Energy policy plan 2021-2024

Radboud University

2 March 2021

Introduction

This document describes the objectives of Radboud University's energy conservation efforts and the approaches the university plans to take. It also outlines projects that will be carried out over the next few years as part of this, and offers a perspective up to 2050. The document is the foundation for our adherence to the National Climate Agreement through the roadmap for universities.

It also includes objectives related to drinking water and the sustainable use of materials, as these fall within our energy policy coordination.

Intensified energy policy leads to savings

Radboud University's energy policy is constantly being intensified. Since 2005, the university has participated in the government's multi-annual agreement (MJA) on energy savings, applicable to all universities. The objective – a 2% *efficiency improvement* per year – has been comfortably achieved by Radboud University. Figure 1 shows the development of our energy consumption and CO_2 emissions.

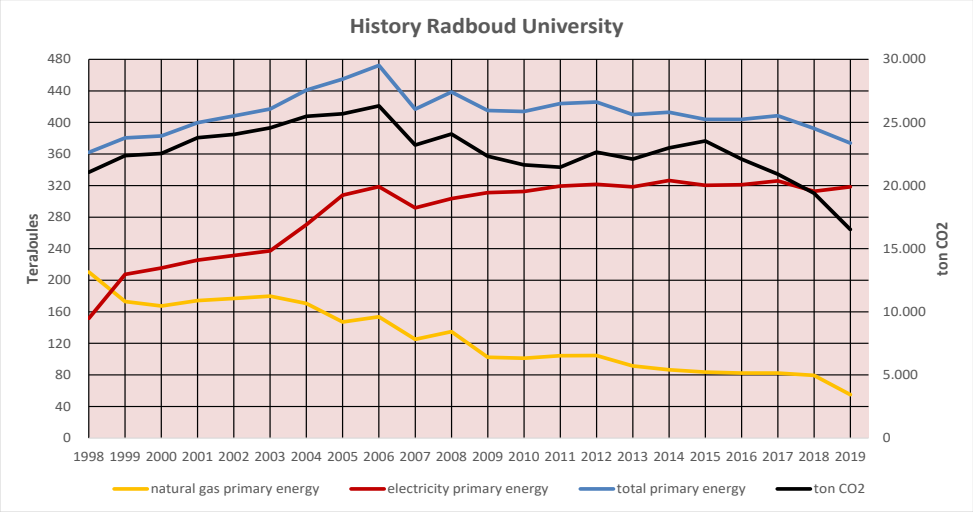

Figure 1 Primary gas and electricity consumption and CO_2 emissions

Since 2012 the objective has been more ambitious: a 2% *absolute energy saving* per year. Absolute savings relate to gas and electricity consumption on campus, defined as the total energy saving minus the additional consumption resulting from, for example, the acquisition and use of more equipment and longer opening hours for buildings. It's an ambitious objective that was initially difficult to manage, but in the past few years this too has been achieved.

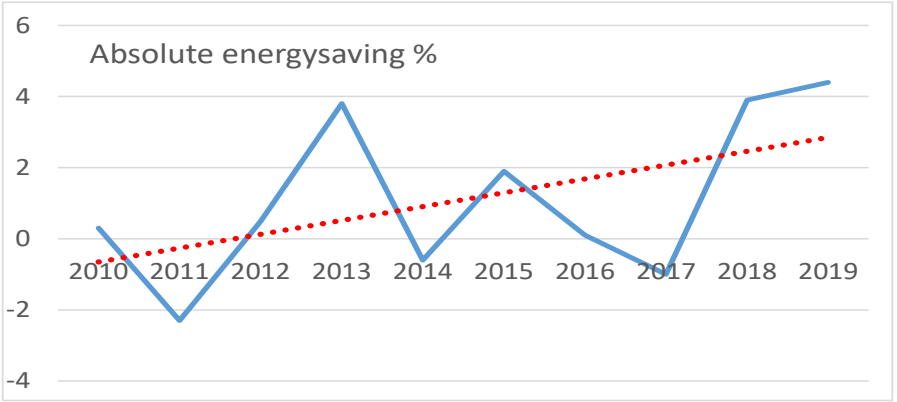

Figure 2 Radboud University absolute energy savings

The rising line (figure 2) is the outcome of intensified energy measures, the demolition/construction/renovation of buildings, and the use of the Aquifer Thermal Energy Storage (= Seasonal Storage = WKO) system. In recent years, older buildings have also been connected to that system through the Hybrid Energy Grid (HEG+). This is enabling us to phase out the use of natural gas. On the other hand, it does require additional electricity for the heat pumps.

