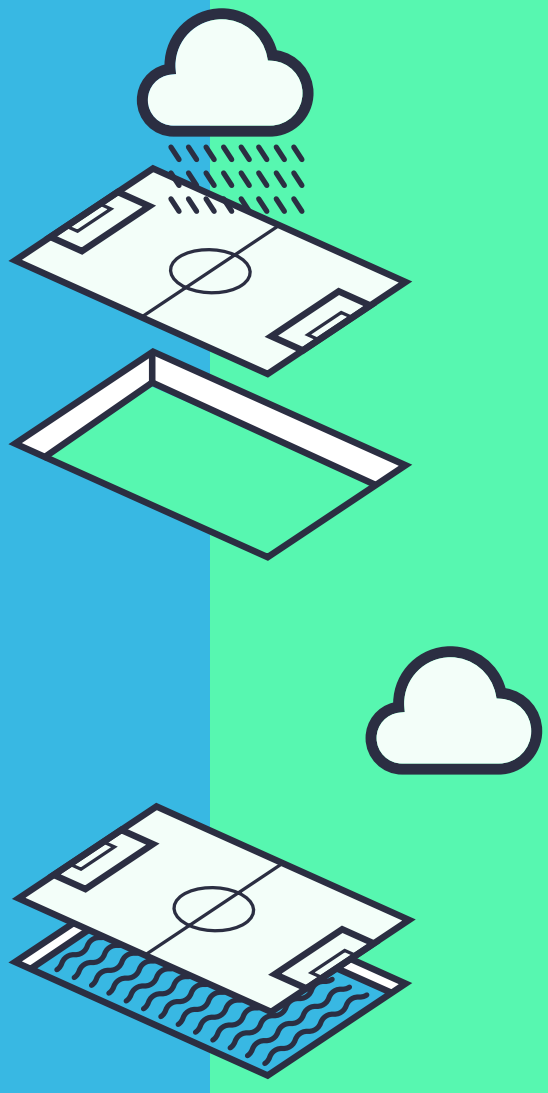
ROADMAP FOR IMPROVING SUSTAINABILITY IN SPORT

Towards a Sustainable and Affordable Sports Sector



Contents

1 Sustainable and Affordable Sport

The 12th of December 2015 was a historical milestone: it was on this date that a total of 195 countries signed the Paris Agreement, an international treaty on climate change. The signatories committed to limiting global warming to well below 2 degrees Celsius, with 1.5 degrees Celsius being the target. Climate change has a dramatic impact on the natural world, leads to changes in climate patterns and, by extension, agricultural output, as well as to rising sea levels and an increase in extreme weather events (IPCC, 2014). In signing the Paris Agreement, these countries (including the Netherlands) undertook the obligation to reduce this impact as much as possible.

In order to achieve this global target[1], each of the individual signatory countries is required to implement its own measures. In the Netherlands, government authorities, the business community and NGOs are therefore working together on drafting a national Climate Agreement (Klimaatakkoord)[2]. The main objective of this Dutch Climate Agreement is to reduce greenhouse gas emissions in the Netherlands by 95% by 2050 (compared to 1990), with the intermediate target of reducing emissions by nearly half (49%) by 2030. In this Dutch Climate Agreement, the parties concerned have made tangible commitments about the measures we can implement to achieve this target. This helps to generate support: we need each other in order to achieve the target, and this requires that the Agreement is supported by as many people as possible.

The Dutch Climate Agreement also sets out ambitious goals for the sports sector, which is what formed the impetus for this Roadmap. Specifically, this includes the following targets:

- By 2050, all sports facilities[1] in the Netherlands must be low-carbon,[2] which means a 95% reduction in carbon emissions from 1990;
- By 2030, carbon emissions must have been reduced by 49%;
- In 2021, a new standard is expected to be drafted for the energy performance of buildings, with which all sports facilities will need to comply with effect from 2050.

In order to achieve this objective, a total of 320 sports facilities a year[3] must be converted into either low-carbon facilities or carbon-neutral facilities starting in 2020. Since we have no data available on energy consumption for 1990, the Dutch national government conducted a baseline measurement in conjunction with the Netherlands-based Mulier Institute and CFP Green Buildings for non-commercial and commercial real estate used for sports purposes, which is used as a basis for the reduction target.

This Roadmap for Improving Sustainability in Sport, which serves as an action plan for the sector, describes how we intend to put this into practice. Before discussing this action plan, we will focus on the question of why it is good and useful for everyone operating in the sports sector to take these sustainability targets seriously.

[1] Carbon reduction at all sports facilities concerns the energy consumption of the buildings located on sports grounds or buildings used by the public for sporting purposes (excluding gymnasiums). This includes both municipal and commercial facilities.

[2] 'Low carbon' is defined as: maximum energy efficiency, and the energy consumed must be free of fossil fuels and must therefore be generated using sustainable methods.

[3] Of these facilities, around 200 are owned by local authorities, while 100 are owned by other operators.

The roots of sport

When men from the higher social echelons began gathering together in the late nineteenth century to engage in sport and physical activity, they did so outdoors: in forest and woodlands, parks and meadows. The flourishing Dutch culture of clubs and societies and the outdoor exercise culture to which it gave rise have always been closely linked to a love of nature. The sports practised in indoor gymnasiums after World War II were also rooted in outdoor sports. The fact that people began taking up a larger number and a greater variety of sports (including indoors) also prompted more government intervention. Sport was believed to contribute to people's individual wellbeing, which is why local governments began allocating more money towards sport during this time. They mainly invested in sports facilities, of which there was a huge dearth during these postwar years.

This shows that sport and nature have traditionally been closely entwined, and people's access to the healthy practice of sports was considered self-evident. However, until recently issues such as sustainability and environmental awareness were not on the agenda. These are issues for the long term, while sports clubs are concerned mainly with the immediate future: the next match or tournament. They focus on ensuring that there are a sufficient number of volunteers, players and coaches available, that the pitches and courts are well maintained, that the cafeteria is well stocked, and that membership levels are maintained and improved. Due to this short-term focus, energy-efficiency measures or the use of circular materials barely got a look in in the world of sport. The challenge we currently face collectively is to change all this.

Fortunately, the tide is turning, and the public focus on climate and the environment is gradually carried through into the world of sport. Particularly the younger generation of administrators and policymakers at the national and local levels is aware of the importance of sustainability and reducing the impact of sport on the environment. This renewed focus also ties in closely with the roots of sport: taking part in physical activity in a healthy and natural environment.

Showing courage

While the Netherlands may not be a global superpower and sport has not traditionally been prioritized domestically, we must not underestimate ourselves, as the Dutch economy is among the 20 largest in the world. The country has also consistently punched above its weight in sport, and – based on the amount of real estate in the Netherlands used for sports purposes – sport occupies a significant place in Dutch society alongside healthcare, education and hospitality. The entire sports economy makes up 1 % of the Dutch GDP; there are many sectors and industries which are smaller. A total of 8 million people in the Netherlands like to spend time every weekend on sports fields and pitches, swimming pools and other sports facilities. With these kinds of numbers, it is only appropriate for the sports sector to demonstrate both maturity and a certain level of ambition when it comes to sustainability. This is, in fact, also ingrained into the very fabric of sport: wanting to excel and be the best, leading by example and showing courage. It can also have an inspirational effect: if we achieve our sustainability targets at sports clubs, surely we must be able to accomplish the same in our homes?

Of course, the sports sector cannot achieve the targets set under the Dutch Climate Agreement on its own, which is why the national government, the sports sector and local authorities are preparing this Roadmap together. Local authorities are faced with the wider challenge of improving the sustainability of non-commercial real estate, including sports facilities. Municipal sports budgets in the Netherlands add up to a total of more than €1 billion; more than 71% of this amount is allocated towards the construction, maintenance and operation of sports facilities. Facilitating participation in competitive and recreational sports is not an obligation under Dutch law; local authorities choose to do so voluntarily, based on the belief that sports have a significant public benefit.

The Netherlands is home to a large number of sports facilities that consume substantial amounts of energy, including obsolete gyms and – especially – swimming pools. If local authorities start working on creating a sustainable sports infrastructure, this could potentially result in substantial cost savings. This also applies to the issue of climate adaptation. Thanks to smart innovations, sports facilities with artificial grass can serve to absorb large quantities of rainwater, which can also be purified and reused. High-quality vegetation ensures a reduction of heat-related stress and improves air quality. This cooling of the environment also results in a reduction in energy consumption by air-conditioning systems.

In this playing field, the national government has chosen to both initiate projects and programmes, and bring people together. This Roadmap was drafted by gathering together representatives from local authorities, the sports sector[4], suppliers of sustainable facilities and materials, innovators, and operators of best practices[3]. The provincial authorities have also expressed their commitment to promoting greater sustainability in the sports sector and will be taking on a facilitating role. In addition, the government can promote best practices by providing funding and setting parameters for funding and other legislation. The general idea is always for the sports sector to decide independently how the climate targets are to be achieved.

Opportunities

Smart innovations can generate energy (and, by implication, income), while improving the sustainability of real estate and making it climate-neutral is a first step in this process. There is also a massive amount of space available for this purpose, as sports facilities cover a huge amount of space. Through the use of solar panels or, in the future, roll-out foil, and with local energy storage, sports complexes (for example) can serve as energy providers for an entire district.

The partners in this Roadmap have used this approach to the climate goals as a basis for the Roadmap, as it leads to new opportunities. The funds, which can be saved and/or earned by improving sustainability and through electricity or heat generation, can be used by local authorities to promote sport. Alternatively, it can be used to professionalize the clubs; engaging the services of a paid club manager or neighbourhood sports coach can pay off significantly.

[4] 'Commercial sports organizations' include all providers of for-profit sports services, e.g. fitness centres/gyms and providers of outdoor sports services.

Sport Agreement and Green Deal for Sporting Grounds

In order to be able to seize these opportunities, we also looked at two Dutch initiatives that are closely linked to this Roadmap: the Sportakkoord (Sport Agreement)[4] and the Green Deal Sportvelden (Green Deal for Sporting Grounds[5]). The Sport Agreement is integrated into the coalition agreement and was entered into between the sports sector, the business community, local authorities and NGOs with the objective of making the organization and finances of sports viable for the future. The Sport Agreement is valid from 2018 to the end of 2021 . A total of six targets and objectives have been set, which are valid for the same dates. One of these objectives is called 'Sustainable Sports Infrastructure'.

The Green Deal for Sporting Grounds is designed to ban the use of crop protection products (pesticides)[5] and to reduce biocides on sports pitches in order to protect the health of athletes and reduce environmental impact. This Green Deal was launched in 2015 and will be extended into the terms of this Roadmap – see Section 2.2. The Green Deal for Sporting Grounds will be integrated into the Sport Agreement by means of this Roadmap. The Green Deal also extends to local authorities, which are required to facilitate the sustainable management of sports fields.

This Roadmap for Improving Sustainability in Sport was drafted in response to the Dutch Climate Agreement (Klimaatakkoord), which includes the Sport Agreement and the Green Deal for Sporting Grounds. The Roadmap focuses on the following three areas:

- Carbon reduction, especially through energy-efficiency, energy storage and the generation of renewable energy, including solar energy (see Section 1).
- Use of materials based on circular-economy principles (see Section 2.1).
- Banning pesticides (see Section 2.2).

[5] 'Crop protection products' refers to high-risk agents such as regular herbicides, fungicides, insecticides and biocides. Low-risk agents are currently virtually non-existent and also lack effectiveness.

Providing full support

The partners in this Roadmap – i.e. the sports sector, the national government and local authorities – are guiding sports clubs in achieving these goals together. The world of sport is run to a large extent by volunteers, who tend not to be particularly knowledgeable in this area, so it is important to provide them with maximum support.

This is why a national network of consultants has been established, who advise clubs on ways of making their operations more sustainable. These consultants work under the aegis of the Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF) and are employed by the following organizations: de Groene Club, Sportstroom, Sport Service Noord Brabant, Team Sportservice and Sport Drenthe. This network may be further expanded in the future. These consultants guide the clubs through an action plan, starting with an energy performance scan and following all the way through to implementation. These services are also provided for commercial sports organizations.

In achieving sustainability plans, they align with local sport agreements, in which local authorities are also involved. Local sports consultants may play a key role in this process, as they can help prepare effective funding proposals. When clubs form alliances with each other to improve sustainability, they have more chances of success. For the immediate future, the focus is on supporting the trailblazers, i.e. the clubs and associations that are intrinsically motivated to work on achieving these goals and which may then generate the critical mass needed to inspire others. The provincial authorities will facilitate additional support where possible.

In addition, the Kennis- en Innovatieplatform Maatschappelijk Vastgoed (Knowledge and Innovation Platform for Non-Commercial Real Estate) has been established, which unites various existing expertise centres and organizations, including representatives of the sports sector.

The Kenniscentrum Sport & Bewegen (Sport & Exercise Expertise Centre) has developed the www.duurzamesportsector.nl platform for sports federations, commercial sports organizations and local authorities. This platform will include a number of useful action plans, practical information and inspiring stories from local authorities and associations that have already started making their sports facilities more sustainable. The Sport & Exercise Expertise Centre will provide a helpdesk and ensure that data and information are aggregated, documented and disseminated.

In addition to this expertise platform, there is also an innovation platform*, which will focus, among other things, on:

- Establishing various locations across the Netherlands where local authorities, the sports sector and the business community develop (or enhance) the required innovations together. These innovations will result in new standards for, among other things, tendering documents.

- Promoting innovation by making the sports infrastructure more sustainable through the organization of Q&A sessions which are used as input for the challenges and company calls of Sport Innovator*. Development and use of financial models for improving the sustainability of facilities (including funds, ESCO financing and guarantees). These models are made available to local authorities and sports clubs and associations.

  * https://www.sportinnovator.nl/subsidietraject-bedrijven/

Future success

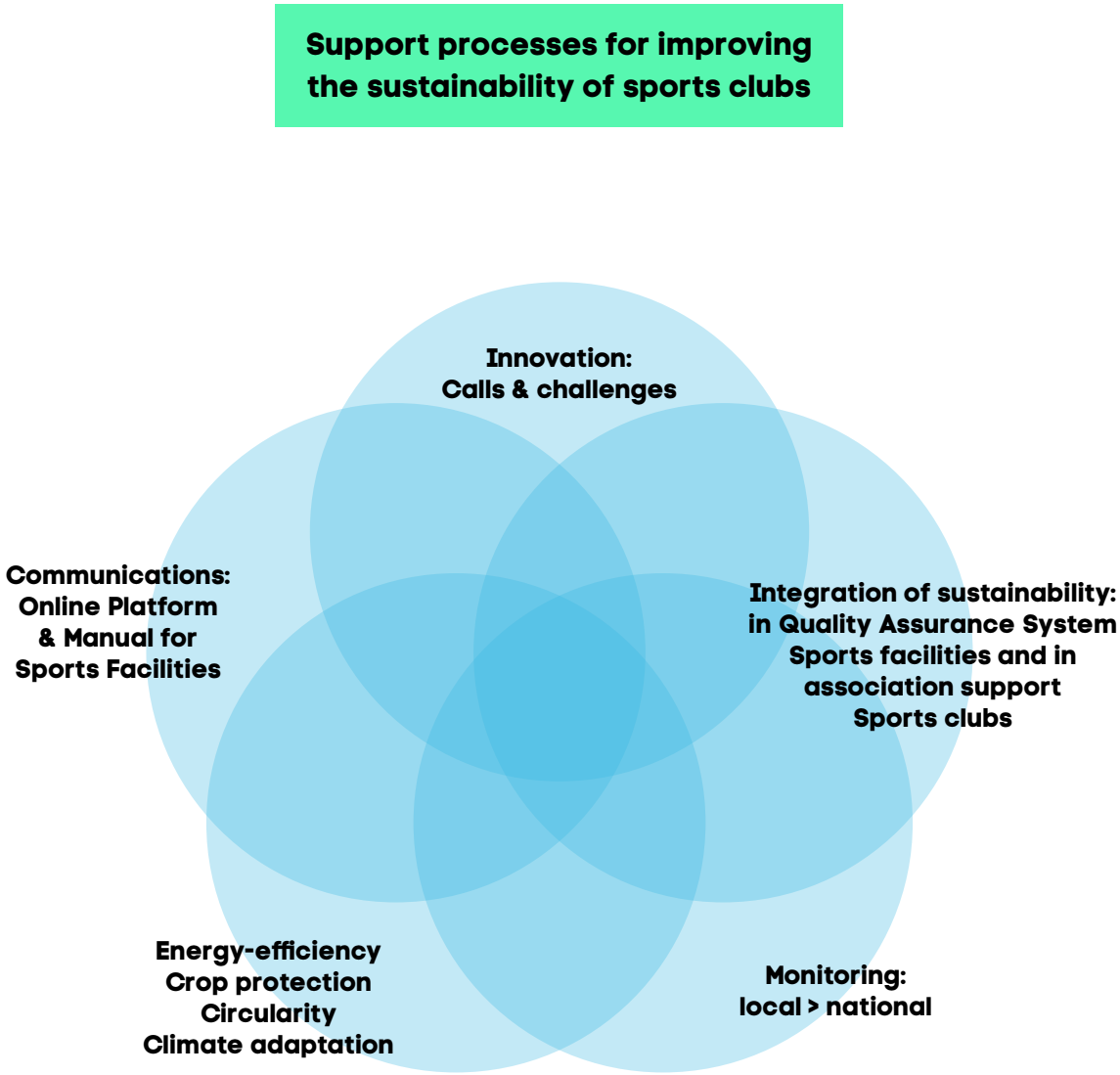
This Roadmap will be further developed in the immediate future by the strategic partners in the Sport Agreement: the sports sector, local authorities and the Ministry of Health, Welfare and Sport (VWS).

Something that is essential to achieving the goals set out in this Roadmap is that all partners agree with each other and create the best solutions together. There will therefore be a clear relationship and cohesion between two twinned Roadmaps to be drafted: the Roadmap for Municipal Real Estate and the Roadmap for a Sustainable Sports Sector.

Dutch sports federation NOC*NSF has already moved towards an integrated approach and structure for the goals set out in this Roadmap. The main ingredients for future success are explained in Figure 1. This structure and approach will be further developed in the coming years in conjunction with the sports federations.

The commercial sports sector – which has also committed to these goals – is faced with a set of similar challenges. Through the various umbrella organizations, these parties must ensure self-regulation and integration of sustainability into their quality assurance systems. The fitness organizations, for example, are subject to the 'Standards and Guidelines for Fitness Facilities'[6], which was published in 2010; this document will need to be updated. The document ties in with similar initiatives undertaken by the NOC*NSF sports federation. The Green Deal agreements may also provide support in this area.

Figure 1 – Illustration of integrated approach for improving the sustainability of sports facilities based on the sports policy



Source: NOC*NSF

1.1 Scope

This Roadmap covers the approximately 10,000 sports facilities found across the Netherlands, which are used by the country's 22,000 sports clubs/associations and organizations. A large number of these facilities (between 60 and 70%) are owned by local authorities. These facilities are subject to the terms agreed in the Roadmap for Municipal Real Estate. The remaining 30-40% of facilities are owned by entities other than the municipal authority (local council) and include both commercial (e.g. fitness, golf and squash) and non-commercial (football, tennis, hockey and golf) real estate. The bulk of these properties consist of cafeteria and dressing rooms. As with swimming pools, the use of heating and hot water are the main issues.

The action plan at the sectoral level will be updated at fixed intervals with the aid of existing and future action plans at the portfolio level. The carbon reduction measures to achieve the targets under the Dutch Climate Agreement roughly boil down to significantly reducing energy consumption and banning fossil fuels for energy generation (by 2050).

