

Energy policy plan 2020-2030: follow-up and adjustment - 2022

1. Framework and principles

UGent supports the EU ambition to be CO₂-neutral by 2050. This ambition was made concrete for the next 10 years in an [energy policy plan 2020-2030](#) (Executive Council dated 28/6/2019, RVB dated 9/10/2020, adaptation in RVB dated 3/9/21):

- **total CO₂ emissions from building heating and electricity supply are reduced by 2030, in line with the targets of the European Green Deal¹ ;**
- **energy use is reduced annually through more efficient use of space and energy by at least 2.5% per year;**
- **fossil-free construction and renovation starting now (2019).**

This requires investment, as well as measures to achieve behavioral and systemic change. This should include efforts in space and energy efficiency and investments in green energy facilities.

The trias energetica defines the strategy: first, reduce energy use through waste, then maximize the use of energy from renewable sources, and as a final step, use (fossil) energy sources as efficiently as possible to meet remaining energy needs.

This is also what the IPCC report clearly states² : "greening energy sources is not enough, demand must also decrease."

After all, renewable energy sources also have their limits, e.g., in terms of available space. Moreover, the use of renewable energy sources requires major adjustments to a building (low-temperature heating) and thus a strong reduction in energy demand. Finally, reference is made to the electrification of the energy system, where the electricity grid also has its limitations.

Every year, a follow-up report provides a status report, explains the actions carried out and assesses the results. This forms the basis for continuous improvement and adjustment and determines the input for next year's plans.

The energy policy plan is part of UGent's [climate plan](#) and was aligned with the master plan "UGent imagines 2050".

2. Evolution of energy use and costs from 1998 to 2022

Since 1998, the use of fuel and electricity has been closely tracked in energy accounting.

The 2020 data presented a very distorted picture due to the corona crisis, as did those for 2021 and the first half of 2022. In order to maintain as much activity as possible, ventilation rates were raised, ventilation was done over longer periods, and windows and doors were opened en masse. But windows were also very often left open at night and on weekends or windows were opened in adequately mechanically ventilated buildings. A lot of heat was lost that way. In addition, all buildings continued to be heated, including those where occupancy was very low due to a lot of telecommuting.

¹ If the EU ambition should tighten even further in the coming years (to better align it with the Paris Climate Agreement), then this UGent objective will also have to be adjusted.

² <https://www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/>

When prices also rose very sharply, new [energy-saving measures](#) were introduced in the 2^{de} half of 2022. The central heating systems were set to a lower temperature, aiming for an indoor temperature of 19°C. Heating went to night regime (reduced temperature) at 4 pm. During evening hours, reservation of classrooms was limited to well-insulated buildings and during vacation periods fewer buildings were heated. During this period, energy consumption was noticeably lower in many buildings (Figures 1 and 2). However, this is largely lost in annual usage due to the still very high usage in spring 2022.

Meanwhile, prices have fallen sharply again, but are still 2-3 times higher in mid-2023 than in early 2021.

The following was established for calendar year 2022:

Electricity use increased 59% since 1998 (Figure 3). **Relative to 2021, usage increased 1%; total cost increased 58%.** Relative to **2019 (more representative)**, usage increased 6.4%; cost increased 100%.

Adjusted fuel use fell 14% since 1998 (Figure 4). **Relative to 2021, adjusted use decreased 3%; relative to 2019 (more representative), it increased 7%.**

Actual fuel use fell 23% since 1998 (Figure 4). **Relative to 2021, actual usage fell 22%; total cost increased 70%. Relative to 2019 (more representative), actual consumption decreased 5%; total cost increased 214%.**

Fuel use per m² of building area decreased by 34% since 1998; by contrast, electricity use per m² increased by 21% (Figure 5). Fuel and electricity use per UGent employee (staff + student) decreased by 59% and 24%, respectively (Figure 6).

