarious situations More effort needed	Likely	Low	Long term	Number of times emergency services are mobilised for climate-related matters
Tourism	Overcrowding of recreational zones and blue-green algae in summer	Possible	Moderate	Medium-long term	Number of observations of blue-green algae

2 Municipality of Zoersel as an example

2.1 VISION OF THE FUTURE

The municipality of Zoersel leads by example and aims at a climate-neutral organisation by 2030. Awareness on climate change challenges is raised among all departments of the municipality of Zoersel. The environmental department coordinates the climate policy from the bottom up. Here lies an important role for council and management in shaping this priority at financial and policy level within the organisation. The municipality draws the card of a strong climate policy by focusing on various themes.

The municipality will only build energy-producing buildings in future. An energy specialist is part of the organisation. The entire municipal patrimony must evolve step by step towards energy efficiency, ranging from zero-emission and highly energy-efficient heating systems to the replacement with LEDs and smart patrimony management. A step-by-step plan drawn up by specialists and users/managers is required for each building. Renovations are thoroughly addressed to reduce energy use in buildings by at least 75% and to enable in-house production of renewable energy.

The municipality – involving the local residents – will place solar panels on municipal roofs and/or set up a wind turbine on its own land, with the possibility of citizen participation. The municipality is also looking into other possibilities to use renewable energy in its buildings, such as biomass or heat pumps.

The municipality is mapping public lighting, applying the maximum principles of dimming and switching off, and switching to LED lighting.

The municipality is reducing its fleet size while making it more sustainable. As of 2019, only zero-emission vehicles are purchased, where technically possible. Employees are encouraged to leave their cars at home and to make maximum use of bicycles and public transport for commuting and job-related travel.

The municipality opts for a coherent and sustainable procurement policy by purchasing sustainable materials.

2.2 THE MUNICIPAL ADMINISTRATION IN 2012

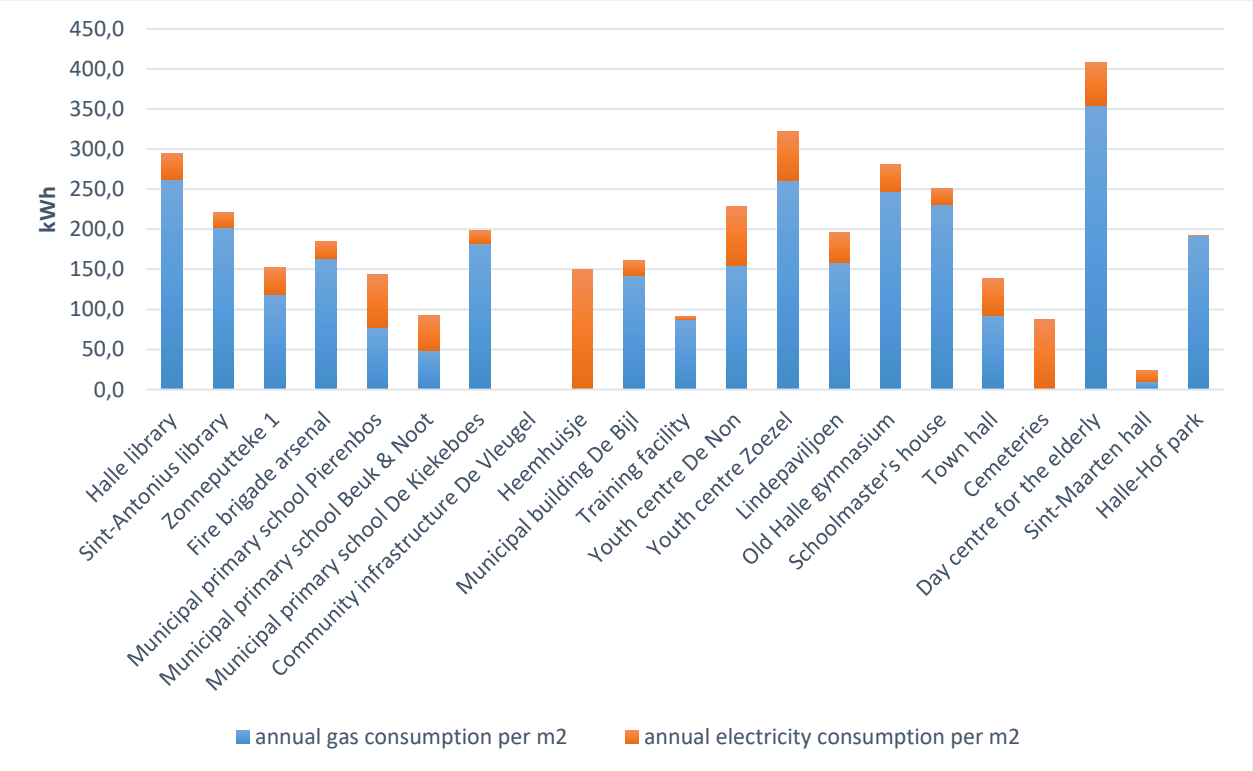
2.2.1 Building stock

The benchmark includes energy use in all municipal buildings managed by the local authority or by the PCSW. The figures are provided by the Fluvius System Operator. Figure 12 shows the annual electricity and gas consumption in each building expressed in kWh per m^2 of heated surface. This allows to map buildings with high consumption in relation to the heated surface. The data summary table can be found in Annex 3.

The following buildings were included in the 2012 benchmark:

- Halle library
- Sint-Antonius library
- *Zonneputteke 1*
- Fire brigade arsenal
- Municipal primary school *Pierenbos*
- Municipal primary school *Beuk & Noot*
- Municipal primary school *De Kiekeboes*
- Community infrastructure *De Vleugel* (became operational at a later date)
- *Heemhuisje*
- Municipal building *De Bijl*
- Training facility
- Youth centre *De Non*
- Youth centre *Zoezel*
- *Lindepaviljoen* ('Linden Pavilion')
- Old Halle gymnasium
- School master's house
- Town hall
- Cemeteries
- Day centre for the elderly
- Sint-Maarten hall
- Halle-Hof park

Figure 12 Annual electricity and gas consumption in municipal buildings in 2012 in relation to the heated area



2.2.2 Renewable energy

In 2012, the local authority purchased 100% green energy.

It also produced 2,000 kWh of green electricity by means of PV panels on the municipal school *De Kiekeboes* with a 10 Wp system.

2.2.3 Public lighting

Since March 2016, public lighting is switched off from 11 p.m. to 6 a.m., with the exception of intersections, side streets, blind bends, turnarounds in dead ends and regional roads. As of 2016, lighting is systematically switched to LED in sewerage projects.

2.2.4 Mobility

Table 9 below gives an overview of the travel modes of municipal staff in the municipality of Zoersel in 2012. The exact data of rail travel is not known for this year. Annex 4 presents an overview of the known figures for job-related travel and fuel consumption.

Table 9 Movements of municipal staff in 2012 (as far as known)

Mode	Distance (km)	CO_2 emissions (tonnes)
Service vehicles	74,202.3	185
Airplane	56,916	8,99 (13)

According to the federal diagnostic survey conducted by the FPS Mobility and Traffic, 47% of the municipal administration and technical service staff used sustainable modes of transport (mainly bicycle, to a lesser extent walking or public transport) for commuting in 2011. In 2017, this percentage had increased to 52%. In addition to this survey, the municipality conducted a survey among a larger target group of staff members in 2017, which included library and municipal primary school staff. 48% of the larger target group used sustainable transport modes for commuting. 45% of the staff members living in Zoersel still came to work by car.

2.2.5 Procurement policy

The municipality does not have a central purchasing department or a detailed procurement policy.

2.3 CO_2 EMISSIONS IN 2012

The local authority's operations represented **2%** of total CO_2 emissions in the municipality of Zoersel in 2012 (Figure 13). The emissions are related to the heating and operation of the municipal patrimony, public lighting and the municipal vehicle fleet. The local authority's total emissions amounted to **1,377 tonnes of CO_2** in 2012.

Figure 13 Emissions from the local authority compared to other sectors (2012)

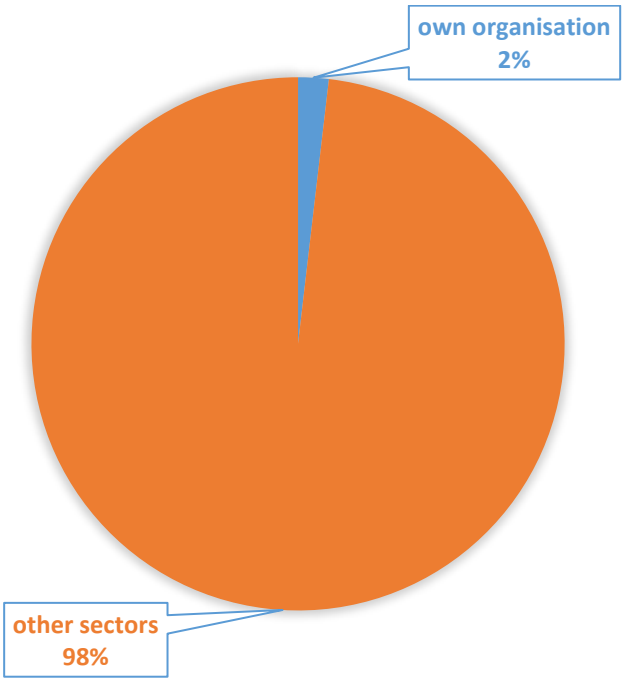
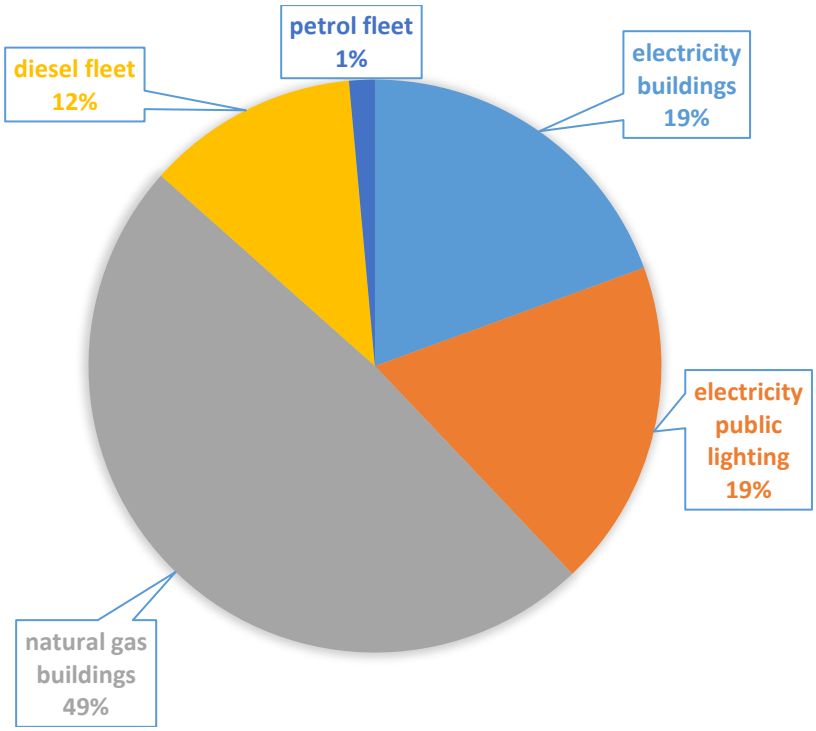


Table 10 Emissions from the local authority in 2012 per energy carrier (MWh and tonnes of CO_2)

Emissions from local authority 2012	MWh	Tonnes of CO_2
electricity buildings	1,310	268
natural gas buildings	3,318	670
electricity public lighting	1,247	255
diesel fleet	618	165
petrol fleet	78	20
biofuel fleet	31	-
total	6,605	1,377

Figure 14 shows that natural gas consumption (mainly used for heating buildings) accounts for almost half of the emissions (49%) from the local authority, followed by electricity with 38% (sum of electricity use in buildings and public lighting). The vehicle fleet is responsible for the remaining 13%, with 12% diesel and 1% petrol.

Figure 14 CO_2 emisions from the local authority in 2012 per energy carrier



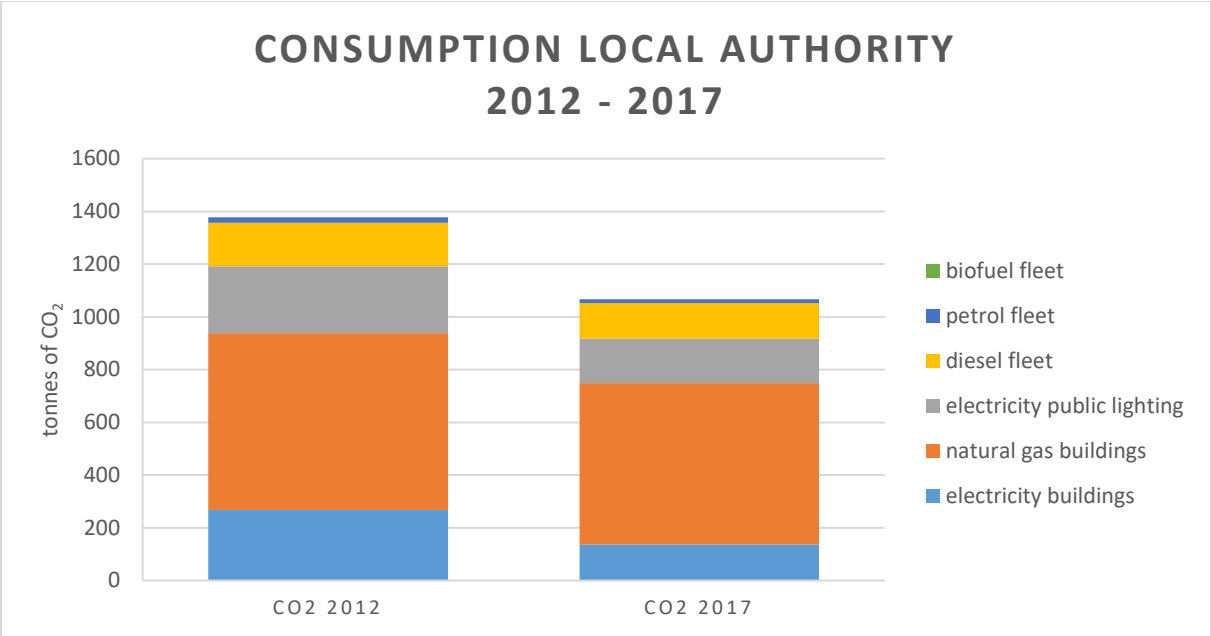
2.4 Evolution of consumption between 2012 and 2017

In the period between 2012 and 2017, the local authority's total consumption decreased by 22% (Table 11, Figure 15). The use of electricity in buildings has declined most by nearly 48%. Table 11 shows the emissions from local authority in 2012 compared to 2017.

Table 11 Emissions from the local authority in 2012 compared to 2017 per energy carrier (MWh and CO_2)

Emissions from local authority comparison 2012-2017	2012		2017		Difference in CO_2 emissions (%)
	MWh	Tonnes of CO_2	MWh	Tonnes of CO_2	2012-2017
electricity buildings	1,310	268	685	137	-47.8
natural gas buildings	3,318	670	3,029	612	-8.7
electricity public lighting	1,247	255	851	170	-31.9
diesel fleet	618	165	504	135	-18.5
petrol fleet	78	20	59	15	-26.4
biofuel fleet	31	-	33	-	-
total	**6,605**	**1,377**	**5,160**	**1,067**	**-22.0**

Figure 15 Evolution of consumption of the local authority in 2012 and 2017



In the period between 2012 and 2017, the local authority implemented various measures to reduce energy use in its own organisation:

- making available service bikes;
- purchase of two CNG cars (2017);
- adopting an energy-efficient policy and optimising the sustainability of its own patrimony through various adaptations, by building an energy-efficient school, etc.;
- performing energy audits of various buildings and drawing up energy accounts in cooperation with the system operator;
- switching off public lighting;
- since 2016, replacing public lighting with LEDs when carrying out works.

2.5 REDUCTION POTENTIAL

Based on the data of the 2017 greenhouse gas report (14), entities can be identified that qualify for emission reduction measures. The following priorities can be established.

- Reduction of natural gas consumption in buildings: the largest natural gas consumers are the town hall, the municipal primary school *Beuk & Noot* and the municipal primary school *De Kiekeboes*.
- Reduction of electricity consumption in buildings: the town hall and *Zonneputteke* are the largest consumers of electricity among the buildings. Electricity consumption in the town hall has increased in recent years. Energy savings by staff and visitors can be examined here.
- Reduction of electricity consumption in public lighting: consumption in public lighting has decreased in recent years by an adapted illumination regime. Optimisation of public lighting can reduce consumption even further.
- Energy consumption of the own fleet has already decreased in recent years by 42% for diesel and 32% for petrol.
- In recent years, sustainable commuting has been achieved to a limited extent. There is still reduction potential in this area.

2.6 IMPACT OF CLIMATE CHANGE

Climate change presents challenges at different levels which are discussed in more detail later on. The biggest challenge for the municipality's own organisation is to make climate a policy theme. A theme that is equivalent to leisure, sports and civil affairs. The climate theme is still optional and has no legally binding framework, although this is becoming increasingly essential due to global warming. The impacts of global warming for citizens will be enormous. From an economical, ecological and social perspective. The local authority can already take responsibility and include this theme in its long-term policy.

Moreover, the local authority is confronted with the impacts of climate change on its own operation. Each impact is discussed separately.

2.6.1 Impact of heat

The impact of heat on the municipality's own operation will be felt mainly in the three municipal primary schools *Beuk & Noot*, *De Kiekeboes* and *Pierenbos*. It should be considered here that toddlers and children are more sensitive to heat. They will suffer health problems sooner. Since all three municipal primary schools are located in high-density areas (centre of Zoersel, Sint-Antonius and Halle), they will all be confronted with increased heat stress. (4)

2.6.2 Impact of drought

Drought may cause soil subsidence and damage to infrastructure (roads and cycle paths) and buildings (9).

2.6.3 Impact of floods

Floods are initially problematic for buildings, infrastructure, facilities and cultural heritage. They can cause a lot of damage and disrupt society for some time.

Moreover, vulnerable groups, including toddlers and children, are residing in buildings that are potentially flood-prone. The municipal primary school *Beuk & Noot* and the neighbourhood school *Kievitje* are facing limited risk of flooding between 0 and 30 cm. There is no flood risk for the primary school *De Kiekeboes*. (4)

2.7 STRATEGIES FOR THE LOCAL AUTHORITY

2.7.1 Incorporate the climate theme into the municipal organisation

The municipality of Zoersel provides sufficient support to the municipal services regarding the climate theme. Procurement, executive and support services must receive guidelines on the direction in which the municipality wants to evolve. People need to start thinking 'out of the box' and break certain habits. Adequate training and external expertise can promote this process.
The climate policy must be spread by management and the board. The council will provide sufficient resources and staff to implement the climate plan.

2.7.2 Invest in climate-friendly infrastructure

The first step consists of providing buildings in municipal ownership or management with energy monitoring systems. Energy monitoring allows to trace losses and excesses and to take concrete actions. Moreover, a survey among users can quickly identify problems.

Subsequently, the buildings in municipal ownership or management must be adequately insulated. For each existing building, roof, wall and floor insulation is considered and the insulation standards for new buildings are pursued.

The approach to heating methods is the next step in the process towards energy-efficiency in buildings. The buildings in municipal ownership or management are provided with a sustainable heating system. There is a realistic chance that the municipality will be

disconnected from the gas grid by 2050. Reflecting on joint heat production and heating grids is crucial in this respect.