The objective to reduce carbon focuses on sustainable energy consumption, also by eliminating the reliance on gas (including natural gas) in buildings. Since the main focus of this Roadmap is reducing the use of carbon inside buildings, the installation of LED lighting in outdoor areas has not been factored into the calculations. This means the calculations of energy consumption are comparable to those of the above-mentioned public sectors. For the measurements of the carbon reduction, we exclusively use energy data, as this can easily be monitored.

This target/objective touches on a number of challenges which fall outside of the scope of this Roadmap, but which are nevertheless inextricably linked with them. Solar energy generation plays a key role in significantly reducing carbon emissions; this has an impact on the energy grid, which will need to be modified. This reinforcement of the energy grid falls outside the scope of this Roadmap, but is nevertheless inextricably linked with it (see also articles 1.2, 'Regional Energy Strategy', and 1.4.1, 'Energy Storage'). The renovation or upgrading of sports facilities, for example, will also need to include asbestos removal, due to the age of the facilities. Like the modifications made to the power grid, asbestos removal falls outside the remit of this Roadmap, but is nevertheless vital when it comes to creating a safer and healthier sporting environment.

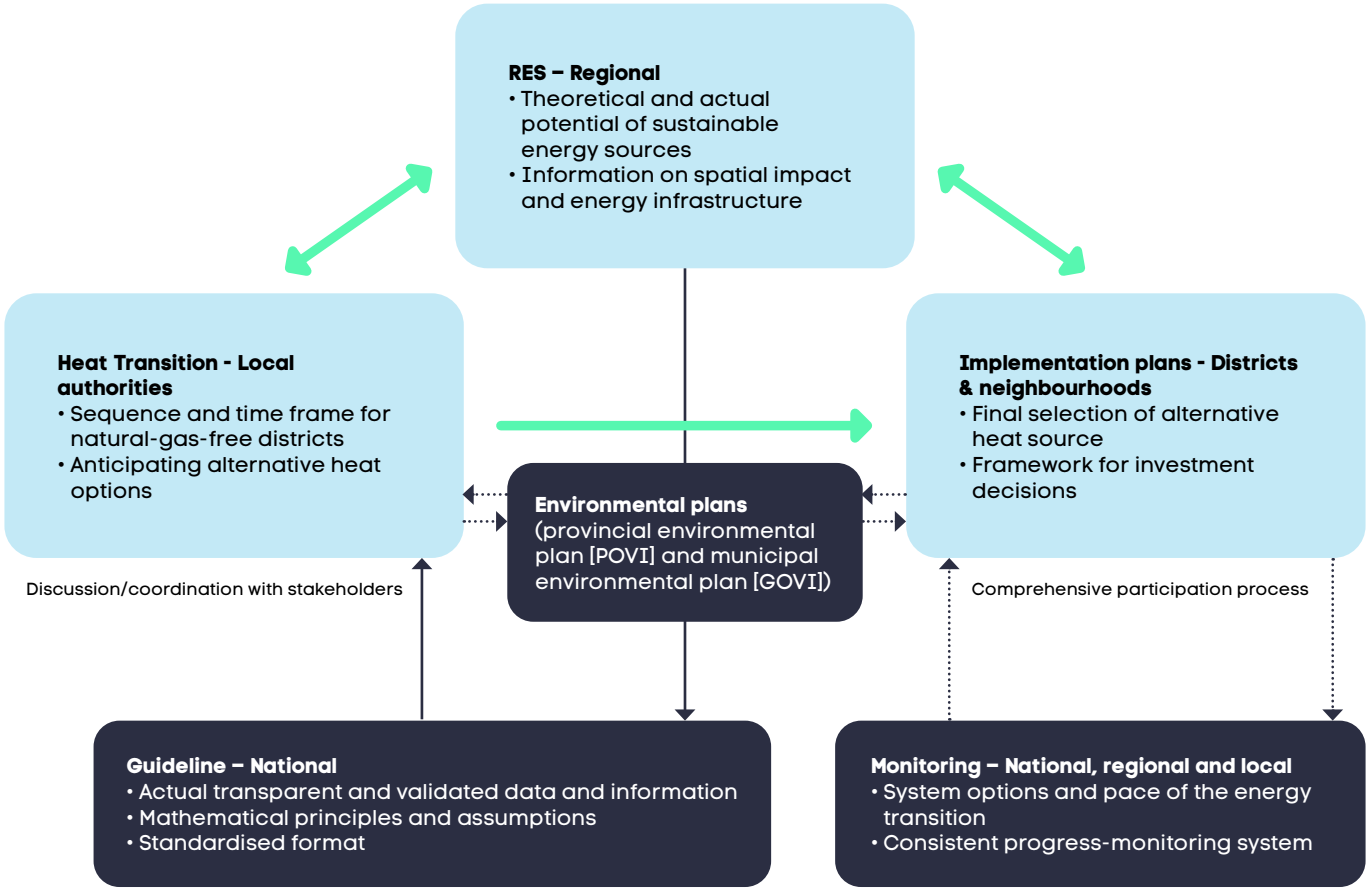
1.2 Timeline

The objective of the sports sector is therefore to start with around 320 facilities from the time of signing this Roadmap. The baseline measurement and the monitoring lead to the expected renovation cycle, which will be used as a guideline for the time frame. Based also on the sustainability plans set out in the BOSA funding scheme for the promotion and construction of sports facilities (Stimulering Bouw en Onderhoud van SportAccommodaties), a number of timelines will be prepared. In addition, an analysis will be made of the national support programmes for commercial organizations for expanding opportunities for commercial sports organizations. These commercial providers will also focus on facilitating broader partnerships between various umbrella organizations. The support process designed to help providers achieve energy-efficiency is an important item on the agenda. For details on this timeline, see Appendix 1.

A key requirement for these plans is alignment with the Regional Energy Strategy (RES). By joining the RES and the heat transition plans at the district level, several social infrastructure plans can be addressed more effectively (see Figure 2). Sports facilities may be able to play a key role in this process at the district level.

A note on the Omgevingswet (Environmental Act) would be appropriate here. While the above may make it appear otherwise, energy-efficiency is not a goal in itself. The Environmental Act provides buildings must offer a fresh and healthy indoor climate, in which people can work, live and play sports in safety and comfort. This certainly also includes energy-efficiency and energy generation.

Figure 2 – Alignment with RES – Implementation of transition plan



Source: Routekaart gemeentelijk vastgoed (Roadmap for Municipal Real Estate) (2019).

1.3 Energy Agreement – Challenge of 2.5 PJ

The sports sector must save an additional 0.41 petajoules (PJ) of the additional effort of 2.5 PJ in non-commercial real estate. These savings are achieved through the mandatory disclosure of information based on the lists of recognized energy-saving measures (Erkende maatregelenlijsten/EML) and the measures implemented as part of the EDS scheme for promoting the use of renewable energy in sports facilities (2018) and the new BOSA funding scheme for the sector in 2019-2020.

1.4 Baseline measurement

The Dutch national government conducted a baseline measurement in conjunction with the Mulier Institute and CFP Green Buildings (a consultancy providing support and tools for 'greening' buildings) for public and commercial real estate used for sports purposes (i.e. energy consumption levels measured in 2018). The results of this baseline measurement provide a general basis for the options for carbon reduction. The following data was recorded:

1 Current consumption levels;
2 Target consumption levels for the sector, expressed in carbon (or converted from PJ into carbon);
3 Gross Floor Area (in sq. m.);
4 Current energy labels;
5 Years of construction;
6 Purposes of buildings; and
7 Expected renovation cycle based on years of construction;
8 Investment in, and savings achieved through, sustainability measures.

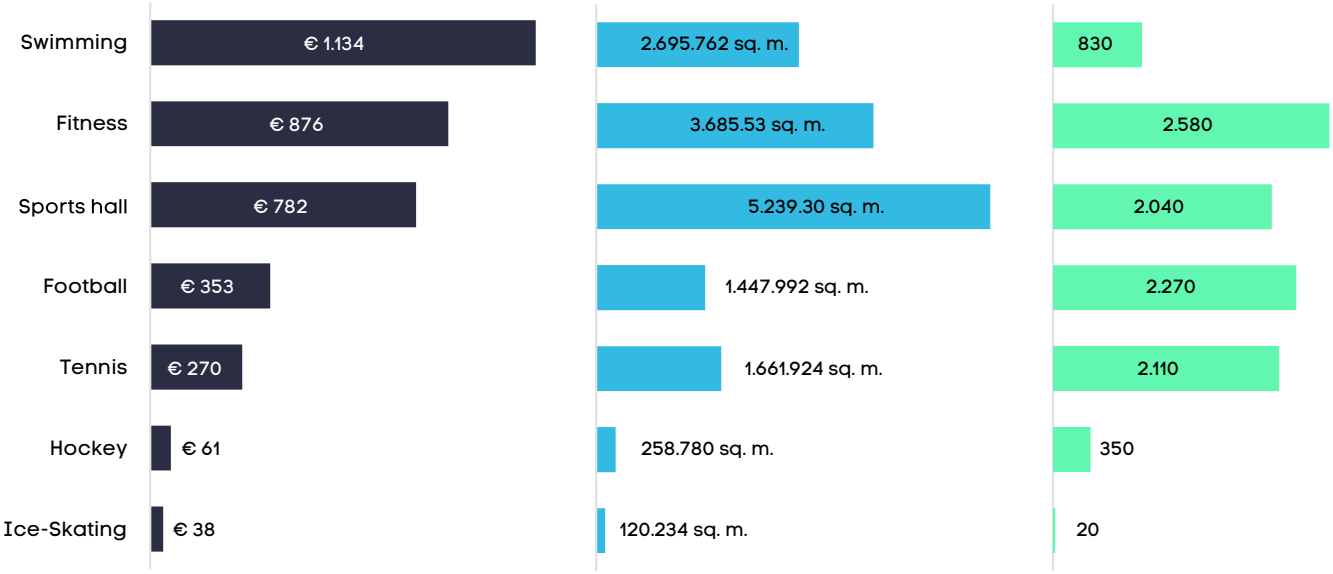
The baseline measurement is based on the seven largest types of sports facilities; see Figure 3. This means more than 90% of the energy consumption at the building level has been identified, with the remaining 10% of the energy consumption being fragmented across a larger number of smaller sports; an exact breakdown is currently unavailable. The zero line will be enriched over the years with the energy-efficiency data of sustainability projects. This ensures that, whenever an assessment is conducted, it is possible to establish whether the sector is still on the right track.

The current baseline measurement does not factor in gymnasiums, as these are not classified as sports real estate. In addition, as noted above, replacement of the field lighting is not included in the final data of the baseline measurement, as this is not officially part of the facilities. For the owners of the facilities themselves, however, replacing old field lighting with LED lights can obviously result in significant energy savings. Figure 7B shows the investment and energy-efficiency of field lighting for the three largest outdoor sports in the Netherlands.
Note that it was also not possible to make a precise distinction between municipal and private property in this initial baseline measurement, as many facilities are owned by several different parties. The ratios described in this document are estimates; the values listed below therefore relate to the sector as a whole and not just to the municipal sports real estate. See Appendix 3 for details on how the baseline measurement was conducted.

In addition, four extra scenarios for carbon reduction were developed based on energy consumption. These scenarios have been developed for all 12 social sectors[6] – for which roadmaps were also drafted in order to improve the sustainability of the real estate – with the intention of creating an inventory of all non-commercial real estate in the Netherlands. The outcome and choice of measures in the four alternative scenarios vary from the baseline measurement; this is because the baseline measurement, based on a future without natural gas, reveals an optimum pathway for reducing carbon by up to 95% by 2050. The four scenarios are based on eliminating natural gas, as well as on a certain measure of energy-efficiency. The most suitable measure might change depending on the scenario. You will find an outline of these scenarios in Appendix 4.

[6] These 12 non-commercial real estate sectors include: National government/Provincial authorities/ local authorities/Police/Education: Universities/Universities of applied sciences/Senior secondary vocational education/Primary education/ Secondary education/Healthcare services (Care + Cure)/Sport/ Landmark/listed buildings.

Figure 3 – Total investments by sector (million €) (left), breakdown of portfolio of sports facilities in sq. m. per sector (centre) and number of assets per sector (right)

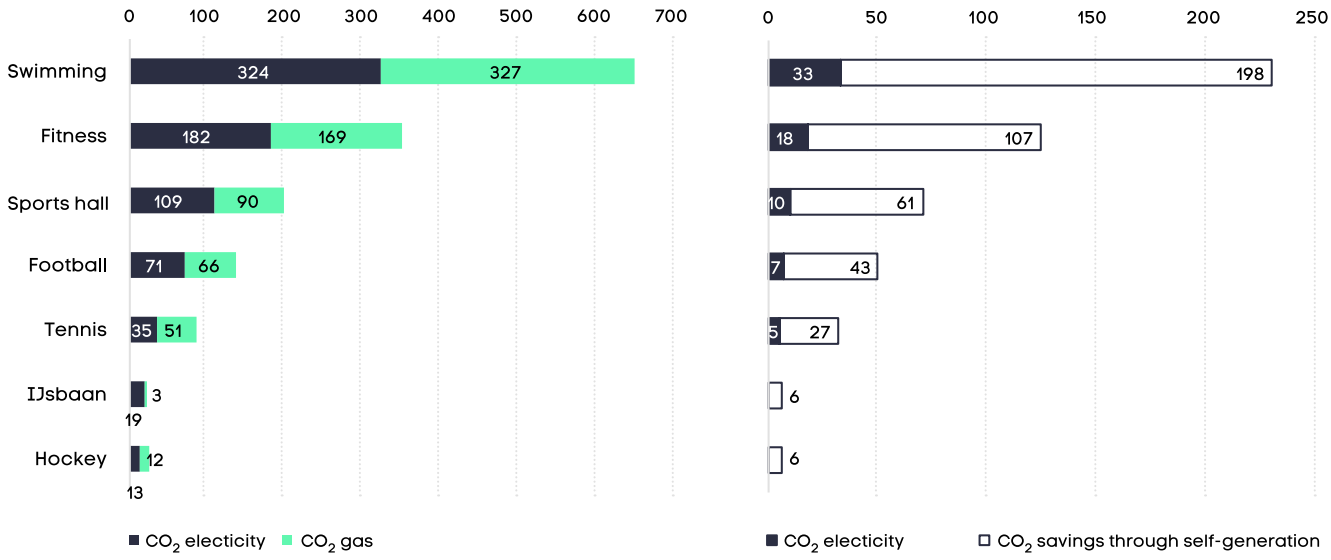


Source: CFP Green Buildings & Mulier Institute (2019).

Based on the baseline measurement conducted by the Mulier Institute and CFP Green Buildings, energy consumption for sports real estate added up to approximately 17.7 PJ in 2018, with swimming pools, fitness centres, sports hall and football (soccer) facilities accounting for the bulk of this consumption. This puts carbon emissions generated by sports facilities at roughly 1,372 kilotons/year, based on data for the baseline year 2018.

Since no data is available for emissions generated by sports real estate for the year 1990, the target for carbon reduction is based on the baseline (2018) year for this baseline measurement. The goal is to reduce carbon emissions from 1,372 kilotons a year in 2018 to 69 kilotons a year by 2050 (see Figure 4).

Figure 4 – Carbon emissions by sector for 2018 and 2050.



Source: CFP Green Buildings & Mulier Institute (2019).

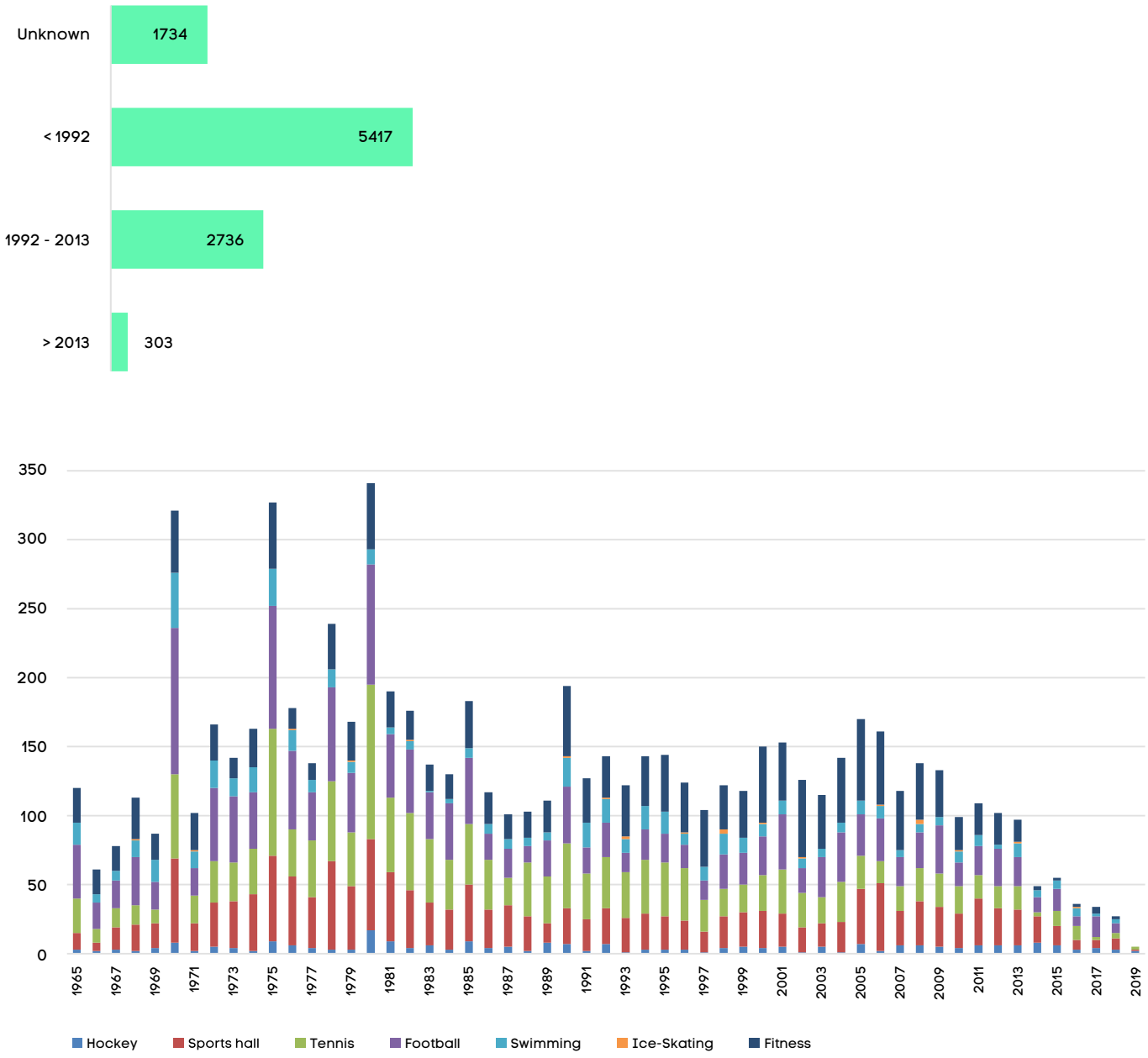
1.4.1 Carbon reduction target of 95% by 2050

In order to achieve this reduction in the sports sector, an additional investment of €3.5 billion is expected to be necessary for the next 30 years; these represent the sustainability measures. Around 90 % of investments are allocated to swimming pools, fitness, sports facilities and football (soccer) facilities. However, this does not include maintenance costs and the costs of regular renovation. The calculations also do not include essential energy storage, as this technology is currently undergoing rapid development. This means it is currently not possible to make a realistic cost estimate for local energy storage. However, the sustainable generation of electric power and heat through solar panels and collectors score highly. This is necessary in order to be able to offset the elimination of natural gas as an energy source within the sports sector. This can be used to make sports facilities energy-neutral (i.e. the amount of energy generated is equal to the amount consumed).