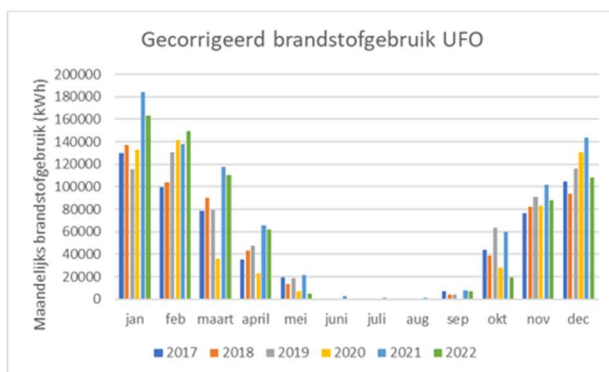


Fig. 1: Monthly adjusted fuel consumption UFO from 1998 to 2022

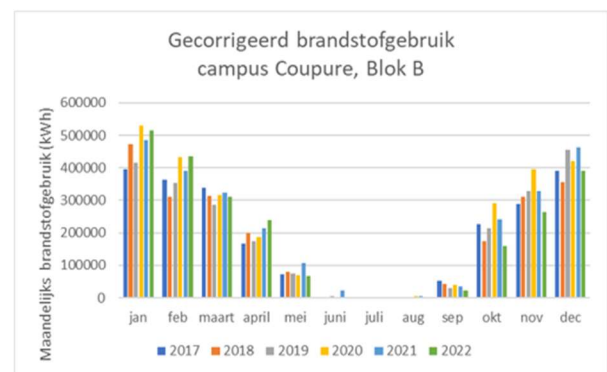


Fig. 2: Monthly adjusted fuel use Block B, Coupure campus from 1998 to 2022

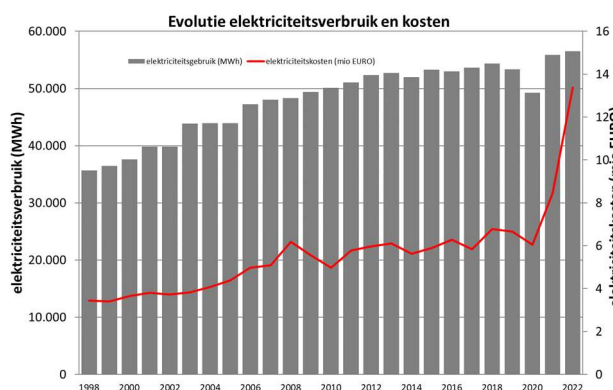


Fig. 3: Electricity consumption and costs from 1998 to 2022

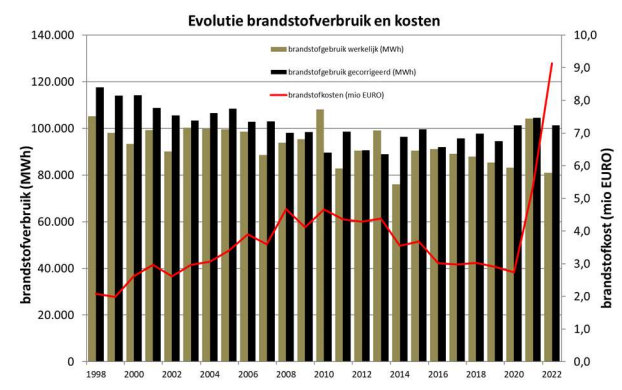


Fig. 4: Fuel consumption and costs from 1998 to 2022

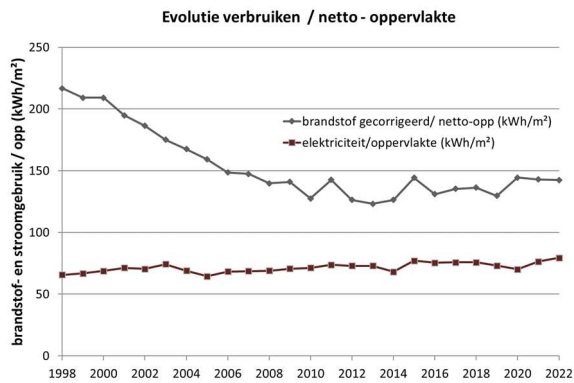


Fig. 5: Energy consumption per m² from 1998 to 2022

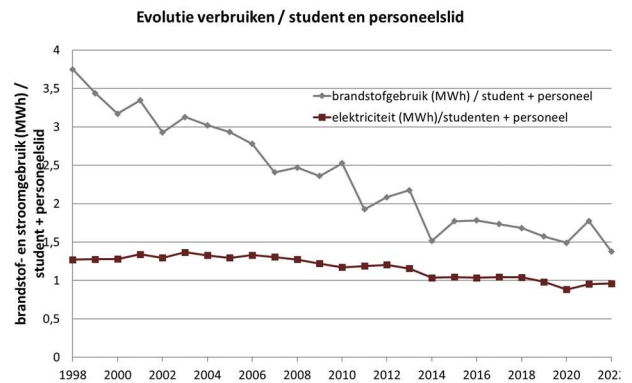


Fig. 6: Energy consumption per UGent employee from 1998 to 2022

As part of the climate plan, Climate Lab calculated the CO₂ footprint of UGent³ using the 'Bilan Carbone' method. The CO₂ reduction targets by 2030 compared to 1990 were recalculated to the reference year 1998, the beginning of the UGent⁴ energy accounting. This gives a correct picture of the efforts needed over the next 10 years:

- WB2C ("well below 2°C"), the CO₂ reduction targets endorsed by the European Commission: -48% CO₂ e by 2030 compared to 1998;
- WB1.5 ('well below 1.5°C'), the CO₂ reduction targets needed for a rich continent or knowledge institution to take the lead and move faster, in line with IPCC recommendations: -72% CO₂ e by 2030 compared to 1998.

Table 1 and Figure 7 show the evolution of CO₂ equivalent emissions from heating (actual fuel use) and electricity supply in the buildings, in addition to the set targets. The purchase of green electricity is not rewarded in the calculation method, as the energy mix of an energy supplier is taken into account. **CO₂ emissions decreased by 16% compared to 2021 and by 2.4% compared to 2019.**

	Emissions (tCO ₂ e)					Target 2030 (tCO ₂ e)	
	1998	2019	2020	2021	2022	WB2C	WB1.5C
Fossil burning	25.363	16.049	15.645	19.111	15.025		
Heat grid	872	2.566	2.464	3.233	2.561		
Electricity (purchased and produced)	8.541	10.081	9.266	10.997	10.416		
Total	34.777	28.696	27.375	33.341	28.002	18.100	9.900
Relative to previous year (%)			-4,6%	+21,8%	-16,0%		
Compared to 2019 (%)				+18,0%	-2,4%		

Table 1: CO₂ emissions from 1998 (base year) to 2022 and targets for 2030

³ Carbon footprint of Ghent University:

<https://www.ugent.be/nl/univgent/waarvoor-staat-ugent/duurzaamheidsbeleid/klimaatplan/co2footprint>

⁴ Partial science-based targets for energy:

<https://www.ugent.be/nl/univgent/missie/duurzaamheidsbeleid/klimaatplan/klimaatdoelen.pdf>

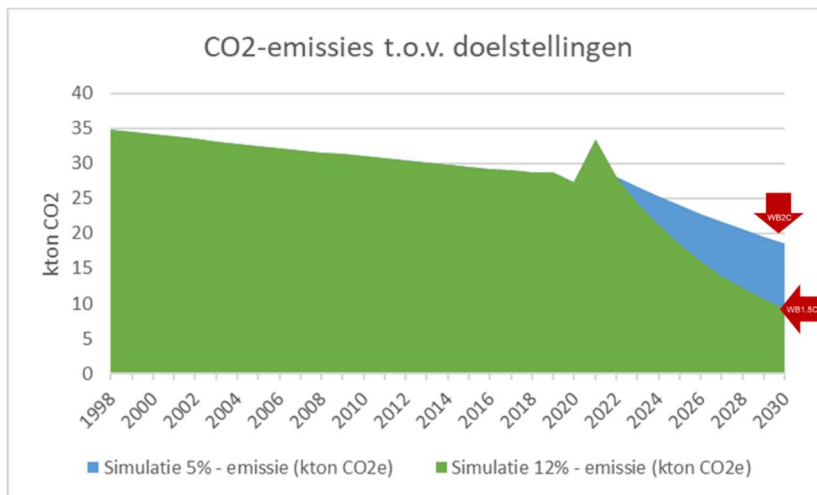


Fig. 7: Graphical representation of CO₂ emissions from 1998 (base year) to 2022 and targets for 2030

3. Evaluation action plan and adjustment

For energy transition, we are working on **2 parallel tracks**. On the one hand, the action plan contains **strategic thinking and policy choices** that set the lines.

On the other hand, it is about **operational actions** built around 3 pillars:

- Pillar 1: Optimization of space and energy efficiency
- Pillar 2: Renewable energy
- Pillar 3: Deploy UGent expertise and engagement, internal and external, to further elaborate and adjust the transition plan

Due to stricter regulations, extra investments and the ambitions of the UGent as part of the energy policy plan, new buildings and total renovations are gradually becoming more energy efficient and disconnected from fossil energy. **But the climate crisis calls for an acceleration. CO₂ emissions are not decreasing enough to be in line with the reduction targets (5% per year).**

The enormous challenge is now made very concrete by regulations as part of the [Flemish long-term renovation strategy for buildings](#). **For example, every large public non-residential unit or government building must have an energy performance certificate for non-residential buildings (EPC NR) as of 2024.** This certificate will make visible whether a building meets the long-term goal or at what "distance" from the long-term goal it is. **Starting in 2028, all public and government buildings must achieve a minimum EPC NR.** Specifically, this means that each building must produce a sufficient proportion of renewable energy relative to its total energy use. Consequently, ways are proposed to reduce the total energy consumption and to maximize renewable energy production.