Quick and easy savings can be achieved with lighting. The switch to LEDs saves a great deal of energy. The detection of standby power is more complicated but should not be ignored. Control systems such as light and motion sensors can save extra energy.

Finally, renewable energy sources such as solar roofs, heat pumps and solar collectors on municipal buildings will be integrated where possible with the participation of citizens, associations and the tertiary sector.

2.7.3 Move towards zero-emission mobility

The sustainability of the municipal officials' mobility must be augmented by reducing vehicle kilometres and improving the environmental characteristics of the fleet and the fuels used. The procurement policy plays an important role here. The municipality of Zoersel is committed to promoting bicycle traffic and public transport for commuting and job-related travels. The need for mobility is reduced by promoting telework where possible. Moreover, the municipality of Zoersel wants to discourage the use of cars for job-related travels.

2.7.4 Opt for a sustainable procurement policy

The municipality of Zoersel wants to bring its purchases fully in line with the outlined climate policy: energy-efficient appliances, renewable energy (of local origin, if possible), local and sustainable food production, fair trade, conscious meat consumption, low-waste products, electric vehicles, etc.

The municipality will also test its internal and external guidelines against the climate targets to avoid conducting a contradictory policy and to raise maximum awareness among staff and visitors about all aspects of the climate theme.

2.7.5 Be a smart city

New technologies open up new perspectives. As an organisation, see where artificial intelligence can be embedded in the municipality. Do not wait for others but act on innovative ideas and technologies that increase the efficiency and sustainability of municipal operations.

2.8 PLANNED MULTI-ANNUAL PLAN ACTIONS

Zoersel wants to fully replace public lighting by LEDs by 2030. To achieve this, the municipal council decided on 19 November 2019 to transfer the public lighting network to the electricity and gas distribution grid operator Fluvius, based on the 'light as service' principle. The total cost of replacing public lighting with LEDs in the period 2019-2030 (investments and maintenance) amounts to 2,558,582 EUR. The municipality will receive a one-time transfer value of 174,008 EUR. Replacement with LEDs will gradually decrease electricity consumption and associated costs. CO_2 emissions will decrease by 82,546 kg.

The municipality undertakes to install solar panels on the roofs of all suitable municipal buildings using a framework agreement concluded by the Flemish Energy Company and financed by a citizens' cooperative.

Furthermore, the multi-annual plan 2020-2025 provides, among other things, for investments to:

- increase the energy efficiency of school buildings: 450,000 EUR;
- implement a carsharing project that is also used by the municipal services: 95,000 EUR;
- purchase service bikes: 10,000 EUR.

3 Housing and living

3.1 VISION OF THE FUTURE

A vibrant centre where everything is close by and everyone can go to the shops, to school or to work on foot or by bicycle. Where streets function as living streets with spacious footpaths, benches, street trees, garden facades, playgrounds and municipal gardens. Where cohousing and assisted living facilities promote social contact. Where sustainable electricity is available to all. Where young and old live closer together.

Strengthening the village centre is a top priority, taking into account the capacity, identity and village character, and deliberately avoiding 'apartmentization'. Strengthening the centre correlates closely with a good collective transport offer and needs to be considered separately for each village centre. Qualitative strengthening also implies dedensification, whereby space is created for greenery and water.

Proper densification reinforces the economic foundation for local businesses. The enhancement of public green spaces will increase social contact. There is less energy loss, as a terraced house can be heated much cheaper and more efficiently than a detached house. Collective power grids based on biogas or bio-residual heat become feasible and affordable.

Residential expansion within the municipality is based on well-informed decisions. Even if the concrete stop is not yet in place, sacrificing green areas to new residential expansion areas is avoided. The creation of innovative housing forms in a large house should be enabled. This requires a progressive and innovative spatial planning policy. The existing open spaces are needed as CO_2, water and heat buffer.

Building at the right location, compact building, optimum orientation towards the sun, car-free residential areas, cycling and walking connections: these aspects should be considered in every step of the process. Starting from the first sketches and continuing in the spatial implementation plan, the allotment plan and the building permit.

A vision of the future of spatial planning is indispensable for a good climate policy. A new zoning policy plan for Flanders is in preparation and will replace the current Regional Zoning Plan. In the municipality of Zoersel, the Municipal Council Decision on 'desired policy developments' is in preparation. In a next phase, the Zoning Plan for Zoersel will be drawn up.

3.2 SITUATION IN 2012

3.2.1 Inhabitants and households

In 2012, a total of 21,555 inhabitants or 8,302 households lived in a total area of 39 km² in Zoersel. The population density of the municipality of Zoersel is thus 558 inhabitants per square kilometre. By way of comparison, in the province of Antwerp this is an average of 642 inhabitants per km². The most densely populated area in Zoersel is the centre of Sint-Antonius with 2,811 inhabitants per km². (15)

3.2.2 Evolution of the population

Every three years, Statistics Flanders makes demographic forecasts. Here we show the projections made in 2018. This allows us to look ahead to 2027. Forecasts are always exercises based on current trends. Trends may change, however, which is why the forecast might prove erroneous.

In the municipality of Zoersel, the official population is expected to evolve from 21,857 in 2017 to 22,784 in 2027. This is an increase of 4.2% of the total population. Projections to 2030 are that the population in the municipality of Zoersel will continue to increase to a total of 22,976 inhabitants, while ageing at the same time. The working-age population (20-64) as well as the future young generation (0-19) will decrease.

A number of important conclusions can be drawn from the demographic data for the municipality of Zoersel.

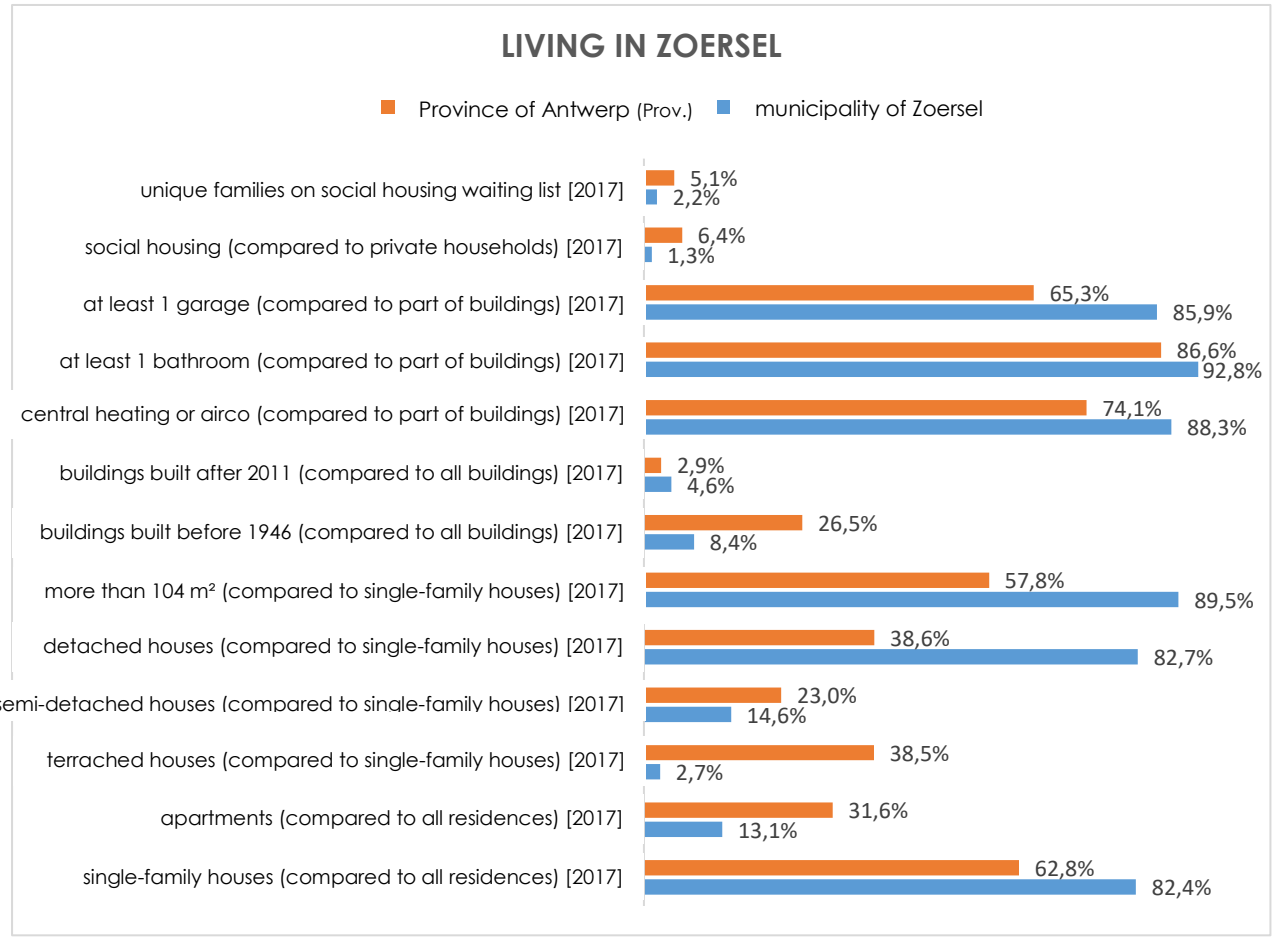
- For several years now, the average family size is showing a general downward trend which is mainly determined by the increasing number of singles (in each age category) on the one hand, and the decreasing number of families with children on the other. The Federal Planning Bureau's outlook, among others, also points to a further increase in the number of people living alone, combined with a decrease in the number of families with children.
- In terms of housing, the demand for small houses will rise due to the increasing number of small families, including single-person households.
- The ageing population will profoundly change the need for social assistance, healthcare and public utilities, and increase the demand for adapted housing, new forms of housing, …
- Ageing populations often come with declining incomes. This income reduction is not an ideal climate for making energy renovations attractive.

Most dwellings and buildings in Zoersel will still exist in 2030. It is therefore a priority to stimulate and speed up the pace of renovations to make homes more energy efficient.

3.2.3 Buildings and dwellings

The figures presented in this chapter were taken from the Land Registry Statistics of the building stock (General Administration of the Patrimonial Documentation, i.e. the Land Registry Office). The statistics show the situation of the buildings on 1 January 2017.

Table 12 Comparison of housing in 2017 between the province of Antwerp and the municipality of Zoersel



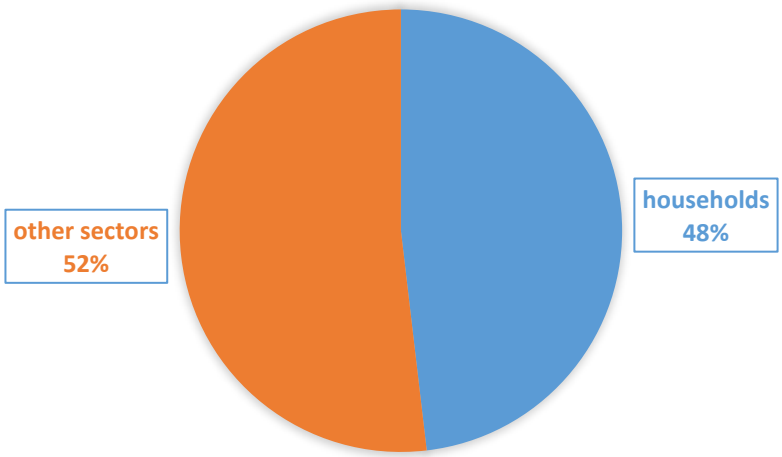
When comparing the municipality of Zoersel with the province of Antwerp, the following conclusions can be drawn with respect to housing (Table 12):

- the municipality of Zoersel has a high percentage of single-family houses compared to other forms of housing such as apartments;
- when splitting up the total number of single-family houses according to type, the municipality of Zoersel has a strikingly high percentage of detached houses compared to semi-detached and terraced houses;
- the municipality of Zoersel has a high number of single-family houses over 104 m²;
- the municipality of Zoersel has a low percentage of buildings built before 1946;
- the municipality of Zoersel has a high percentage of buildings with utilities such as central heating or air conditioning, at least one bathroom and at least one garage;
- the municipality of Zoersel has a low percentage of social housing compared to the total number of private households;
- the municipality of Zoersel has a low percentage of unique families on the social housing waiting list.

3.3 CO_2 EMISSIONS FROM HOUSEHOLDS IN 2012

Household emissions account for **48%** of total emissions in the municipality of Zoersel in 2012 (Figure 16). Household consumption includes energy use for heating, domestic hot water, appliances and lighting in homes. Table 12b and Figure 17 show the distribution of emissions per carrier. Total household emissions are **35,829 tonnes of CO_2**.

Figure 16 Emissions from households in 2012 compared to other sectors



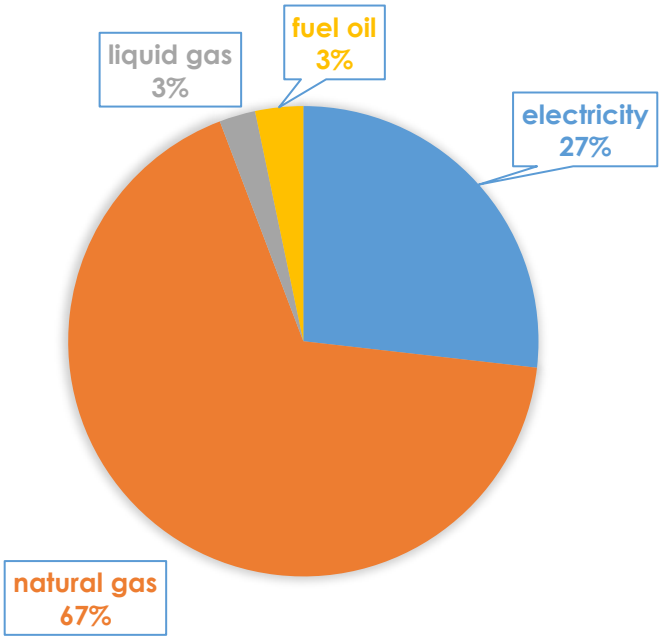
Natural gas consumption accounts for 67%, followed by electricity with 27%. Fuel oil and liquid gas are used by a small number of households and both account for 3%. Besides conventional natural gas heating, some households use wood for heating. To determine the total amount of wood (biomass) in energy consumption, the wood used for auxiliary heating is also taken into account. Table 12b shows the consumption and emissions per energy carrier. Biomass (wood) and renewable energy account for 13.6% of total consumption.

Table 12b Emissions from households in 2012 per energy carrier (MWh and CO_2)

Emissions from households 2012	MWh	Tonnes of CO_2
electricity	47,052	9,610
natural gas	119,549	24,149
liquid gas	3,915	888
fuel oil	4,424	1,181
other biomass	27,039	-
solar/thermal energy	166	-
geothermal energy	362	-
total	202,507	35,829

In 2012, 121 solar boilers and 20 heat pumps were installed in households (accounting for an average production of 570 MWh). In 2012, green electricity was produced by 147 installations that together produced 47 kvA.

Figure 17 Distribution of emissions from households in 2012 per carrier



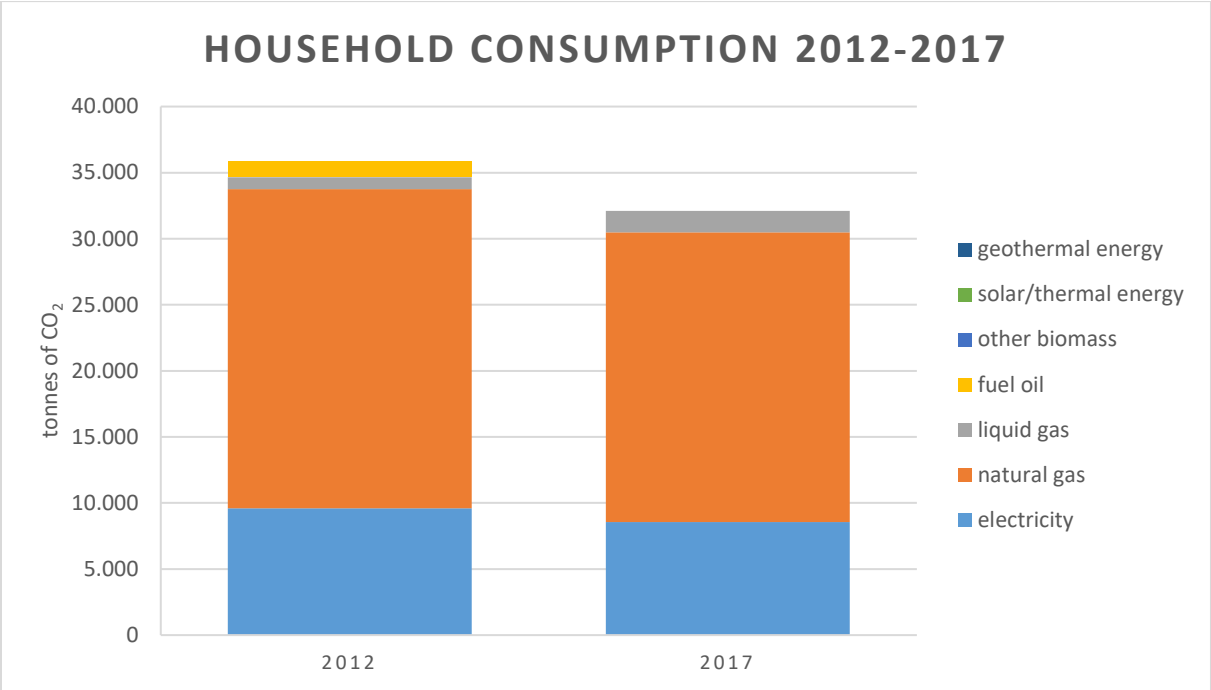
3.4 EVOLUTION BETWEEN 2012 AND 2017

The energy consumption of households in Zoersel decreased by 8% between 2012 and 2017. It is worth noting that more use is made of solar energy and geothermal energy in 2017 in comparison with 2012. This switch will help reduce CO_2 emissions from households by 10.4% (Figure 18). These results call into question the BAU scenario in which a 6.8% increase in CO_2 emissions from households was predicted by 2020 (Table 13, Figure 8).

Table 13 Comparison between emissions from households in 2012 and 2017

Emissions from households comparison 2012-2017	2012		2017		Difference in CO_2 emissions 2012-2017
	MWh	Tonnes of CO_2	MWh	Tonnes of CO_2	%
electricity	47,052	9,610	42,957	8,565	-10.9
natural gas	119,549	24,149	108,529	21,923	-9.2
liquid gas	3,915	889	7,108	1,614	+81.5
fuel oil	4,424	1,181	0	-	-100.0
other biomass	27,039	-	26,158	-	-
solar/thermal energy	166	-	557	-	-
geothermal energy	362	-	969	-	-
total	**202,507**	**35,829**	**186,278**	**32,102**	**-10.4**

Figure 18 Evolution of household consumption between 2012 and 2017



3.5 REDUCTION POTENTIAL

In order to calculate the reduction potential for dwellings in the municipality of Zoersel, the maximum potential of various possible measures is calculated. This gives an idea of the total reduction potential for dwellings. It should be noted here that the effects of the measures cannot simply be added up as they affect each other. The reduction potential of the measures is calculated using the measure tool (VITO) and shown in Table 14 for the three most efficient measures.