Energy storage (either power or heat) onsite provides significant opportunities for making better use of sustainably generated energy on sporting grounds, while at the same time attempting not to overburden the network. Local authorities will be able to use this in the RES and the heat transition plans at the district level. In addition to the extra investments based on energy consumption numbers and current proven technology, this sustainability challenge also pays off: an estimated €360 million a year.

Given the current age of most facilities, there are good opportunities for achieving significant carbon reductions during the first stage of the road towards 2050 by incorporating energy-saving measures into essential large-scale maintenance.

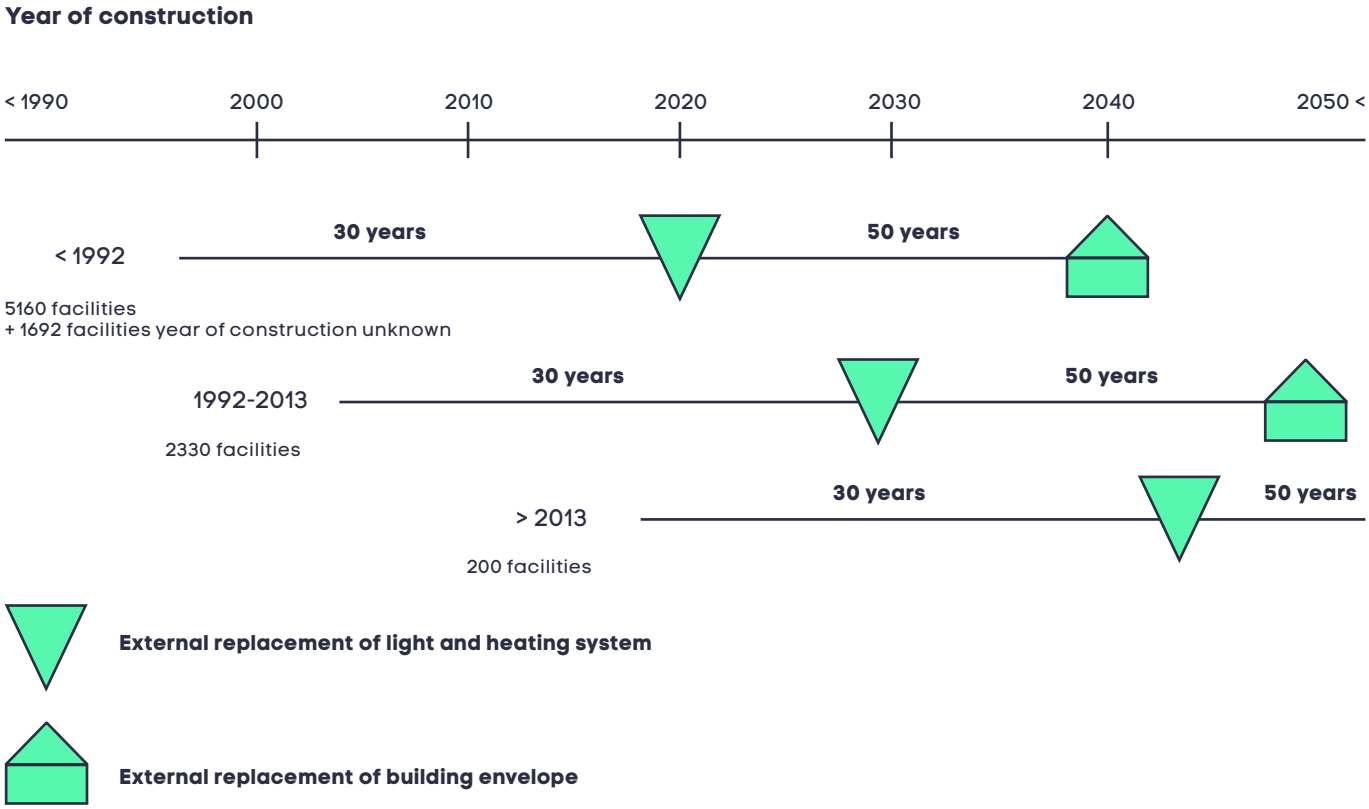
Figure 5 — Age breakdown of sports facilities for sports accounting for the highest level of energy consumption



Maintenance will need to be carried out on around 70% of all sports facilities in the Netherlands over the next decade, as these are older than 30 years (Figure 5). This provides opportunities for a Sustainable Multi-Year Maintenance Plan (Duurzaam Meerjaren OnderhoudsPlan/DMJOP). The demolition of real estate is not factored in here, nor is the asbestos removal referred to in paragraph 1.1.

Figure 6 provides a categorization of appropriate times at which sports facilities can be made more sustainable. This provides local authorities and sports clubs with the opportunity to incorporate sustainability into the municipal integrated accommodation plans (gemeentelijke integrale huisvestingsplannen/IHP) and link these to the RES.

Figure 7A – Breakdown of investments in sustainability measures at appropriate replacement times (in million €).



*Facilities with an unknown year of construction are excluded from the figure. This concerns 1692 facilities.

In implementing sustainability measures, it is sensible to choose appropriate replacement times. In Figure 7A, these investments are broken down by type of measure and time period. Figure 7B shows the cost of field lighting and what difference this makes for outdoor sports. This factors in the three major outdoor sports, with a minimum of one field per sports ground. However, this is not linked to carbon reduction, as this falls outside the scope of the sports facilities.

By calculating the costs of these energy-saving measures by type of sports real estate, we can see where we can expect the largest investment per facility. See Figure 8.

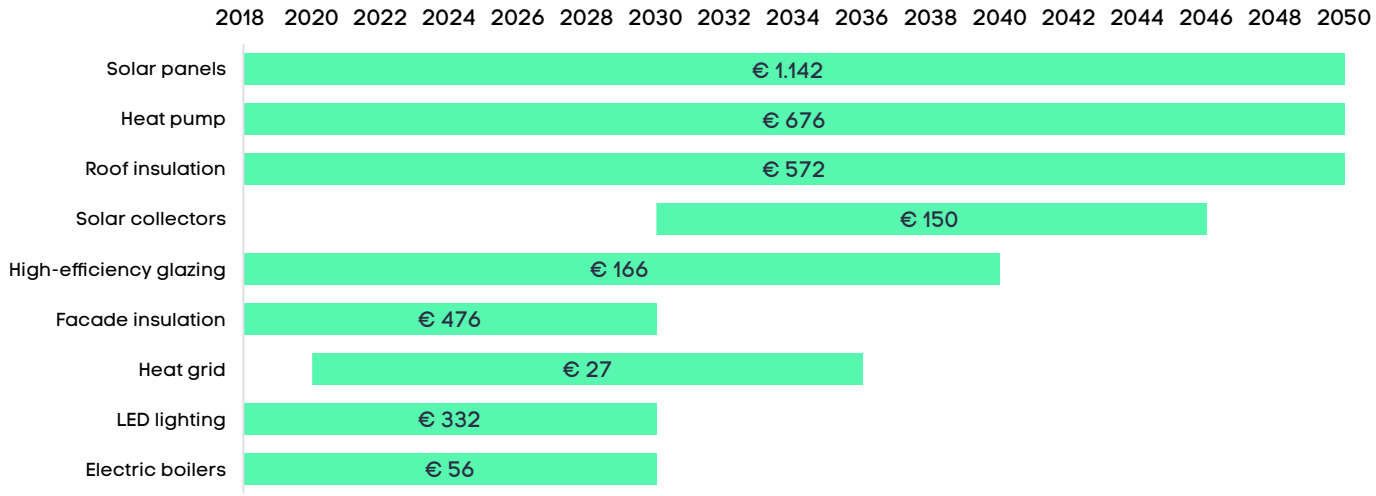
The costs of sustainability measures form part of the total costs needed to bring sports facilities at the desired level of sustainability based on regular renovation. Based on current knowledge, it is estimated that the total investment for renovating sports facilities at appropriate times adds up to around €7.4 billion.
Of this amount, €3.5 billion is earmarked for sustainability measures, while the other €3.9 billion concerns regular renovation.

For an overview of investments and savings in the process of making sports facilities energy-neutral and the four alternative scenarios, see Appendix 4 on page 62. Note that this does not include expenses for fees, insurance, advice/ consultancy, etc., which are incurred in all regular construction and renovation projects. These are estimated at around 10% of the total amount and are classified as regular expenses.
The breakdown would then look as follows:

€3.5 billion for sustainable investments
€4.6 billion for regular investments +

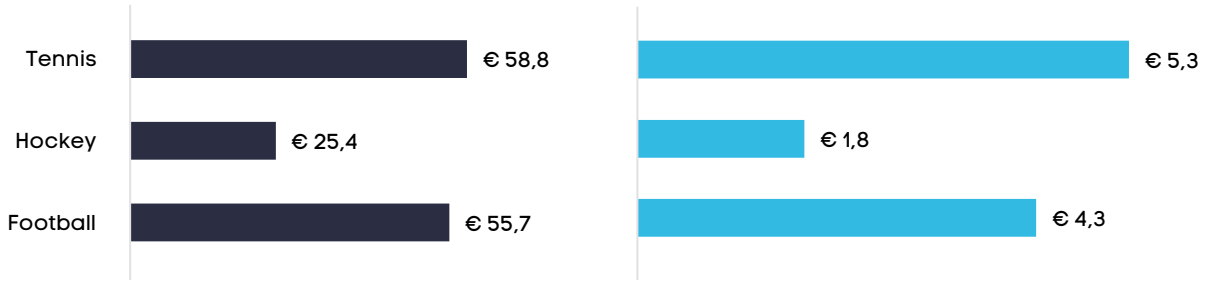
€8.1 billion in total investments

Figure 7A – Breakdown of investments in sustainability measures at appropriate replacement times (in million €).



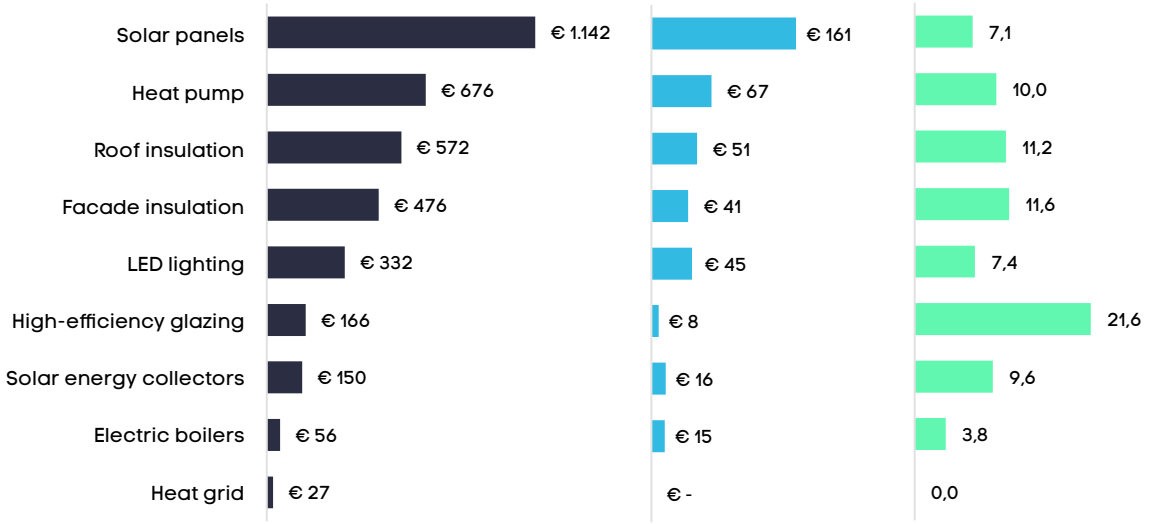
Source: CFP Green Buildings & Mulier Institute (2019).

Figure 7B – Total investments (left) and annual savings (right) on LED field lighting for sports facilities with at least 1 field/pitch (in million €).



Source: CFP Green Buildings & Mulier Institute (2019).

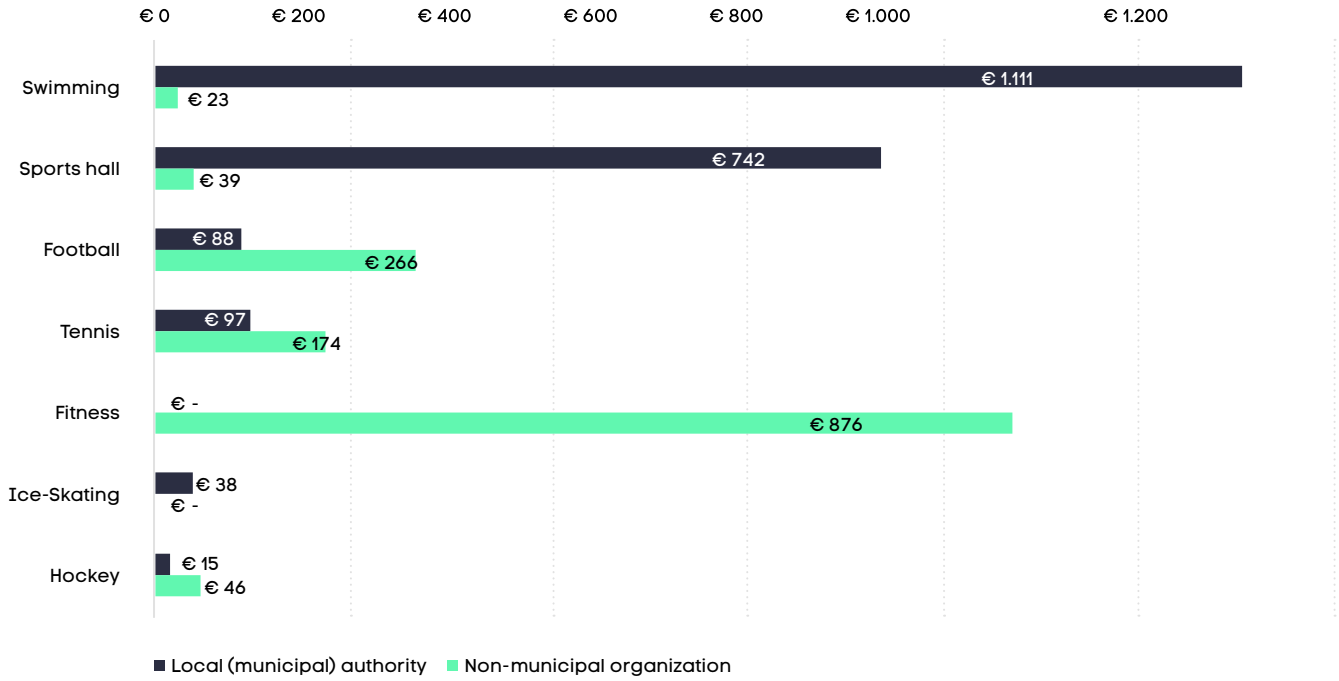
Figure 8 — Total investments per measure (million €) (left), savings per measure per year (million €) (centre), payback period per measure in years (right)



Source: CFP Green Buildings & Mulier Institute (2019).

Although no sharp distinction is made between municipal and private property, for a few types of facilities it is clear what the bulk of the investments will be allocated to. Investments in swimming pools and sports facilities will need to be made mainly by local authorities, while many tennis facilities (for example) are in private ownership (see Figure 9).

Figure 9 — Estimate of investment breakdown between local authorities (€ 2.1 billion) or sports federation (association or commercial sports organization) (€ 1.4 billion).



Source: CFP Green Buildings & Mulier Institute (2019).

1.4.2 Carbon reduction target of 49% by 2030

In addition to the end target of 2050, there is also an intermediate target of 49% carbon reduction by 2030. There are several pathways to achieving this target. The baseline measurement, which is based on energy neutrality, as well as alternative scenarios 2, 3 and 4 in Appendix 4, generate a 49% reduction in carbon emissions. None of the scenarios outlined factor in demolition. It is possible that, due to the demolition of old buildings and smart construction of new buildings (e.g. by integrating two or three old buildings into a single new building), the investment will be lower, while annual cost savings will increase.

Area of focus: no natural gas

A 49% carbon reduction by 2030 is feasible if all facilities stop using natural gas. This applies to the baseline measurement based on energy neutrality and the alternative scenarios 2, 3 and 4. In scenario 2, it is important, however, that heat grids used for linking are carbon-neutral. The baseline measurement, scenarios 3 and 4 are based on all-electric energy generation with no natural gas. An important principle here is that the electric power must have been generated on a carbon-neutral basis. This makes solar panels important for sustainable and local energy generation. The baseline measurement is based on appropriate assessment times and therefore concerns 70% of the facilities. The estimated costs for this carbon reduction based on Figure 7A is €1.87 billion, thereby avoiding 673 kilotons of carbon emissions a year; this is equivalent to a reduction of 49%. On account of the large number of older buildings, this target could result in potential estimated cost savings of €190 million a year.

1.5 Monitoring

Central monitoring is the basis for making utility buildings in the Netherlands more sustainable. Due to the diversity of owners of sports real state, monitoring plays a key role in the continued carbon reduction. This will need to be done from a single, central location.
The national government will eventually provide a sustainability tool, including to all other owners of sports facilities. This shows, at the facility level, what measures can be implemented in the immediate future or the longer term. For the sports sector, the tool will be designed such that it will enable voluntary board members to start saving energy and, in doing so, reduce their club's energy expenses. Note that a tool is already available through the BNG; you can find the Maatschappelijk Vastgoed Scan (Scan for Non-Commercial Real Estate) at www.bngbank.nl/mvs.

Local monitoring

In order to enable all organizations (including both NGOs and commercial sports organizations) to keep track of their own energy consumption and to promote awareness, arrangements could be made in sports buildings for real-time monitoring of energy consumption and energy generation. This makes it possible to show sustainability in a fun, educational and challenging way. At the local level, monitoring based on smart metering is necessary in order to gain an insight into the sustainability challenge for private and municipal sports real estate. The compulsory sharing of this data is a prerequisite for smart sustainability processes. In addition, local monitoring data is an essential source of information for a central database, which can be used to centrally monitor the entire sector.

1.6 Finances

Local authorities can borrow the funds for investment in real estate (without affecting their solvency) from BNG Bank and the Nederlandse Vereniging van Banken (Dutch Banking Association). The national government is currently examining whether this is also possible for other owners of non-commercial real estate.

The Stichting Waarborgfonds Sport also increased the warranty capital in recent years by €12.5 million in order to facilitate more guarantees for associations. This is expected to free up more capacity for providing guarantees between now and 2025 in order to reconcile the financing for the sustainability investment for associations, which will want to use these until that time. This also extends to challenges related to circular and environmentally friendly management. The capacity of the Stichting Waarborgfonds Sport will be factored into the assessments.

While improving the sustainability of commercial sports facilities, we will also investigate whether the existing support tools are sufficient (or can be adapted), so that commercial sports organizations can help to achieve the goals set out in this Roadmap.
The BOSA funding scheme for the construction and maintenance of sports facilities (Bouw en Onderhoud SportAccommodaties) already provides organizations with additional funding to finance sustainability measures for their facilities.
There are tax incentives in place for commercial sports organizations, including the EIA (Energie Investeringsaftrek), which can support them in their business operations. In addition, there are the ISDE and SDE+schemes for support of sustainable energy production and efficient heating equipment.
Provincial and local authorities also regularly provide support measures – you can check their websites for further information.

For wider social challenges with regard to asbestos removal and the reinforcement of the power grid, the assumption is that other sectors and industries will take this on at some point.