For the elaboration and adjustment of the energy transition plan, UGent expertise and commitment is called upon, brought together in the Energy Policy Working Group. After all, it is **very important to monitor the objectives well. Depending on the results of the actions undertaken, adjustments will have to be made. The evaluation below will therefore also determine the action plan for the coming year.**

3.1 STRATEGIC THINKING AND POLICY CHOICES

3.1.1 Emission reduction targets and outlined transition pathway

With the adoption of the energy policy plan, a clear strategic policy choice was made. In the long term, fossil-free construction and renovation should lead to campuses where fossil-free heating can be provided by electrification of the heat demand. In addition, in the short term, operational savings opportunities in the existing buildings will be used to identify and combat energy waste, as well as to use energy more efficiently wherever possible.

Without very radical measures in the existing patrimony, it is clear that, given the slow pace of renovation and external factors, the reduction target to 2030 can no longer be achieved. However, it was aligned with the European Green Deal, on the assumption that commuting and air travel would be subject to a commensurate effort.

In order to safeguard the 2050 objective of CO₂ neutrality, and to be able to present a transparent and well-founded story to the outside world, there is an urgent need for a **phased, realistic step-by-step plan that maps out the construction and renovation projects in order to arrive at the final 'UGent Verbeeldt 2050' image, coupled with a CO₂ reduction plan that shows what reductions will be achieved where and when.** In addition, there is a need for an additional indicator that is less subject to external influences (such as the current CO₂ intensity of Belgian electricity production) but that does drive progress towards a fossil-free patrimony (such as, for example, x m² of fossil-free/year, or x m² of electrification/year, or x m² of heat pump ready/year).

<p>Action 1.</p>	<p>Structural vision 'UGent imagines 2050', with clear path to CO₂ neutrality</p> <p>Under the heading "UGent imagines 2050," a structural vision is being developed to rethink our campuses and buildings in terms of the sustainability challenges that await us in the coming decades and our core tasks and the interaction between them.</p> <p>With the vision in mind, a phased, realistic roadmap toward 2050 is being drawn up.</p>
<p>Evaluation</p>	<p>The RVB ratified the structural vision 'UGent verbeeldt 2050' (01/07/22) and the spatial-strategic framework that defines the contours within which UGent can develop in and with the city in the future. With this structural vision in mind, a roadmap for optimizing and rationalizing UGent's entire real estate portfolio is currently being developed. In this roadmap, the relocations needed to realize the final picture are linked to the necessary total renovations of our buildings (in terms of a life cycle of 40 years).</p>
<p>Adjustment and planning (proposal)</p>	<p>The roadmap that maps construction and renovation projects toward 2050 simultaneously estimates annual CO₂ reductions to achieve CO₂ neutrality in 2050.</p> <p>A new indicator will be developed that is less subject to external influences (such as the current CO₂ intensity of Belgian electricity production, hot and cold years, etc.) and that drives the transition towards a fossil-free patrimony (such as x m² of fossil-free patrimony/year, or x m² of electrification/year, or x m² of heat pump ready/year).</p> <p>This exercise can be done internally, by energy managers and energy experts. A project proposal for this will be submitted to the commission living labs as part of the climate plan.</p>

3.1.2 Strategy around optimizing economical use of space

There are many gains to be made by using space more efficiently. **Multiple buildings are underutilized, some research infrastructure could be shared more, and the many home-**

based jobs have created free office space. Managing in this requires a lot of reorganization, but concentrating and compacting buildings means less space to heat. It also means that the bill to *future-proof* the entire patrimony becomes less onerous.

During the approval of the Real Estate Policy Plan 2019-2028 (BoE 10/11/15), the ambition to achieve a compact university was put forward as a priority. The RVB asked to work out a practical concept for optimizing and reducing research space (offices, laboratories, meeting rooms), and this by bringing awareness to and empowering UGent'ers.

In line with this, some initial steps were taken, such as the introduction of a central auditorium management system, the core facilities, the adjustment of the area standard and actions listed under "action 8.

But further steps are not forthcoming. The far-reaching participatory approach to users encourages excessive demands for space and excessive customization. Moreover, it is impossible for designers to reasonably assess the arguments of researchers in favor of more infrastructure or against shared use with other research groups. Finally, reference is made to occupancy measurements, which, certainly since the Corona pandemic, show a much lower occupancy rate than the 80% currently used to estimate the surface area required for space requests.

There is a need for stronger steering or accountability mechanisms.

<p>Action 2.</p>	<p>Optimize strategy around economical use of space, through steering or optimization mechanisms</p> <p>Clear strategic policy choices are needed to achieve more economical use of space:</p> <ul style="list-style-type: none"> - Response stabilization of space use costs - Adjust area standard to actual occupancy
<p>Evaluation</p>	<p>In 2017, the consulting firm MSC examined concepts for space optimization of UGent's offices and labs. Based on this, the surface standard for labs was reduced from 21 m² to 18 m² per FTE (incl. growth) and the RVB decided to persuade faculties to save space by making their space use and associated costs transparent and negotiable.</p> <p>A pilot project ran at the WE and RE faculties under the slogan "thinking about space together. Only in the WE faculty did this produce results. It involved a total of 1,400 m² of useful space, spread over 50 classrooms in various buildings, which was decommissioned at the end of 2019. Based on the surface study, the faculty did have 5,000 m² too much.</p> <p>The evaluation report of this project showed that more is possible and more is needed. A steering committee on "empowerment of space use" proposed concrete policy measures. A draft proposed policy framework-which was discussed twice with deans and directors in 2021-did not land.</p> <p>The office concept of the "working differently" policy framework was revised by the RVB (10/12/2021), again with more room for individualized, personalized workplaces and with participation processes to involve users to the maximum extent in the design. With the Core Mission Memorandum 2.0, it was now decided that the 12m² standard will no longer be calculated based on an occupancy rate of 100% but on 80%. This calculation method will be applied to new (re)construction projects and when considering new space requests.</p> <p>Occupancy measurements in office environments have shown occupancy rates (much) lower than 80% since the corona crisis.</p>

Adjustment and planning (proposal)	<p>There should be a policy framework for more economical use of space, with steering or accountability mechanisms.</p> <p>The design process regarding participation must be optimized.</p>
------------------------------------	--

3.1.3 Provision for sustainable measures

The 'provision for sustainable measures' allows investments in profitable energy measures, which fall outside the design or renovation directive. At the Executive Council meeting of June 10, 2010, the Energy Policy Working Group proposed that subsidies obtained and proven savings as a result of energy investments be used to replenish this budget annually, so that investments can continue to be made in profitable measures. Guidelines were agreed to organize the expenditure and income of this provision.