Table 14 Reduction potential for dwellings per measure

Measure	MWh	Tonnes of CO_2
100% of the dwellings have roof insulation	43,250	7,589
100% of the dwellings have wall insulation	45,590	8,000
100% of the dwellings have high-efficiency glazing	29,021	5,092

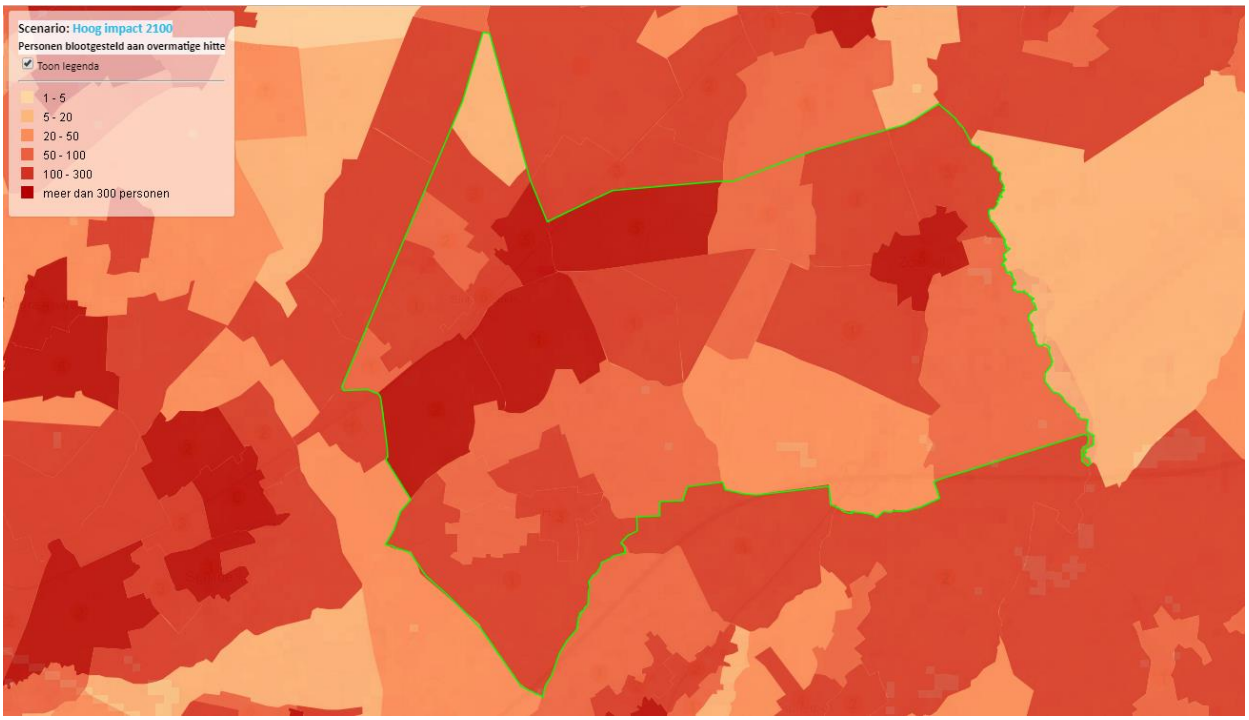
3.6 IMPACT OF CLIMATE CHANGE ON HOUSING AND LIVING (4)

3.6.1 Impact of heat

Heat primarily affects the elderly, babies and toddlers. Older people, especially over the age of 75, are prone to heat-related health problems. Some of them, who often still live at home, live in older houses that warm up quickly. An extended period of hot days may lead to more hospitalisations and deaths.

Figure 19 shows the number of people of the population between 0-4 years and over 65 years of age per statistical sector exposed to heat stress of 60 heat wave days or more per year in the high-impact scenario in 2100. In high-density Sint-Antonius and the centre of Zoersel, these are more than 300 people per statistical sector.

Figure 19 Number of people exposed to extreme heat in the high-impact scenario in 2100



3.6.2 Impact of drought

Drought puts the groundwater resources for the extraction of drinking water under pressure. The per capita water availability in Flanders is now around 1,480 m^3 which is significantly lower than the European average. Flanders therefore formally belongs to the category of water-scarce regions.

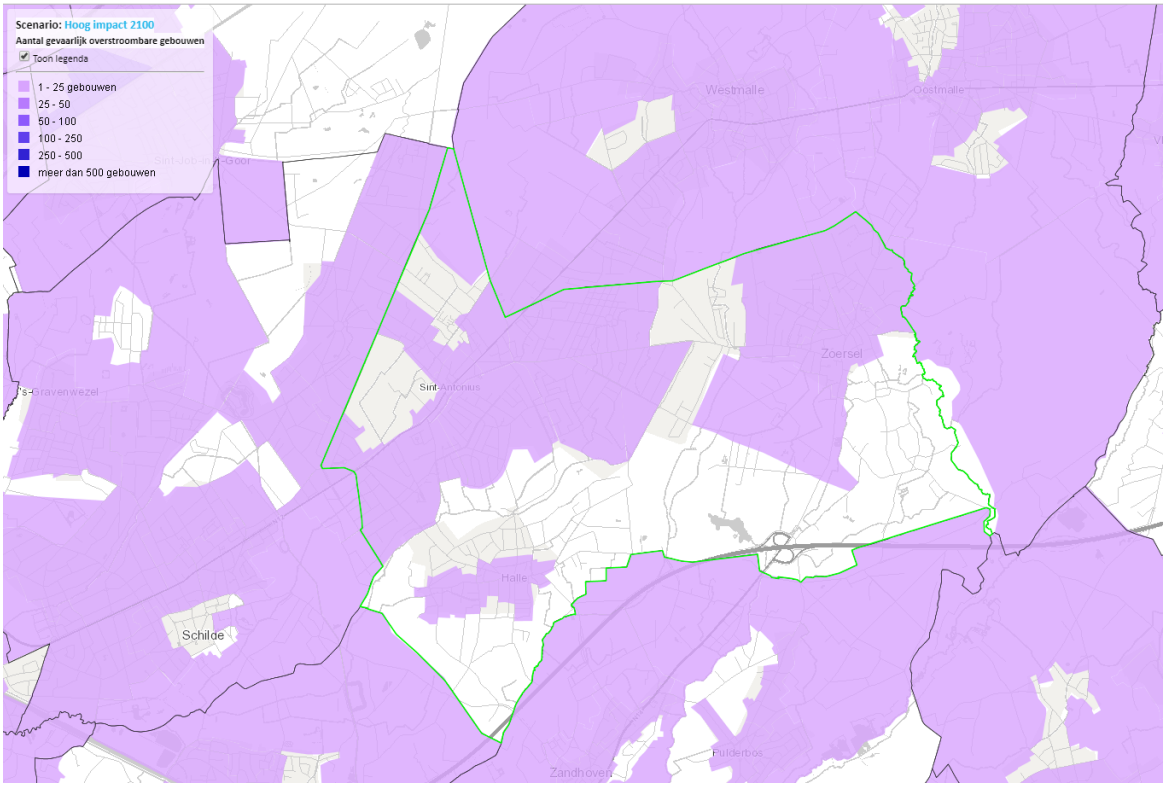
Reduced water availability also leads to poorer surface water quality due to reduced dilution of pollutants, and thus to higher costs for purification of surface water into drinking water.

Especially in summer, this may cause drinking water shortage. Although there is no abstraction of drinking water in Zoersel, this will still highly affect the population.

3.6.3 Impact of floods

Floods initially cause damage to buildings. Figure 20 below shows the number of buildings per statistical sector that, in the high-impact scenario, are prone to flooding once every 1,000 years by 70 cm or more in 2100. In large parts of the municipality of Zoersel, 1-25 buildings will be affected.

Figure 20 Number of flood-prone buildings in the high-impact scenario in 2100



Besides damage to buildings, floods also cause a great deal of social chaos and human suffering that cannot be expressed in monetary terms. Not everyone handles flood events the same way. Vulnerable groups such as the elderly, single parents and chronically ill people often find it more difficult to deal with the aftermath of flooding, such as cleaning, negotiating with insurance companies or organising temporary accommodation. This leads to stress, anxiety and depression and puts pressure on the financial reserves of these people. Some people also get physically ill and suffer from cardiac arrhythmia or the flu. (9)

3.7 STRATEGIES FOR HOUSING AND LIVING

3.7.1 Adapt SIPs, BPAs and spatial structure plans to today's climate challenges

Enable community living at suitable locations, such as in the village centre. Cohousing, assisted living facilities and kangaroo residences are forms of housing of the future. They can ensure that large old houses are rebuilt or renovated and given a shared spatial interpretation, which will reduce some of the pressure on allotments.

Opt for infill development instead of residential expansion. Safeguard the existing residential expansion areas by, for example, levying a municipal climate tax when sacrificing existing open spaces to housing construction. Encourage redevelopment of old vacant sites into residential areas by adapting SIPs to these locations. Provide the necessary space for interweaving with local services and small traders. Try to safeguard open spaces by repurposing existing paved sites.

Protect existing open spaces and include them in SIPs. Prevent construction on large open spaces and change zoning on structural plans if necessary.

3.7.2 Strengthen the village centre

The proximity of the centre promotes walking or cycling and makes citizens less dependent on the car. Public transport is given more opportunities and carsharing becomes protifable. Moreover, construction in the centre strengthens the economic foundations for local businesses. Strengthening the centre should therefore not only focus on more dwellings in the village centre, but also on keeping economic activities in or returning them to the centre.

Compact building creates more space for public green areas and promotes social contact. Densification makes joint energy grids based on geothermal and solar energy feasible and affordable. The municipality can stimulate densification in the centre with a spatial implementation plan by allowing more building densities and heights at the right locations. In addition, qualitative densification also involves creative use of space for greenery and water.

3.7.3 Focus on greening and depaving

Densification must go hand in hand with greening. More green in the centre will help mitigate the effects of climate change. Heat islands are reduced by trees, shrubs, plants and water. A greenspace standard can be established in a general municipal assessment framework. Green spaces absorb CO_2 which will soon be necessary to keep global warming below 2°C.

Make playgrounds green, opt for a neighbourhood garden instead of a garage box, depave front gardens and encourage green roofs. Provide car parks with a surface that allows water infiltration.

3.7.4 Make existing buildings energy efficient and opt for energy-neutral new buildings

Unburden citizens of their energy renovations by engaging independent experts. Perform renovation audits and ensure that citizens can participate in a guided renovation project.

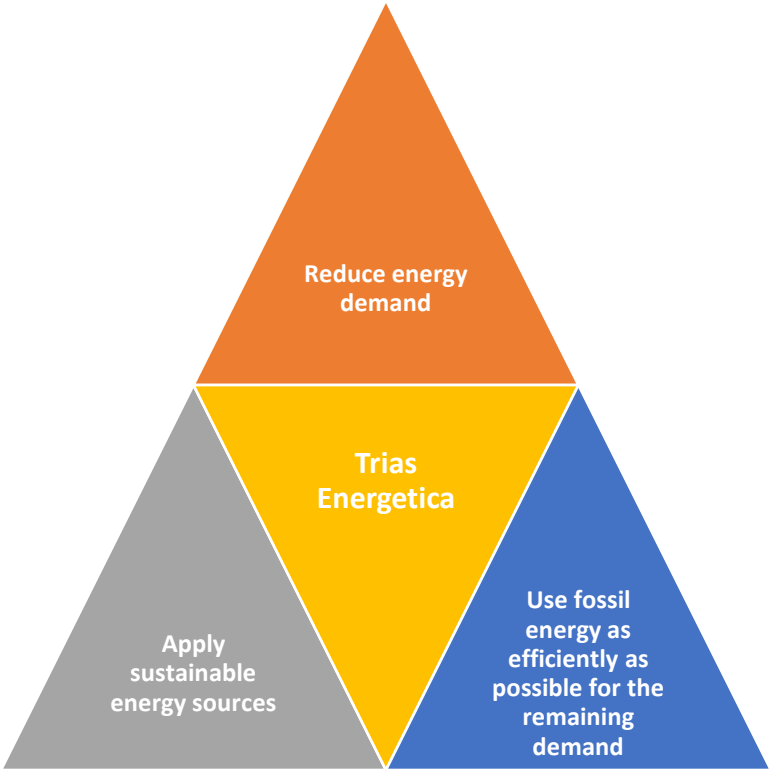
As regards the current building stock, the municipality will mainly focus on an extensive energy renovation of the existing buildings, with attention to insulation, increased heat supply efficiency and integration of renewable and sustainable energy. In order to realise this ambition, our approach is based on the Trias Energetica, a three-step plan to achieve sustainable energy use (Figure 21).

STEP 1: Reduce energy demand (e.g. through insulation and behavioural change)

As a first and major step, it is crucial to reduce the energy demand of the Zoersel families. Renovations are often required to make a house energy efficient. To achieve our climate goals, the number of renovations must increase significantly and as soon as possible.

This is a very ambitious goal that requires a tripling of the number of renovations. Responding to the technical, financial and social barriers here is crucial.

Figure 21 The Trias Energetica shows the steps towards sustainable energy use



The current Flemish standards for renovation of private homes are not ambitious enough in the light of climate challenges. Municipalities can examine the roll-out of an enabling policy where owners are not punished but rewarded for their sustainable investments. The municipality of Zoersel wants to appropriately support owners-occupants and landlords in their renovation project by providing professional and independent advice.

The citizen participation moment strongly emphasised the local authority's exemplary function. A local authority is considered neutral and confidential. Besides renovation, it is also crucial to raise awareness on energy demand reduction. The diversity of target groups (owners-occupants, tenants, employees, …) requires a custom approach.

STEP 2: Apply sustainable energy sources where possible (e.g. residual electricity and renewable energy)

When existing energy demand is limited to a maximum, the possibilities of using sustainable energy sources can be explored. The most obvious solution for the energy supply of homes and buildings is the installation of solar boilers and solar panels. Here, too, preferential or unburdening measures to stimulate investments by citizens and businesses can be considered. The second step in the Trias Energetica also includes the purchase of green electricity, whether or not produced locally. For local renewable energy production, the municipality of Zoersel will call upon citizen cooperatives.

STEP 3: Use fossil energy as efficiently as possible for the remaining demand

The final step in the Trias Energetica is to use fossil fuels as efficiently as possible to meet the remaining energy needs.

For example, by using a heat pump and low-temperature heating ventilation systems. These systems should become a standard in the renovation and construction of (new) buildings and homes.

3.8 PLANNED MULTI-ANNUAL PLAN ACTIONS

Zoersel wants to provide a regulatory framework for spatial planning. In this context, a Municipal Council Decision on 'desired policy developments' is planned in 2020, which will determine the type of construction desired at which locations and impose sustainable measures on new construction projects. In addition, the Flemish Government Architect's team will carry out a spatial scan in 2020. A Spatial Policy Plan will then be drawn up for Zoersel. The multi-annual plan 2020-2025 provides an investment of 94,875 EUR for these studies.

Enforcement is the cornerstone of good spatial planning. In order to better monitor compliance with the regulations in force, the municipality will join an intermunicipal cell that will be set up within the intercommunal association Igean.

The municipality aims at climate neutrality for its own future construction projects. In this context, the expertise of the Provincial Centre for Sustainable Building and Living Camp C is used in the realisation of the *Zonneputteke* project.

Zoersel has committed itself to the SURE2050 project coordinated by the Flemish Energy Company. This project supports local authorities and central Flemish governments in establishing a strategic real estate plan, with climate neutrality by 2050 as a starting point.

Strengthening the centre and preserving open spaces outside the village centres are the focal point of spacial policy. However, village centres must also allow for open spaces with a public function. Where possible, the necessary space should be created through depaving. In this context, the multi-annual plan 2020-2025 foresees an amount of 30,000 EUR for the demolishment of the building at Dorp 50 in the submunicipality of Zoersel, located next to the library, and its transformation into an open greenspace. At a later stage, the land can be sold as part of a project in which, together with the adjoining plots, an innovative residential project with sufficient open greenspace will be realised.

4 Mobility

4.1 VISION OF THE FUTURE

Traffic jams, overcrowded village centres, air pollution, stress, traffic casualties, noise pollution, … The way we move today clearly presents several negative effects. Low-traffic centres and cosy streets without car traffic make happy people and boost local economy. If we start moving less, we need to increase local consumption. Through good spatial planning and interweaving of different activities, the need to move will decline.

More and more people relax, work and bring their children to school in the vicinity of their homes. Our movements are pollution-free. We walk or cycle for short trips. For slightly longer distances, we use the electric bike. We use public transport or shared mobility largely running on renewable energy for longer distances.

Electric vehicles can be used by those who have difficulty walking or need to move heavy loads. We will make optimal use of them and therefore share them. Carsharing and carpooling are growing rapidly. The coming years will also be a breakthrough for electric vehicles: they are cleaner and quieter. The local authority in Zoersel has already started to make its own fleet sustainable. (16)

Policy and infrastructure are inextricably linked. Citizens expect a local authority to pursue a vision of mobility that takes into account future challenges. The municipality of Zoersel is working on a new mobility plan. The results and conclusions will contribute to realising this vision of the future.

4.2 SITUATION IN 2017

Our chaotic spatial planning with many scattered dwellings and parcels in the rural zone causes large traffic flows every day. This is no different in the municipality of Zoersel. The car is a very dominant mode of transport. In Zoersel, a staggering 97% of all resident members of a family own at least one car. No less than 70% of the residents over 17 years of age use the car to travel between home and work/school or education. This figure is very high in relation to the 59% for the Flemish Region (2017 figures) as shown in Table 15 and 16. The data further shows that 94% of the families in Zoersel own at least one bicycle and 24% can use an electric bike. This is significantly higher than the average figures for the Flemish Region. (17) (18) (19)

Table 15 Comparison of vehicle ownership by families for the population of Zoersel and the Flemish Region in 2017

Vehicle ownership 2017	Zoersel	Flemish Region
car	97%	92%
motorbike	16%	12%
bicycle	94%	87%
electric bike	24%	18%

Table 16 Modal split based on dominant transport mode for travelling between home and school, work or education in proportion to the inhabitants over 17 years of age in Zoersel and the Flemish Region in 2017

Dominant transport modes 2017	Zoersel	Flemish Region
walking	3%	4%
bicycle	11%	16%
public transport	11%	16%
car	70%	59%
other	5%	4%

Several calculations through 2040 indicate a general increase in both passenger and freight transport in Flanders. The municipality of Zoersel is facing a major challenge to reduce traffic and CO_2 emissions from transport while meeting the mobility needs of its inhabitants. The municipality of Zoersel wants to encourage 'desired' behaviour while discouraging 'undesired' behaviour.

4.3 CO_2 EMISSIONS IN 2012

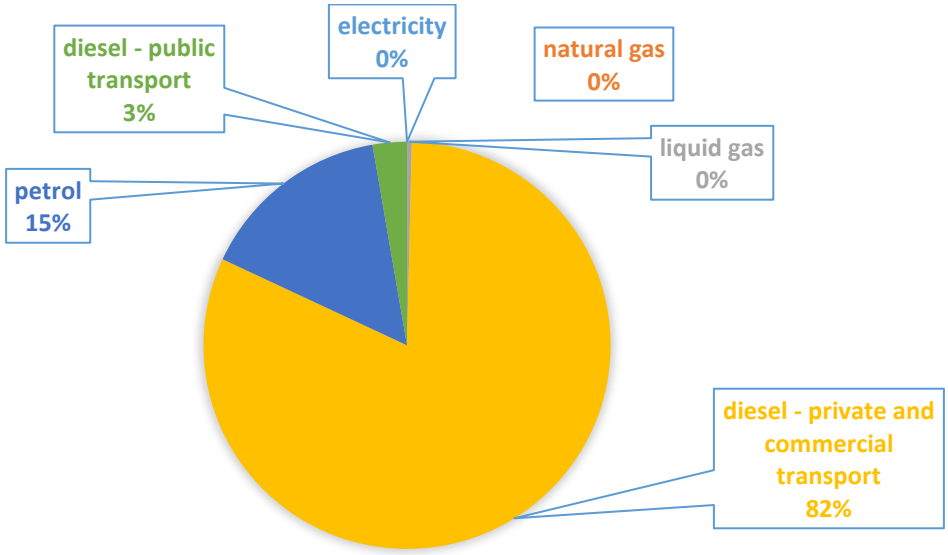
In the municipality of Zoersel, private and commercial transport and public transport were responsible for **27%** of CO_2 emissions in 2012. Since the municipality of Zoersel has no impact on traffic using motorways and this exceeds the powers of the municipality, emissions on the motorways are excluded from the benchmark.