2 Sustainable and Healthy Sporting Environment

2.1 Circular materials

2.1.1 Vision and strategy

Improving the sustainability of the sports sector extends beyond energy consumption alone: there are other sustainability issues that the sports sector will need to take on collectively to ensure a healthy and sustainable sports environment in the future. Key issues, for example, include environmentally responsible crop protection products and the recycling of artificial grass fields and pitches. The Roadmap for a Sustainable Sports Sector provides a sectoral action plan to reduce the total carbon footprint of the sports sector. These issues are an addition to the targets set under the Dutch Climate Agreement.

The Dutch government drafted a plan (including targets) in 2016 to achieve a circular economy by 2050[7]. Through a total of three basic objectives, the government is attempting to transform the Dutch economy into a circular economy as soon as possible[8], in which waste and all the problems it brings with it has been eliminated, or at least minimized. These objectives are:

1 Existing production processes make more efficient use of raw materials, so as to reduce the need for these natural resources.
2 If new natural resources are needed, sustainably produced, renewable (infinite) and generally available energy sources will be used to the extent possible. This includes biomass, a natural resource made from plants, trees and food residue. This will make the Netherlands less dependent on fossil fuels, as well as being better for the environment.
3 Developing new production methods and designing new products based on a circular model.

This Roadmap endorses the objectives set out above. Objectives 2 and 3 are the most relevant to the sports sector. These objectives include the transition agendas, the most relevant of which are the manufacturing industry[9], construction[10], and the consumer goods industry[11]. The sports sector serves as a guideline for more effectively integrating circularity into a sustainable sports environment in the future.

Since the use of circular materials in the sports sector is still at the nascent stage, the focus in the coming years will be mainly on the organizational aspects of this transition. Nevertheless, the sports sector is working with local authorities and vendors and suppliers to change artificial grass from a waste problem into a circular solution as soon as possible (see Article 2.1.3 for further details). There are also numerous other circular examples to be found in the sports sector.

You will find further information about the transition toward a circular economy by 2050, and you can also track the progress of this transition at the following link: https://www.rijksoverheid.nl/onderwerpen/circulaire-economie/nederland-circulair-in-2050

As stated, there are two other processes in the sports sector: the Sport Agreement and the Green Deal for Sporting Grounds. Both of these are discussed in more detail below.

The following items have been added to the Sport Agreement:

- Where possible, the sports sector (working closely with local authorities and with the support of the Ministry of Health, Welfare and Sport) will take the initiative through self-regulation, either enhanced by Green Deals or otherwise;
- The Kennis- en Innovatieplatform Verduurzaming Maatschappelijk Vastgoed (Expertise and Innovation Platform for More Sustainable Non-Commercial Real Estate) was established, in which sport and various other, existing centres of expertise and organizations are also represented. The platform will focus on all aspects related to sports facilities, e.g. the standardization of facilities, occupancy rates, accessibility and quality. The expertise centre will also be tasked with:
  - Establishing various locations across the Netherlands where local authorities, the sports sector and the business community develop (or enhance) the required innovations together. These innovations will result in new standards for, among other things, tender documents;
  - Promoting innovation by making the sports infrastructure more sustainable through the organization of various challenges;
  - Development and use of financial models for improving the sustainability of sports facilities (including funds, ESCO financing, guarantees, etc.) and making these available to local authorities, sports federations and associations;
  - Commercial sports organizations also play a role in the areas above. They will need to make the relevant financial decisions themselves. Through the various umbrella organizations, these parties must ensure self-regulation and integration of sustainability into the quality assurance system. Fitness organizations, for example, are subject to the 'Standards and Guidelines for Fitness Facilities, version 1.1' (2010); this will need to be updated. Similar initiatives launched by Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF) can potentially create synergy. Green Deals could be a supporting feature in this process.

By combining these elements, the sports sector will be able to take actual measures towards a healthy and sustainable sport environment, in which low-carbon buildings and a smaller carbon footprint will be integrated.

2.1.2 Scope

This Roadmap covers the approximately 10,000 sports facilities found across the Netherlands. A large number of these facilities (between 60 and 70%) are owned by local authorities. These facilities are subject to the terms agreed in the Routekaart Maatschappelijk vastgoed van Gemeenten (Roadmap for Municipal Real Estate). The remaining 30 to 40% of these facilities include both commercial (e.g. fitness, golf courses, ice-skating rinks, outdoor sports, etc.) and non-commercial (football, tennis, hockey, golf, etc.) properties.
Increasing the share of recycled, circular materials and sporting equipment provides major opportunities for solving waste problems and reducing carbon footprint in the sports sector, although it is currently unclear how this can be monitored using reliable and verifiable methods. The potential for carbon reduction through the use of circular materials will be further developed over the next several years. This addresses two challenges at the same time: it reduces carbon footprint in the sports sector and promotes a pleasant and healthy environment for athletes.

The action plan at the sectoral level will be updated at fixed intervals with the aid of existing and future action plans at the portfolio level.
Commercial sports organizations – particularly in the fitness sector – already have a good network in place for exchanging used sports equipment. In order to further integrate the purchase of circular materials into existing purchasing procedures, the requirements for recycled materials in new equipment must be further developed. This is based on alignment with the transition agenda of the manufacturing industry. The plan to use recycled materials in sports buildings is consistent with the transition agenda for the construction industry. As with the carbon reduction for energy, circularity in the sports sector will be based on cooperation with other entities[12], in order to be able to also handle these challenges as well.

2.1.3 Timeline

The plan for the sports sector is to start by addressing the problem of waste from artificial grass. To this end, the Dutch national government promotes the use of circular artificial grass fields and pitches without the use of infill materials[13]. In order to achieve this, a SBIR initiative for environmentally friendly sports fields has been launched to promote high-quality recyclable artificial grass sports fields and pitches[14]. Through the master plan for circular sports fields (BSNC in conjunction with VSG [the Association of Sports and Municipalities] and NOS*NSF), the improved quality assurance system (NOC*NSF) and the monitoring of this system, the expected development in circularity objectives can be indicated. This will serve as a guideline for the timescale. Since the start of 2021, the BOSA scheme for promoting the construction and maintenance of sports facilities (subsidieregeling 'Stimulering Bouw en Onderhoud van SportAccommodaties) includes a category that provides for the promotion of circular materials.

The national government has launched an investigation into potential sustainability criteria for circular purchasing and sustainable management of artificial grass sports fields and pitches, the results of which must lead to a more balanced promotion through the BOSA and other relevant funding programmes. This investigation can also provide input for a baseline measurement (Article 2.1.4). Commercial sports organizations will start by investing in more far-reaching cooperation between umbrella organizations, where circular-economy principles will be a key item on the agenda. Another area of focus is the national support programmes for commercial sports organizations. The options available for this group may possibly be extended. It is already possible to use, for example, the MIA/Vamil (Milieu Investeringsregelingen [Environmental Investment Schemes]), which can support them in their business operations. Provincial and local authorities also regularly provide support measures – you can check their websites for further information. For details on this timeline, see Appendix 2A.

2.1.4 Baseline measurement

Based on the Master Plan for Circular Sporting Grounds, information will be provided in the coming years on the reduction of the carbon footprint of sports equipment. Making artificial grass sustainable has been given extra focus due to the large amount of waste[15] produced in this area. The Supply Chain Agreement is a first major step in this direction[16].

2.1.5 Monitoring

Central monitoring. Due to the many different owners of the sports real estate across the Netherlands, central monitoring is necessary in order to keep track of the progress of the use of circularity.
Circularity of materials is only at an early stage. Tools to learn more about the use of these materials and to be able to monitor this use are currently under development.

Local monitoring

In order to be able to share information with all organizations on their own use of materials based on circular-economy principles (as well as raise awareness on this topic), measures should be implemented inside sports facilities for monitoring purposes. This makes it possible to show sustainability in a fun, educational and challenging way. In addition, local monitoring data is an essential source of information for a central database, which can be used to centrally monitor the entire sector.

2.2 Reduction in the use of crop protection products

2.2.1 Vision and strategy

Since the objective is to improve the health of sporting grounds across the Netherlands, the priority is to ban the use of crop protection products on natural grass. The reduction of biocides on artificial grass, which is occurring at the initiative of the stakeholders and is supported by innovation programmes launched by the national government, is both important and necessary. The process initiated by the Green Deal for Sporting Grounds for the sustainable management of sporting grounds has resulted in a plan to ban crop protection products from all sporting grounds/outdoor sports facilities. However, ideas on how this is to be achieved are currently still limited and fragmented across the sports sector. It is important that people become aware of the risk more quickly, as – with the exception of golf – this has fallen by the wayside in recent years.

2.2.2 Scope

Through the Green Deal for Sporting Grounds (GDS), various organizations are committed to eliminating the use of crop protection products on and around sporting grounds. This Green New Deal will expire in 2021 , but since it relates to terms agreed in the Roadmap, the obligation of the sustainable management of

sporting grounds will remain in place. The objective is to eliminate the use of crop protection products altogether. A plan[17] is in place to ban crop protection products as soon as possible. Conventional agents can currently only be used in exceptional situations, where the preference is for low-risk agents, to the extent that these are available and sufficiently effective. This is based on practicability in terms of technical feasibility and affordability. The Ministry of Infrastructure and Water Management aims to eliminate the use of all chemical crop protection products on sporting grounds beyond 2022. While some exceptions will continue to apply until that time, the use of chemical crop protection products will be allowed only for a limited number of specific and persistent plagues to be determined (including specific weeds, fungi and insects) in situations where there is no viable alternative available.*

*Letter from the State Secretary for Infrastructure and Water Management to the Dutch House of Representatives dated 25 October 2019

Integrated Pest Management (IPM) on sporting grounds is the basis here for the absolute minimum use of crop protection products. Several different developments have been initiated for this purpose:

- In 2020 , an updated version of the IPM manual will be published, which can be used for integrated crop protection on sports grounds. Self-regulation is key to a successful implementation. Yet in addition to protection through self-regulation, enforcement by the Netherlands Food and Consumer Product Safety Authority (NVWA) will also be necessary.
- Options for implementing changes to contract formats for grounds management. This would need to contain a reference to a list of exceptions of high-risk agents that can still be used.
- Improved professional training as proof of professional competence. This requires an independent assessment of professional knowledge in order to ensure that the implementing parties can make the right decisions. A key part of this is clarifying the parameters within which chemical agents may be used. The issues of 'Where not to spray' and 'What absolutely not to use as pesticides' are both essential parts of this process.
- Investigating whether certification processes can speed up the process of banning crop protection products, where the proposed reduction in the use of biocides on artificial grass fields is also considered.

2.2.3 Timeline

In addition to the developments outlined above, the Golfalliantie (Golf Alliance; an alliance between three major Dutch golf organizations: the Netherlands Golf Federation, the Dutch Golf Course Association and the Netherlands Greenkeepers Association) will be launching a pilot project related to IPM in 2020, paving the way for an overall ban on crop protection products.
The Golfalliantie/Golf Alliance already has experience with the GEO certification system. Possibly working with the Netherlands Food and Consumer Product Safety Authority (NVWA) as the enforcing organization, the Golfalliantie/Golf Alliance will set up a self-regulation system and test this for practicability. The organization will assess whether this system can be applied across the entire sports sector. The monitoring of the reduction of – or the outright elimination of – crop protection products is a basic part of the self-regulation process. Developments will be supported with innovation calls and opportunities for promotion. The terms agreed under the Green Deal for Sporting Grounds will be integrated on the expiry of this agreement into the draft of the Sport Agreement, using the Roadmap (see: Appendix 2B).

2.2.4 Baseline measurement

Data on the current use of crop protection products is expected in early 2020, in any event from the Golfalliantie/Golf Alliance. Based on this data, an assessment will then be made what efforts will need to be made until the end of 2022.

2.2.5 Monitoring

The monitoring section will be integrated into the plan for sustainable management of sporting grounds and will serve as a basis in order for determining how much reduction is effectively achieved on an annual basis.
Monitoring will be conducted under the supervision of the Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF) and the relevant sports federations. Monitoring may take place in a number of ways, including of the total use of crop protection products; of the exceptions remaining in place only; or of the number of certificates issued (if a certification system is established).

2.3 Climate-adaptive sporting environment

2.3.1 Vision and strategy

Climate change is associated with more extreme weather conditions, and athletes are confronted with this phenomenon when practising their sport, e.g. flooding, drought and extreme heat. As a result of climate change, outdoor sports facilities are also affected by heat-related stress and flooding. A comprehensive approach, incorporating a role for greenery and nature, can provide non-technical solutions in addition to having a positive effect on health[18]. Improved water storage during extreme downpours can not only mitigate flooding, but also facilitate water storage for the spraying of sporting grounds. The smart use of greenery can also reduce the effect of very warm weather while playing sports. This makes it possible to cancel out extreme weather conditions as a result of climate change to some extent at a local level.

2.3.2 Scope

The creation of a climate-adaptive sporting environment essentially transcends the components of the Roadmap outlined above. In this sports environment, carbon reduction, the circular use of materials and the banning of crop protection products are considered self-evident.

Many measures[19,20] related to these objectives will need to be implemented by local authorities as part of an integrated district approach. The Roadmap for Municipal Non-Commercial Real Estate and district transition plans take precedence as of now. It is also important to note that local authorities are supported by the other parties and are made aware of the opportunities available. Through programmes such as DuurzaamDoor (https://www.duurzaamdoor.nl/), a multi-stakeholder expertise programme launched by government authorities and NGOs, integrated data is provided in order to promote circularity, biodiversity and climate-adaptive measures within the built environment. Sports facilities can play a key role in the integrated approach to districts[21].
Research and educational organizations support the integrated approach of this Roadmap by publishing more general information on their websites. Examples of such websites (which provide a wealth of information on how climate-adaptive construction is both necessary and possible) include (but are not limited to) NatuurInclusief Bouwen ('Integrating Nature in Construction') and a website launched by Wageningen University, 'Klimaat in de stad' ('Urban Climate').

2.3.3 Timeline

The objective of the sports sector is therefore to start with around 320 facilities on an annual basis.
The baseline measurement and the monitoring lead to the expected renovation cycle. Climate-adaptive measures as part of sustainable sports facilities are integrated to the extent possible. It will be investigated whether a category can be added to the BOSA funding scheme for promoting the construction and maintenance of sports facilities (subsidieregeling 'Stimulering Bouw en Onderhoud van SportAccommodaties') that provides for climate-adaptive measures on sporting grounds. In addition, an analysis will be made of the national support programmes for the specific increase in options available for commercial sports organizations. It is already possible to use, for example, the MIA/Vamil (Environmental Investment Schemes), which can support them in their business operations.
Provincial and local authorities also regularly provide support measures – you can check their websites for further information.

2.3.4 Monitoring

Local monitoring. In order to share information with organizations on their own water consumption (and increase awareness), measures should be implemented inside sports facilities for monitoring purposes. This makes it possible to show, for example, water storage and the reduction of water consumption in a fun, educational and challenging way.
In addition, local monitoring data is an essential source of information for a central database, which can be used to centrally monitor the entire sector.

2.3.5 Finances

Local authorities will be the driving force behind initiatives for area development[22]. The funding of these projects aligns with the Roadmap for Municipal Real Estate and integrated district approach within local authorities.

3 Commitments

All stakeholders must become and remain active in order to achieve desirable and necessary results together so the transition of national commitments into local commitments can be ensured. It is particularly essential that sports federations receive full support. Examples:

- A national network of consultants directed by the Dutch Olympic Committee* Dutch Sports Federation (NOC*NSF), which provides clubs with advice and support in making their clubs more sustainable. The intention is for these services to also be opened up to commercial sports organizations.
- Sharing knowledge through the Duurzame Sportsector ('SustainableSports Sector') platform, which forms part of the Kennis- en Innovatieplatform Verduurzaming Maatschappelijk Vastgoed (Knowledge and Innovation Platform for More Sustainable Non-Commercial Real Estate): www.duurzamesportsector.nl
- The obligation to link energy-efficiency measures to a 'free' energy scan. However, it is unclear whether this is also possible in conjunction with the duty-of-disclosure reports.
- Cost assurance through BNG/Stichting Waarborgfonds Sport. The objective is for these loans not to result in an increase in contributions. Premiums and repayments can be paid from additional funds available through reduced energy costs.
- Performance/Service contracts: installation companies will remain responsible for the correct implementation for a specific period. A key condition for this is the Total Cost of Ownership (TCO) in contract negotiations.

Commercial sports organizations are faced with the same set of challenges. Improved cooperation between umbrella organizations in the Platform Ondernemende Sport (Platform for Commercial Sports Organizations; POS) offers more widely supported integration. The parties concerned assume the responsibilities set out below, where they are expressly looking for mutual cooperation.

3.1 Sport

- In funding the various sports federations, NOC*NSF requires that federations that possess their own facilities must draft an action plan for sustainability (i.e. the 'portfolio approach'). In their support for clubs and associations, sports federations will also be fully integrating sustainability or will join the above-mentioned network of consultants who operate under the supervision of NOC*NSF. They will also provide data and information on innovation issues in the coming year.
- The sports sector will work with local authorities to align all available information related to energy efficiency, storage and generation (including smart meters and previously implemented measures) with the government-wide system for information provision.
- NOC*NSF and the Dutch sports federations will include sustainability as an integrated part of the optimization process of the Kwaliteitszorgsysteem Sportaccommodaties (Quality Assurance System for Sports Facilities). This will cover a variety of areas, including energy-efficiency, crop protection, circularity, and environmental damage.
- A dedicated team specialized in sustainable sports facilities will be established within NOC*NSF and the sports federations. This team will be focusing on (list is not exhaustive):
  - Quality Assurance System for Sports Facilities;
  - Manual for Sports Facilities; and
  - Comprehensive sustainability.
- The Kenniscentrum Sport & Bewegen (Sport & Exercise Expertise Centre) forms an active part of the Kennis en Innovatieplatform Verduurzaming Maatschappelijk Vastgoed (Expertise and Innovation Platform for More Sustainable Non-Commercial Real Estate).
- Commercial sports organizations will facilitate support projects as part of a broader cooperative relationship.
- Commercial sports organizations will actively communicate with their membersabout options for sustainability. They will be working with the Kenniscentrum Sport & Bewegen (Sport & Exercise Expertise Centre) and other entities operating in the world of sports.
- NL Actief, an industry association for commercial sports organizations, is exploring opportunities for joining the Quality Assurance System For Sports Facilities launched by NOC*NSF and the sports federations. NL Actief has incorporated sustainability as an integral part of the quality assurance system for fitness.

3.2 Local authorities

- Will align the targets and objectives set under the Roadmap for a Sustainable Sports Sector with the Roadmap for local authorities to be able to ensure an integrated approach, in areas where roadmaps at the local level lack the commonalities required.
- Will identify the ownership ratios and investment ratios for each sports facility over the next two years and, by implication, who is responsible for transitioning to low carbon.
- Will be starting in 2020 to include new performance specifications for circularity and low-carbon sports facilities in their tenders, with the objective of organizing this in all municipalities within the foreseeable future. Based on intermediate evaluations, the parties concerned will assess whether any additional action is required in this area.
- Will be developing a common innovation agenda over the next year identifying which areas must be innovated.
- Working in conjunction with, and with the support of, the sports federations, will bring available information (on energy-efficiency, energy storage and energy generation), including smart meters and previously implemented measures, in line with the government-wide system for information provision.
- Will respond, where possible, to the need for support from entities operating in organized sports (NOC*NSF, sports federations, etc.) and commercial sports organizations.
- Will take measures where necessary to actively support associations (i.e. taking some of the weight off their shoulders) in achieving the objectives under the Dutch Climate Agreement.
- Will explain when sports facilities must be incorporated into district heat transition.
- Will be exploring and, if desirable, take additional measures with regard to the direction and organization of policy instruments (from a financial, economic, informative and legal perspective) in order to promote improving the sustainability of sports facilities. This includes, for example, linking funding programmes to a required multi-year sustainability plan for sports associations/ organizations.