In this way, the goals of this energy policy plan can be pursued permanently and with sufficient vigor. This was also recommended in the Deloitte audit on the realization of the investment program.

Action 3.	<p>Financing mechanism to accelerate investment in additional energy measures</p> <p>By returning annually obtained subsidies and proven savings to the "sustainable measures provision" according to predetermined guidelines, investments in additional energy measures can be accelerated.</p>
Evaluation	<p>The "provision for sustainable measures" took effect at the Executive Council on June 10, 2010, where it was proposed that subsidies obtained and proven savings as a result of energy investments be used to replenish this budget annually, so that accelerated investments can be made in additional energy measures.</p> <p>In order to avoid fluctuations in the budget, this budget item has been entered since 2020 for 500,000 EUR (average of the last 5 years), of which 73,000 EUR is made available through the operating budget as a salary reservation for the energy management employee. A correct settlement is made every 5 years. This was done a first time for the 2024 budget preparation. An average of approximately EUR 650,000 was transferred underpaid for 5 years.</p>
Adjustment and planning (proposal)	<p>It is proposed to modify the guidelines for organizing commission income and expenses:</p> <ul style="list-style-type: none"> - In the multi-year budget 2024-2028, it is proposed to draw EUR 1,300,000 annually. Periodic offsetting can be done. - As part of the core tasks note, EUR 500,000 is withheld annually (already decided). - The budget that is saved when a natural gas system is chosen instead of a heat pump for certain reasons is added to the provision for sustainable measures (see action 10).

3.2 OPERATIONAL ACTIONS

3.2.1 Pillar 1: Optimization of space and energy efficiency

With pillar 1, stronger efforts should be made (see also master plan 'UGent imagines 2050'):

- Density and infill the building heritage (concentration)
- Increasing energy efficiency

Action 4.	(Total) renovations to increase energy efficiency fossil-free heating Investment Plan 3 reserved 100,000,000 EUR for replacement investments. This budget should be sufficiently safeguarded for total renovations (initial proposal: 60,000,000 EUR). Depending on the results of the master plan 2050 'UGent imagines 2050', some buildings will be brought forward.
Evaluation	The budget for total renovation was allocated to the renovation of Aula, the reconstruction of Paddenhoek and the study of the renovation of S4/S4bis, as well as new construction projects study landscape on campus UZGent and S11 on campus Sterre. In addition, 7 mio EUR is needed annually for urgent repair work. The investment budget is largely insufficient to meet the objectives of the energy policy plan and the structural vision 'UGent verbeeldt 2050'. However, these objectives will be legally imposed within a few years. The point-by-point approach to renovations (e.g. just relighting or renovating the roof) has too little impact on the overall CO2 emissions of the building or UGent patrimony.
Adjustment and planning (proposal)	There should be further advocacy for more structural funding from the government.

Action 5.	Tightening up energy measures in the draft directive Technological change is rapid. Decisive technological developments often take place (e.g., smart grid, light as a service, circular materials) or new insights arise (e.g., energy efficiency). Such developments must be monitored in order to translate them -if applicable- into building policy.
Evaluation	A new version of the design guideline was approved, setting additional guidelines toward fossil-free construction and renovation. Aspects of GRO, the Flemish Government's sustainable building manual, were also integrated in several places. New European regulations around the banning of fluorescent lamps (fluorescent lamps), should lead to an accelerated switch to LED lamps. 12% of the UGent patrimony is now equipped with LED luminaires. There is a need for additional manpower to gather knowledge and experiment with new tools/techniques.
Adjustment and planning (proposal)	Innovative techniques are being experimented with, e.g., as a living lab. A plan was drawn up to accelerate the conversion to LED lighting. In addition to energy efficiency measures (heat pumps, smart control systems), a number of "energy efficiency" measures ("Heath the bodies, not the building") are being further investigated:

	<ul style="list-style-type: none"> - Dynamic method: in summer may be warmer than in winter (cooling less low, heating less high) by appropriate clothing <ul style="list-style-type: none"> ➤ 19°C in winter, 27°C in summer (deviations in specific cases are possible). - The deeper you go into a building, the higher the level of comfort becomes: in a foyer or in hallways, you are a short period of time, still have your coat on; in an office, it should be comfortably warm. <ul style="list-style-type: none"> ➤ 16°C in foyers (deviations in specific cases are possible, e.g. events) and corridors. - In large rooms with few people, personal heaters, a fan, ... <ul style="list-style-type: none"> ➤ Additional heaters and fans can be provided centrally. - By analogy with "exceedance hours," "underrun hours" are also introduced: a number of defined hours for which it is accepted that it becomes too hot vs. too cold in a room, allowing the cooling/heating system to be sized smaller. <ul style="list-style-type: none"> ➤ Heating systems are sized for -2°C (instead of -8°C now). <p>A master thesis is being issued in which Architecture students can work around energy efficiency in the design of T4 (offices and machine hall).</p>
--	---

Action 6.	<p>Building management system follow-up and aftercare</p> <p>In several new buildings and recent renovations, strong emphasis was placed on sustainability and efficient use of space and energy, using the latest technologies: iGent, resto Veterinary Medicine, Dunant 1, Technicum I and II, new Pharmacy building, expansion De Brug, ...</p> <p>But even after construction or renovation, it is important to properly monitor installations and continuously tune them to the (changing) usage profile and users of the building. This can save energy while creating a comfortable and healthy indoor climate.</p>
Evaluation	<p>An aftercare study was conducted in resto Veterinary Medicine, from which useful information emerged but where it was judged that DGFB would be better off conducting such follow-up on its own.</p> <p>The specifications now include that during the 2 years before final delivery, the contractor is responsible for optimization of the building management systems and aftercare. It is included in the specifications to organize 4 times a year consultation on this, together with DGFB. But it requires more manpower to proactively monitor and update building management systems and to free up sufficient time for aftercare in the newly delivered buildings. In practice, the focus remains on getting rid of teething problems. The contractors do not take a proactive approach.</p> <p>There is a shortage of manpower for audits and to monitor building management systems structurally and proactively.</p>
Adjustment and planning (proposal)	<p>Follow-up by in-house project managers DGFB can be more focused and shorter on the ball.</p>