Motorised transport thus becomes the second largest source of greenhouse gases in the municipality, after residences and buildings. In 2012, total emissions from mobility amounted to **19,822 tonnes of CO_2**. Table 17 gives an overview of emissions from mobility per energy carrier. Figure 22 shows the distribution of emissions per carrier in 2012. It should be noted here that diesel is responsible for 85% of emissions from mobility.

Table 17 Emissions from mobility in Zoersel in 2012

Emissions from mobility 2012		
	MWh	**Tonnes of CO_2**
electricity	2	0
natural gas	6	1
liquid gas	319	72
diesel – private and commercial transport	60,561	16,170
petrol	12,206	3,039
biofuel – private and commercial transport	3,255	0
diesel – public transport	2,019	539
biofuel – public transport	89	0
total	**78,456**	**19,822**

Figure 22 Emissions from mobility per carrier in 2012



This information is based on data from the Flemish Traffic Centre, differentiating between the type of road (motorways, numbered roads and unnumbered roads) on the one hand, and the type of vehicle (light and heavy vehicles) on the other.

4.4 EVOLUTION BETWEEN 2012 AND 2017

Figures from the FPS Mobility and Transport and FEBIAC (the Belgian and Luxembourg Federation of the Car and Two-wheeler Industries) show an increase in the number of cars in Belgium by 342,371 cars between 2012 and 2017. We mainly note an increase of petrol, electric, CNG and hybrid cars. The number of diesel and LPG cars has declined. This is shown in Figure 23.

When comparing energy consumption and CO_2 emissions from mobility in the municipality of Zoersel between 2012 and 2017 (Table 18), a slight decrease by 2% is noted.

Figure 23 Evolution of the vehicle fleet in Belgium by fuel type

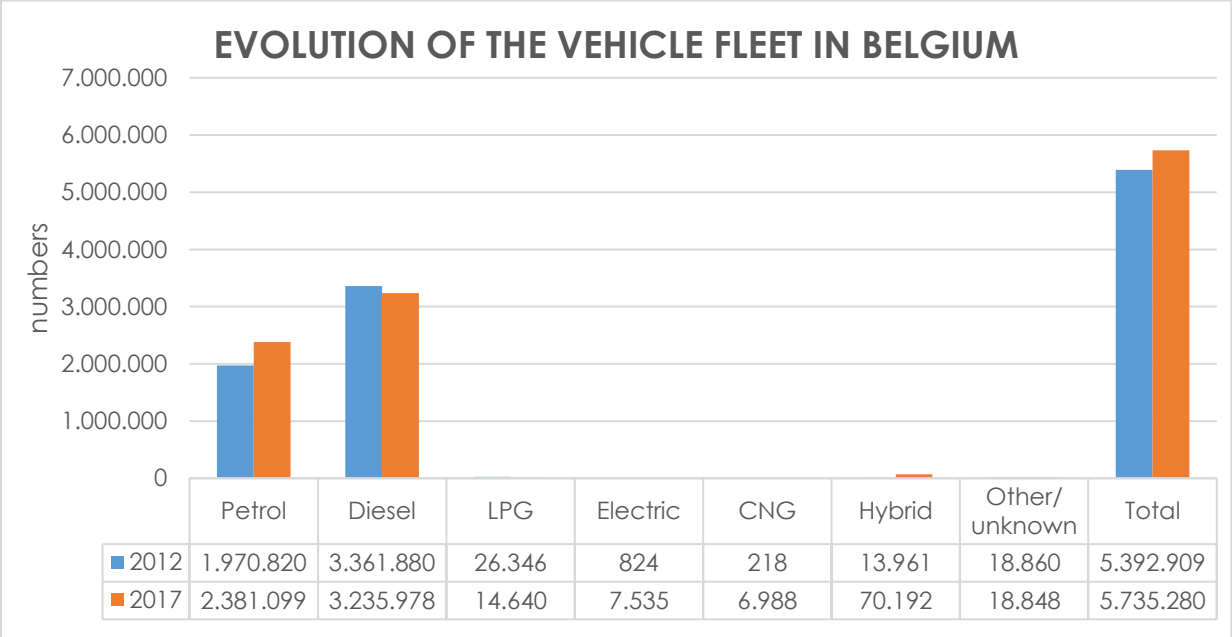


Table 18 Difference in energy consumption related to mobility between 2012 and 2017

Emissions from mobility 2012-2017	2012	2012	2017	2017	Difference in CO_2 emissions 2012-2017
	MWh	Tonnes of CO_2	MWh	Tonnes of CO_2	%
electricity	2	0	49	10	+2,484.0
natural gas	6	1	209	42	+3,648.0
liquid gas	319	72	159	36	-50.0
diesel – private and commercial transport	60,561	16,170	59,061	15,769	-2.5
petrol	12,206	3,039	15,434	3,843	+26.0
biofuel – private and commercial transport	3,255	0	4,420	0	-
diesel – public transport	2,019	539	1,736	464	-14.0
biofuel – public transport	89	0	96	0	-
total	**78,456**	**19,822**	**81,165**	**20,164**	**+2.0**

4.5 REDUCTION POTENTIAL

In order to fully use the reduction potential for mobility, savings can be made in several areas by reducing the demand for transport, achieving a modal split towards public transport or soft modes of transport, and electrification of transport. To calculate the reduction potential for mobility by 2030, the figures of 2017 are used as a starting point. This allows us to include the most recent data and evolutions in the calculation.

In 2017, 81,165 MWh were consumed for transport (private, commercial and public) in the municipality of Zoersel. By focusing on three areas, we will systematically reduce the energy use for mobility in the municipality of Zoersel.

- Reduce the demand for transport by 10%: suppose we can reduce the demand for transport by 10% through measures such as working from home, teleworking and strengthening the centre. A 10% reduction of total energy consumption for transport means a decrease by 8,117 MWh, leaving an energy demand of 73,048 MWh.
- Realise a 50/50 modal split for short trips: 50% of all trips will then eventually be made by bicycle, bus, taxi, shared systems, etc. Only 50% by car. Since we observe a higher bicycle and electric bike ownership in the municipality of Zoersel compared to the Flemish Region (Table 15), this goal seems feasible in the municipality. Suppose we achieve a modal shift whereby 50% of the trips are made in a sustainable way, energy demand will drop to 36,524 MWh.
- Suppose we meet this energy demand 100% electrically with electric cars, trucks and buses. When taking into account an emission factor of electricity of 0,205 tonnes/MWh, CO_2 emissions from transport would decrease to 7,487 tonnes of CO_2. Here, we take the 2017 electricity mix as a starting point, the largest part of which is represented by non-renewable energy sources. As the share of renewable energy in the electricity mix increases, emissions from electric vehicles will further decline.

All these measures will result in a CO_2 reduction by 12,335 tonnes of CO_2 or 62% in comparison with 2012. This is the maximum reduction potential for the mobility sector.

4.6 IMPACT OF CLIMATE CHANGE

4.6.1 Impact of floods

Intensive rain showers increase the likelihood of traffic jams and accidents. Flooding may then lead to water damage and closure of roads and motorways. Climate change increases the risk of flooding and damage to roads. Flooding also disrupts public transport and trains.

4.7 STRATEGIES FOR MOBILITY (20)

4.7.1 Focus on vulnerable road users

A turning point in our mobility behaviour is needed and requires a sustainable mobility policy that takes actions and provides a framework for their implementation: a low-traffic neighbourhood is not just about a bicycle parking space here and a shared car there, but it is the result of a new vision on movement. A municipality with a sustainable vision on housing density and mobility is best equipped to make truly sustainable neighbourhoods a reality.

More and more people relax, work and bring their children to school close to home. The need for long-distance trips is decreasing. People walk and cycle for short trips. They use the electric bike for slightly longer distances and the cargo bike for groceries. So invest in cycling infrastructure, safe village centres with space for pedestrians, crossings, cycle streets, … A mobility policy with vision and guts will encourage more people to make the modal shift than just investing in car infrastructure.

Apply the 'STOEP' principle (*Stappers*/Pedestrians, *Trappers*/Cyclists, *Openbaar vervoer*/ Public transport, *Elektrisch rijden*/Electric vehicles, Privaat vervoer/Private transport) to all infrastructure works. This means that priority is given to Pedestrians and Cyclists. Followed by Public Transport, Electric vehicles and Private transport by fossil-fuel burning cars. A new slow road interconnecting different 'hotspots' such as schools, shopping centres, neighbourhoods, … will immediately attract users. Pedestrians and cyclists will then be able to move in a safe and healthy way, mostly through green and open spaces.

Maintain a strict parking policy. The projected modal shift to sustainable transport modes cannot be achieved by simply making cycling and public transport more attractive. Car traffic must also be discouraged.

Car parking standards and a minimum standard for bicycle parkings near residential areas are included in urban planning regulations. In large new projects, parking spaces are partly reserved for shared mobility and equipped with charging stations. In road redevelopment projects (e.g. Halle Dorp), longitudinal parking spaces are removed where necessary to create sufficiently wide footpaths or cycle paths. Parking will eventually be shifted to central locations in and on the outskirts of village centres.

4.7.2 Encourage shared mobility

Draw up a shared mobility plan. People do not just get rid of their car or start moving in a different way, … Alternatives are needed to make this shift. Many families currently own 2 cars. Do they always need both? They take up a lot of public space and cost the community a lot of money. With the introduction of the mobility budget, employees can opt for alternatives besides the company car. Adequate shared mobility must therefore be provided to offer these families the opportunity of using a car every once in a while. As a local authority, opt for electric shared mobility on renewable energy and thus pursue a healthy policy.

Share your own vehicle fleet with residents and make optimal use of existing cars. Invest in zero-emission vehicles to keep the municipality healthy. See if shared electric bikes or shared cargo bikes are an option in certain neighbourhoods. Be critical of a free-floating system to prevent nuisance from abandoned bicycles. Here lies a challenge for the executive services.

4.7.3 Provide easy access by public transport to neighbouring municipalities/cities and mobility hotspots

Mobihubs in your municipality make it easy to move for residents. Provide sufficient bicycle parking spaces, pick-up points, shared cars and passage of various public transport lines. Large city centres such as Antwerp, Mechelen and Brussels with high employment must be easily and quickly accessible by public transport. An alternative mode of transport cannot take much longer than using your own car.

Pick-up points prevent parcel services from rushing through the streets and standing before a closed door because people are not at home during the day.

4.7.4 Go for healthy air

The introduction of a low-emission zone in cooperation with neighbouring municipalities can be considered. The municipality aims for a low-traffic zone in residential areas and village centres.

Provide adequate smart charging infrastructure and fast-charging stations for zero-emission passenger and freight transport. Give residents who invest in a zero-emission vehicle access to the necessary charging infrastructure. Provide sufficient capacity of parking spaces equipped with charging infrastructure for zero-emission transport. Make sure that these charging stations are reliable, accessible and operational.

4.7.5 Choose MaaS

Guide the Transport Region towards Mobility as a Service (MaaS) through consultation with various public and private providers of collective transport. Municipalities can then accelerate the evolution from car ownership to the use of different transport modes. Citizens plan and pay for a trip via the mobility platform and can combine different modes of transport.

4.8 PLANNED MULTI-ANNUAL PLAN ACTIONS

'Together, we will ensure the sustainable development of Zoersel into an active community focused on all forms of mobility.' This is the first sentence of the vision set out in the multi-annual plan 2020-2025 which contains numerous actions in the context of a sustainable mobility policy.

The municipality has chosen resolutely to facilitate and encourage walking and cycling. The multi-annual plan provides, among other things, for funds for slow road building and repair (180,000 EUR), the creation of cycling networks within and outside the village centres (42,000 EUR), the continuation of the rental service for children's bicycles initiated in 2019 (27,000 EUR), and a digital registration and reward system for children who walk or cycle to school (75,000 EUR). 220,000 EUR will be made available for the reconstruction of existing cycle paths. The municipality wants to participate in the Antwerp Transport Region's shared bicycle project at mobihubs.

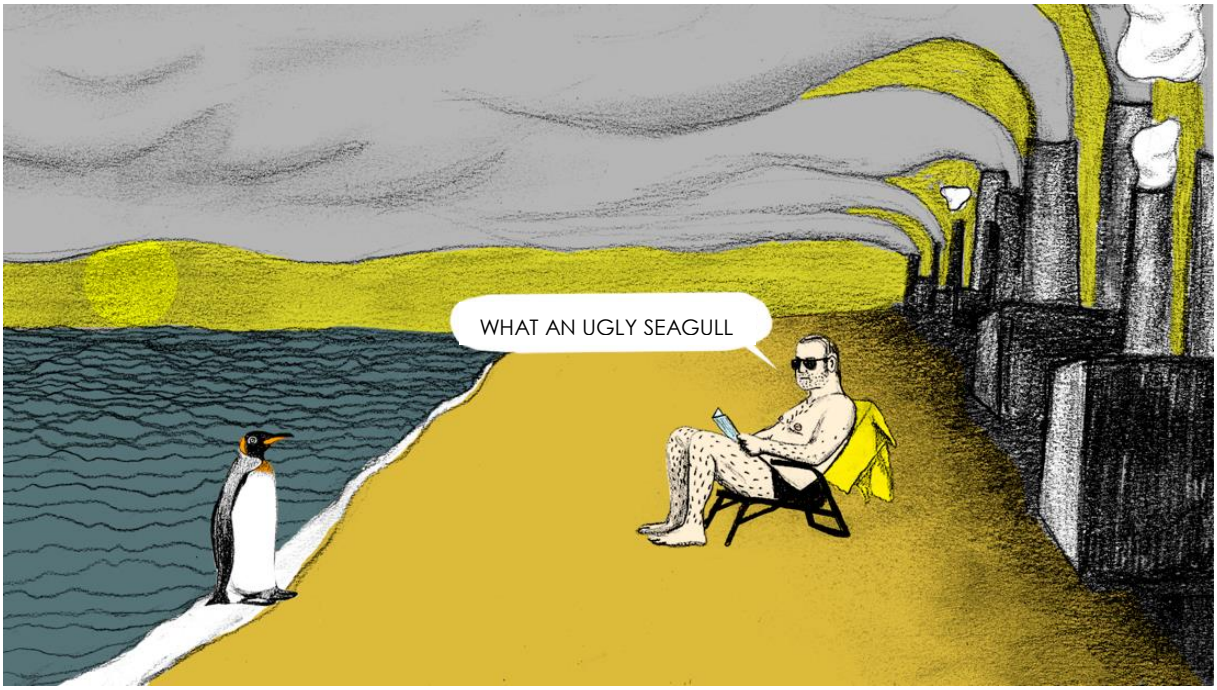
In the absence of an adequate supply of public transport for some trips and for the submunicipality of Halle in general, Zoersel wants to focus on custom transport solutions. The community bus project is continued (120,000 EUR). In addition, a subsidy application is submitted for the development of a liftsharing/carpooling project.

In 2020, the municipality will initiate a shared-use vehicle project for its residents and the municipal services. Other carsharing systems will be promoted.

In an environment that encourages walking or cycling, rat running or cut-through traffic must be prevented. To achieve this, a traffic circulation plan will be drawn up for each neighbourhood.

The passage for pedestrians and cyclists through the centre of the submunicipality of Halle is inadequate at present. The multi-annual plan provides for 130,000 EUR (supplemented by general resources) for a traffic-safe redevelopment of the village centre.

5 SMEs and tertiary sector



5.1 VISION OF THE FUTURE

Municipalities are an important link in the process of accelerating sustainability in certain sectors. There are huge opportunities for renewable energy at business sites, heating grids between companies/care centres coming from 1 joint heat source. Today we see care campuses in Zoersel without sunroofs. They need to become partly self-sufficient through renewable energy. Schools can also become climate-neutral. Municipalities can pursue an enabling policy across the grids. These sectors should all be involved in the mobility debate to ensure safe, bicycle-friendly and low-traffic business sites.

5.2 SUMMARY OVERVIEW OF THE SITUATION IN 2012

There is little industry on the municipality of Zoersel's territory. Energy consumption and CO_2 emissions from the existing SMEs are therefore relatively small. Most enterprises are small-sized with various activities such as garages, joinery, transport company, construction materials, …

The tertiary sector is the third largest energy consumer after households and private and commercial transport. In 2012, the tertiary sector in the municipality of Zoersel included the following facilities:

- Hospitals:
  - PZ Bethaniënhuis
  - ZNA Joostens (SP service)
- Care centres:
  - PC Bethaniën
  - Halmolen residence
  - Ter Dorpe
  - Lindehof residence
  - De Loteling residence
  - ZNA Joostens
- Schools:
  - Municipal primary school *Pierenbos*
  - Municipal primary school *Beuk & Noot*
  - Municipal primary school *De Kiekeboes*
  - Community primary school *Klim-op*
  - Primary school *Sint-Elisabethschool*
  - Primary school *Antoniusschool*

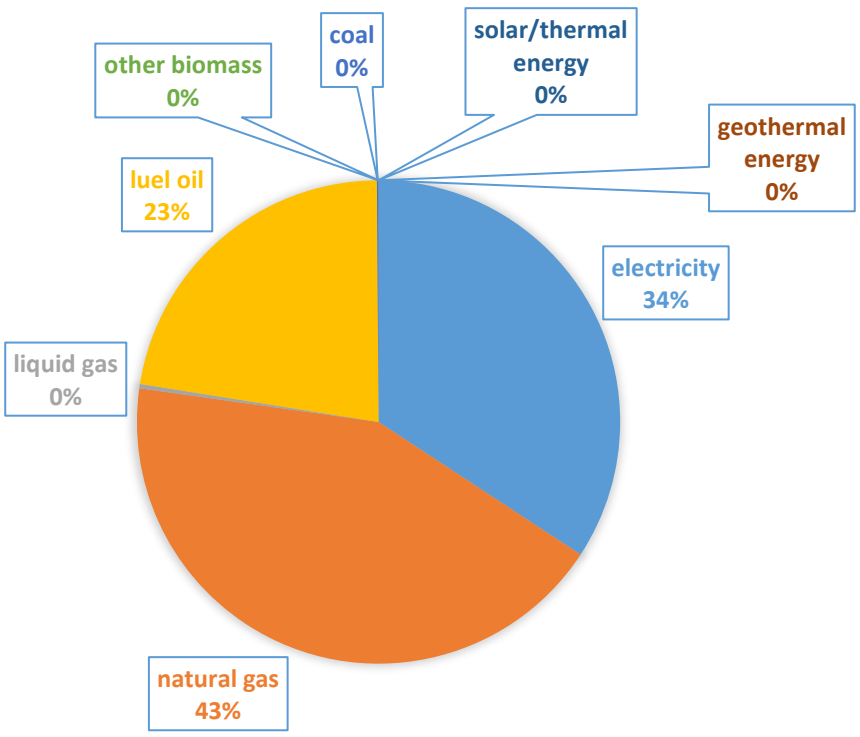
5.3 CO_2 EMISSIONS FROM SMEs IN 2012

SMEs are responsible for **2%** of total CO_2 emissions in the municipality of Zoersel. Natural gas, electricity and fuel oil are the three carriers with the largest energy consumption (Table 19, Figure 24). In total, SMEs account for 1,607 tonnes of CO_2 in 2012.