3.3 National government

- Will provide information and data based on the government-wide approach to the Dutch Climate Agreement. Will facilitate a central location where all information and data is aggregated and shared (i.e. the Kennis- en Innovatieplatform Verduurzaming Maatschappelijk Vastgoed/Knowledge and Innovation Platform for More Sustainable Non-Commercial Real Estate).
- Will set a final standard (scheduled for 2021) for real estate, including sports facilities, which must be complied with from 2050.
- Will investigate whether a provision can be included in its funding programme (BOSA) from 2022 that, in order to be eligible for an additional contribution on top of the basic financial support, recipients must (for example) have a building-related sustainability plan in place for transitioning to low-carbon real estate.
- Will be entering into talks with local authorities (Association of Netherlands Municipalities [VNG]/Association of Sports and Municipalities [VSG]) in order to be able to include a building-related sustainability plan for the transition to a low-carbon infrastructure as a condition for eligibility for specific financial contributions.
- Will be calling for innovation in a number of urgent issues that require innovation, including circularity and crop protection products, in order to incite the business community, local authorities and the sports sector to create new solutions.
- Will act based on the need for support from the sports sector (NOC*NSF, sports federations, commercial sports organizations, Stichting Waarborgfonds Sport, etc.).

3.4 Suppliers, contractors and other supporting entities:

- Suppliers, contractors and other supporting entities will ensure – including through the Master Plan for Circular Sporting Grounds – an acceleration in the use of circular outdoor sports equipment. In addition, the Master Plan also focuses on processing current outdoor sports equipment.
- Suppliers and other supporting entities facilitate transparent customization work and measures designed to actively support the sustainability challenge facing the sports sector.
- Supporting entities, including independent consultants, will provide full support to sports organizations in realizing sustainability investments based on a neutral advisory role.

3.5 Provincial authorities

- Will provide, based on provincial plans and policies, information about energy-efficient measures, circularity, crop protection, climate adaptivity and biodiversity.
- Will be negotiating with local authorities on the desirability and use of overarching provincial support for integrated sustainability of sports facilities (various initiatives have already been launched to this end in several provinces).

The Ministry of Health, Welfare and Sport made an initial attempt in this area with the Challenge Energieneutrale Sportaccommodaties (Energy-Neutral Sports Facilities Challenge) in 2017. [https://starthubs.co/vws/energieneutralesportaccommodaties]
This initiative produced a total of five winners. Two winners will be focusing on generating energy by using rollable solar foil on sports fields and pitches. Two other winners will be focusing on the question of what the energy storage capacity and energy generation capacity of an association must be in order to eliminate the use of gas altogether; and the final winner will attempt to tackle the issue of an energy-efficient hot-water supply.

Sources

1. Dutch national government, 2019. https://www.klimaatakkoord.nl/klimaatakkoord/achtergrond.
2. Dutch national government, 2019. https://www.klimaatakkoord.nl/klimaatakkoord.
3. Input sessions held in September 2018 and January 2019. Attended by the following parties: local authorities, sports federations, financiers, suppliers, national government, NGOs.
4. Representatives from the Ministry of Health, Welfare and Sport; the Association of Sports and Municipalities; the Association of Netherlands Municipalities and the Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF) (2018). National Sport Agreement, 2018-2022 Sport unites the Netherlands. The Hague: Ministry of Health, Welfare and Sport (VWS). https://vng.nl/sites/default/files/sportakkoord 2018.pdf
5. Green Deal sportvelden (Green Deal for Sporting Grounds), 2019 http://www.greendealsportvelden.nl.
6. F!tvak, 2010. Normen en Richtlijnen Fitnessaccommodaties (Standards and Guidelines for Fitness Facilities). Version 1.1.
7. Dutch national government, 2016. https://www.rijksoverheid.nl/onderwerpen/circulaire-economie/nederland-circulair-in-2050.
8. Dutch national government, 2019 Letter to Parliament concerning various initiatives relating to a circular economy: https://www.rijksoverheid.nl/documenten/kamerstukken/2019/10/09/voortgang-diverse-initiatieven-circulaire-economie
9. Circular manufacturing industry, 2019. https://circulairemaakindustrie.nl/.
10. Circular construction economy, 2019. https://circulairebouweconomie.nl/.
11. Knowledge Platform 'From Waste to Resources' – waste segregation, 2019. https://www.vang-hha.nl/programma/
12. Green Deals, 2019. Green Deal for Circular Festivals. https://www.greendeals.nl/green-deals/green-deal-circulaire-festivals
13. Dutch national government, 2019 Report on waste from artificial grass fields and pitches, plus letter to Parliament: https://www.rijksoverheid.nl/documenten/kamerstukken/2019/02/20/afval-uit-kunstgrasvelden
14. RVO (Netherlands Enterprise Agency) 2019. SBIR's (Small Business Innovation Research) appeal for environmentally friendly sports fields and pitches: https://www.rvo.nl/subsidie-en-financieringswijzer/sbir/sbir-oproep-milieuvriendelijke-sportvelden
15. BSNC (Sport and Culture Technology Trade Association), 2019. RIVM (Netherlands Institute for Public Health and the Environment): Environmental impact of rubber granulate used on artificial grass fields and pitches: https://www.bsnc.nl/dossier-verspreiding-infill/.
16. BSNC (Sport and Culture Technology Trade Association), 2019. Supply Chain Agreement for the Processing of Artificial Grass. Arnhem. https://www.bsnc.nl/wp-content/uploads/2019/01/Convenant 290119 getekend.pdf
17. NGF (Netherlands Golf Federation), 2019. From Green Deal to fully pesticide-free management, https://www.ngf.nl/themas/duurzaam-beheer/green-deal
18. Kennisportaal Ruimtelijke Adaptatie (Knowledge Portal for Spatial Adaptation), 2019. https://ruimtelijkeadaptatie.nl/overheden/nas/gezondheid/
19. PBL (Netherlands Environmental Assessment Agency), 2019. Climate Change. https://www.pbl.nl/onderwerpen/klimaatverandering
20. Spatial Adaptation 2019. https://ruimtelijkeadaptatie.nl/hulpmiddelen/
21. BodemPlus. 2019. Example: 'Climate-active city: question of smart connections' https://www.bodemplus.nl/onderwerpen/bodem-ondergrond/kennisagenda/klimaatverandering/voorbeeld/
22. SBRCURnet, 2014. Approximate cost of climate measures in urban areas. Rotterdam. https://docplayer.nl/11330288-Kostenindicaties-van-klimaatmaatregelen-in-de-stad.html

Appendix 1
Timeframe for Roadmap for Improving Sustainability in Sport — Carbon Reduction

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
	Ongoing	Sharing sample projects in an accessible format through existing networks	All stakeholders	Supplying examples; posting innovations on platform. Disseminate through the VSG (Association of Sports and Municipalities), Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF), Netherlands Enterprise Agency (RVO), Kenniscentrum Sport & Bewegen (Expertise Centre for Sport & Exercise), Bouwstenen voor Sociaal, Sportief Opgewekt, etc.
1	2019	Support measures for sports federations initiated by the national government.	Ministry of Health, Welfare and Sport	The BOSA programme is a support programme for sports federations.
2	2019	Support measures for commercial sports organizations initiated by the national government.	National government	Existing tools and instruments can already be used. Investigate whether this can be made visible, specifically for sport.
3	1 May 2019	Sectoral baseline measurement for sports facilities	Ministry of Health, Welfare and Sport	Sectoral insight into the current situation in the sports sector. This means insight into the average sustainability level of sports facilities for energy consumption.
4	1 July 2019	Compliance with duty of disclosure	Organizations subject to the Wet maatschappelijke ondersteuning (Social Support Act) based on a set of prerequisites	This involves implementing energy-efficiency measures which can be earned back within five years.
5	1 September 2019	Innovation Call for Making Sport More Sustainable	Ministry of Health, Welfare and Sport	Innovative projects requested related to energy-efficiency/energy generation/energy storage
6	End of 2019	BNG Sustainability Sports Fund to become operational	BNG	BNG Sustainability Sports Fund to become active/ operational. This serves to provide sports federations with guarantees from the Stichting Waarborgfonds Sport quickly and efficiently.
7	2019 and beyond	Publishing sample projects as a source of inspiration	All stakeholders	Demonstrating that there are many options available already at 'regular' costs (and strong delivery results) is essential in order to increase support.
8	23 January 2020	Officially establishing the terms agreed in the Roadmap	On behalf of the local authorities – VNG (Association of Netherlands Municipalities)/VSG (Association of Sport and Municipalities) On behalf of National government – Ministry of Health, Welfare and Sport On behalf of Sport – Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF) and NL Actief Provincial authorities	Official signing of the Roadmap for Improving Sustainability in Sport during the Jumping Amsterdam equestrian event at the RAI Amsterdam Convention Centre. The signing ceremony will be followed by a mini-conference.

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
9	2020	Upgrade quality assurance system for sports facilities with sustainability requirements	Dutch Olympic Committee*Dutch Sports Federation (NOC-NSF), Commercial sports organizations	Effective quality assurance system for installing sports facilities. This must be further extended by incorporating sustainability requirements related to carbon reduction through energy-efficiency, energy generation and energy storage measures.
10	2020	Increasing the use of results-based tenders (at least eliminating the use of natural gas)	Local authorities, commercial sports organizations	Maximum use of results obligation by the supplying entities instead of obligation in contracts. This will accelerate innovation. Prerequisite: incorporating a portion of the maintenance period is essential in order to create an effective business case for both parties concerned.
11	2020	Increasing the use of an integrated TCO-based approach in tender processes.	Local authorities, commercial sports organizations	This reveals more clearly how much the investment will yield across the entire usage period, meaning the focus is not just on initial costs.
12	2020	Widely available, independent support/ compherensive support desks for sports federations and organizations	Local authorities, Dutch Olympic Committee*Dutch Sports Federation (NOS*NSF), commercial sports organizations and sports federations Supported by the provincial authorities	Since most sports federations are not especially knowledgeable about sustainability, these parties must be supported in order to be able to create successful projects.
13	2020	Establishment of Kennis- en Innovatieplatform Verduurzaming Maatschappelijk Vastgoed (Knowledge and Innovation Platform for More Sustainable Non-Commercial Real Estate)	Kenniscentrum Sport & Bewegen (Expertise Centre for Sport & Exercise), Ministry of the Interior and Kingdom Relations, Ministry for Health, Welfare & Sport and others.	A single desk people can turn to for questions about non-commercial real estate. The appropriate entities will be found to answer each query/meet each request, including (for the sports sector) the Kenniscentrum Sport & Bewegen (Expertise Centre for Sport & Exercise) (operational from 10 October 2019).
14	2020	Addition to baseline measurement with data from the EDS 2018 and BOSA funding programmes in order to support the results achieved as part of the Dutch Energy Agreement	Ministry of Health, Welfare and Sport	0.41 PJ energy reduction determined by means of enhanced baseline measurement.
15	2021	Alignment of projects to RES	Local authorities, commercial sports organizations and provincial authorities	Fully align sustainability of sports facilities with the RES.

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
16	2021	Access to data on sports facilities being connected to district-focused heat transition	Local authorities	Necessary in order to be able to estimate and monitor carbon reduction. As described in the Roadmap for Municipal Real estate as a process commitment: From 2021, in the process of improving sustainability, municipal buildings will be incorporated into the district-based implementation plans to eliminate the use of natural gas. As before, portfolio-based management will be used, but focusing on specific areas.
17	2022	First interim results of carbon reduction initiatives Interim evaluation of the sustainability of sports facilities	Owners of sports facilities	Based on the baseline measurement and its follow-up, including a measure and monitoring tool to calculate the carbon reduction.
18	2022	Evaluation of the Roadmap.	All stakeholders	Which facilities have been made more sustainable in terms of energy consumption, and how much energy/carbon has been saved? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal?
19	2025	Second interim result for carbon reduction (minimum of 25% reduction); Evaluation of the Roadmap.	All stakeholders	Which facilities have been made more sustainable in terms of energy consumption, and how much energy/carbon has been saved? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
20	2028	Third interim results of carbon reduction initiatives Interim evaluation of the sustainability of sports facilities	All stakeholders	Which facilities have been made more sustainable in terms of energy consumption, and how much energy/carbon has been saved? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
21	2030	Fourth interim results of carbon reduction initiatives (minimum of 49% reduction); Evaluation of the Roadmap.	All stakeholders	Which facilities have been made more sustainable in terms of energy consumption, and how much energy/carbon has been saved? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
22	2035	Fifth interim result for carbon reduction (minimum of 70% reduction); Evaluation of the Roadmap.	All stakeholders	Which facilities have been made more sustainable in terms of energy consumption, and how much energy/carbon has been saved? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
23	2040	Draft list of facilities that will no longer be made sustainable at an appropriate time, but for which the date of improving sustainability must be brought forward (this is not without obligation).	All stakeholders	From 2040, there will not be enough time left to make the last group of facilities sustainable at appropriate times. The sustainability investment in these facilities has been brought forward in order to ensure that the sports sector will actually be circular and low carbon by 2049.
24	2040	Sixth interim result for carbon reduction (minimum of 80% reduction); 100% circular purchasing policy. Evaluation of the Roadmap.	All stakeholders	Which facilities have been made more sustainable in terms of energy consumption, and how much energy/carbon has been saved? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal?
25	2045	Seventh interim result for carbon reduction (minimum of 85% reduction); Evaluation of the Roadmap.	All stakeholders	Which facilities have been made more sustainable in terms of energy consumption, and how much energy/carbon has been saved? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal?
26	2049	Eighth interim results of carbon reduction initiatives. Virtually carbon-neutral sports sector (including both commercial and non-commercial facilities), but with a carbon reduction of at least 95%.	All stakeholders	Party to celebrate achievement of target.
27	2050	Fully sustainable sports sector in the Netherlands	All stakeholders	

Appendix 2A
Timeframe for Roadmap for Improving Sustain-ability in Sport — Sporting environment based on a circular-economy model

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
	Ongoing	Sharing sample projects in an accessible format through existing networks	All stakeholders	Supplying examples; posting innovations on platform. Disseminate through the VSG (Association of Sports and Municipalities), Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF), Netherlands Enterprise Agency (RVO), Kenniscentrum Sport & Bewegen (Expertise Centre for Sport & Exercise), Bouwstenen voor Sociaal, Sportief Opgewekt, etc.
1	2019	Support measures for sports federations initiated by the national government.	Ministry of Health, Welfare and Sport	The BOSA programme is a support programme for sports federations. Extension of the parameters with measures aimed at climate adaptation, the phasing-out of crop protection products, and the circular use of materials.
2	1 April 2019	Organize innovation challenge for environmentally friendly sporting grounds	Ministry of Health, Welfare and Sport and Ministry of Infrastructure and Water Management	Appeal by Small Business Innovation Research (SBIR) for 'high-quality recyclable artificial grass sporting grounds' and publication of 'protection against weeds and other problems encountered on sporting grounds'.
3	2019	Support measures for commercial sports organizations initiated by the national government.	Various ministries and provincial authorities.	Existing tools and instruments can already be used. Investigate whether this can be made visible, specifically for sport.
4	1 May 2019	Sectoral baseline measurement for sports facilities	Ministry of Health, Welfare and Sport	Sectoral insight into the current situation in the sports sector for circularity of artificial grass and restriction of the use of crop protection products, if available.
5	2019 and beyond	Publishing sample projects as a source of inspiration	All stakeholders	Demonstrating that there are many options available already at 'regular' costs (and strong delivery results) is essential in order to increase support.
6	2020	Upgrade quality assurance system for sports facilities with sustainability requirements	Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF)	Effective quality assurance system for installing sports facilities. This must be further extended by incorporating sustainability requirements related to circular materials.

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
7	2020	Integrated absorption of circularity of materials in tenders for sports facilities.	Local authorities, commercial sports organizations	Key areas of focus are: aligning with the Transition Agenda for Circular Construction, requirement to collect and reprocess used materials after their lifespan has ended (especially artificial grass fields and pitches, and sports equipment).
8	2020	Maximizing results-focused tenders (in terms of circularity, water absorption, heat stress reduction, and the elimination of toxins)	Local authorities, commercial sports organizations and provincial authorities	Maximum use of results obligation by the supplying entities instead of obligation in contracts. This will accelerate innovation. Prerequisite: incorporating a portion of the maintenance period is essential in order to create an effective business case for both parties concerned.
9	2020	Increasing the use of an integrated TCO-based approach in tender processes.	Local authorities, commercial sports organizations and provincial authorities	This makes it more clear how much the investment will yield across the entire usage period. This means the focus is not just on initial costs.
10	2020	Widely available, independent support/ comprehensive support desks for sports federations	Local authorities, the Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF), sports federations and commercial sports organizations	Most sports federations and organizations are not especially knowledgeable about sustainability. This is why these parties must be supported in order to be able to create successful projects. When it comes to commercial sports organizations, providing comprehensive support is also about effective approaches to business cases.
11	2020	Establishment of Kennis- en Innovatieplatform Verduurzaming Maatschappelijk Vastgoed (Knowledge and Innovation Platform for More Sustainable Non-Commercial Real Estate)	Kenniscentrum Sport & Bewegen (Expertise Centre for Sport & Exercise), Ministry of the Interior and Kingdom Relations, Ministry for Health, Welfare & Sport and others.	A single desk people can turn to for questions about non-commercial real estate. The appropriate entities will be found to answer each query/meet each request, including (for the sports sector) and the Kenniscentrum Sport & Bewegen (Expertise Centre for Sport & Exercise).

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
12	2020	BSNC (Sport and Culture Technology Trade Association) duty-of-care document – update	BSNC	The BSNC 'Duty of care' taskforce is currently drafting a document for the industry: this concerns one single, widely supported report on all components of artificial grass fields and pitches. 'In addition to SBR rubber granulate, we also focus on other materials found in the artificial grass system. The focus is on complying with environmental standards rather than on the sports-related part.'
13	Mid-2020	Recycling plant for artificial grass	Suppliers and municipal authorities	Building a recycling plant for reprocessing artificial grass into new materials ready to be reused. Reducing carbon by monitoring the circularity of artificial grass for a potential share in overall carbon reduction. Prerequisite: Efficient procedure for location licence for recycling plant.
14	2022	Evaluation of the Roadmap.	All stakeholders	Which facilities have been made sustainable in areas other than energy-efficiency; year of launch to be confirmed (sometime after 1 January 2019?). Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal?
15	2025	Second interim results – available on carbon reduction due to the use of circular materials Evaluation of the Roadmap.	All stakeholders	Which facilities have been made sustainable in areas other than energy-efficiency? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
16	2028	Third interim results – generic access to data on carbon reduction due to the use of circular materials Evaluation of the Roadmap.	All stakeholders	Which facilities have been made sustainable in areas other than energy-efficiency? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
17	2030	Non-toxic and circular artificial grass – only product to be purchased.	Suppliers, local authorities, owners of commercial sports facilities	Artificial grass is purchased on the basis of fully circular methods, thereby ensuring circular processing after it has completed its lifespan.