Action 7.	Collaborative use of education and research infrastructure
------------------	---

	<p>The available specific expertise and research infrastructure at UGent will be inventoried as part of the UGent research information system GISMO. Knowledge about available expertise and infrastructure will lead to more voluntary sharing.</p> <p>In addition, Core facilities are being used. This is a cost-effective means of making infrastructure, materials and/or services available to researchers inside and outside the institution.</p> <p>Education and research infrastructure are shared more through a guiding framework.</p>
Evaluation	<p>The GISMO module, which will include the available infrastructure covered by certain criteria, will become operational in fall 2023 and be consultable via research explorer by the end of 2023.</p> <p>In April 2021, the policy framework and accompanying recognition procedure for Core facilities was approved with co-funding from BOF. Meanwhile, 17 Core facilities have been officially recognized.</p> <p>In the new building on campus Pharmacy, a practical room was expanded so that it can serve for all practicals 'analytical chemistry' for large groups (undergraduate courses). Thus, the room can be used by the FW and GE faculties, as well as by other faculties offering practicals 'analytical chemistry'. A large microscopy classroom can also be shared between GE faculty and FW faculty. An analysis of occupancy happened in 2022. According to the reservation system, only 4 of the 13 classrooms were slightly over 50% occupied; 2 rooms were not used.</p> <p>A preliminary study is underway to establish multi-purpose lab space for "organic and inorganic chemistry," a "Central Chemical Teaching Lab," which can be shared and efficiently used by undergraduate programs that host these labs. This program will be housed in the renovation of S4/S4bis. The works are scheduled for 2028-2029.</p> <p>S10 currently houses about 290 departmental colo-servers. Of these, 190 are older than 10 years. These use a disproportionate amount of energy relative to the amount of computing power they represent. Moreover, many of these old departmental servers are seemingly "idle" (unused) on, which still results in energy consumption of 60% compared to maximum load. Years of sensitization caused little shift. Meanwhile, the ICT committee approved a more binding framework, working with the department on a phase-out plan with a clear deadline by which the server must be taken out of service.</p> <p>The Bioresource center Ghent is the central contact point for biobanks at U(Z)Gent, with a coordinating function and a central management system (with cost ventilation). There is still a lot of unused space, as this is little known and departments are free to place -80°C freezers. However, the annual consumption of one -80°C freezer is 6000 to 9000 kWh (without additional cooling) and a lot of biological material remains untouched (and in some cases superfluous) in the freezer for many years, which may not be compliant with the stricter Biobank legislation. There are an estimated 130 -80°C freezers at UGent, 9 -150°C freezers and 1 -180°C freezer at UGent. Recurring information sessions and communication have not yet yielded results.</p> <p>Block locations were evaluated and grouped more in the better buildings, such as Technicum I and II. Class activities and other activities after working hours or during vacation periods will also be allowed in a more limited number of buildings.</p>

Adjustment and planning (proposal)	<p>In the case of new requests for infrastructure that is specific, consumes a lot of energy, requires a lot of management, is subject to strict legislation, etc., it may be asked to check whether this infrastructure is available elsewhere and to argue why shared use is not possible and a new purchase and installation are necessary, to manage the infrastructure at the level of the faculty or the UGent instead of at the level of a department, to work out a management system that allows shared use (cf. core facilities), etc.</p> <p>The residual capacity in the new Pharmacy building can be included in new space requests for similar activities.</p>
------------------------------------	--

Action 8.	<p>Additional measures under rational energy use to reduce high energy costs</p> <p>Due to the sharp energy price increase in 2022, additional measures are needed to limit the increased cost. The measures taken will be subsequently evaluated and, if necessary, retained to reduce energy use even after the price crisis.</p>
Evaluation	<p>New energy measures were introduced. This avoided an additional cost of about EUR 1.5 million.</p> <p>Energy prices have since fallen, but are still 2-3 times higher in mid-2023 than in early 2021.</p> <p>Increase the number of buildings that can go to night reduction (earlier) during vacation periods or after working hours. Sound measure is useful in terms of energy savings, but also facilitates management in terms of access control, cleaning, security, etc.</p> <p>Since schemes are manually adjusted and customization is required, specific settings require a lot of extra effort.</p>
Adjustment and planning (proposal)	<p>There is an agreement to maintain the following measures:</p> <ul style="list-style-type: none"> - additional commitment to managing temperature and ventilation; - aim for lower comfort temperature (19°C); - further reduce the number of rooms that are usable off-duty through more efficient use of space in other (well-insulated) buildings; - expand the number of rooms that go to night reduction during vacation periods when many employees take vacations; - Further commit to efficiently air-conditioned buildings/spaces as a block location. <p>It is important here to keep customization to a minimum.</p>

3.2.2 Pillar 2: Renewable energy

The electricity purchased consists of purchased green electricity (84%), electricity generated by three wind turbines on campus Proefhoeve (12%), electricity produced by cogeneration plants on campus Coupure and campus Ledeganck (3%) and solar panels (1.6%).

The buildings are heated mainly with natural gas (78.4%) and heat from the Luminus heat network (15.3). In addition, heat is used from 2 cogeneration installations (3.5%), heat from the UZGent boiler room (1.5%) and fuel oil (0.3%). **Heating via heat pumps (1%) is still minimal. However, this is the change that will have to be made in the coming years.**

In total, UGent derives about half of its energy demand from green energy, mainly through the purchase of green electricity.

However, the new energy label (EPC NR) as part of the [Flemish long-term renovation strategy for buildings](#) is based on the measured amount of **locally generated renewable energy** in relation to total energy consumption. From 2028, all public and government buildings must have a minimum share, which will have to increase systematically to 100% in 2050.