Table 19 CO_2 emissions from SMEs per energy carrier in 2012

Emissions from SMEs 2012		
	MWh	**Tonnes of CO_2**
electricity	2,695	550
natural gas	3,421	691
liquid gas	20	5
fuel oil	1,347	360
coal	5	2
other biomass	143	0
solar/thermal energy	0	0
geothermal energy	0	0
total	**7,631**	**1,607**

Figure 24 CO_2 emissions from SMEs per energy carrier in 2012



5.4 CO_2 EMISSIONS FROM THE TERTIARY SECTOR IN 2012

The tertiary sector is responsible for **19%** of total CO_2 emissions in the municipality of Zoersel. Natural gas, electricity and fuel oil represent the bulk of emissions (Table 20, Figure 25). In total, the tertiary sector accounts for 13,970 tonnes of CO_2.

Table 20 CO_2 emissions from the tertiary sector per energy carrier in 2012

Emissions from the tertiary sector 2012		
	MWh	**Tonnes of CO_2**
electricity	24,445	4,993
natural gas	35,995	7,271
liquid gas	190	43
fuel oil	6,229	1,663
other biomass	921	0
solar/thermal energy	2	0
geothermal energy	0	0
total	**67,782**	**13,970**

The tertiary sector includes the following subsectors: offices and administrations, catering, trade, health and social care, other community, social and personal services, and education.

Figure 26 shows the energy consumption for each subsector per energy carrier. The subsectors of health and social care, and offices and administrations account for 38% and 25% respectively of energy use in the tertiary sector. The remaining subsectors account for maximum 14% of total energy use in this sector. The 'REST tertiary' sector includes a number of businesses that cannot be allocated to a separate subsector for privacy reasons.

Figure 27 shows a proportionally higher energy consumption of the trade subsector compared to the other subsectors. This is explained by the use of computers, lighting and cooling. In the other subsectors, most energy is used for heating buildings, with a higher percentage of natural gas.

Figure 25 CO_2 emissions from the tertiary sector per energy carrier in 2012

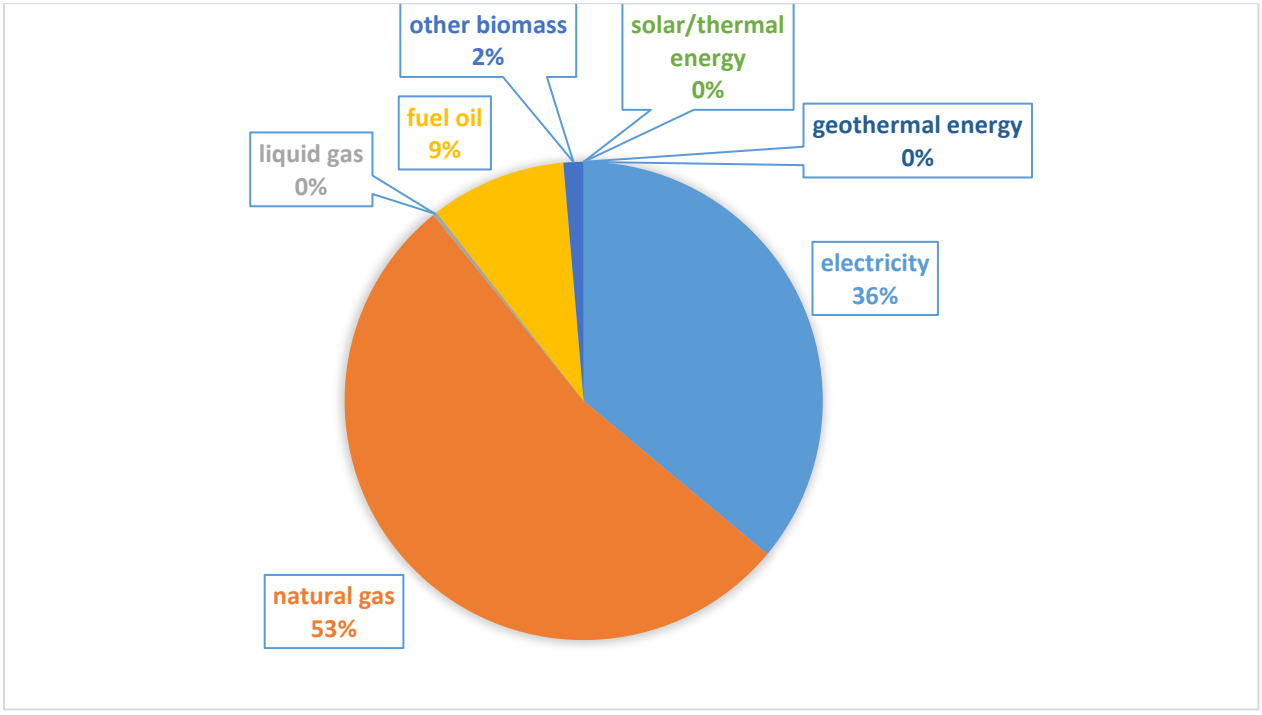


Figure 26 Distribution of energy use in the tertiary sector per subsector in 2012

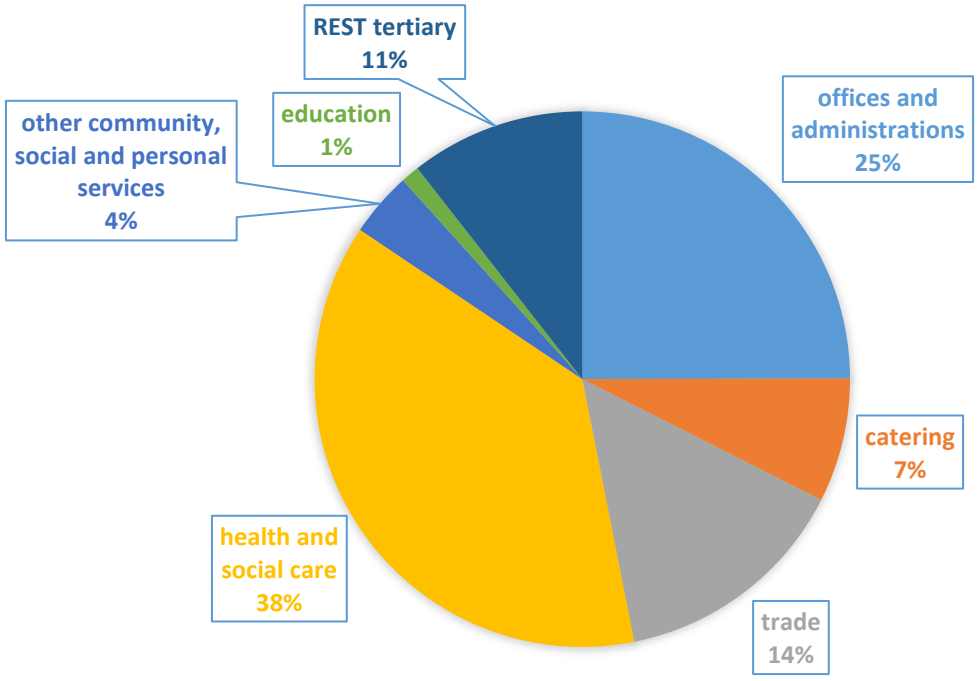
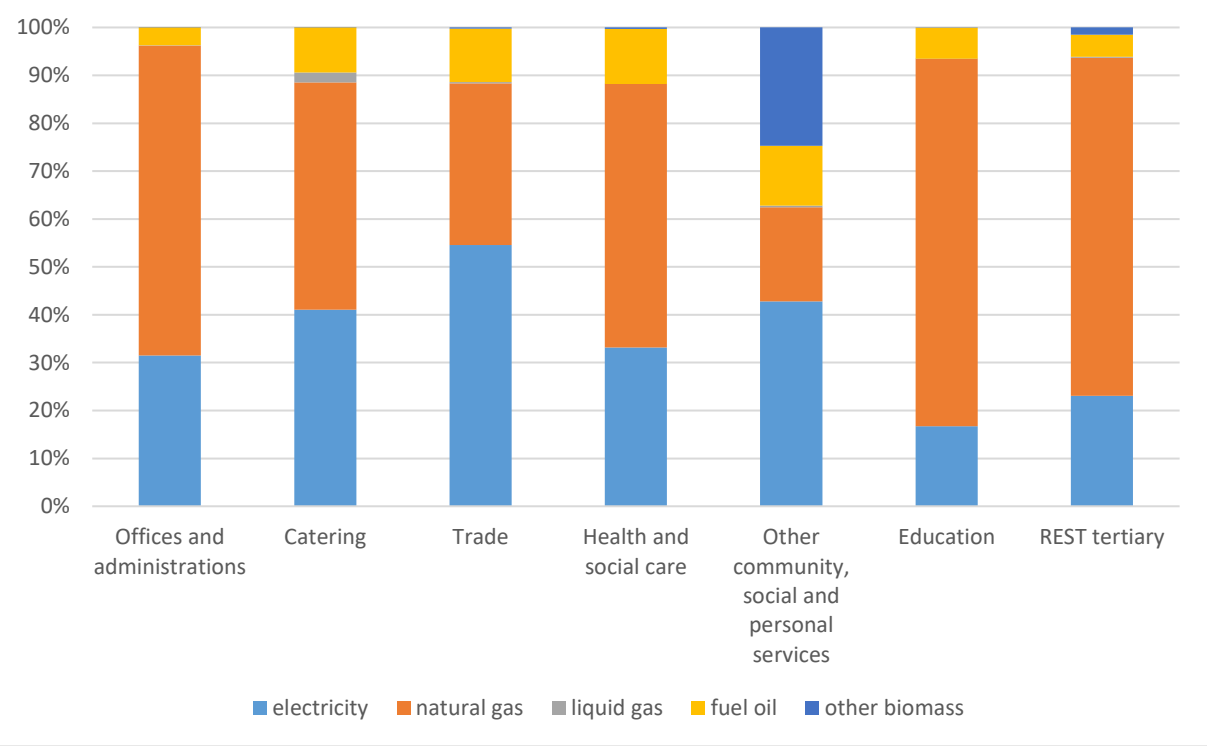


Figure 27 Energy consumption in the tertiary sector per subsector in 2012



5.5 EVOLUTION BETWEEN 2012 AND 2017

Total energy consumption and CO_2 emissions from SMEs decreased slightly between 2012 and 2017. The use of electricity, natural gas, fuel oil and coal fell slightly and increased for biomass and liquid gas. It is particularly striking that no use is made of solar energy or thermal energy in this sector. An overview is given in Table 21.

Table 21 Evolution of energy consumption in SMEs between 2012 and 2017

Emissions from SMEs comparison 2012-2017	2012		2017		Difference 2012-2017
	MWh	**Tonnes of CO_2**	**MWh**	**Tonnes of CO_2**	**%**
electricity	2,695	550	2,471	493	-10.5
natural gas	3,421	691	3,338	674	-2.4
liquid gas	20	5	376	85	+1,748.6
fossil fuel	1,347	360	1,183	316	-12.2
coal	5	2	3	0,9	-47.0
other biomass	143	0	149	0	0
solar/thermal energy	0	0	0	0	0
geothermal energy	0	0	0	0	0
total	**7,631**	**1,607**	**7,521**	**1,569**	**-2.4**

In the tertiary sector, total energy consumption between 2012 and 2017 decreased by 13.4% or 1,765 tonnes of CO_2 (Table 22). A decrease is mainly observed in electricity, natural gas and fuel oil. An increase in the use of liquid gas, biomass and geothermal energy can be noticed. In this sector, too, the use of solar energy is still very limited.

Table 22 Evolution of energy consumption in the tertiary sector between 2012 and 2017

Emissions from the tertiary sector comparison 2012-2017	2012		2017		Difference 2012-2017
	MWh	**Tonnes of CO_2**	**MWh**	**Tonnes of CO_2**	**%**
electricity	24,445	4,993	24,762	4,937	-1.1
natural gas	35,995	7,271	31,731	6,410	-11.8
liquid gas	190	43	268	61	+41.2
fuel oil	6,229	1,663	2,561	684	-58.9
other biomass	921	0	874	0	-
solar/thermal energy	2	0	10	0	-
geothermal energy	0	0	53	0	-
total	**67,782**	**13,970**	**60,259**	**12,092**	**-13.4**

5.6 REDUCTION POTENTIAL

5.6.1 SMEs

There are two ways to reduce emissions from SMEs: established companies need to save energy for their current activities and efforts need to be made to reduce additional CO_2 emissions from future companies with new activities.

Since mostly smaller enterprises with limited production processes are established in the municipality of Zoersel, most energy savings can be achieved through modifications to the shell of the buildings, interventions on heating, ventilation and air conditioning, lighting, sunblinds, cooling, … Energy management measures such as energy monitoring have also proved useful.

These measures are difficult to quantify, however, which complicates the reduction potential assessment for SMEs. Since SMEs in the municipality of Zoersel only make a small contribution to total emissions in the municipality, this sector is not given priority in the climate plan.

5.6.2 Tertiary sector

In the municipality of Zoersel, the largest energy consumers in the tertiary sector are health and social care, and offices and administrations. These subsectors mainly use natural gas, electricity and a small proportion of fuel oil. The action points here are similar to the reduction potential for the residential sector.

Given the wide diversity of buildings, individual measures cannot be quantified. In order to estimate the reduction potential for the tertiary sector, a total reduction of 30% is taken as a starting point by using roof insulation, wall insulation, high-efficiency glazing, rational energy consumption and high-efficiency boilers.

5.7 IMPACT OF CLIMATE CHANGE

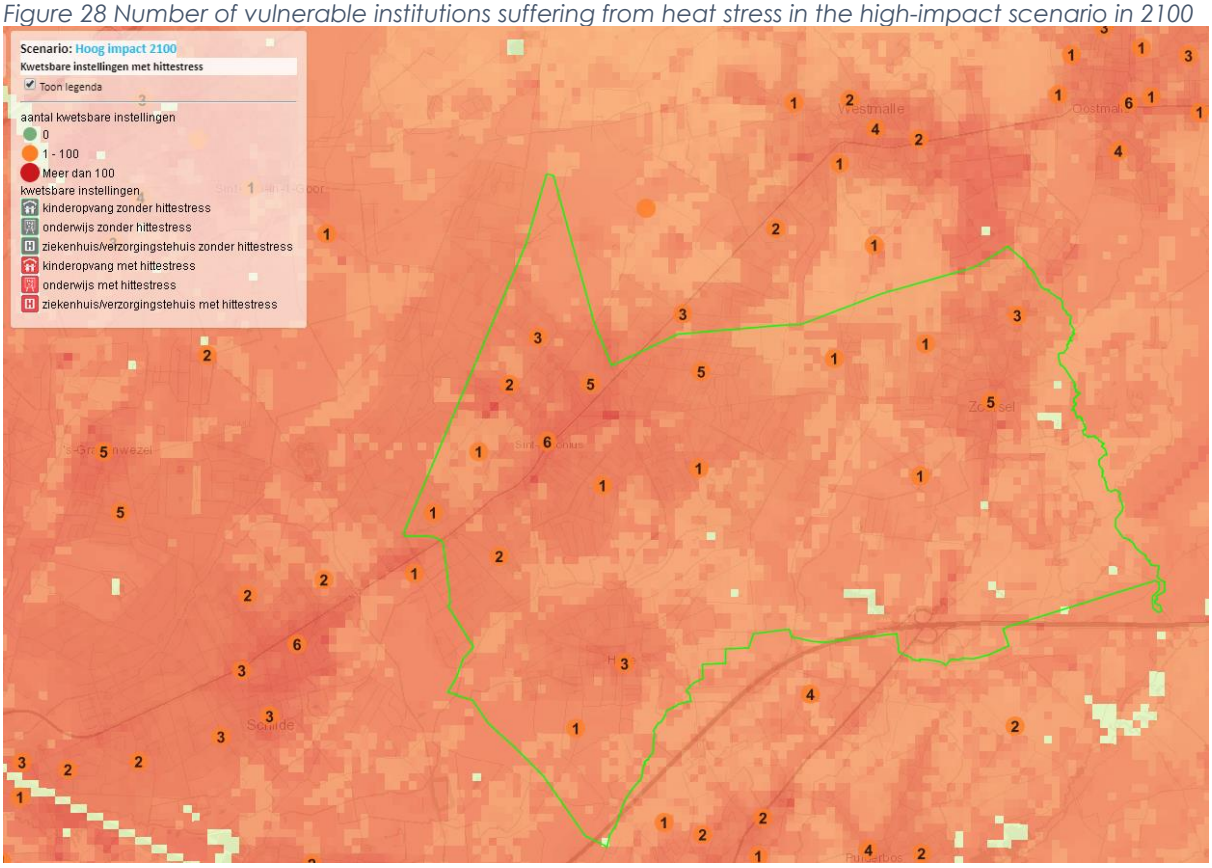
The various effects of climate change relevant to the tertiary sector in the municipality of Zoersel are discussed below.

5.7.1 Impact of heat

Especially in the centres of Zoersel, Halle and Sint-Antonius, heat stress will increase. Already in 2030, 21 vulnerable institutions such as schools, childcare services and hospitals are expected to suffer from heat stress in the high-impact scenario. The high-density centre of Sint-Antonius seems to be particulary affected.

Figure 28 shows the number of vulnerable institutions that will experience heat stress in 2100 in the high-impact scenario. It concerns educational institutions, childcare services, hospitals and nursing homes. The highest concentrations of vulnerable institutions are found in the centres of Sint-Antonius and Zoersel.

Figure 28 Number of vulnerable institutions suffering from heat stress in the high-impact scenario in 2100



Heat also has an impact on economy. When it is too hot, employees suffer from loss of concentration, fatigue and difficulty in making decisions. This affects labour productivity. With temperatures of 30°C and more, labour productivity is only 70%. Heat involves extra energy costs for businesses to cool their goods and products and to keep office temperatures at a comfortable level. (9)

Apart from that, dry weather and higher temperatures are good for the leisure and catering sector.