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
18	2030	Fourth interim results – access to data on carbon reduction due to the use of circular materials 50% circular purchasing policy (100% circular on artificial grass and for sports equipment) Evaluation of the Roadmap.	All stakeholders	Which facilities have been made sustainable in areas other than energy-efficiency? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
19	2035	Fifth interim results. 50% carbon reduction due to the use of circular materials versus new natural resources. 75% circular purchasing policy (100% circular on artificial grass and sports equipment). Evaluation of the Roadmap.	All stakeholders	Which facilities have been made sustainable in areas other than energy-efficiency? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
20	2040	Draft list of facilities that will no longer be made sustainable at an appropriate time, but for which the date of improving sustainability must be brought forward (this is not without obligation).	All stakeholders	From 2040, there will not be enough time left to make the last group of facilities sustainable at appropriate times. The sustainability investment in these facilities has been brought forward in order to ensure that the sports sector will actually be circular and low carbon by 2049.
21	2040	Sixth interim results. 75% carbon reduction due to the use of circular materials versus new natural resources. 100% circular purchasing policy. Evaluation of the Roadmap.	All stakeholders	Which facilities have been made sustainable in areas other than energy-efficiency? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
22	2045	Seventh interim results. 80% carbon reduction due to the use of circular materials versus new natural resources. 100% circular purchasing policy. Evaluation of the Roadmap.	All stakeholders	Which facilities have been made sustainable in areas other than energy-efficiency? Evaluation of the Roadmap: Do any modifications need to be made in order to achieve the goal? See previous evaluation.
23	2049	Eighth interim results. 100% circular purchasing policy. Full access to data on the carbon emissions generated by circular materials.	All stakeholders	Party to celebrate achievement of target.
24	2050	Fully sustainable sports sector in the Netherlands	All stakeholders	

Appendix 2B Timeframe for Roadmap for Improving Sustainability in Sport — Pesticide-free sports fields (sustainable management of sporting grounds)

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
	Ongoing	Sharing sample projects in an accessible format through existing networks	All stakeholders	Supplying examples; posting innovations on platform. Disseminate through the VSG (Association of Sports and Municipalities), Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF), Netherlands Enterprise Agency (RVO), Kenniscentrum Sport & Bewegen (Expertise Centre for Sport & Exercise), Bouwstenen voor Sociaal, Sportief Opgewekt, etc.
1	2020	Support measures for sports federations initiated by the national government.	Ministry of Health, Welfare and Sport	The BOSA programme is a support programme for sports federations. Extension of the parameters with measures aimed at climate adaptation and the phasing-out of crop protection products
2	1 April 2019	Organize innovation challenge for environmentally friendly sporting grounds	Ministry of Health, Welfare and Sport	Appeal by Small Business Innovation Research (SBIR) for 'high-quality recyclable artificial grass sporting grounds' and publication of 'protection against weeds and other problems encountered on sporting grounds'.
3	2020	IPM manual available	Partners in the sustainable management of sporting grounds (currently the Green Deal partners)	IPM manual available. This applies to crop protection in the natural environment and the use of biocides on artificial grass fields and pitches.
4	2020	Communications plan for the entire sports sector concerning the use of chemical agents; parameters established	Partners in the sustainable management of sporting grounds	The awareness-raising process and professional education programmes include communication across the sports sector on the parameters for the use of chemical agents.
5	2019-2020	Update of training/education, including independent assessment of professional competence	Partners in the sustainable management of sporting grounds	Proof of professional competence through the assessment of independent entities ensures improved knowledge and awareness.
6	2020	Date from baseline measurement is available (to the extent possible); parameters for monitoring established.	Partners in the sustainable management of sporting grounds	Annual usage data available for monitoring, where it has been established how the monitoring is conducted.
7	2020–2022	IPM pilot project based on certification and enforcement	Golfalliantie (Golf Alliance); partners in the sustainable management of sporting grounds (, possibly the Dutch Food and Product Safety Authority [NVWA])	Demonstrate that certification and enforcement result in effective implementation of the DBS plan.
8	2020	Upgrade quality assurance system for sports facilities with sustainability requirements	Partners in the sustainable management of sporting grounds, Dutch Olympic Committee*Dutch Sports Federation (NOC*NSF)	Effective quality assurance system for installing sports facilities. This must be further extended by incorporating sustainability requirements related to circular materials and a phase-out of crop protection products.
9	2020	Investigation into modified contract formats, including a list of exceptions	Partners in the sustainable management of sporting grounds	Essential improvement of contract formats for improved professional competence and verifiability of grounds management

Serial no.	Realized (Year)	Subject	Stakeholders	Notes
10	2021	First evaluation of the Roadmap and GDS plan.	Partners in the sustainable management of sporting grounds	Evaluation of DBS plan, pilot project, update of training and education, and initial monitoring data for reduction in the use of chemical agents. Do any modifications need to be made in order to achieve the goal?
11	1 January 2020	No use of chemical crop protection products	Ministry of Infrastructure and Water Management, Ministry of Health, Welfare and the Environment and partners in the sustainable management of sporting grounds	Elimination of the use of chemical crop protection products, but including a list of alternatives and exceptions.
12	1 January 2023	Ban on the use of chemical crop protection products	Ministry of Infrastructure and Water Management, Ministry of Health, Welfare and the Environment and partners in the sustainable management of sporting grounds	The Ministry of Infrastructure and Water Management aims to eliminate the use of all chemical crop protection products on sporting grounds beyond 2022.
13	2023	100% reduction in the use of chemical crop protection products; second evaluation of the Roadmap.	Partners in the sustainable management of sporting grounds	Evaluation of DBS plan: Are follow-up measures necessary in order to ensure grounds management? Monitoring data available
14	2028	Third interim results. Evaluation of the Roadmap.	Partners in the sustainable management of sporting grounds	Evaluation of DBS plan: Are follow-up measures necessary in order to ensure grounds management? Monitoring data available
15	2030	Fourth interim results. Evaluation of the Roadmap.	Partners in the sustainable management of sporting grounds	Evaluation of DBS plan: Are follow-up measures necessary in order to ensure grounds management? Monitoring data available
16	2035	Fifth interim results. Evaluation of the Roadmap.	Partners in the sustainable management of sporting grounds	Evaluation of DBS plan: Are follow-up measures necessary in order to ensure grounds management? Monitoring data available
17	2040	Sixth interim results. Evaluation of the Roadmap.	Partners in the sustainable management of sporting grounds	Evaluation of DBS plan: Are follow-up measures necessary in order to ensure grounds management? Monitoring data available
18	2045	Seventh interim results. Evaluation of the Roadmap.	Partners in the sustainable management of sporting grounds	Evaluation of DBS plan: Are follow-up measures necessary in order to ensure grounds management? Monitoring data available
19	2049	Eighth interim results.	Partners in the sustainable management of sporting grounds	Evaluation of DBS plan: Are follow-up measures necessary in order to ensure grounds management? Monitoring data available
20	2050	Fully sustainable sports sector in the Netherlands	All stakeholders	

Appendix 3
Baseline Measurement — Principles and supporting amounts

Details on timeline for appropriate replacement times

- **Solar panels:** can be installed on top of buildings during the period from 2020 to 2050. As our basis for calculating the scenarios, we used a consistent investment throughout the years.
- **Solar energy collectors:** these are installed in order to meet the need for hot tap water. This measure is incorporated into scenario 4 and will replace the purchase of (new) electric boilers.
- **LED lighting:** used from now in all buildings at appropriate replacement times. It is likely that existing lighting in all buildings must be replaced by 2030, as they have ended their technical lifespan. Reinvestment in new lighting has not been factored in; the assumption is that this is incorporated into existing budgets and maintenance plans.
- The transition to LED lamps for field lighting is not included in the final totals, but is added to the baseline measurement as a separate calculation.
- **Electric boilers:** these are used to replace conventional boilers. Since the use of all fossil fuels will be banned by 2030, the measure must also have been implemented everywhere by 2030.
- **High-efficiency glazing:** In existing buildings, single glazing will be replaced with high-efficiency glazing at appropriate replacement times, i.e. when buildings are 50 years old. Between now and the end of 2050, it is expected that high-efficiency glazing will be installed in a large number of buildings.
- **Heat grids:** buildings that are not yet heated with all-electric heating by 2030 will be connected to a heat grid. The costs of connection to the heat grid for sports associations and owners of the sports facilities are included. The costs of installing heat grids and heat sources are not included.
- **Heat pumps:** will be used prior to 2030 in buildings constructed after 1992. Under the Building Decree, insulation is sufficient for heating buildings through the use of heating pumps. In all other buildings, heat pumps can be installed after 2030, since these buildings will be sufficiently insulated at that time.
- **Roof insulation:** Between now until the end of 2050, roof insulation will be used in all buildings constructed prior to 2000, since the technical lifespan of roofs in these buildings is expected to have ended after 50 years. The replacement of roofs can be combined in this case with the use of roof insulation. In the other buildings, additional roof insulation can be used if necessary and if roofs are replaced.
- **Facade insulation:** This can be used in buildings constructed prior to 1992, since these buildings are less insulated under the Building Decree. It would make sense to do this prior to 2030, since that is when all buildings must be either heated with electric power or connected to the heat grid. It is possible to use additional insulation in newer buildings if this can be incorporated when replacing the facades. Note that this is not expected to happen on a large scale before 2050, and these costs are therefore not included.

Principles of DSA/database:

- If multiple clubs/associations use a single facility, the baseline measurement will include one facility.
- Surface areas of sports facilities are based on the Basisregistratie Adressen en Gebouwen (Addresses and Buildings Key Registry/BAG).
- Very large-sized facilities have been filtered out. An assumption was made to this end of the number of square metres based on the average for each sports sector and the number of fields/pitches/sports centres.
- User function of hockey, tennis and football (soccer) facilities is 'meeting place', as these often represent cafeterias and dressing rooms.
- The remaining sports facilities have the user function 'sport'.
- Not all facilities are included in the calculation (e.g. golf clubs). However, a minimum of 90% of the sports facilities has been mapped out, by focusing on the seven largest categories.
- Gymnasiums are not included as sports facilities, as these are often part of other types of facilities, such as schools.
- If the year of construction of a sports facility is unknown and no data is available from the Land Registry, the year of construction of 1965 has been used as a basis.

Total investment in buildings	€3,513,389,749
Total investment in sporting	€137,284,138
grounds Total Gross	15109532
Lettable Area	

Total amounts by category	**Investments**	**Savings**	**TVT**
Swimming	€1,133,615,578	€161,077,251	7.0
Indoor sports facility	€781,480,764	€47,903,461	16.3
Football	€353,089,905	€33,670,711	10.5
Tennis	€270,412,935	€22,141,835	12.2
Fitness	€875,690,501	€85,875,132	10.2
Ice-skating rinks	€37,713,105	€4,349,036	8.7
Hockey	€61,386,960	€6,090,486	10.1
Total/average	€3,513,389,749	€361,107,912	9.7

Average per building	**Investment, broken down by facility**	**Gross Lettable Area, broken down by facility**
Football	€155,890	639
Hockey	€175,391	739
Tennis	€128,340	789
Indoor sports facility	€382,516	2,565
Swimming	€1,372,416	3,264
Ice-skating rinks	€1,639,700	5,228
Fitness	€339,942	1,431

Appendix 4
Alternatives — 4 scenarios

Various scenarios for choosing a sustainable approach for each Roadmap

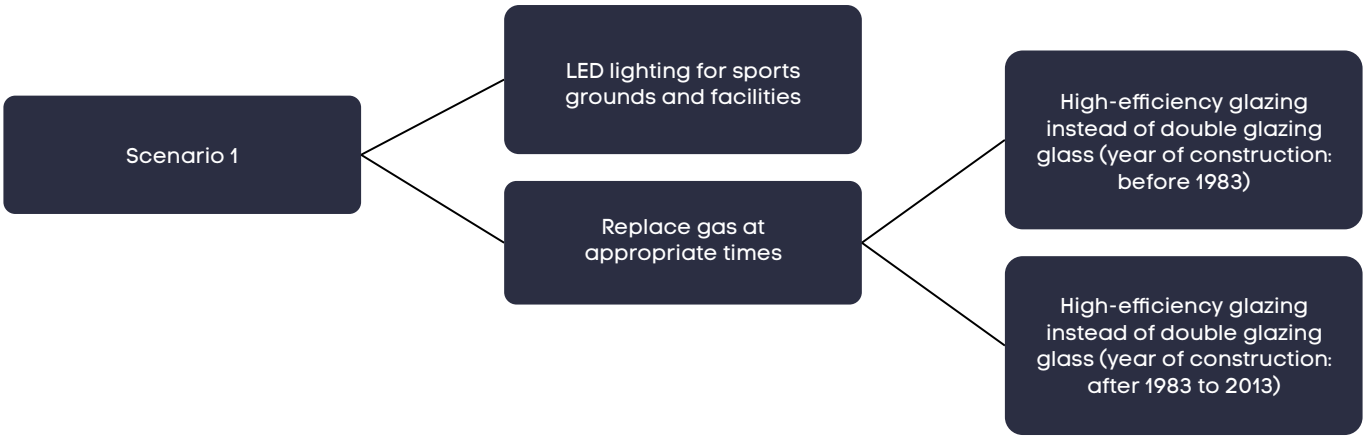
- Scenario 1: The existing budgets determine to what extent and at what pace sustainability measures can be implemented. Measures such as LED lighting, and replacement of single glazing.

- Scenario 2: Building-related energy will be reduced by 25-35% between 2018 and 2050, and the remaining building-related demand for energy will be filled without the use of natural gas.
  Measures for facilities without the use of natural gas (insulation, heat pumps or connection to the heat grid and electric boilers).

- Scenario 3: Building-related energy will be reduced by 45-55% between 2018 and 2050, and the remaining building-related demand for energy will be filled without the use of natural gas.
  Measures for additional energy generation (solar panels).

- Scenario 4: Building-related energy will be reduced by 70-90% between 2018 and 2050, and the remaining building-related demand for energy will be filled without the use of natural gas.
  Measures for all-electric facilities and additional energy generation (solar panels) and use of solar energy collectors.

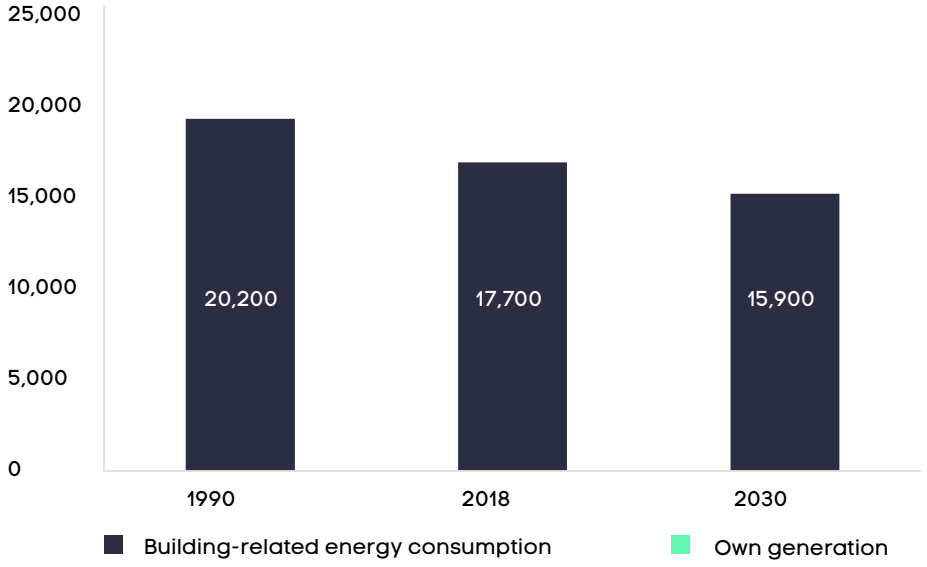
Improving sustainability based on existing budgets (scenario 1)



Basis for Scenario 1 (Author: RVO (NETHERLANDS ENTERPRISE AGENCY))
The basis is that the existing budgets determine to what extent and at what pace sustainability measures can be implemented. For 2030 and 2050, this scenario provides data on:

- Estimated actual building-related energy consumption, including energy generation on a plot of land;
- Reduction in the use of fossil fuels for the purpose of building heating (2030 only)

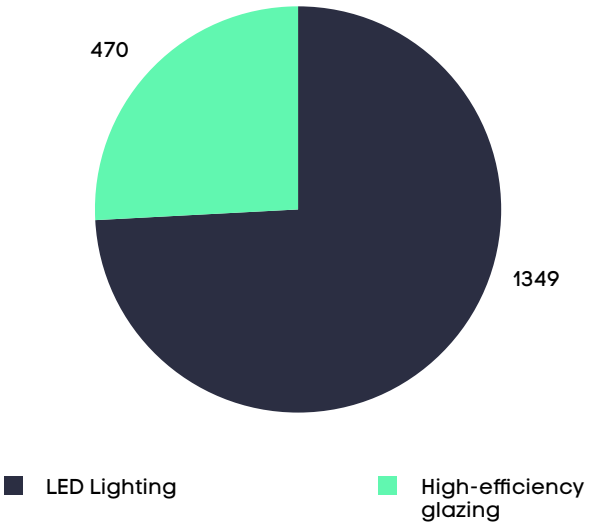
Estimated actual building-related energy consumption, including energy generation on a plot of land (expressed in TJ)



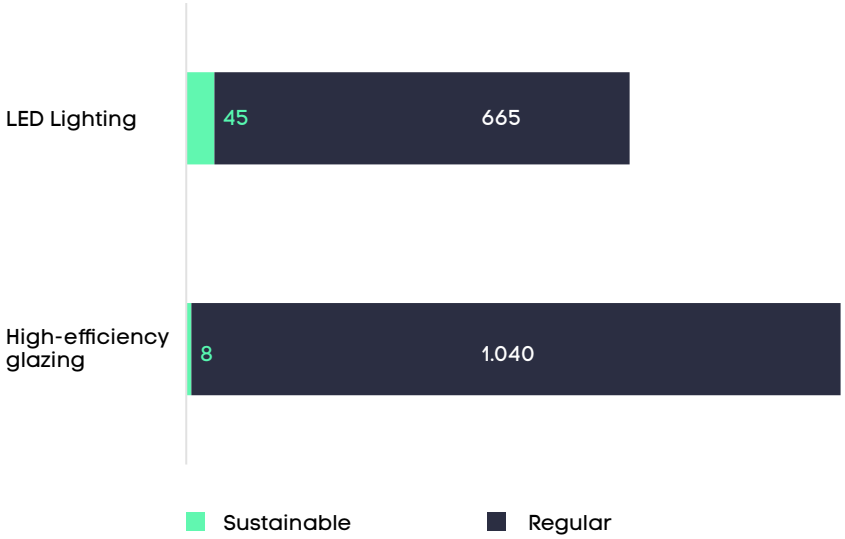
Basic conditions

- **LED lighting**
  - **Used in all buildings before 2030**
- **High-efficiency glazing**
  - **Buildings constructed before 1983 are currently equipped with single glazing and will be fitted with high-efficiency glazing**
  - **Buildings constructed in or after 1983 are currently equipped with double glazing and will be fitted with high-efficiency glazing**
  - **Buildings constructed in or after 2013 are already equipped with high-efficiency glazing**