Such additional consumption makes it harder to achieve savings in electricity. However, our electricity consumption has been made more sustainable through the purchase of *additional green power*.

Ambition

The Energy Policy Plan (EBP) is embedded in a broader policy context. Radboud University is part of the National Climate Coalition 2014 and is a signatory of the Dutch

universities' Climate Letter. Radboud University is aiming to be a climate-neutral organisation by 2050 and has enhanced its climate policy:

"We strive for a green and healthy campus with a positive impact on climate and circularity."

These sustainability objectives are part of the *Strategic Plan* and of Radboud University's proposed Sustainability Policy 2020-2025. The *Campus Strategy* takes objectives from the *Strategic Plan* and translates them into priorities and principles for the development of the campus over the next 10 years. The *Campus Plan* turns these priorities and principles into projects and programmes. *"The bottom line is that Radboud University is aiming to be climate neutral, contribute to circularity, create a healthy environment and ensure equal opportunities. At present, the campus still uses a lot of natural gas and electricity. To reduce our impact on climate change, we need to adopt more ambitious measures."*

The Energy Policy Plan and the Energy Programme 2021-2024 have been designed to reflect the above. Where climate neutrality is relevant to an entire business operation (including goods and transport) the energy policy focuses on gas and electricity consumption on campus. The aim is to be energy neutral by 2050 and that means all of our energy requirements will be generated sustainably on the campus.

The Executive Board has said it aims to be energy neutral as early as 2040. In the current policy period we will therefore be looking into how this might be achieved.

Energy Programme 2021-2024

The Energy Programme 2021-2024 specifies how we will achieve our energy reduction ambitions. Over the next four years, this will be done through three pathways.

Reducing gas and making electricity more sustainable

The Hybrid Energy Grid (HEG+) has achieved a large reduction in gas consumption. The sustainable heating and cooling of buildings through the Aquifer Thermal Energy Storage system has led to a saving of 660,000 m3. The next step is an expansion to HEG++, which will connect Mercator 1 and 2, the greenhouse complex, Forum and Berchmanianum to the Hybrid Energy Grid. In September 2020, €4.9M was allocated to this. This will enable a further saving of 435,000 m^3 of gas by 2024.

The demolition and renovation of buildings will enable Radboud University to reduce its gas consumption by 75% compared to 2017.

Radboud University is making great strides towards "phasing out gas". A multi-annual agreement with an electricity supplier and the purchase of *additional green power* are also helping to make our use of electricity more sustainable. Electricity savings, however, are more challenging to achieve (e.g. because of the additional use of heat pumps, longer opening hours and some partially vacant buildings). Radboud University will need to adopt additional measures to reduce its electricity consumption.

Package of measures

Extensive research into opportunities for energy savings has led to an additional package of measures related to LED lighting (e.g. in the Library, the Gymnasion Building, and the Erasmus and Huygens Buildings), pumps, ventilation, insulation, low-temperature heating and solar panels (e.g. on the HFML, the Erasmus Building and the Sports Centre). These measures will cost €18.1M over the next four years. The investment will pay for itself within the technical lifecycle when the cost of replacing standard lighting is taken into account. Insulation measures will not pay entirely for themselves but have been adopted because new legal insulation standards will come into force from 2023.