Thus, much stronger efforts must be made:

- Green heat
- Green own electricity production

Action 9.	<p>Concrete translation of 'UGent imagines 2050' into campus plans</p> <p>The structural vision is translated into campus plans, in which transition "layers" in terms of space, energy, mobility, water, biodiversity, etc. are drawn up and coordinated. This provides clear guidance for study bureaus in infrastructure projects, but also ensures a coherent story for licensing authorities and campus users.</p>
Evaluation	<p>An initial campus plan was approved for campus Sterre (RVB 28/03/23) for the next 15 years.</p> <p>For campus Ardoyen, the study bureau 'Transition Stories' organized consultations commissioned by the City of Ghent to assess whether a joint approach is possible and useful for sustainable heating and cooling. A 'Letter of Intent' was drawn up and signed by BASF, Sanofi/Ablynx, Centexbel, Fujirebio and VIB; the evaluation for the continuation of the process has yet to take place. For the time being, UGent cannot actively follow up or pull this project due to lack of manpower. However, Master of Architecture students will try to estimate future consumption in the next academic year.</p> <p>Exploratory energy transition studies (very rough) were conducted for campuses Proeftuin, Kortrijk, campus Melle and Ostend Science Park.</p> <p>In the absence of a clear campus plan with an energy transition 'layer' for campus Merelbeke and campus UFO, it is/was unclear which energy systems should/should be chosen for renovation. This led to delays and made the choice fall on classic natural gas systems with a relatively cheap investment cost.</p> <p>It requires more manpower to draw up campus plans (gathering information, coordinating, informing parties, describing studies, tendering, etc.), even if external study firms were to be hired for this purpose.</p>
Adjustment and planning (proposal)	<p>Work is being done on:</p> <ul style="list-style-type: none"> - A campus plan for campus Ardoyen, in the context of planned developments on campus; - A campus plan for campus Merelbeke, as part of the preparation of the SIP; - An energy transition plan for campus UFO, in the context of planned developments on campus. <p>Study firms are appointed to prepare these energy transition studies. Subsidies may also be sought.</p>

Action 10.	Aligning ongoing projects with energy transition studies
-------------------	---

	<p>In all new construction projects and total renovations, renewable energy sources are resolutely chosen instead of fossil fuels, or are prepared to do so.</p> <p>In doing so, planned projects should be aligned with energy transition plans.</p>
Evaluation	<p>Fossil-free construction and renovation, meanwhile, was included in the design guideline.</p> <p>The plans of new construction projects and some major renovation projects were adjusted accordingly:</p> <ul style="list-style-type: none"> - Short Lake - Aula: heat pumps - Paddenhoek: heat pumps - New construction block B UZ: heat pumps - S11: heat pumps - Rector 1: heat pump as base heating <p>For some specific cases (renovation Chevron on campus Ardoyen, D4 and D5 on campus Veterinary Medicine) it was investigated whether heat pumps could be chosen without a total renovation. It was concluded that this was too expensive and technically uncertain an option. Some minimal interventions are necessary, such as insulation of the building envelope. Natural gas was again chosen for the 3 cases.</p>
Adjustment and planning (proposal)	<p>In the investment plan, reserves should be built up for those energy infrastructures that are outside the construction project itself, e.g. for the construction of a heat network.</p> <p>Frequently, the total renovation (and thus façade peel renovation) of a building is not yet planned, but investments must be made in the heating system. In this case, it should be thoroughly considered to opt for heat pumps as preferential and complementary heat production of existing boilers. On the one hand, this is necessary to accelerate the conversion to fossil-free, but may also contribute to cost reduction in the long run, if fuel prices remain high and there may be a tax shift from electricity to gas. However, there may be reasons to abandon this for the time being. These should be very clearly argued and fit into the campus energy transition plan and the CO₂ reduction plan of the UGent patrimony (see action 1). If a natural gas installation is chosen instead of a heat pump because of the cost price, the budget saved should be added to the provision for sustainable measures, in order to spend it on a 'more justified' energy project.</p>

Action 11.	<p>Accelerating deployment of rooftops for electricity generation</p> <p>A cooperation is set up with the Flemish Energy Company (VEB), established by the Flemish Government to assist and relieve governments in the installation of PV installations. The VEB is an Externally Autonomous Agency and can thus act as an agency within the Public Procurement Act as a procurement center. The government entities / public services are exempted from organizing an award procedure themselves, which saves a lot of time.</p>
Evaluation	<p>UGent chose to use an internal loan to temporarily provide funds for the installation of PV systems. The repayment can be done with the income from operations.</p> <p>In 2022, PV installations placed on S1 and S5 of campus Sterre (99.9 kWp and 46.25 kWp, respectively) and on Block A of campus Coupure (207 kWp) went into operation. Installation of a PV system on the roofs of campus Veterinary Medicine (1,400 kWp) started. The works were delayed due to delivery</p>

	<p>problems. A contractor was also appointed for a PV installation on campus Pharmacy (105 kWp).</p> <p>The preparation of a PV installation on the UGent-VIB research building was placed on hold, as additional roof insulation must first be provided.</p> <p>It requires more manpower to accelerate the rollout of PV installations and explore energy sharing opportunities.</p>
Adjustment and planning (proposal)	<p>Installation of PV systems on high-rise Pharmacy and roofs Veterinary Medicine is being finalized.</p> <p>New opportunities for PV installations on UGent-VIB research building, Lo²cus, B3 and K3 of campus UZGent and Blandijn are being prepared.</p> <p>In addition, the possibilities for (the expansion of) PV installations on the roofs of labo Magnel, HILO, Homes Kantienberg and Dunant 1 are being investigated. After all, it is now possible to share surplus energy produced, as is the case with the PV installations of GUSB and Veg-i-Tec, with other UGent buildings.</p>

Action 12.	<p>Placement of wind turbines</p> <p>A right of superficies was granted to Ecopower and Energent for the construction and operation of a wind turbine on campus Proeftuinstraat through an energy cooperative. This allows participation by local residents, staff and students.</p> <p>The ground lease for the 3 wind turbines on campus Melle expires in 2030. These wind turbines can be replaced by larger and more profitable ones.</p>
Evaluation	<p>The preparation of the environmental application for the construction of a wind turbine on campus Proeftuinstraat was put on hold. Forest would have to be cut down for the construction, which is no longer negotiable even though the implantation is foreseen in a zone colored as industrial land according to the SIP.</p> <p>Initial discussions were initiated for the replacement of the 3 wind turbines in Melle. This will require a new permit procedure (higher turbines).</p>
Adjustment and planning (proposal)	<p>Discussions continue regarding the replacement of the 3 wind turbines on campus Melle.</p>

3.2.3 Pillar 3: Deploy commitment and expertise, internal and external, to further develop and adjust the transition plan

The transition to a sustainable energy system based on renewable energy sources promises to be quite a challenge, and one that will not tolerate any more delays. At the same time, there are still many uncertainties, familiar systems and practices will have to change and complex, risky and expensive interventions will have to be budgeted for in an already very tight budget. So there is a need for strong support to make energy transition a top priority.

Administrators must be convinced of the necessity. Staff and students must be involved in the UGent energy policy and be convinced of the importance of energy efficiency, know how BEN

buildings should be used, understand why infrastructure must be shared and needs must be correctly assessed, be stimulated to make commitments beyond their comfort zone, ...