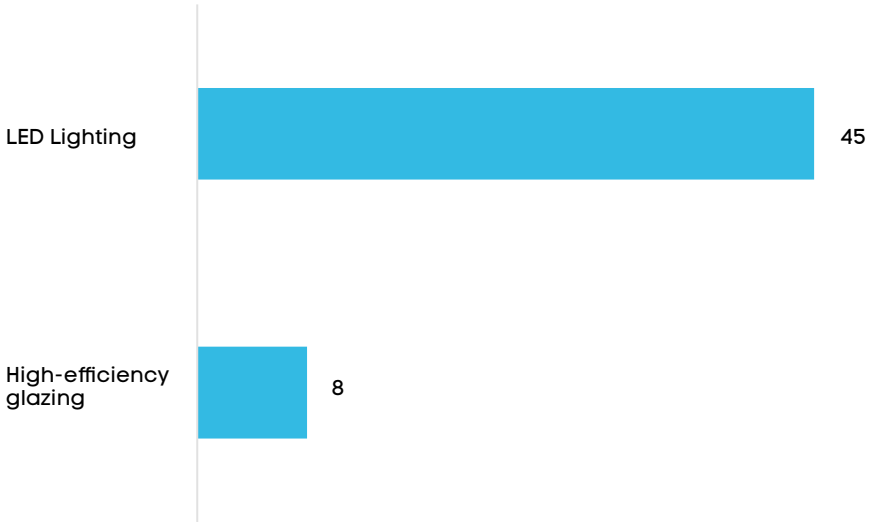
Reduction in the use of fossil fuels (including building heating) (TJ)



Investments per measure (million €)



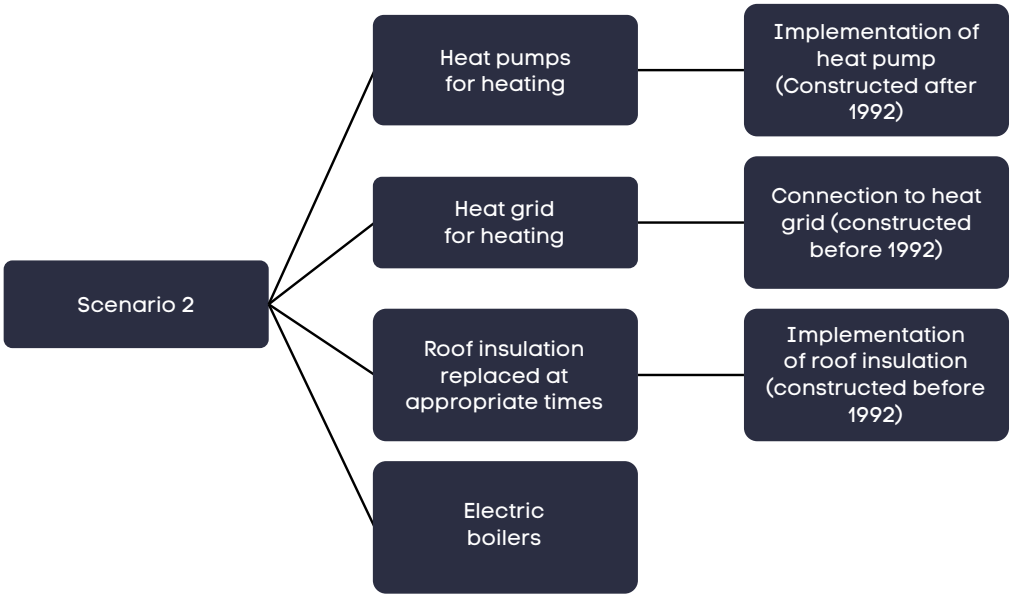
Energy savings per measure (million €)



Basic conditions

- **LED lighting**
  - **Used in all buildings before 2030**
- **High-efficiency glazing**
  - **Buildings constructed before 1983 are currently equipped with single glazing and will be fitted with high-efficiency glazing**
  - **Buildings constructed in or after 1983 are currently equipped with double glazing and will be fitted with high-efficiency glazing**
  - **Buildings constructed in or after 2013 are already equipped with high-efficiency glazing**

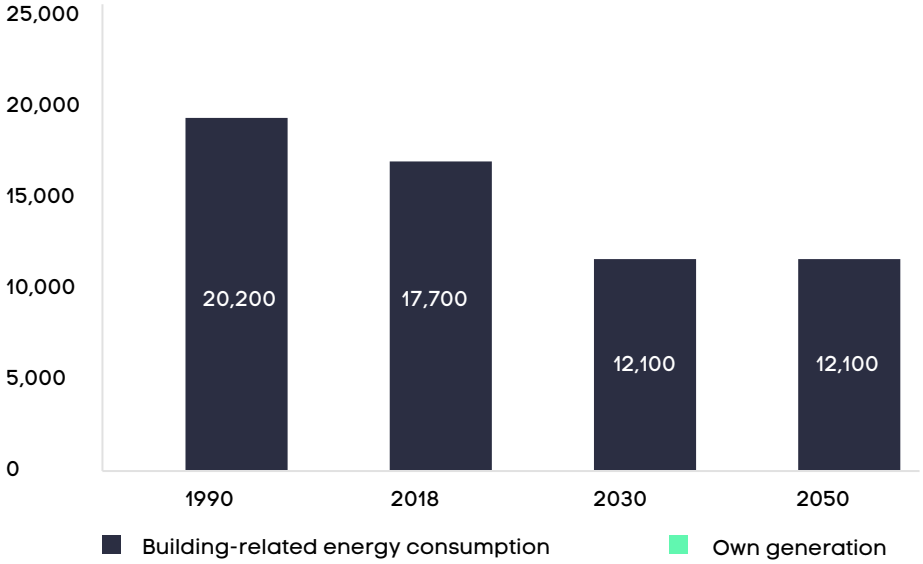
Building-related energy will be reduced by 25-35% and buildings will use no natural gas (scenario 2)



Basis for Scenario 2 (Author: RVO (NETHERLANDS ENTERPRISE AGENCY))
This is based on the assumption that investments will increase, so that building-related energy will decrease by 25-35% between 2018 and 2050 and the remaining building-related demand for energy will be met without the use of natural gas (or fossil fuel, if this is preferred). For 2030 and 2050, this draft scenario provides data on:

- Estimated actual building-related energy consumption, including energy generation on a plot of land (2030 only);
- Reduction in the use of fossil fuels for the purpose of building heating (2030 only);
- The associated costs (i.e. investments less reduced energy costs)

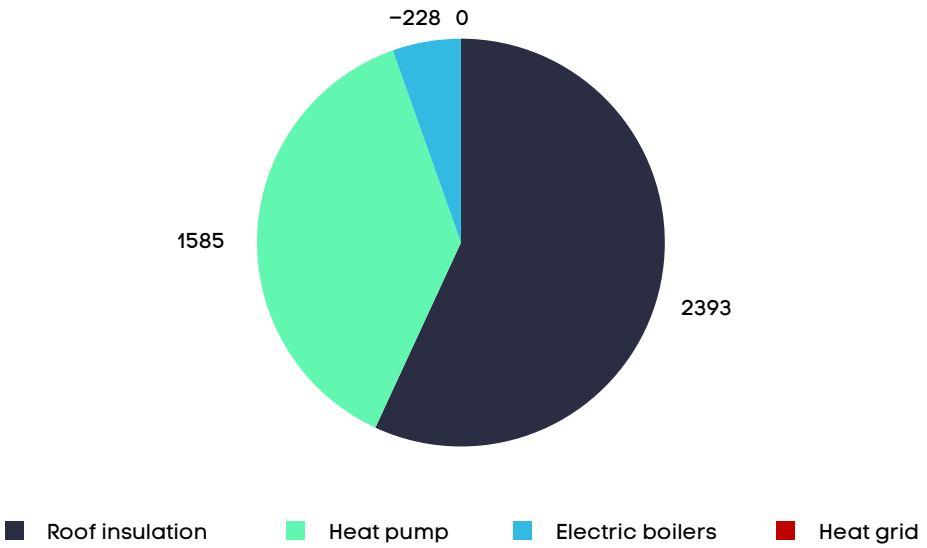
Estimated actual building-related energy consumption, including energy generation on a plot of land



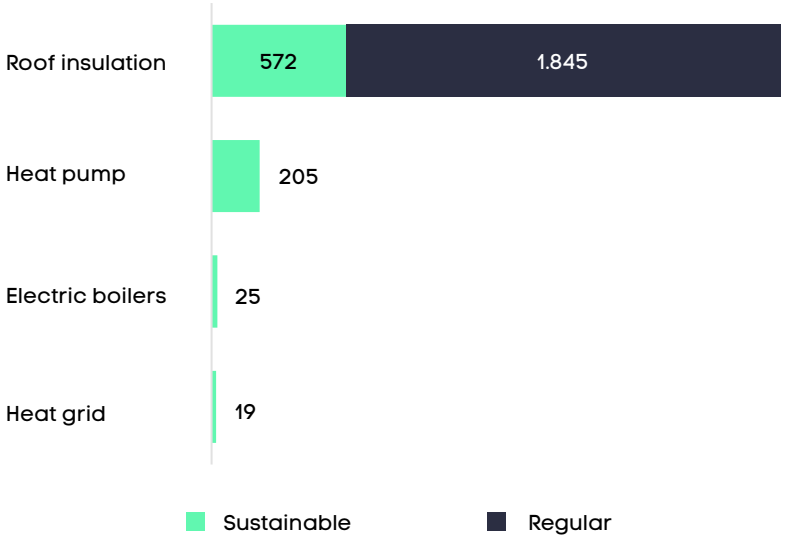
Basic conditions

- **Heat grid**
  - **Buildings constructed before 1992 will be connected to a heat grid**
- **Heat pump**
  - **Buildings constructed before 1992 will install a heat pump**
- **Roof insulation**
  - **Use at appropriate times (50 years after the year of construction), i.e. all buildings constructed before 2000**
- **Electric boilers**
  - **Replace current gas boilers with electric boilers**

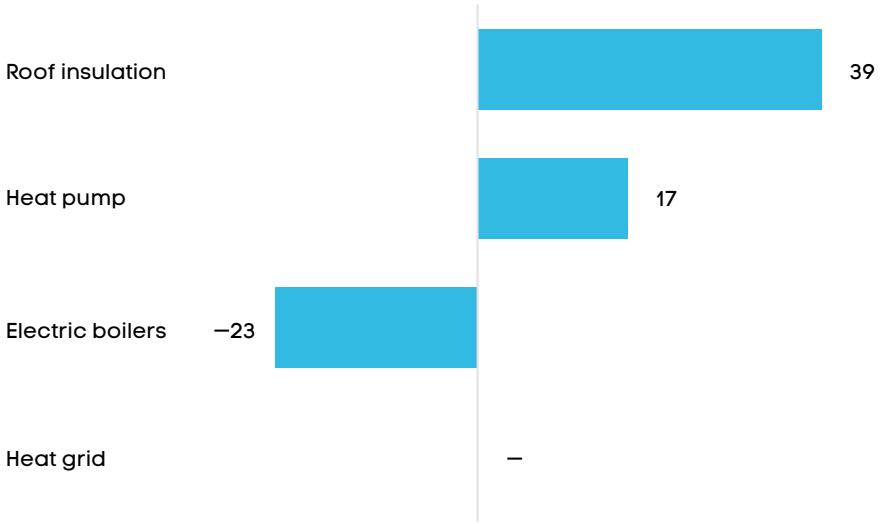
Reduction in the use of fossil fuels (including building heating) (TJ)



Investments per measure (million €)



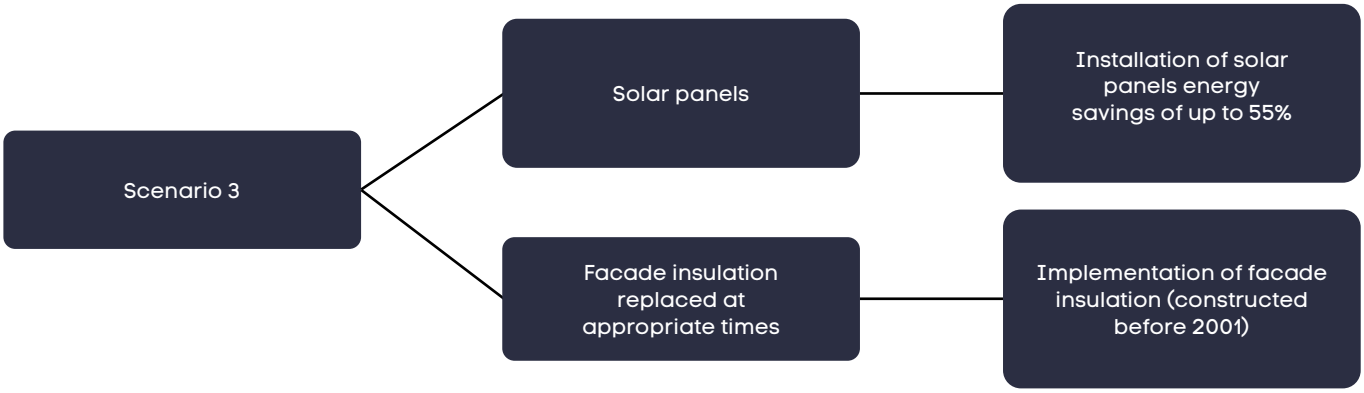
Energy savings per measure (million €)



Basic conditions

- **Heat grid**
  - **Buildings constructed before 1992 will be connected to a heat grid**
- **Heat pump**
  - **Buildings constructed before 1992 will install a heat pump**
- **Roof insulation**
  - **Use at appropriate times (50 years after the year of construction), i.e. all buildings constructed before 2000**
- **Electric boilers**
  - **Replace current gas boilers with electric boilers**

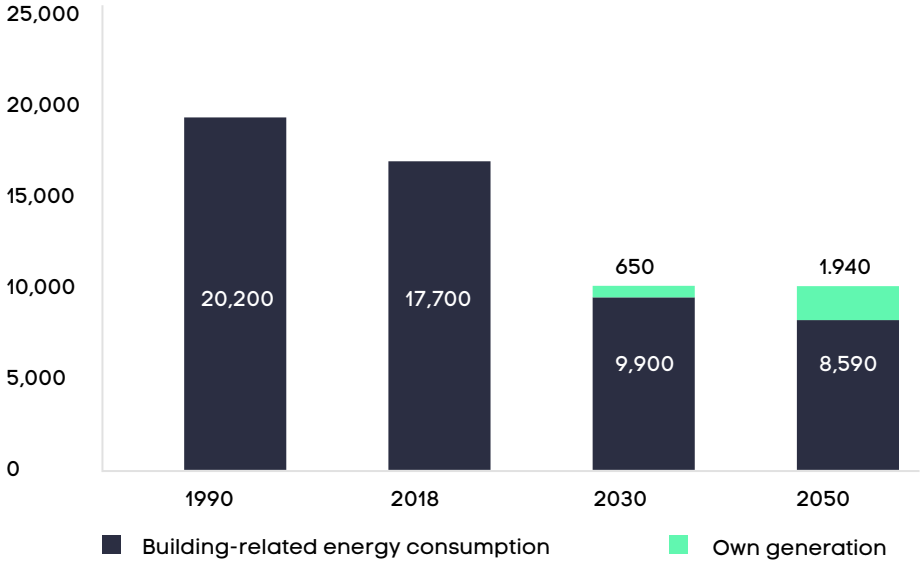
Building-related energy will be reduced by 45-55% and buildings will use no natural gas (scenario 3)



Basis for Scenario 3 (Author: RVO (NETHERLANDS ENTERPRISE AGENCY))
This is based on the assumption that investments will increase, so that building-related energy will decrease by 45-55% compared to 2018 and the remaining building-related demand for energy will be met without the use of natural gas (or fossil fuel, if this is preferred).
For 2030 and 2050, this draft scenario provides data on:

- Estimated actual building-related energy consumption, including energy generation on a plot of land (2030 only)
- Reduction in the use of fossil fuels for the purpose of building heating (2030 only)
- The associated costs (i.e. investments less reduced energy costs).

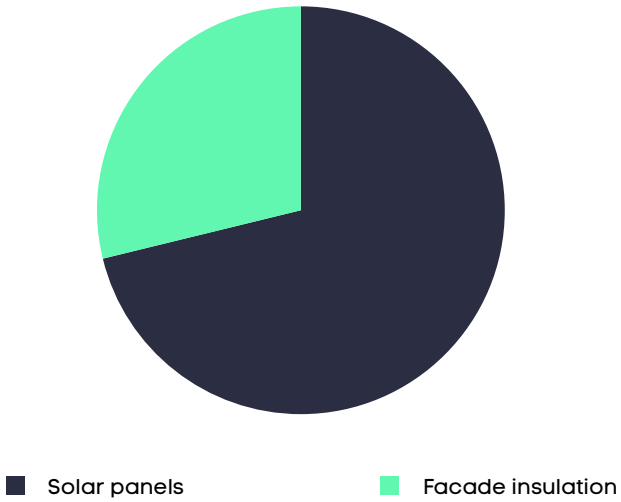
Estimated actual building-related energy consumption, including energy generation on a plot of land



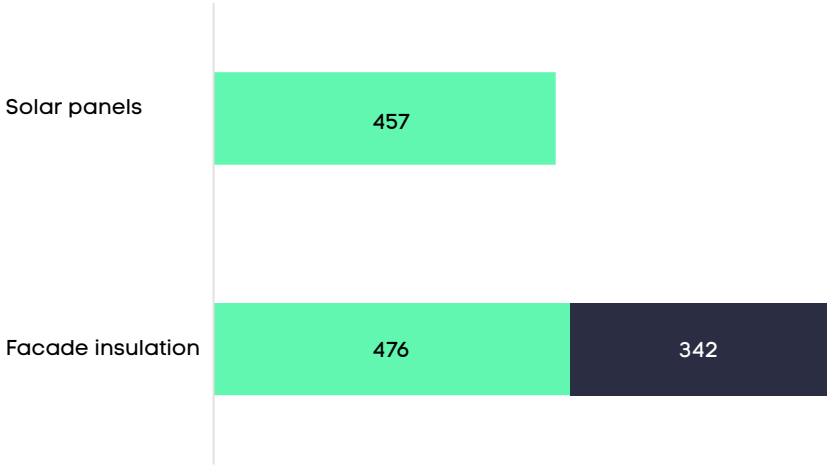
Basic conditions

- **Solar panels**
  - **40% of the energy required is generated by solar panels**
- **Facade insulation**
  - **Use at appropriate times (50 years after the year of construction), i.e. all buildings constructed before 2000**

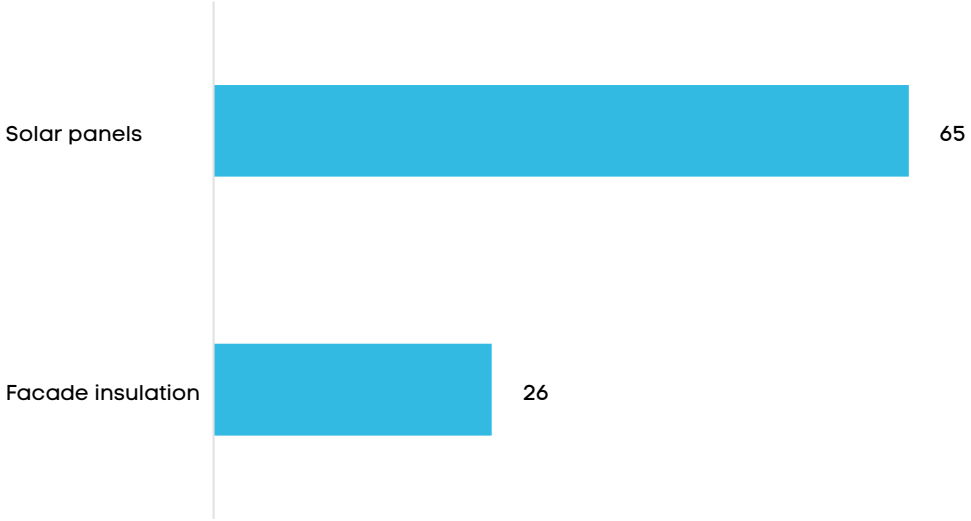
Reduction in the use of fossil fuels (including building heating) (TJ)