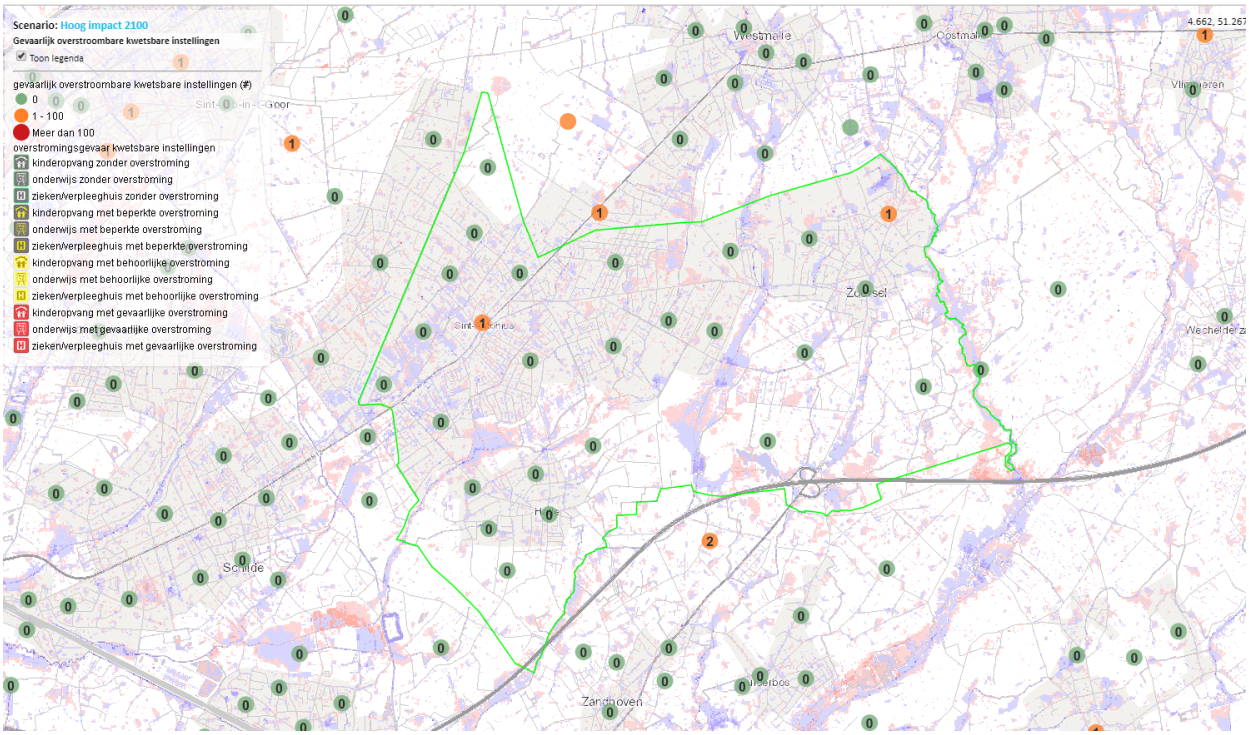
5.7.2 Impact of drought

Water scarcity has economic implications. Knowing that the average water availability in Flanders is already alarmingly low compared to international standards, this is a point of concern that needs to be addressed. (9)

5.7.3 Impact of floods

For Zoersel, this means an increase in flood-prone areas. Two schools in the centre of Sint-Antonius and Zoersel are at risk of flooding by 70 cm or more in 2100 (Figure 29). (4)

Figure 29 Flood-prone vulnerable institutions in the high-impact scenario in 2100



5.8 Strategies for SMEs and the tertiary sector

5.8.1 Support businesses, schools and care centres towards climate neutrality

Guidelines can be drawn up to stimulate climate-neutral entrepreneurship among SMEs and retailers. Moreover, specifications of various energy-efficient measures and renewable energy can be prepared to which businesses, schools, care centres, etc. can subscribe. For example: installation of LED lighting, installation of a sunroof, … These specifications should also consider enterprises working with citizen participation such as local energy cooperatives. The whole community will then support a shift to a climate-neutral municipality.

Children are the future. Therefore, support schools on difficult issues such as SDGs, climate and energy. Collaborate with education specialists to create packages that schools can work with. Also support schools in their energy renovations. They are often waiting for subsidies from higher authorities to implement energy-efficient measures. An ESCO model guarantees energy savings in exchange for energy renovations without requiring additional investments or budgets from the school itself.

Support associations in making their own premises energy-efficient by providing renovation audits and guidance.

5.8.2 Try to integrate local economy and agriculture into the tertiary sector

Organise meeting days between local economy and farmers. Local businesses will then get to know each other and neighbours will become each other's customers.

5.8.3 Communicate good practices and research into businesses

In clothing stores, on average more than half of the energy is used for lighting, which makes it the largest energy guzzler. They often use oversized lighting and lamps with high energy consumption and heat generation. This high heat generation rate leads to employee complaints about comfort and causes air conditioning to work overtime, which in turn increases the energy bill by 10%.

The correct dimensioning and control of lighting and the use of energy-saving lamps can lower the bill by 35 to 50% while improving working comfort, which brings double benefit.

A study conducted by Eandis and Stadslab 2050 in 2016 showed that closing shop doors resulted in energy savings of about 40%, without losing customers.

5.9 PLANNED MULTI-ANNUAL PLAN ACTIONS

The tertiary sector in Zoersel mainly consists of a few large care institutions. They have already gained considerable knowledge on possible actions for CO_2 emission reduction. In consultation with the sector, the municipality wants to share 'good practices' for setting up sustainable initiatives.

Zoersel will enter into dialogue with local entrepreneurs and SMEs to provide measures for CO_2 emission reduction.

The municipality wants to support schools that do not belong to the municipal education network by informing them about the possibilities of energy renovations. Educational projects such as the 'climate gang' will still be offered to primary schools in Zoersel.

6 Agriculture

6.1 VISION OF THE FUTURE

Climate change poses major challenges for agriculture. More frequent and prolonged wet or dry periods, new diseases, … Traditional farmers will have to evolve into modern managers who are open to eco-friendly and alternative cultivation methods and crops. Maize as ideal forage may no longer be economically viable due to excessive crop damage. Soil should be seen as a water buffer. Healthy soil with sufficient organic matter can store water in wet periods and release it slowly in dry periods, and also reduce erosion.

The shift towards more local consumption provides opportunities for farmers. Many people are willing to pay more for locally grown, healthy food. This creates an opportunity for meat and vegetables. Partnerships will make farmers stronger as not everyone can set up their own shop or market their own products. Finding each other is the message.

The shift towards a more vegetarian diet can be seen as a challenge instead of a threat. It is healthier and reduces methane production by intensive livestock farming. Stimulating local consumption gives young farmers a new vision of the future and strengthens the bond between producer and consumer.

Technological breakthroughs can be made in terms of reducing greenhouse gas emissions from livestock and in developing plant alternatives to animal products. Fuel consumption in agriculture and glasshouse horticulture should be further reduced, whereby the most polluting fuels (fuel oil and diesel) are phased out first.

In 2050, there will still be greenhouse gas emissions in agriculture, mainly from the remaining livestock. As the world will need to evolve towards negative emissions after 2050, an increased uptake of greenhouse gases by nature, for example, will have to compensate for emissions in agriculture.

6.2 SUMMARY OVERVIEW OF THE SITUATION

Agriculture and horticulture are responsible for a small percentage of CO_2 emissions in the municipality of Zoersel. CO_2 emissions from agriculture are caused by the energy used for agricultural activities (e.g. heating of greenhouses and stables). The Covenant of Mayors only takes these emissions into account. However, there are also emissions caused by the digestion of livestock, the storage of manure and CO_2 emissions from the soil. These greenhouse gas emissions are not included in the climate plan.

For agricultural holdings, and horticulture in particular, energy costs are a major expense. In recent years, many greenhouse horticultural holdings have invested in CHP (combined heat and power) to replace an old boiler (often using fuel oil). The CHP installation leads to (primary) energy savings of 20 up to 30%. These investments were often made before 2012, the benchmark year of this climate plan.

Most measures to achieve energy savings in agriculture and horticulture are also cost-effective. It is therefore important to inform farmers and horticulturists about the possibilities and to support them in the implementation of measures. Moreover, the agricultural sector can play an important role in renewable energy production, e.g. from biomass.

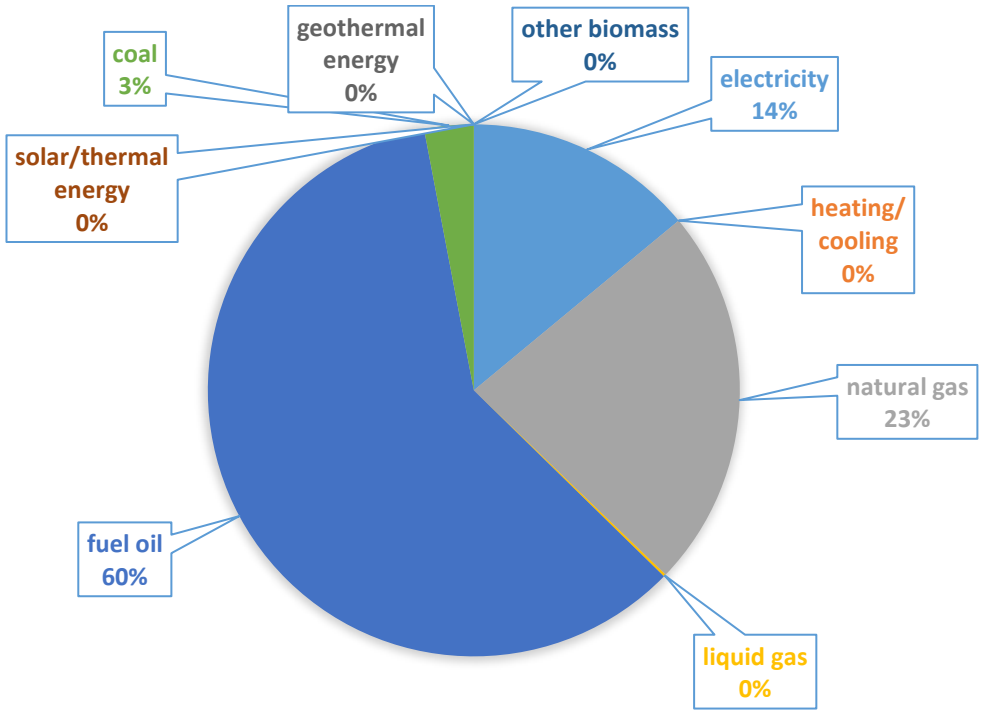
6.3 CO_2 EMISSIONS FROM AGRICULTURE IN 2012

CO_2 emissions from agriculture amount to only **1%** of total CO_2 emissions in Zoersel. Natural gas and fuel oil together account for more than 80% of these emissions. The agricultural holdings in Zoersel are mainly cattle farms. Table 23 and Figure 30 give an overview of emissions in 2012 per energy carrier.

Table 23 CO_2 emissions from agriculture per energy carrier in 2012

Emissions from agriculture 2012		
	MWh	**Tonnes of CO_2**
electricity	537	110
heating/cooling	0	0
natural gas	900	182
liquid gas	5	1
fuel oil	1,751	468
coal	66	24
other biomass	0	0
solar/thermal energy	0	0
geothermal energy	0	0
total	**3,259**	**784**

Figure 30 CO_2 emissions from agriculture per energy carrier in 2012



6.4 EVOLUTION BETWEEN 2012 AND 2017

Statistics from VITO (Flemish Institute for Technological Research) indicate a significant increase in energy consumption in agriculture over the last few years. This resulted in an increase in the percentage of total CO_2 emissions from agriculture by 1% in 2012 up to 3% in 2017. The number of animals has not increased in proportion to consumption, but has only increased slightly. The increase in consumption can therefore only be explained by higher energy use in existing farms.

At a consultation meeting on 28 October 2019, the strong increase in energy consumption between 2012 and 2017 was discussed with a delegation of Zoersel farmers. They could not come up with an explanation. Some of them even mentioned that they had been making efforts regarding renewable energy in recent years.

To obtain further information about the submitted data, VITO – the institute providing statistics for the preparation of a climate plan – was initially contacted. They referred to Fluvius, the intermunicipal electricity and gas distribution system operator, who indicated that a significant increase in the number of access points for agricultural holdings had been recorded in recent years. Another contributing factor may have been a different breakdown of NACE codes (allocated by economic activity) following a sector reclassification.

No specific figures are available for the use of fuel oil and coal in agricultural holdings in Zoersel. VITO data is based on the Flemish average electricity and gas consumption distributed among the municipalities. The share of fuel oil and coal is a major factor as they account for more than half of the energy consumption in the agricultural sector.

The above observations should therefore be made regarding the reported strong increase in energy consumption in agriculture between 2012 and 2017. Moreover, several agricultural holdings have taken initiatives in recent years to increase in-house processing and short-chain sales. These activities are fully in line with a sustainable agricultural policy and can partly explain the increase in recorded energy consumption.

In view of the above, the comparison of the evolution of emissions from agriculture is only given for information in this climate plan, without drawing any further conclusions.

Table 24 Evolution of energy consumption in agriculture between 2012 and 2017

Emissions from agriculture comparison 2012-2017	2012		2017		Difference 2012-2017
	MWh	**Tonnes of CO_2**	**MWh**	**Tonnes of CO_2**	%
electricity	537	110	1,402	280	+155.1
heating/cooling	0	0	35	8	+8.0
natural gas	900	182	2,906	587	+223.0
liquid gas	5	1	44	10	+765.6
liquid oil	1,751	468	4,956	1,323	+183.0
coal	66	24	386	137	+481.9
other biomass	0	0	0	0	0
solar/thermal energy	0	0	0	0	0
geothermal energy	0	0	0	0	0
total	**3,259**	**784**	**9,730**	**2,345**	**+199.2**

6.5 REDUCTION POTENTIAL FOR FOOD AND AGRICULTURE

Energy costs can be high for agricultural and horticultural holdings. Good energy management can save a lot of money. Wind turbines, solar panels, LED lighting, … also contribute to CO_2 emission reduction by saving energy and producing renewable energy. Many farmers and horticulturists already make conscious use of energy, but further profits can still be achieved. (21)

The agricultural and horticultural sector has already come a long way in terms of energy consumption in recent decades. Heavy fuel oil and the like made way for natural gas and the introduction of biomass as an energy source. Cogeneration and the production of green energy are a fact.

However, individual enterprises can still make energy savings without compromising the quality of the production process and the comfort of animals, plants and people. This often implies investments. It therefore makes sense for agricultural and horticultural holdings to first map out their energy management situation. This can be done by means of energy and heat scans.

6.6 FOOD

Besides the opportunities to reduce emissions from local agriculture, consumers also have a few trump cards in their hands. The food we eat obviously also emits CO_2. Although emissions from cultivation and transport may not be quantified in your own municipality, they are included in total CO_2 emissions on our planet. So even if this is not part of the present local climate plan, it is still recommended to eat more vegetarian meals and to throw away less food. Lamb and beef account for most greenhouse gas emissions. The biggest savings can be made by eating vegetarian meals. For example, the energy savings of eating vegetarian meals for one year can be compared with the installation of high-efficiency glazing. Make a conscious choice for short-chain products from our local farmers.

6.7 IMPACT OF CLIMATE CHANGE

6.7.1 Impact of heat

Heat can also cause problems for agriculture. Cattle farms in particular are areas of concern. For example, the comfort zone of cows is between 5˚C and 20˚C and heat stress actually occurs around 25˚C. On days with high temperatures, it is necessary to provide sufficient shade on the meadows, to cool stables and to give extra care to animals, also during transportation. Pigs in particular are sensitive to heat waves and they have a higher risk of mortality during transport. Heat may also affect the quality of milk. Other animals, too, may be affected by heat. Crops experience heat stress as well. Besides problems caused by drought, plants can be burnt, which leads to yield losses. (9)

6.7.2 Impact of drought

The soil map was used to determine drought sensitivity (Figure 10). A major part of the soils in Zoersel appear to be sensitive or even extremely sensitive to drought. This can have harmful effects on grasslands and maize plantings serving as animal feed.

6.7.3 Impact of floods

Hailstorms can damage greenhouses. Rainstorms and hailstorms can also damage crops in open fields in spring and summer. A well-functioning drainage system can help mitigate water damage to crops. Floods make land cultivation difficult which may lead to shorter growing seasons and lower yields. Flooding with poor quality water is another concern for farmers due to the strict food safety requirements. Moreover, floods can increase soil erosion

and heavy rainfall washes away crop protection agents and fertilisers. Diseases and pests are more likely to occur. In animal farming, wet meadows can cause health problems.

6.8 STRATEGIES FOR FOOD AND AGRICULTURE

6.8.1 Encourage consumption of local products

Support initiatives such as food teams, farmers' markets and farmers and neighbours. Encourage short-chain sales of products fom our local farmers.

Lead by example and use local products like beer, fruit juice and snacks at receptions of the municipality. Look for caterers who offer and process these products. Do not hesitate to integrate vegetarian alternatives.

6.8.2 Create space for local production

Many people would like to grow their own vegetables but do not have the space or knowledge to do so. Therefore, support allotment garden and co-gardening initiatives.

Create space for agriculture. Do not sell your own land through public auction but rather use it for sustainable production for a local market through open calls. Another possibility is long-term land leasing to projects such as *'De Landgenoten' ('Fellow citizens')*. In the cooperative of *De Landgenoten*, farmers and consumers work together to improve access to agricultural land for farmers.

Create space and opportunities for initiatives such as self-harvest farms, a food forest and CSAs (Community-Supported Agriculture).

Support farmers who want to expand their business with farm tourism, farm classes or a farm shop. Small plots of land or undeveloped parcels can be used for community development initiatives. A small communal garden or edible park with large and small fruits.

Enable young people to start up an agricultural activity. This can be done by enabling multiple families to live on the same farm, provided that agricultural activities are carried out and possibly coupled with the obligation of energy-efficient renovations. Joint investments can thus be made while reducing the investment pressure for one family.

6.8.3 Support existing farmers

Look for partners in existing agricultural organisations such as the farmers' union, the Flemish infocentre for agriculture and horticulture (VILT), … to create a framework for new challenges for existing farmers. The challenge is not to present climate policy as a threat but as an opportunity. Help from sector organisations may be important within this context.

In consultation with the agricultural sector, we want to examine initiatives that can reduce energy consumption in agriculture and horticulture. We want to inform farmers and horticulturists about existing energy-saving initiatives and techniques and focus on good practices. Since the greatest energy saving efforts were already made before 2014, additional opportunities to achieve savings in this sector are limited.

Furthermore, recent dry years have shown the need for sustainable water use. In this context, we want to consult with the agricultural sector about adaptation measures for optimal water retention and buffering. This can be complemented by measures to prevent heat stress in farm animals, such as planting trees to create shade in meadows, heat-resistant roofing on stables, …

6.8.4 Eat sustainably

Sustainable eating is about reducing food waste to a minimum, limiting red and processed meat consumption, not eating more dairy and cheese than you need, not eating more than you need, avoiding snacks and candy, limiting the consumption of sugary drinks and alcohol to a maximum, opting for wholegrain products, vegetables and fruit, and paying attention to the origin and season of vegetables and fruit. Products flown in from outside Europe have a higher climate impact. The same applies to vegetables from heated greenhouses. Be sure to consult a fruit and vegetable calendar.

6.9 PLANNED MULTI-ANNUAL PLAN ACTIONS

The municipality wants to promote short-chain initiatives taken by the Zoersel farmers through announcements in municipal publications and leaflets, among other things. It will purchase products from Zoersel farmers for municipal activities. Local food initiatives such as the food team will be supported.

Nature and agriculture are partners in safeguarding open spaces. The municipality is planning consultations between nature associations and agricultural holdings to look for opportunities that benefit both nature and agriculture.

7 Renewable energy

7.1 VISION OF THE FUTURE

A sustainable and climate-neutral municipality must become the target. The amount of renewable energy produced in the region must be able to cover the total consumption of families, businesses and the tertiary sector, both for heating and electricity. Taking into account that natural gas is also a greenhouse gas that contributes to global warming, and will therefore eventually disappear. Regional energy landscapes including landscape integration, public support, economic benefits, … are expanding and allow for a joint energy supply by all participating municipalities. A bold ambition.

As a municipality, enable easy installation of sunroofs for various target groups, examine the wind, heat and biomass potential in the municipality or region, and support initiatives in this area. The municipality must prepare for the disconnection from the natural gas network. Heating grids based on local sources and joint sustainable heat generators are examined. The use of biomass based on local residual flows is also a promising form of renewable energy generation. Moreover, small-scale projects are given opportunities for wind energy where possible. Scaling up and intermunicipal planning are a more interesting choice for large wind turbines. The municipality of Zoersel is committed to expanding the production of local green electricity in collaboration with citizens' cooperatives, among others.

7.2 PRODUCTION OF RENEWABLE ENERGY IN 2012

In 2012, the municipality of Zoersel had only a limited established capacity of renewable energy: only solar energy for green electricity and a limited number of heat pumps, solar boilers and biomass boilers (for green heating). This capacity equals an annual production of 3,586 MWh or 0.7% of the annual consumption in the municipality of Zoersel. Most installations are still young and – unlike their nuclear and fossil counterparts – do not need to be replaced in the short term.