In addition to providing sufficient manpower, who can monitor energy management, the following measures are suggested:

Action 13.	<p>Joining forces and strengthening support</p> <ul style="list-style-type: none"> ○ Energy Policy Working Group: a network of policy staff (DGFB, DICT, Environment), energy experts and interested parties. They shape the energy policy plan, follow up on the action plan, provide advice, develop policy instruments and initiate student research and experiments. ○ Transitie UGent: an open renewal network of committed students and staff, academics and policy makers, who meet about 3 times a year and consider different sustainability themes. They act as a sounding board group and help create support for further elaboration and integration into energy policy. ○ Faculty environmental and sustainability committees: a group of staff members who follow up on environmental and sustainability issues related to their faculty. They act as a focus group and help build support among building users. ○ Campaigns around energy awareness in the winter period, efficient use of space, global climate goals, following the energy crisis, ... ○ Broad communication of objectives and policy choices and results achieved. ○ General point of contact for comments, suggestions, initiatives, ... around energy policy (energie@ugent.be, milieu@ugent.be, duurzaam@ugent.be) .
Evaluation	<p>The energy policy plan, with its objectives and policy choices, is discussed in the Sustainability Committee, in faculty environmental and sustainability committees, in Transition UGent, in general UGent communications and some specific media (Green Office newsletter, etc.), ...</p> <p>The expanded energy policy working group remains active for further development and follow-up of the energy policy plan, policy preparatory work, setting up (student) research and living labs (see below).</p> <p>These initiatives are now being pulled by the environmental coordinator.</p>
Adjustment and planning (proposal)	<p>These efforts will continue.</p>

In addition, energy transition still requires a great deal of technical, process and social innovation. There are still a lot of knowledge gaps and challenges for knowledge institutions to achieve a sustainable and energy-neutral building heritage. As a university, we can act as a living lab in research projects.

The following collaborations have already been/are being established:

<p>Proposal for master's thesis by Architecture students regarding energy efficiency in design T4:</p> <ul style="list-style-type: none"> - Literature review around sufficiency, apply comfort models for different functions; - Thermal comfort in terms of sufficiency: temperature measurements (in winter) in old/new rooms with certain functions (e.g. lab, office...), as well as user survey among users in terms of comfort; - indoor air quality i.k.v. sufficiency, using CO₂ sensors;
--

- Search for HVAC solutions, usage strategies, comfort requirements that support sufficiency in existing buildings; prepare guidelines/attention points for new buildings
<i>Prof. A. Janssens, E. Himpe, DGFB, energy policy working group</i>
In the Engineer-Architect course, work was done on a special issue with the topic "Roadmap toward an energy efficient FEA campus Ardoyen. The results can provide insights for the energy transition plan. Following this educational project, a master thesis topic was issued by the Department of Architecture and Urban Planning entitled 'Energy concepts for a low-carbon university campus Ardoyen'.
<i>Prof. A. Janssens, E. Himpe, DGFB, energy policy working group</i>
Developing a Local Energy Action Plan for Ekkergerem, with funds from the neighborhood budget of the City of Ghent: "An approach is needed that not only focuses on the transformation of individual houses, but also on the level of building ensembles, building blocks and actual city fragments. How can we evolve from an approach that targets individual citizens, plots and buildings to a cross-plot approach and more complex commissioning? To this end, there are currently insufficient instruments and practical experience." (Flemish Environmental Planning Agency, on climate mitigation and adaptation) The district budget is used to hire social and technical experts for the following tasks:
<ul style="list-style-type: none"> - A concrete and supported plan for the neighborhood's energy transition - a program of projects, plotted on the neighborhood map - the definition of bite-sized and feasible chunks in that plan - an overview of quick-wins in the district - a schedule for implementing all of this, with short- and long-term - a concrete commitment from actors in the form of commitment statements - An overview of partnering and grant opportunities.
<i>Ekkergerem neighborhood committee, fac. BW, E. Himpe, DGFB, energy policy working group</i>
Master's thesis students in Architecture: Sustainable renovation scenarios for flexible building use on Sterre campus
<i>Prof. A. Janssens, E. Himpe, R. De Preter, M. Vincke, DGFB, energy policy working group</i>
Master's thesis students in Geology: Is a KWO system feasible on Sterre campus?
<i>Prof. T. Hermans, L. Tas, S. Simpson</i>
Presentation: Energy crisis and role of UGent
<i>T. Van de Graaf, J. Laveyne, S. Hamels, Transition UGent</i>
Master's thesis ' Modeling and performance analysis of a hybrid heat pump system in the S2 Ghent University Building '
<i>A. Scheirlinckx, Prof. M. De Paepe, DGFB</i>
Master's thesis 'iGent tower as a living lab for sustainable building solutions'
<i>T. Vlaeminck, Prof. M. De Paepe, DGFB</i>

4. Summary

STRATEGIC THINKING AND POLICY CHOICES			
Action 1	Structural vision 'UGent imagines 2050', with clear path to CO neutrality ₂	Development and follow-up of a timeline, linked to a step-by-step plan of construction and renovation projects as part of 'UGent verbeeldt 2050', making visible the annual CO ₂ reduction to reach CO ₂ neutrality in 2050.	Policy Choice Human resources (team of 4 FTE)
		Work out an additional indicator that is less subject to external influences and drives progress toward a fossil-free patrimony (such as, e.g., x sq. m. fossil-free/year, or x sq. m. electrification/year, or x sq. m. heat pump ready/year).	
Action 2	Optimize strategy around economical use of space, through steering or optimization mechanisms	Policy framework for more economical use of space, with steering or accountability mechanisms.	Policy Choice
		Re-evaluate participatory approach in construction and renovation projects.	
		Evaluate area standard by occupancy measurements, and adjust if possible.	
Action 3	Provision sustainable measures	Adjust guidelines to organize commission income and expenses: <ul style="list-style-type: none"> - In budget 2024-2028, EUR 1,300,000 will be included annually. A settlement will occur in budget 2029. - As part of the core tasks note, EUR 500,000 is withheld annually. - The budget saved when a natural gas system rather than a heat pump is chosen for certain reasons is added to the provision for sustainable measures. 	Policy Choice
OPERATIONAL MEASURES			
Pillar 1: Optimization of space and energy efficiency			
Action 4	(Total) renovations to increase energy efficiency and achieve fossil-free heating	Further advocate for more structural funding from the government.	
Action 5	Tightening up energy measures in the draft directive	Experiment with innovative techniques, e.g., as a living lab.	Human resources (team of 3 FTE)
		Experimenting with "energy efficiency" concepts.	