Investments per measure (million €)



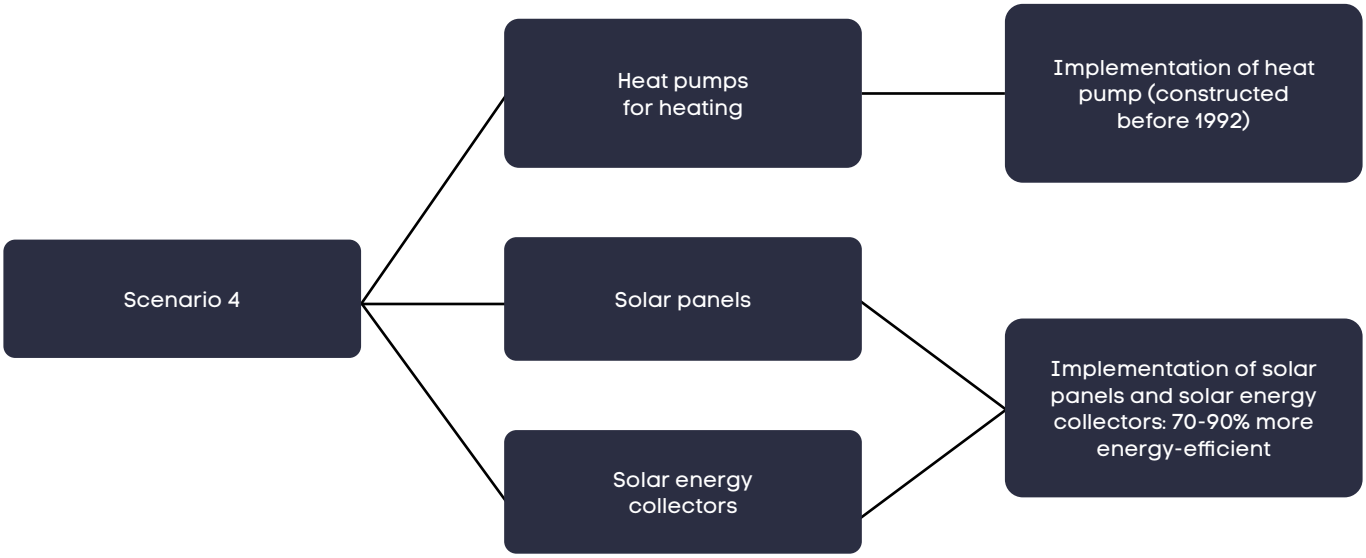
Energy savings per measure (million €)



Basic conditions

- **Solar panels**
  - **40% of the energy required is generated by solar panels**
- **Facade insulation**
  - **Use at appropriate times (50 years after the year of construction), i.e. all buildings constructed before 2000**

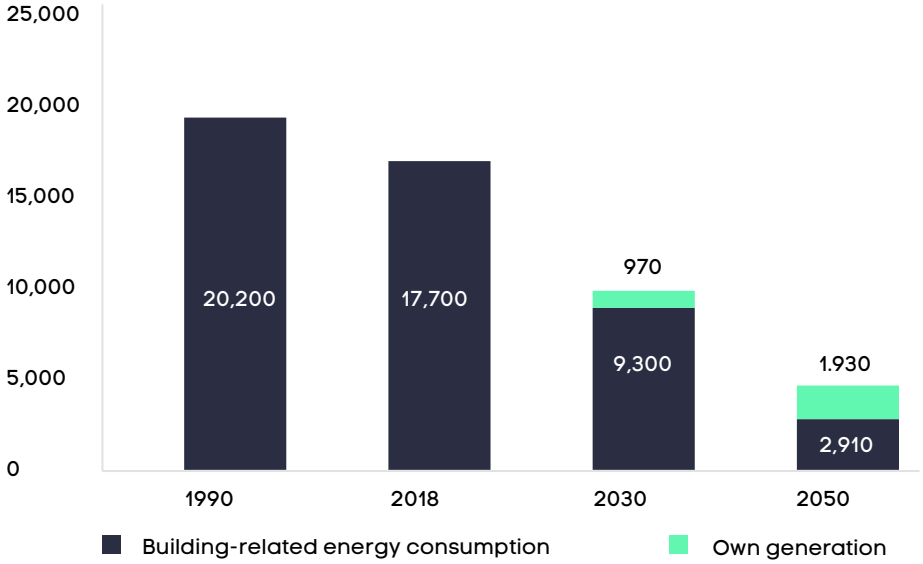
Building-related energy will be reduced by 70-90% and buildings will use no natural gas (scenario 4)



Basis for Scenario 4 (Author: RVO (NETHERLANDS ENTERPRISE AGENCY))
This is based on the assumption that investments will increase, so that building-related energy will decrease by 75-85% compared to 2018 and the remaining building-related demand for energy will be met without the use of natural gas (or fossil fuel, if this is preferred).
For 2030 and 2050, this draft scenario provides data on:

- Estimated actual building-related energy consumption, including energy generation on a plot of land (2030 only);
- Reduction in the use of fossil fuels for the purpose of building heating (2030 only);
- The associated costs (i.e. investments less reduced energy costs).

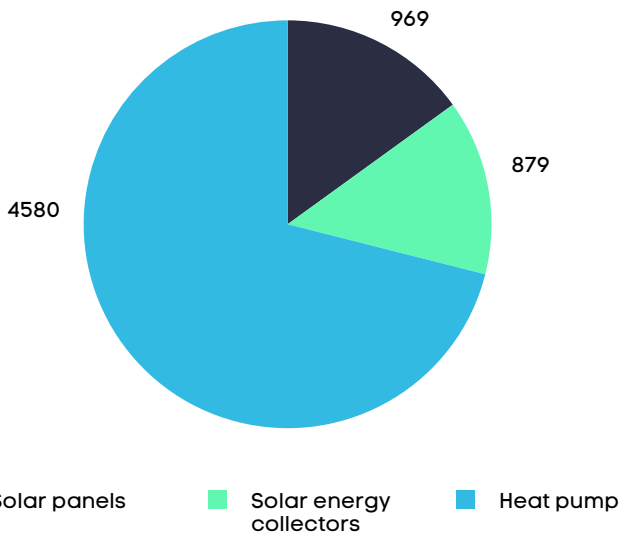
Estimated actual building-related energy consumption, including energy generation on a plot of land



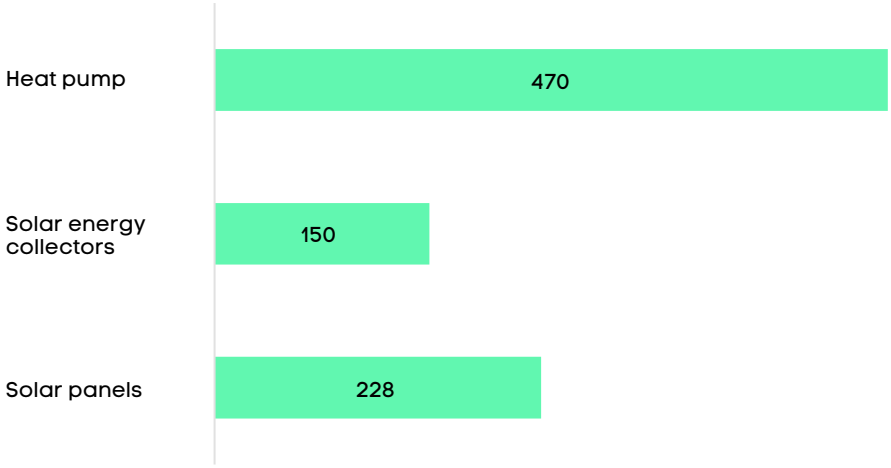
Basic conditions

- **Heat pump**
  - **Buildings constructed after 1992 will install a heat pump**
- **Solar panels**
  - **70% of the energy required is generated by solar panels**
- **Solar energy collectors**
  - **Full hot tap-water facility using solar energy collectors**

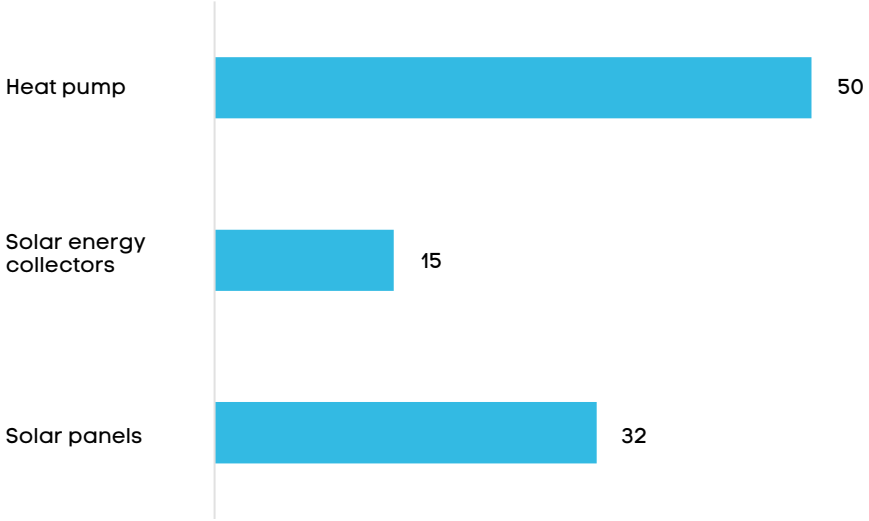
Reduction in the use of fossil fuels (including building heating) (TJ)



Investments per measure (million €)



Energy savings per measure (million €)



Basic conditions

- **Heat pump**
  - **Buildings constructed after 1992 will install a heat pump**
- **Solar panels**
  - **70% of the energy required is generated by solar panels**
- **Solar energy collectors**
  - **Full hot tap-water facility using solar energy collectors**

Basic conditions for the 4 scenarios (1)

Improved sustainability of sporting facilities:

- These investments represent the actual sustainability investments. Additional investments for, for example, structural modifications to the building or the replacement of heating supply systems are only included for each scenarios and not in the comprehensive overview.
- Several measures have been incorporated for the existing sports facilities. Note that any measures previously implemented/already in place have not been taken into account.
- The measure regarding LED lighting for fields and pitches has not been included for all existing sports facilities. However, field lighting has been added as a separate calculation for facilities for outdoor sports, without factoring in the possibility that LED lighting has already been installed.
- The sustainability measures implemented at fitness centres/gyms are based on the similar installation-based facilities found in sports centres.
- Regular replacement investments such as maintenance are not included in the investment.
- Maintenance and operating costs are not included in the investment.
- CSR Manager was used to calculate the various scenarios, plus approximately 400 on-site scans of the various local and provincial authorities and De Groene Club (association founded by the Royal Dutch Football Association to support football clubs in implementing sustainability measures.
- The process of improving the sustainability of individual facilities is based on the year of construction, factoring in any previously implemented measures and renovations carried out, ensuring that the new measures are carried out at an appropriate time.
- The specific conditions for each scenario are outlined in the images starting on page 64.

Sustainability measures by scenario:

Scenario 1

- LED lighting
  Used in all buildings before 2030
- High-efficiency glazing
  Buildings constructed before 1983 are currently equipped with single glazing and will be fitted with high-efficiency glazing o Buildings constructed after 1983 are equipped with double glazing and will be fitted with high-efficiency glazing Buildings constructed in or after 2013 are already fitted with high-efficiency glazing.

Scenario 2

- Heat grid
  Buildings constructed before 1992 will be connected to a heat grid Heat pump Buildings constructed after 1992 will install a heat pump
- Roof insulation
  Use at appropriate times (50 years after the year of construction), i.e. all buildings constructed before 2001
- Electric boilers
  Replace current gas boilers with electric boilers

Scenario 3

- Solar panels
  40% of the energy required is generated by solar panels
- Facade insulation
  Use at appropriate times (50 years after the year of construction), i.e. all buildings constructed before 2001

Scenario 4

- Heat pump
  Buildings constructed after 1992 will install a heat pump
- Solar panels
  70% of the energy required is generated by solar panels
- Solar energy collectors
  Full hot tap-water facility using solar energy collectors

Conditions for energy-saving measures in the alternative scenarios versus the baseline measurement for Measures

High-efficiency glazing

- The baseline measurement did not assume that the window frames would be replaced, except for buildings constructed prior to 1965 with single gas in a metal frame. In the majority of cases, the window frame will need to be replaced. As a result, the price per square metre is higher in the baseline measurement than in the scenario calculation, due to the addition of the regular costs. The regular costs include the replacement of the window frame.

Facade insulation

- The baseline measurement factored in cavity-wall insulation. The scenarios calculations are based only on interior-wall insulation. This has caused investments to increase substantially.

Solar panels

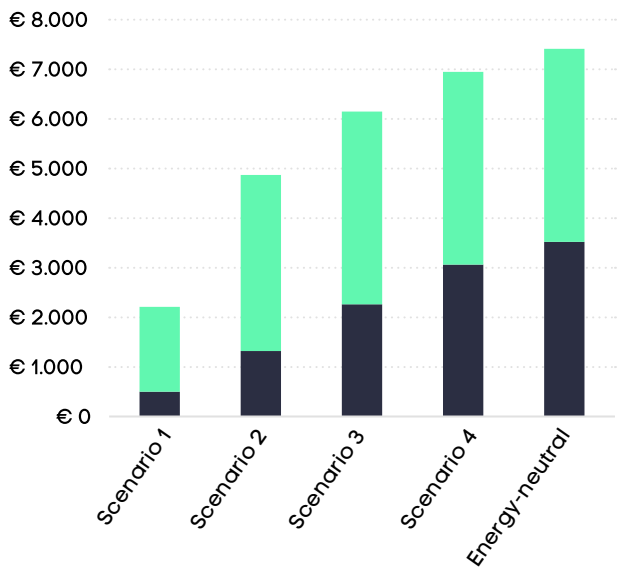
- Total investment in solar panels has increased. This is due in part to the fact that the calculations per property were calculated even more accurately, in order to better be able to assess the scenarios. Calculations are made for each individual property in order to be able to achieve the objectives. This means each individual property can be made energy-neutral.

New DSA

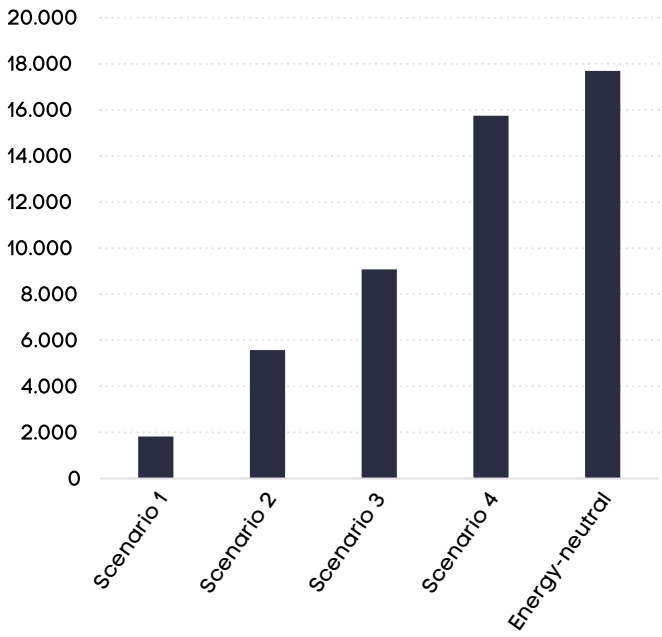
- For the scenario calculation, a new version was used of the DSA of the Mulier Institute. The main changes are the addition of a large number of fitness centres and changes to the surface areas of various facilities.

The total sustainability investment for energy-neutral buildings is €3.5 billion; this results in energy savings of up to approx. 18,000 TJ and €360 million savings on energy costs

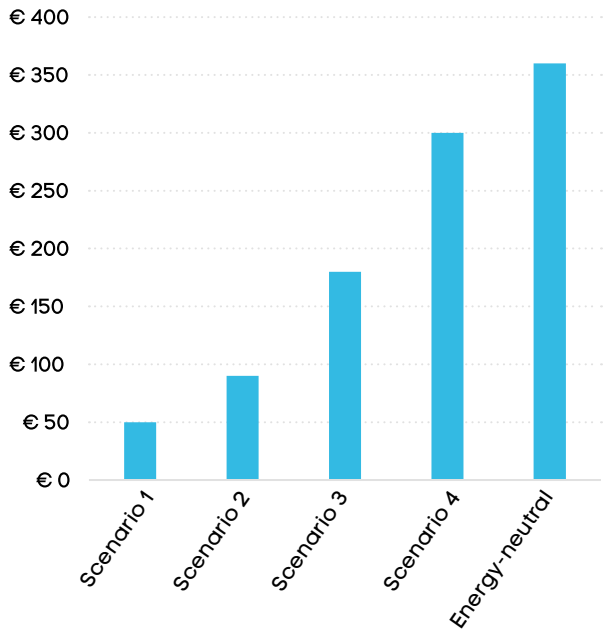
Investment (million €)



Savings (TJ)*



Savings (million €)*

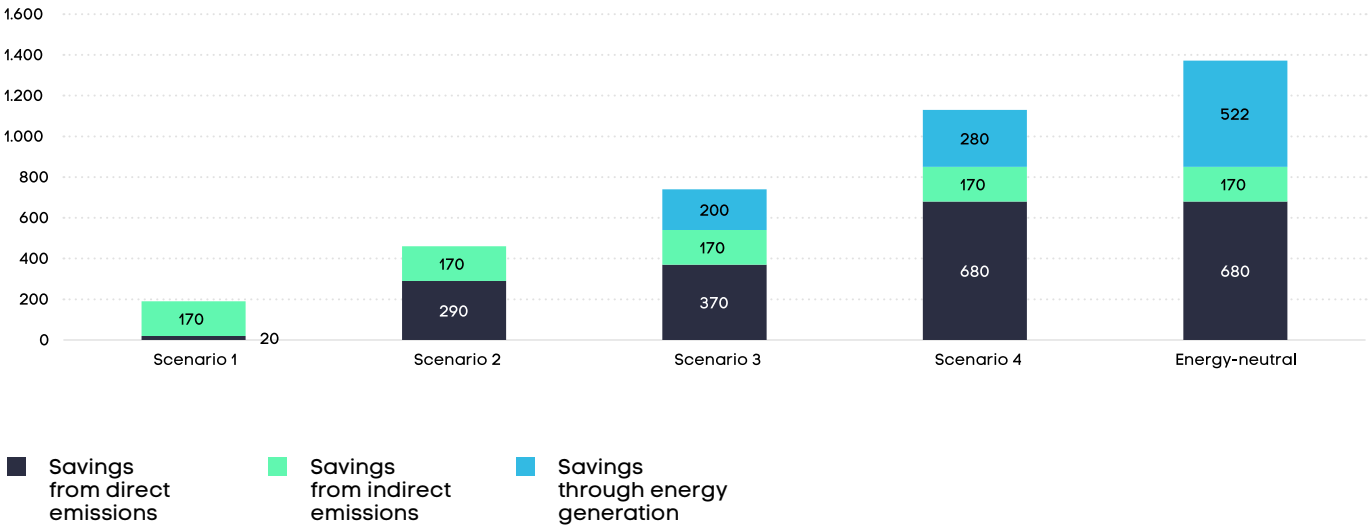


* savings represent maximum savings per year once all the measures have been implemented

Return on sustainability investment

Total carbon reduction can increase to nearly 1,400 kilotons if the entire sector becomes energy-neutral

Total carbon savings for each scenario (in kilotons)



Basic conditions
Direct emission savings through gas savings
Savings from indirect emissions due to savings on electric power
Savings due to energy generation from the installation of solar panels