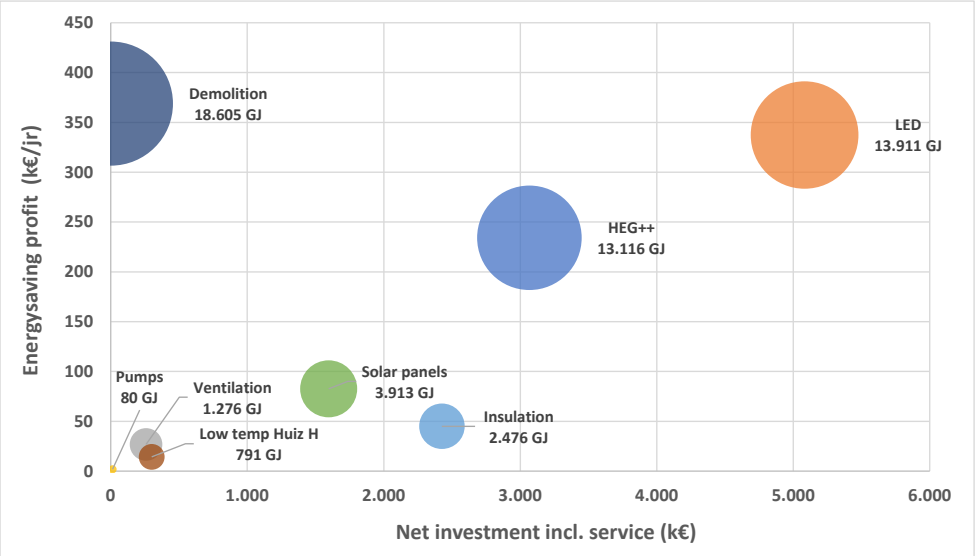

Figure 3 Effect of investment on both cost and energy savings, per measure

The graphic in figure 3 shows the energy cost savings (Y axis) that can be achieved with specific investments (X axis). The size of the circles indicates the savings on primary energy. The investment in LED lighting takes into account the replacement of standard lighting.

This additional package of measures forms the basis for Radboud University's Energy Programme 2021-2024. The proposal is to spread the investment required for this over 4 years in the Multi-Year Investment Prognosis (MIP).

Organisation and behaviour

Technical measures can deliver a high level of energy conservation. But because individual service users and faculties have a significant influence on energy consumption as a whole, the energy consumption of specific user groups is being analysed to identify conservation opportunities. The energy use of servers, catering and laboratory equipment is already being inventoried, for example. The aim is to identify possible measures at an organisational or behavioural level that can reduce energy consumption. This exercise will now be intensified and expanded. The user groups will be given more structured guidance along with any facilities they might need from Campus & Facilities. Additional user groups will be set up where they do not yet exist.

Anticipated results of Energy Programme 2021-2024

Energy use

Figure 4 shows the effect of different measures on energy use. The Hybrid Energy Grid, the additional package of measures and the demolition of various buildings will result in energy savings in excess of 4% per year. The blue colour indicates that these measures have already been confirmed. In total, this will lead to a 26% energy saving in 2024 compared to 2018.

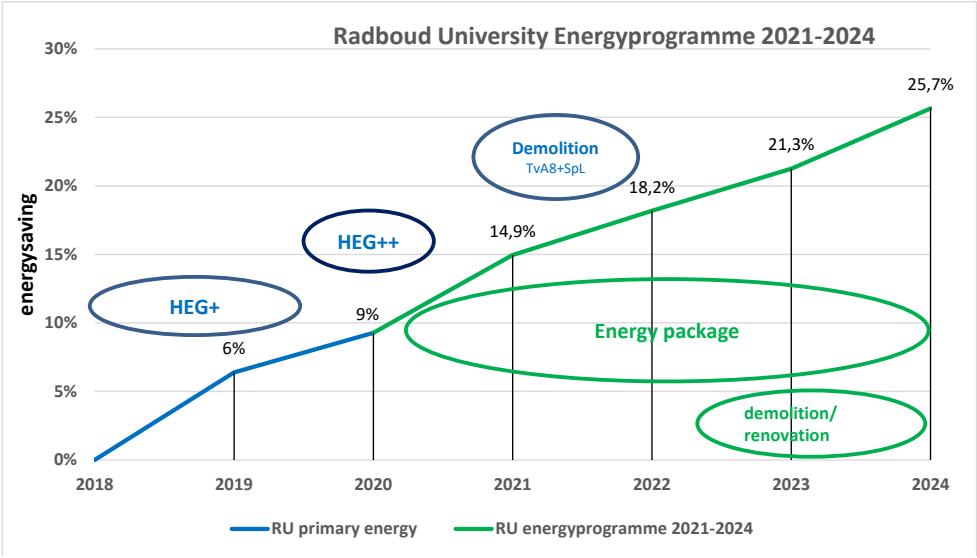

Figure 4 Energy savings from the Energy Programme

CO_2 reduction

In figure 5 the yellow area represents CO_2 reduction resulting from gas conservation through the Energy Programme 2021-2024. The dark brown area represents the reduction from electricity conservation (fewer kWh) achieved by Radboud University