		Accelerated rollout of LED lighting.	
Action 6	Building management system follow-up and aftercare	Closer follow-up of new projects before delivery by DGFB's own project managers.	Manpower (team of 3 FTE for limited implementation (as now), if we want to focus more strongly on this then additional manpower is needed)
		Perform audits, proactive building management.	
Action 7	Collaborative use of research and education infrastructure	For new requests for infrastructure that is specific, consumes a lot of energy, requires a lot of management, is subject to strict legislation, ... impose more binding conditions that allow sharing to happen more often.	Policy Choice
Action 8	Additional measures under rational energy use to reduce high energy costs	<p>Adhere to the following measures (and limit customization):</p> <ul style="list-style-type: none"> - additional commitment to managing temperature and ventilation; - aim for lower comfort temperature (19°C); - further reduce the number of rooms that are usable off-duty through more efficient use of space in other (well-insulated) buildings; - expand the number of rooms that go to night reduction during vacation periods when many employees take vacations; - Further commit to efficiently air-conditioned buildings/spaces as a block location. 	Manpower (team of 3 FTE for limited implementation (as now), if we want to focus more strongly on this then additional manpower is needed)
Pillar 2: Renewable energy			
Action 9	Concrete translation of 'UGent imagines 2050' into campus plans	Preparation of a campus plan for campus Ardoyen, as part of planned developments on campus.	Human resources (team of 3 FTE)
		Drafting of a campus plan for campus Merelbeke, as part of the drafting of the RUP.	
		Preparation of an energy transition plan for campus UFO, in the context of planned developments on campus.	
		Searched for grant opportunities and prepared file.	

Action 10	Aligning ongoing projects with energy transition studies	Align ongoing projects with energy transition studies.	Human resources (team of 3 FTE)
		In case of new natural gas choice: add budget saved to commission sustainable measures, to spend on a "more justified" energy project.	Policy Choice
Action 11	Accelerating deployment of rooftops for electricity generation	Continue current pace of PV installations.	Human resources (team of 3 FTE)
		Accelerate rollout of PV installations.	Human resources (team of 4 FTE)
Action 12	Placement of wind turbines	Continue consultations on wind turbines campus Melle.	Human resources (team of 3 FTE)
Pillar 3: Deploy UGent expertise and engagement, internal and external, to further elaborate and adjust the transition plan			
Action 13	Joining forces and strengthening support	Continue efforts: mandate and tasks of sustainability and environmental coordinator, expert groups, Transition UGent, ...	Human resources (3 FTE team) + support from sustainability/environment.

5. Funding

Sustainable building and the transition to a fossil-free building stock must become an **inclusive story**. The associated costs must be integrated into an investment plan, a building project, etc. However, investment plan 3 does not yet go that far. **The measures to be taken to build and renovate according to the BEN-principles are anchored, but extra budget for e.g. a connection to a heat network, a BEO field, ... are not yet foreseen.**

Some tools used and new suggestions are listed below:

Provision sustainable measures:

The investment plan includes the "provision for sustainable measures. This provision is supplemented annually by proven savings (see Appendix 2). These amounted to **EUR 3,034,570** for 2023. In the next budget, it will be proposed to transfer **EUR 1,300,000** from Division I to Division II.

Grants:

- **Call green heat, residual heat and energy-efficient district heating:** Those who invest in new projects of green heat, residual heat, heat networks or biomethane production can apply for support (30% of the investment) during the annual call for projects. In the further development of the heat networks on campus Sterre, campus Kortrijk and campus UFO, these subsidy opportunities will be thoroughly reviewed.
- **Certificate system:** Older installations are entitled to green electricity and/or CHP certificates. PV plants and CHP received **33,182 and 50,065 EUR respectively** in 2022.

Internal loan:

For the cooperation with VEB for the accelerated installation of PV systems, it is proposed to set up an internal loan that temporarily provides the funds. The repayment can be done with the income from operations. Meanwhile, 1,021,300 EUR (excl VAT) was made available for the PV installation on campus Veterinary Medicine.

UGent sustainable investment fund and third-party financing:

Some investments will pay for themselves in the relatively short term and can be considered a sustainable investment. UGent has a sustainable investment policy, which means that it invests 90% of its liquid assets only in sustainable fossil-free investment funds. In addition, 10% of the total investable capital is taken into own management and invested in specific funds in which UGent wishes to participate because they are closely linked to UGent activities or in sustainable projects.

Third-party financing can also be chosen, where an outside party, borrows or raises money through a cooperative from staff, students and local residents and uses it to finance energy projects. However, this is only applicable for projects with favorable returns.

For the construction and operation of a wind turbine on campus Proeftuin, a long lease was concluded with the energy cooperative Energent and Ecopower. A participation of the UGent through this sustainable investment fund will be considered again later, when the environmental permit is obtained.

Program adaptation:

In some cases, the and-and story comes under pressure. For a long time, we could build and renovate more sustainably without questioning the program. We only had to add extra resources to the project budget for extra insulation, solar panels, heat pumps, and so on.

This is not always the case, making more radical choices necessary. It is suggested that the consideration be made each time with an open mind and that the common objective in terms of CO₂ emissions always be kept in mind.

Questioning increasingly stringent regulations:

The legislation with regard to fire safety, AREI, Codex Welzijn, Legionella, CO₂ concentration in the interior, etc. is becoming increasingly stringent. Questions are asked whether the impact on energy consumption, material consumption and required budget is in proportion to the added value of this measure with regard to safety. The climate risk is not taken into account at all. Now, however, everything must urgently be done to limit this climate risk. A signal can be given here from UGent, VLIR and other institutions.

Release budgets in investment plans section II and III:

However, it is certain that the above financing channels will not suffice. Especially for large investments, i.e. total renovations, construction of BEO field, connection to heat source in the area, ... larger budgets will be needed.

Finding it will be very difficult, not least because of the structural budget deficit that must be eliminated in the coming years, but also because of the tightness in investment plan 3. This means that no additional money can be counted on.

Shifts in budgets will have to happen. When done with the agreed targets in mind, these can help support the sustainable system changes. Moreover, the search for additional resources creates the opportunity to work out steering policies without prohibition or "stick," with the option with the highest associated CO₂ production and environmental footprint carrying an increased contribution to encourage the most climate and environmentally friendly options.

Authors (energy policy working group): Eline Himpe, Stijn Van de Putte and Arnold Janssens from Research Group Building Physics (fac. EA), Michel De Paepe, Joannes Laveyne and Robbert Claeys from the Department of Electromechanics, Systems and Metal Engineering, Lina Avet, Benjamin Van de Velde, Kathelijn Cox, Michaël Seeuws, Christophe Tuypens, Ann Hendricx, Tristan Verleyen and Ellen Lauwereys from DGFB, Dieter Roefs from DICT, Riet Van de Velde from Department of Environment, Ruben Vanholme from VIB-UGent

With input from: DGFB, DICT, Sustainability Policy Committee