7.3 POTENTIAL OF RENEWABLE AND SUSTAINABLE ENERGY BY ENERGY SOURCE (22)

In order to support cities and towns in their climate policy, VITO has developed the Renewable Energy Atlas for Flemish municipalities for the LNE department. This study includes an inventory of the current production of renewable energy. The forms of technology taken into account are PV, solar boilers, wind, hydropower, biomass and ground-coupled heat pumps. Biomass installations that only generate heat, private wood-burning stoves, non-ground-coupled heat pumps and off-shore wind are therefore excluded from the study.

Besides the inventory of the current production of renewable energy, the Renewable Energy Atlas also explores the potential of renewable energy production. The forms of technology taken into account are PV, solar boilers, wind turbines (large-scale (2.3 MWe) and small-scale (300 kWe)), small-scale hydropower at locks and (historic) mill sites and biomass, shallow geothermal and deep geothermal energy. Deep geothermal energy is not an option in Zoersel, as geothermal heat is stored too deep in the subsurface. When mentioning geothermal energy in the scenarios, this mainly concerns earth-to-air heat pumps. Probably only a minority of the heat pumps are actual earth-to-air heat pumps. Air-to-air heat pumps are not considered here.

To explore the additional potential of renewable energy production, two scenarios were examined: the technical potential and the 'Space for Energy 2030' (REV2030) scenario. The time horizon for the REV2030 scenario is 2030. In each scenario, specific sets of spatial boundary conditions are considered for each form of technology. For example, the technical potential for wind only considers safety aspects and the REV2030 scenario takes into account current policies. Using the feasibility coefficient, the potential based on the available space is rescaled to a potential that takes into account current trends and policy objectives.

This implies that 1% of the technical potential is achieved in the REV2030 scenario. When considering the figures of the additional potential in the scenarios, the technical potential turns out to be greater than the final energy consumption in the municipality of Zoersel in 2012, which is 369,810 MWh. The additional potential of renewable energy in the REV2030 scenario represents around 2.2% of the gross final energy consumption in 2012 (Table 25, Table 26).

Table 25 Electricity production in 2015, technical potential of electricity production and potential electricity production in the REV2030 scenario for the municipality of Zoersel

2015 electricity production (MWh)		technical potential – electricity (MWh)		REV2030 – electricity (MWh)	
biomass	0	biomass	442	biomass	7
water	0	water	0	water	0
wind	0	wind	334,334	wind	1,431
sun	4,014	sun	114,866	sun	5,337
total	4,014	total	449,642	total	6,775

Table 26 Heat production in 2015, technical potential of heat production and potential heat production in the REV2030 scenario for the municipality of Zoersel

2015 heat production (MWh)		technical potential – heat (MWh)		REV2030 – heat (MWh)	
biomass	0	biomass	631	biomass	10
geothermal energy	995	geothermal energy	189,213	geothermal energy	725
sun	417	sun	14,893	sun	704
total	1,412	total	204,737	total	1,439

These results imply that a trend break will be needed to substantially increase the share of renewable energy in total energy consumption. The technical scenario demonstrates that although there is sufficient space as such, the spatial boundary conditions laid down in the REV2030 scenario need to be reconsidered and/or additional impulses are needed to break current trends and thus increase feasibility.

7.4 IMPACT OF CLIMATE CHANGE

There are as yet no specific studies on the impact of climate change on electricity supply.

7.4.1 Impact of heat

The energy demand peak is expected to shift from winter to summer. Expectations are that less energy will be needed in winter, but more energy will be used for cooling during summer heat waves. (9)

7.4.2 Impact of floods

Floods often cause power failures when electricity cabins and power stations are flooded. Although no spatial information has been found on the exact location of the power grid, the expected changes in flood risk for power supply are worth investigating in the short term in cooperation with the electricity companies. System breakdowns for other utilities such as telephone, internet and drinking water may also occur.

7.5 STRATEGIES FOR RENEWABLE ENERGY

7.5.1 Support and enable renewable energy

As a municipality, invest as much as possible in renewable energy for own buildings or sites.

Cooperate with other regional municipalities to organise group purchases of renewable energy installations or energy-saving techniques, e.g. group purchases of solar panels and heat pumps.

Let experts draw up a wind energy and biomass potential plan. Define zones and develop strategies that make investments in these technologies possible and profitable.

Install a heating grid for new parcels using renewable energy or residual heat.

Support the operation of the local energy cooperative and involve them as a partner in the municipal energy policy. They can be a driving force and partner for citizens in their energy transition.

7.5.2 Make your grid smart

Oblige the system operator to make their power grid smart.

Examine the possibility of battery storage at district level. This will allow citizens to store the energy produced by their own solar cells in a battery and either use the power themselves at a later time or sell it to third parties.

Provide sufficient charging stations for smart charging of electric vehicles. District batteries can meet peak demand while charging these vehicles.

7.6 PLANNED MULTI-ANNUAL PLAN ACTIONS

In order to increase the share of renewable energy, the municipality wants to lead by example, as mentioned earlier, by placing solar panels on all suitable roofs of municipal buildings. To this end, Zoersel has subscribed to a group purchase of renewable energy financed by a citizen cooperative and organised by the Flemish Energy Company. The municipality is taking initiatives that include an energy cafe, where residents are encouraged to participate in citizen cooperatives for renewable energy.

Future municipal housing projects will make use of communal heating facilities. For large construction projects, an obligation to use renewable energy will be introduced.

The municipality participates in the search for suitable locations for wind and solar energy projects.

8 Nature and water

8.1 VISION OF THE FUTURE

Water will be a major future challenge. There will be moments of flooding or great scarcity. Municipalities can anticipate this by constructing large water buffers around canals and streams, or in the vicinity of existing green elements. Allow water to infiltrate again. On the public domain and in green areas. Pursue an ambitious policy on rainwater recovery.

Global warming puts heavy pressure on nature. Urbanisation also presents a threat. Local authorities therefore have the responsibility to keep this pressure under control. Forests and other green elements are important carbon pools. They are essential in keeping global warming under control. Heat waves and drought result in loss of significant amounts of carbon stored in vegetation, thus causing tipping movements. The interaction between water and vegetation is another major factor. Due to high temperatures early in the year, plants take up water earlier and drought occurs sooner. Drought leads to heat, because water scarcity reduces evaporation and therefore cooling. No cooling leads to more heat.

Local fauna and flora are also under pressure due to climate change. Invasive species come to our habitats and cause damage to native plants and animals. Species will adapt to changing living conditions and in some cases this will cause other major problems, e.g. bats waking too early from hibernation will not be able to find enough food. The challenge of nature and water cannot be underestimated.

8.2 IMPACT OF CLIMATE CHANGE

In the heart of the municipality lies the 'Zoersel Forest' nature reserve. A beautiful nature area of more than 400 hectares, with walking and cycling routes and a colourful diversity of woodlands, meadows and fields. It is a mix of old deciduous and coniferous woods, rugged areas and meadows. The forest is home to a wealth of plants and a large variety of animals.

Characteristic of the Zoersel Forest are the irrigated meadows on the banks of the Tappel brook. Irrigated meadows are part of a medieval agricultural system that was developed, improved and maintained by the Cistercians for centuries. Sluices were used for a controlled flooding of the whole area in winter, as 'natural' fertilisation of the hay lands. In the Zoersel Forest, four sluices – restored in 1995 – are silent witnesses of this ingenious meadow irrigation system (23).

Together with the 'Friends of the Zoersel Forest' and JNM, Natuurpunt ('Nature Point') manages 'Heiblok', a part of the Zoersel Forest (24). The Heiblok nature reserve occupies a special place within the Zoersel Forest. It is characterised by Nardus grasslands, willow and myrtle thickets, and oak-birch forest. The area is actually a subsidence in the sandy flanks of the valley of the Tappel brook. The basin thus created is flooded all winter and spring. This allowed unusual animals and plants to settle there. Toads, frogs and salamanders (e.g. the palmate newt) feel quite at home here. The dense thicket provides excellent cover for all kinds of birds. Various lichens can be found on the willows. A small reed belt growing between the myrtle and willow thickets is a good nesting and breeding place for the marsh warbler, among others. In the southeast lies a small pond that is a magnet for damselflies and dragonflies. Four-spotted chasers are often found flying over the pond. On the moist open hay lands, the yellow-winged darter can be observed.

Dry heath is found on slightly higher ground. Typical plants such as round-leaved sundew, heaths and heathers grow here. The common blue and the small copper are both butterflies typically seen in barren hay meadows, while the large skipper is often found on the thickets.

8.2.1 Impact of heat

When temperatures are high, people cool off in recreational areas: in the shadow, in nature, in the vicinity of water. Warmer summers will make people spend their holiday more often in their own country and region. Green areas such as the Zoersel Forest will attract more visitors and therefore come under pressure.

8.2.2 Impact of drought

Drought in the sense of less periods of rain is good for recreation facilities as people will engage more in recreational activities. However, drying-out can be extremely harmful to green domains that are particularly attractive for their nature, due to loss of nature values and falling branches or fire risk. Drought and heat increase the risk of wildfires. Forests and heathland are particularly susceptible to fire and wildfires are expected to occur more frequently. Semi-natural grasslands and peatlands are vulnerable to fire. Wildfires can cause loss of biodiversity and ecosystem services. In the municipality of Zoersel, the dry heaths of the Zoersel Forest are fire-prone areas.

In extreme cases, domains will have to be closed because safety is jeopardised. The same applies to heathland and forests. An increase in frequency of droughts can increase the vulnerability of nature to other pressure factors such as wildfires and insect infestations.

8.2.3 Impact of floods

Flood regime changes can also have an impact on nature due to water levels and food richness of the water. Irregular, extreme floods in particular can disrupt nature. Nature adapts more easily to small floods with a certain regularity. If floods occur more frequently, ecosystems will be less able to recover and they will become more vulnerable to disturbances such as insect infestations. (9)

8.3 STRATEGIES FOR NATURE AND WATER

8.3.1 Buffer and reuse rainwater

Make it compulsory for large renovation projects to install a rainwater tank in accordance with the rainwater regulations. Encourage the use of rainwater by private individuals through the group purchase of rain barrels. For the construction of a separate sewerage system, call in a disconnection expert to examine the possibilities for intiltration into the soil. Encourage disconnection of the rainwater tank from the sewerage system. If the rainwater tank or barrel is full, the excess water can infiltrate into the soil.

Create buffer canals and ponds which can be used to a limited extent as water supplies for agriculture in dry periods. Create green interior areas in parcels of land with WADIs to which rainwater is directed and where it can infiltrate quietly into the soil.

The municipality of Zoersel limits impermeable pavements in car parks and allotments. This requirement is laid down in the environmental permit.

8.3.2 Limit groundwater pumping

Make a policy for groundwater pumping in residential construction projects. Determine a maximum period, check it and ensure maximum re-infiltration at other locations. Limit groundwater extraction.

8.3.3 Adopt an economic water policy

Set up awareness-raising campaigns with feasible tips to encourage rational use of drinking and rainwater in homes and gardens all year round. Communicate any ban by the governor on watering lawns during the summer months.

Raise awareness among users of sports clubs to make rational use of drinking and rainwater.

8.3.4 Create more green areas in urban environments

Cooperate with SMEs and the tertiary sector to bring more biodiversity to business sites. Replace existing pavements on public domains with green areas where possible. This will allow for cooling and water infiltration.

Create 'tiny forests' in appropriate areas. These are small woods the size of a tennis court. They provide more biodiversity and CO_2 capture and prevent overheating.

Encourage maximum use of green roofs for new parcels, apartment buildings, large dwellings and extensive renovations. Green roofs provide cooling, water buffering and more biodiversity. Create this heat stress-reducing greening primarily in places where vulnerable groups are gathered, such as schools, childcare centres and residential care centres. Encourage green facades in densely populated areas.

8.3.5 Protect existing fauna and flora

Introduce a species policy to protect species under pressure. Create corridors between different green areas to allow migration of species.

Create amphibian-friendly parks, support animal crossings and take accompanying measures for migrating toads. Provide breeding and wintering areas for various species such as amphibians, solitary bees, bats, …

Set up a tree fund to compensate for each felled tree, either by planting another tree in the same place or by paying an adjusted compensation (estimated value of the tree) into the fund. The tree fund is then used for investments in tree planting at a suitable location.

Provide more flowers by planting bulbous plants in grass strips and verges. Sow flower mixtures and implement an extensive mowing policy for public property and roadsides.

8.3.6 Give more space to water

Allow water to infiltrate green areas and nature reserves by installing water buffers.

8.4 PLANNED MULTI-ANNUAL PLAN ACTIONS

Zoersel is historically lagging behind as regards the degree of sewer network connections. The multi-annual plan 2020-2025 provides for 10,419,824 EUR to further catch up.

The municipality will buy the *Gestel Forest*, currently designated as industrial area, from the intermunicipal company IGEAN with the intention of not developing and maintaining it as a forest (555,000 EUR). For *Domain De Welvaart*, currently designated as recreational area, a solution is being sought to develop it as valuable woodland.

The association supports *Natuurpunt* in the purchase of nature reserves under the applicable subsidy regulations (31,032 EUR in 2020, 5,100 EUR per year from 2021 onwards). The *Friends of the Zoersel Forest* will receive an annual operational grant of 3,000 EUR. The municipal Mina council will be granted an annual budget of 5,100 EUR to develop its own initiatives.

The municipality aims for more biodiversity in verges and the rest of the public domain. Seasonal plantings will be replaced with perennials.

9 Bibliography

1. IPCC. *Fifth assessment report.*

2. MIRA Agency. *Climate Report. s.l.*: VMM, 2015.

3. KNMI (Royal Netherlands Meteorological Institute). *Summary for policymakers.* 2014.

4. *Climate Portal.* [Online] 2018. [Quote from: 1 10 2018.] https://klimaat.vmm.be/nl/welkom.

5. IPCC. *Special Report: Global Warming of 1.5°C.* 2018.

6. Sumaqua. *Risk and Vulnerability Assessment for the Meetjesland under Climate Change. s.l.*: Study carried out on behalf of Veneco and the Province of East Flanders within the Meetjesland Climate-Healthy Initiative, 2018.

7. IGEAN. *Climate Action Plan.* 2015.

8. Climate Change Department of the Federal Public Service for Public Health, Food Chain Safety and the Environment, in collaboration with Climact and VITO. *Scenarios for a Low-Carbon Belgium by 2050.* s.l.: Climate Change Department, 2013.

9. Natuur Policy, Department for Sustainable Environment and. *Provincial Climate Adaptation Plan.* s.l.: Province of Antwerp, 2016.

10. Brouwers, Johan. Annual average temperature. *Environmental Report.* [Online] Flemish Government, 2018. [Quote from: 25 10 2018.] https://www.milieurapport.be/milieuthemas/klimaatverandering/temperatuur/jaargemiddelde-temperatuur.

11. De Meyer, Laurens. Al etend redden we de wereld, of maken we haar kapot? *Bond Beter Leefmilieu* (We save the world while we eat, or do we destroy her? *Society for a Better Environment*). [Online] [Quote from: 18 10 2018.] https://www.bondbeterleefmilieu.be/artikel/al-etend-redden-we-de-wereld-maken-we-haar-kapot.

12. Climatological Overview of 2014. *meteo.* [Online] KMI. [Quote from: 13 12 2018.] https://www.meteo.be/meteo/view/nl/18606670-2014.html.

13. Carbon Footprint Calculator. *flygrn.* [Online] 2019. [Quote from: 07 05 2019.] https://flygrn.com.

14. PIH. *Follow-up Report Greenhouse Gas Emissions 2016.* Zoersel: Province of Antwerp, 2017.

15. *Demographic data sheet.* s.l.: The province in figures, 2018.

16. Environment, Society for a Better. *The future is in local hands.* Brussels : Danny Jacobs, 2017.

17. Flanders Statistics. *Survey municipality/city monitor.*

18. Metadata, ABB. *Mobility.*

19. Environment, Society for a Better. *Recipes for Core Strengthening.* Brussels: Society for a Better Environment, 2016.

20. Planning Commission, Regional. *Mobility Plan for Flanders.* s.l.: Department of Mobility and Public Works, 2011.

21. Veel belangstelling voor slotmoment Agro Energie Netwerk Noorderkempen. ('Much Interest in Closing Moment Agro Energy Network Noorderkempen) ***Kempen 2020.*** **[Online] IOK, 2014. [Quote from: 3 12 2018.] http://www.kempen2020.be/content/1117/veel-belangstelling-voor-slotmoment-agro-energie-netwerk-noorderkempen.**

22. Leen Van Esch, Erika Meynaerts, Karolien Vermeiren, Inge Uljee, Liliane Janssen, Ruben Guisson and. ***Final Report Renewable Energy Atlas for Flemish Municipalities.*** **s.l.: VITO, 2016.**

23. Zoersel Forest and the Visitor Centre. ***Zoersel.*** **[Online] [Quote from: 12 10 2018.] https://www.zoersel.be/index.aspx?SGREF=12360.**

24. Zoersel Forest Nature Reserve. ***Natuurpunt.*** **[Online] [Quote from: 10 12 2018.] https://www.natuurpunt.be/natuurgebied/zoerselbos.**

25. www.burgemeestersconvenant.be. [Online]

26. [Online] http://www.burgemeestersconvenant.be/co2-inventarissen.