itself (including electricity generated on site through solar panels). Radboud University therefore has the means to achieve a 22% reduction in 2024 compared to 2018.

Meanwhile, the electricity sector is also working on making electricity production more sustainable in general. Radboud University is contributing to that by collaborating on *additional green power*. This is decreasing emissions per kWh. The light brown area represents the increasing sustainability of the electricity sector (31% increase).

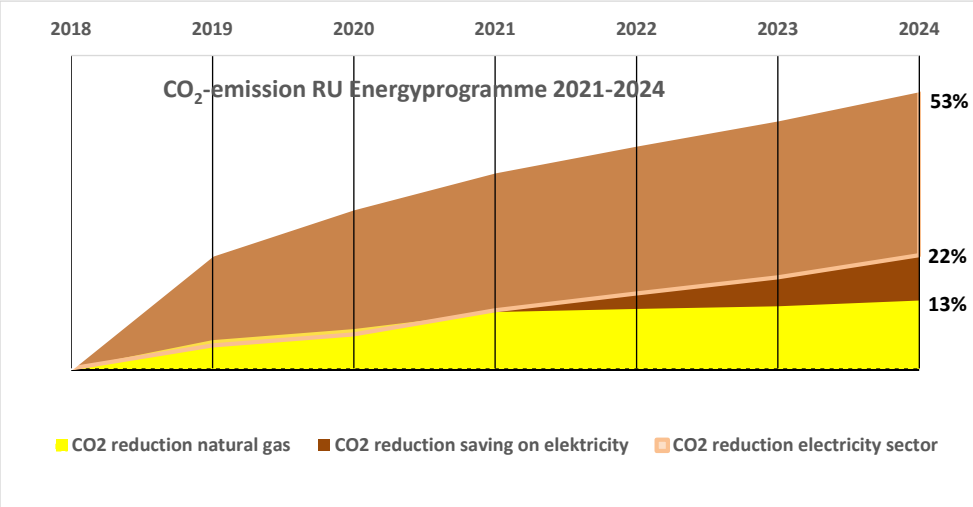

Figure 5 CO_2 reduction through the Energy Programme

Energy neutral in 2050

The Energy Programme runs until 2024. Our ambition is to be energy neutral by 2050. What little energy is still required at that time will be generated sustainably on campus. It's therefore important to look beyond 2024. Figure 6 represents the savings achieved up to 2020 (in blue) and the anticipated savings resulting from this Energy Policy Plan (in green). The dotted line indicates how Radboud University will move towards being energy neutral by 2050.

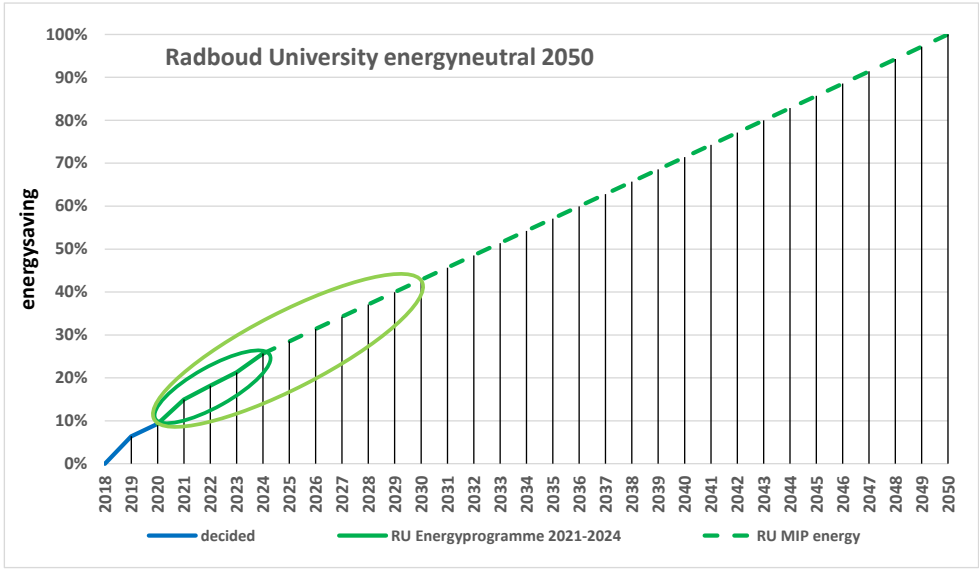

Figure 6 Progress towards being energy neutral in 2050

From 2024, annual energy savings of almost 3% will be required. It's not certain yet how this will be done. Returns on investment are expected to steadily decrease. But there may well be new, disruptive innovations in the form of a breakthrough in new technologies or a significant decrease in the cost of the measures we introduce.

Costs and methodology calculation

Multi-Year Investment Prognosis (MIP)

The gross investments into the measures described above for the Energy Programme 2021-2024 are included in the MIP and amount to €18.1m in total. That's €4.5M per year from 2021 to 2024.

The lifecycle of the measures is 15 to 50 years. The associated depreciation is €1,008k per year. This is countered by energy cost savings of €831k per year plus savings of €503k on lighting replacement (adding up to €1,334k). This leads to a positive balance

of €326k per year. The implementation of this programme will mean that by 2025 virtually all campus lighting will be LED.

The annual investments required from 2025 are difficult to estimate but a certain minimum sum will need to be allocated. €3m is therefore included for energy measures in the MIP. This will enable the ongoing implementation of the energy policy and the achievement of the 'Energy neutral in 2050' objective.

Social costs: true pricing

True pricing is an instrument for enhancing sustainability. It means that alongside the actual investment costs, the social costs of using energy and materials are also taken into account. The costs of climate change and air pollution, for example, are only partially accounted for in the price that Radboud University currently pays for its energy.

If these social costs are included in the energy cost, the savings made by the Energy Programme increase by around 35%. Now that there's a clear point at which the measures will pay for themselves within their lifecycle, this approach can contribute to the creation of broader support for investments. It has no implications for the university's accounting system, but it's an instrument that delivers an additional perspective. Radboud University can already apply this instrument to its use of energy and materials. A general policy is being developed for the application of *true pricing* to other sustainability themes within Radboud University.

Sustainable use of materials and drinking water

Radboud University will be applying design rules to improve the circularity of its systems. The policy around this is still being developed. An initial priority will be to refine the standards applicable to the use of materials. The NIBE environmental classification method will be used. This method divides materials into seven environmental classes, with class 1 having the lowest environmental impact. Products in environmental class 3 or above will not be permitted.

For projects below the value of €1M, their score under the Environmental Performance of Buildings (MilieuPrestatie Gebouwen) assessment scheme must not be greater than 0.55, against the upper limit of 1. Circularity targets are still being formulated.

In terms of drinking water, the university is investigating how to further improve its conservation. Laboratories may present further opportunities for this. The objective is a 2% saving per year.

Campus plan and Energy assessment

For the *Campus Plan* – the implementation of the *Campus Strategy* – projects and programmes are assessed according to design principles which include energy and circularity. The Energy Programme arising from this Energy Policy Plan focuses mainly on buildings that are not included in the potential developments that will be articulated in the Campus Plan. The implementation of the Energy Programme can therefore precede the Campus Plan. For other projects and processes, the *Energy Assessment* from the previous Energy Policy Plan will be worked out and applied.

Roadmap

In 2019 universities in the Netherlands provided a roadmap as a contribution to the National Climate Agreement (2019). It was agreed that in 2020 all universities would submit an individual *roadmap*.

This Energy Policy Plan and its application will form the basis of the individual *roadmap*.

Cover photo: Maria Montessori building (Jos Janssen)