10 Annexes

10.1 Annex 1: Action plan

Theme	Goal	Strategy	Measure	Year	Priority	Budget 2020-2025
Own organisation	*Aim for a climate-neutral organisation by 2030*	*Incorporate climate into all levels of the municipal organisation*	Council and management propagate the climate theme.	continuous		0 EUR
			Plan training and info sessions for staff on the climate theme. Create a hotline within the organisation to identify possible areas for improvement.	2020-2030		through general resources
			Provide additional resources for further actions to implement the climate plan.	2020-2030	x	295,000 EUR
			Involve all advisory councils in the climate theme, in particular Mina and GECORO.	continuous		0 EUR
			Use subsidies from higher authorities to finance measures. Make use of the expertise of internal subsidy working groups. Follow the policy of Flemish, federal and European authorities.	continuous		0 EUR
		Invest in climate-friendly infrastructure	See where buildings can get a multi-functional use (e.g. school buildings as part of a community school).	continuous		0 EUR
			Participation in the SURE2050 project. Preparation of a management and policy plan for municipal real estate.	2019-2020		0 EUR
			Continue the collaboration with Fluvius and draw up an energy care plan.	2020		0 EUR

			Carry out renovations in buildings with the highest energy consumption.	2020-2030	x	450,000 EUR
			Consult ESCO models to finance energy-saving measures in your own patrimony, e.g. for replacement with LED lighting.	continuous		0 EUR
			Continue rational energy consumption. Monitor the temperature in municipal buildings. Raise awareness among users through a 'one degree less' action.	continuous		0 EUR
			Where possible, install solar panels on as many municipal buildings as possible via citizen cooperatives.	2020	x	0 EUR
		Opt for energy-efficient public lighting	Replace all public lighting with LEDs via Fluvius by 2030.	2020-2030	x	2,558,582 EUR (until 2030)
			Investigate the use of movement sensors in dead-end streets and certain slow roads.	2021		0 EUR
		Move towards zero-emission mobility	Purchase (electric) service bikes and provide maintenance.	2020		10,000 EUR purchase
			Follow up consumption/kilometres driven with service vehicles and take appropriate measures.	continuous		0 EUR
			Encourage sustainable commuting, e.g. by: - a bicycle lease project for staff after optimisation of social legislation - carrying out a mobility scan - telework and online conferences to prevent movements - renewing cycling infrastructure (parking facilities, showers, lockers, …) - granting the maximum legal bicycle allowance	continuous		through general resources

			Set up a project with electric cars from a shared platform. Use them for your own organisation as well and do not buy your own cars for administration.	2020	x	95,000 EUR
		Adopt a sustainable procurement policy	Have the purchasing department implement a coherent procurement policy that includes sustainable alternatives. Give priority to local economy support. Choose short-chain, low-waste, organic and fair trade for catering and events.	continuous		through general resources
			Switch as much as possible to tap water for drinking water.	2020		0 EUR
			Always choose the most energy-efficient appliance.	continuous		through general resources
		Be a smart city	Follow technological developments and apply them to the municipal organisation.	continuous		0 EUR
		Associations	Look for alternative forms of financing for associations for energy renovations of their premises (e.g. via SoCrowd).	continuous		0 EUR
			Bring different parties together to make optimal use of premises by different associations.	continuous		0 EUR
			Support associations in energy-saving measures in their buildings and on their grounds.	2020-2030		78,000 EUR
Housing and living	*Make optimal use of the reduction potential of homes and buildings*	*Align SIPs, BPAs and spatial structure plans with today's climate challenges*	Adopt municipal regulations to enable the conversion of large dwellings into multi-generational homes, cohousing facilities or multi-family homes at suitable locations (e.g. by means of a decision on desired policy developments).	2020-2021	x	94,875 EUR

			The municipality screens existing SIPs and Special Planning Schemes for regulations that undermine climate targets, including pavements, parking standards, renewable energy, boiler rooms and insulating applications.	2022		0 EUR
			Evaluate applications for larger renovation and new construction projects by means of a climate test (via decisions on desired policy developments).	2021		0 EUR
			Make all future municipal projects (e.g. *Zonneputteke* and *Watermolen*) sustainable and innovative in cooperation with external specialists such as Camp C.	continuous	priority	0 EUR
			For newly-built houses, take the ideal habitable surface area and compare it with the assessment criteria of the Flemish Spatial Planning Codex (art. 4.3.1) (via decisions on desired policy development).	continuous		0 EUR
			Make spatial planning future-oriented. Lay down a green standard. Encourage the use of solar panels, heat pumps and solar boilers.	continuous		0 EUR
			Investigate the possibilities of communal facilities for heat generation.	continuous		0 EUR
			Stabilise the loss of open space with the intention of keeping land usage in our municipality stable from 2030 onwards.	continuous	x	0 EUR
		Strengthen the village centre	Stimulate qualitative densification in the village centres (Flemish Government Architect's principle - via decisions on desired policy developments).	continuous		0 EUR

		Focus on greening and depaving	Create green areas in the village centres through depaving.	continuous		30,000 EUR
			Set up a green fund in which, according to criteria to be determined, payments must be made when replanting is not possible (via decisions on desired policy developments).	continuous		0 EUR
			Make playgrounds and school buildings (green facades) greener.	continuous		6,000 EUR
			Promote depaving of front gardens.	continuous		0 EUR
			Allocate a district budget for sustainable initiatives.	2020-2030		85,000 EUR
		Stimulate renovation	Participation in the *'100 woningen maken werk van groene warmte' ('100 dwellings work on green heating')* project (via IGEAN).	2020-2022		6,250 EUR
			Start up counselling for landlords parallel with the mandatory conformity certificates (via IGEAN).	2020		0 EUR
			Raise awareness among residents to limit conventional heating in private pools.	continuous		0 EUR
			Raise awareness among residents and encourage them to carry out CO_2-reducing interventions by: - informing them about subsidies from higher authorities - promoting sustainable construction advice for new and existing dwellings, for example, in cooperation with Camp C - removing financial barriers by promoting the *EnergieK* house - organising group purchases for high-quality roof and wall insulation	continuous		0 EUR

			- offering thermographic scanning of roofs via the *EnergieK* desk			
			Promote switching off continuous outdoor illumination around homes.	continuous		0 EUR
		Opt for sustainable materials	Encourage citizens to think about their purchases. Do I need this product? If I do, what are the most sustainable choices? E.g. plastic-free Zoersel action, choose certified wood, choose recycled material, …	continuous		0 EUR
		Focus on enforcement	The municipality joins the intermunicipal spatial planning enforcement cell of the intercommunal association IGEAN.	2020		102,000 EUR
Mobility	*Less and more sustainable traffic*	*Focus on vulnerable road users*	Create new slow roads in strategic places to facilitate connections for vulnerable road users. Check this for each large construction project. Investigate the possibility of reopening inaccessible slow roads (e.g. local road 45).	2020-2030	x	180,000 EUR
			Provide sufficient and safe bicycle parking facilities in the centre near mobihubs. Create space in bicycle parkings by removing abandoned bicycles.	2020-2030	x	45,000 EUR
			Establish car and high bike parking guidelines (via decisions on desired policy developments).	2021		0 EUR
			Draw up district circulation plans to prevent cut-through traffic and to ensure that vulnerable road users can reach the centre safely and easily.	continuous	x	30,000 EUR
			Introduce a reward system for children who walk or cycle to school.	2020	x	75,000 EUR

			Participation in and expansion of the *Velotheek* project. *(Cycle Lending Service)*	2019-2030		27,000 EUR
			Create a network of cycle routes in and between village centres.	2020-2030	x	26,000 EUR
		Go for seamless public transport	Argue in favour of a transport region that is easily accessible by public transport. Make fast connections to cities and railway stations.	continuous		0 EUR
			Provide (better) connections between the submunicipalities (custom transport/local bus).	2020-2030		122,000 EUR
			Set up mobihubs at strategic locations.	continuous		0 EUR
		Encourage shared mobility	Promote carsharing, whereby residents share their own car with others through shared platforms.	continuous		0 EUR
			The municipality is embarking on a shared bicycle project via the transport region.	2020		5,000 EUR
		Go for healthy air	Provide sufficient charging stations for electric vehicles.	continuous		0 EUR
			Set up an action on air quality, for example by monitoring air quality on busy traffic axes during rush hours or on shortcuts.	2021		0 EUR
			Promote tourism in the region and sustainable holiday trips.	continuous		0 EUR
		Reduce waste	Encourage the use of sustainable materials by residents and associations, thus reducing waste.	continuous		0 EUR
			Reduce the amount of residual waste by introducing the grey container.	2021-2030	x	275,000 EUR
Renewable energy	*Make optimal use of the production*	*Support and enable renewable energy*	Find opportunities for alternative heating facilities (such as heating grids).	continuous		0 EUR

	potential of renewable energy					
			Make it compulsory for large projects to use renewable energy heating (via decisions on desired policy developmens).	continuous	x	0 EUR
			Impose a minimum percentage of citizen participation for new renewable energy projects.	continuous	x	0 EUR
			Cooperate in finding potential locations for wind and solar energy. Follow the legal possibilities for the installation of small wind turbines and look for opportunities.	continuous	x	0 EUR
			Follow the evolution of hydrogen technology and other storage possibilities for renewable energy (e.g. district batteries).	continuous		0 EUR
			Facilitate off-grid networks to generate electricity.	continuous		0 EUR
		Involve potential partners	Encourage citizens and businesses to engage in civic participation initiatives.	continuous		0 EUR
Nature and water	*Create and maintain a green-blue network*	*Buffer and reuse rainwater*	Apply a rainwater policy by requiring the installation of a rainwater tank for large renovations and by offering rainwater barrels through a group purchase.	continuous		0 EUR
		Limit groundwater pumping	Pursue a strict groundwater policy that limits groundwater pumping in accordance with regulations from higher authorities.	continuous		0 EUR
		Adopt an economic water policy	Raise awareness among residents with practical tips on rational water use in households and in the garden (e.g. stop spraying the lawn), and among users of sports clubs and other associations.	continuous		0 EUR

		Create more green	Make green interior areas in parcels of land compulsory (via decisions on desired policy developments).	continuous		0 EUR
			Turn free spaces into green recreational areas (e.g. plant trees, tiny forests, edible greenery), such as the *Dwergenbos (Dwarf Forest)*.	2020-2030	x	20,000 EUR
			Plant native avenue trees where possible, taking into account utilities. Plant hedges as an alternative.	continuous		through general resources
			Provide functional connections between landscapes. Create a natural connection between the Zoersel Forest and *Zalfens Gebroekt* nature reserves via the planned ring road around Zoersel. Look for subsidies for the construction of a small ecoduct over the N14 near the former *Groene Vogel* garden centre. Safeguard the relation between the village centre of Zoersel and the Zoersel Forest coming from *Langebaan* and *De Reiger*.	continuous	x	0 EUR
			At the request of their parents, each newborn gets one native tree to plant in their garden or on public domain.	2021		resources to be provided
			Encourage the use of hedges as living fence.	continuous		0 EUR
			Draw up an action plan in consultation with the associations to make their grounds greener.	2021		0 EUR
			Prevent available farmland from being turned into pasture for unwanted horse grazing. When licensing horse pastures, lay	continuous		0 EUR

			down standards for plantations and fences made of natural materials.			
		Protect existing fauna and flora	Preserve existing woodland in non-designated areas through municipal land purchase or agreements with owners (e.g. *Gestel Forest* and *Domain De Welvaert*).	continuous	x	555,000 EUR
			Update the (roadside verge) mowing plan.	2021		0 EUR
			Sow flower mixtures and plant flower bulbs in parks and other open spaces with attention to sustainability (preferably perennials) and biodiversity (native, nectar-rich species).	2020-2030		through general resources
			Stimulate biodiversity in the form of a bee plan.	2020		0 EUR
			Monitor replanting management.	continuous		0 EUR
		Give more space to water	Allow maximum water infiltration on site. Buffer water by creating buffer canals, ponds and WADIs.	continuous		0 EUR
			Catch up with the construction of separate sewers.	2020-2030		10,419,824 EUR
			Add the low-lying plots along the *Heideweg* to the existing *Vorse Beemden* flood area as soon as a system of transferable development rights has become operational.	2020-2030		0 EUR
			In cooperation with Pidpa, the municipality draws up a basic and detailed rainwater plan for the entire territory, taking into account the physical system.	2020		0 EUR
		Water and greenery fight climate change	Make green roofs (for flat roofs) compulsory for newly-built houses and extensive renovations if water is not reused within the	2021		0 EUR

			own home. Organise a group purchase for green roofs on existing homes.			
			Do not make streets wider than necessary. Create green strips in vacant spaces.	continuous		0 EUR
			Limit pavements. Make maximum use of water permeable materials if paving is required. Provide greenery when constructing parkings.	continuous		0 EUR
			Draw up regulations requiring contractors, where possible, to let pumped groundwater infiltrate in the vicinity and to use electrically driven pumps.	2020		0 EUR
		Burning	Compost at least 75% of the trees collected for Christmas tree burns.	2019-2020		0 EUR
		Take measures against heat	The municipality draws up a heat plan with measures to be taken in case of a heat wave, heat and fire risk at events, blue-green algae control, excess water on playgrounds, …	2021		0 EUR
SMEs, tertiary and quarternary sector	*Sustainability*	*Support businesses, schools and care centres in climate neutrality*	Consult with SMEs, the tertiary and quaternary sector on taking initiatives to make their patrimony more energy efficient. Share 'good practices'.	continuous		0 EUR
			The municipality organises a consultation meeting with owners of buildings where vulnerable population groups live around making their buildings heat-resistant (e.g. by installing sunblinds, planting trees, depaving, heat-resistant roofing).	continuous		0 EUR
			Support schools in energy renovations by providing resources and announcing existing initiatives (e. g. climate schools 2050).	continuous		0 EUR

			Work on educational climate projects in schools such as the 'climate gang'.	2020-2030	x	12,000 EUR
		Communicate good practices and research into businesses	Raise awareness among retailers about illuminating shop windows and closing the doors.	continuous		0 EUR
Food and agriculture	*Local and vegetarian food*	*Stimulate consumption of local products*	Encourage consumption of local products by setting a good example at receptions, events and in municipal buildings.	continuous		0 EUR
		Create space for local production	Create space for local agricultural initiatives.	continuous		0 EUR
		Support existing farmers	Bring different initiatives together and provide municipal support. Associate local producers with other local retailers.	continuous		0 EUR
			Continue to support the food team and other local (organic) food initiatives.	continuous		0 EUR
			Plan a consultation meeting between nature associations and local farmers to find opportunities that benefit both nature and agriculture.	continuous		0 EUR
		Eat sustainably	Opt for short-chain first, as well as for fair trade. Raise awareness on reducing food waste and eating organic. Communicate why certain food choices are harmful to the climate (e.g. palm oil).	continuous		0 EUR
			Promote short-chain initiatives by Zoersel farmers, e.g. through publicity and uniform signage.	continuous		through general resources
			Support initiatives to reduce food waste.	continuous		0 EUR

10.2 ANNEX 2: CLIMATE ACTION PLAN SURVEY

Summary of the citizen survey on the climate action plan

Via social media (Facebook), we questioned citizens about the three pillars of the Covenant of Mayors: climate mitigation, climate adaptation and sustainable, safe energy. The aim was to find out what citizens are doing, what they might want to do in the future, and what they expect from the municipality.

The survey was based on the three pillars with four identical questions for each theme. 205 answers were received, with an equal division between men and women. Three quarters of the participants live in Zoersel. The age category that responded the most was the category from 40 to 49 years old. They represent 23.1%. The second largest, from 30 to 39 years old, represented 21.2%, and the third largest, from 60 to 69 years old, accounted for 16.8%.

The four questions asked for each theme were:

1. What actions have you already taken?
2. What actions do you want to take in the future?
3. What do you think the municipality can still do?
4. Why not?

Theme 1 Climate mitigation

The top three answers to the first question are:

- Mobility: use the car less, cycle and/or use public transport more
- Energy: solar panels, insulation, LED lighting, lower heating
- Agriculture: buy less meat, buy locally

The top three answers to the second question are:

- Mobility: cycle or use public transport more, use car less, electric car
- Energy: be energy efficient, filter on wood-burning stove
- Agriculture: eat less meat

The top three answers to the third question are:

- Tackle vehicle fleet, focus on public transport, promote carsharing systems
- Plant trees, more checks on tree felling and replanting
- Cover roofs with solar panels, better/more insulation, alternative forms of housing

As a municipality, it is important to lead by example.

Why not?

Varying responses were received, such as why should we, insufficient knowledge, we'll see how it evolves, other priorities, money-grubbing, nonsense, …

Theme 2 Climate adaptation

The top three answers to the first question are:

- Rational use of water, rainwater barrels, infiltration zone, less densification in garden
- Different handling of waste, recycling, less plastic
- Insulation, lower heating

The top three answers to the second question are:

- Consume less, more conscious consumerism
- Rainwater tank, reduce paving
- Requests for proposals, awareness-raising

The top three answers to the third question are:

- Better water management, less concrete, concrete stop
- Plant more trees, no deforestation, keep greenery in community
- More communication and awareness-raising

Why not?

Again, varying responses were received: too busy, exaggerated, not thought about, costs a lot of money, climate is global and cannot be changed locally, we're already doing enough, we can still live, … Several people responded not having understood the question.

Theme 3 Sustainable energy

The top three answers to the first question are:

- Installation of solar panels
- Purchase of green electricity via group purchase
- Good insulation

The top three answers to the second question are:

- Lack of resources
- Purchase home battery
- Install polar panels, wind turbine or heat pump

The top three answers to the third question are:

- Allow wind turbines
- Lead by example
- Promote and raise awareness on group purchases

Why not?

Again, varying responses: I live in a rented house, too busy, love my freedom, not convinced, waiting for new technology/evolution, not immediately feasible, …

Citizens were also asked if they had any other suggestions about the climate policy of the municipality & PCSW of Zoersel.

Reactions varying from tips already mentioned under the above themes to call for rapid action.

10.3 ANNEX 3: CONSUMPTION IN BUILDINGS IN 2012

Entity	Annual gas consumption (kWh)	Annual electricity consumption (kWh)	Heated surface in m^2
Halle library	70,383	8,960	269
Sint-Antonius library	131,691	11,501	650
Zonneputteke 1	376,992	107,443	3,172
Fire brigade arsenal	126,626	16,583	774
Municipal primary school Pierenbos (branches Lindedreef and Hallevelden)	272,219	232,237	3,527.5
Municipal primary school Beuk & Noot	312,490	281,263	6,451
Municipal primary school De Kiekeboes	469,813	43,944	2,586
Community infra-structure De Vleugel (+ Joeniz youth centre)	83,478	135,227	Unknown at present
Heemhuisje	electrical heating	28,133	187.50
Municipal building De Bijl	54,681	6,950	383
Training facility (Bethanieënlei 108A)	36,202	1,938	416
Youth centre De Non	17,454	8,422	113
Youth centre Zoezel	111,521	26,400	428.50
Lindepaviljoen	58,771	13,689	370.50
Old Halle Gymnasium	43,584	5,981	176,5
Schoolmaster's house	43,176	3,767	187
City hall	587,543	302,978	6,400
Cemeteries (Halle + Sint-Antonius)	electrical heating	28,668	327
Day centre for the elderly	35,495	5,352	100

Sint-Maarten hall	3,498 and ±1,500 l of heating oil	5,044	355
Halle-Hof park (part of the coach house + part of the castle)	482,843	550	2,510
Meter box roundabout (back street) Traffic lights (Bethanïenlei 9011) Fairground power cabinet festive lighting Zoersel village Nativity scene/Fairground power cabinet (Einhoven) Nativity scene (Einhoven) Festive lighting Square/Kiosk Halle-Dorp Bicycle parking facility 'De wissel' Festive lighting (Handelslei 9006) Festive lighting (Handelslei 9007) Fairground power cabinet (Handelslei 9047) Fairground power cabinet (Kerkhoflei 9007) Festive lighting (Kerkstraat 9002) Market power cabinet (Kerkstraat 9007) Market power cabinet (Kerkstraat 9039) Fairground power cabinet (Sint-Teunisplein) Stoppelveld pump sump (Stoppelveld 9000) Market power cabinet (Voorne 9009) Market power cabinet (Voorne 9031)	/	35,081	/

Market power cabinet (Voorne 9042) Market power cabinet (Voorne 9056) A23 road sign (Bethaniënlei 84) Bus shelters 8 info boards + bicycle parking facility Bi-flashes Ac8843 (Kapellei 109)			

10.4 ANNEX 4: JOB-RELATED TRAVEL AND FUEL CONSUMPTION

Airplane	Number of persons	Number of km
Bohicon (airport Charles de Gaulle - Cotonou)	6	56,916 km

Train	Number of persons
Antwerp Central – Brussels North (return)	28
Antwerp Central - Brugge (return)	4
Antwerp - Mechelen (return)	2
Antwerp - Ghent (return)	2
Brecht – Brussels North (return)	1
Brecht - Mechelen (return)	1
Brecht - Ghent	1
Lier - Brussels (return)	3
Lier - Ghent (return)	2
Nijlen - Antwerp (return)	1

Fuel	Diesel (l)	2T petrol (l) included in quantity of 4T petrol	4T petrol (l)
Annual consumption	63,883 litres	self-made in 2012	8,977 litres
List of machines or appliances	- 1 water pump - 1 milling machine - 1 vibratory roller - diesel fleet	- 1 auger - 20 hedge trimmers - 1 sprinkler - 2 water pumps - 2 sawing machines - 9 leaf blowers - 3 leaf collectors - 7 brush cutters - 1 verge mower - 8 sawing machines - 1 vibratory rammer - 2 cut-off wheels	- 1 moss remover - 2 leaf collectors - 1 leaf collector (trailer) - 5 lawn mowers - 1 generatorp - 2 vibrating machines - 1 paint sprayer - petrol fleet

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