



Netherlands Enterprise Agency

Long-Term Renovation Strategy

En Route to a low-CO₂ Built Environment

Date	6 March 2020
Status	Final

This document has been drawn up by the Netherlands Enterprise Agency on behalf of the Ministry of the Interior and Kingdom Relations.

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Long-Term Renovation Strategy: En Route to a low-CO₂ Built Environment

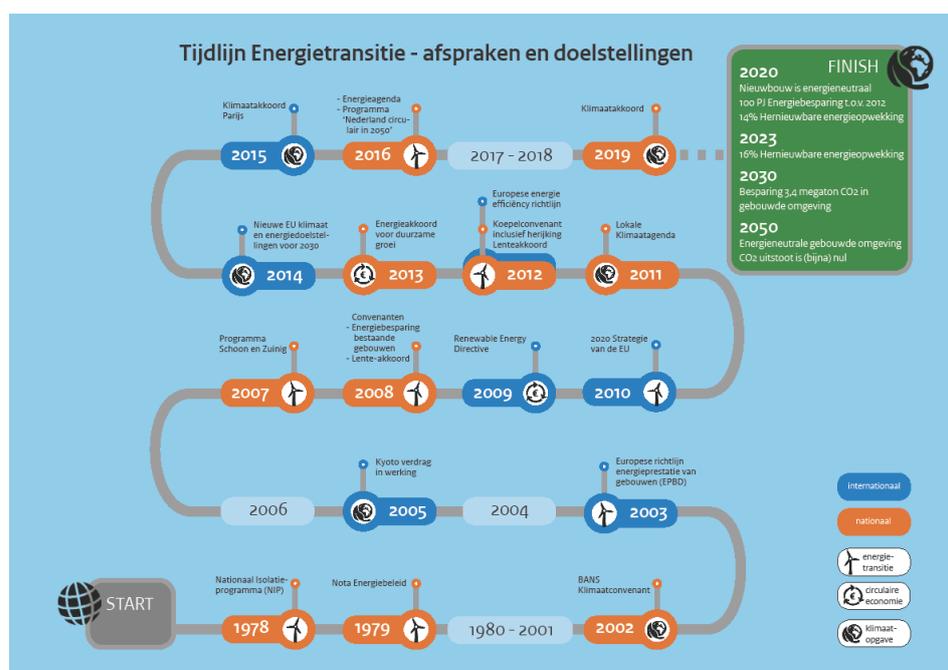
Part A: Overview of the Dutch approach

1 Introduction

1.1 En route to a low-CO₂ built environment

In the Paris Climate Agreement of 2015 nearly two hundred countries agreed to limit global warming to less than two degrees Celsius relative to pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. The Netherlands is determined to make a substantial contribution to this, by emitting 49% less greenhouse gases (GHGs) in 2030 than in 1990, and 95% less by 2050.

Dutch climate and energy policy has a long history. The Government has been working since as long ago as the 1970s on saving energy, including in the built environment. In establishing such policies, the Dutch Government has always left an important place for consultation with partners in the sectors that have to do with energy and GHG emissions.



The figure shows the first steps in the Dutch climate policy for the built environment and the steps in the last ten years. In the meantime, many other steps have of course also been taken, but for ease of reading they are omitted from this figure.

Tijdelijk Energietransitie – afspraken en doelstellingen	Energy transition timeline – agreements and objectives
Klimaatakkoord Parijs	Paris Climate Agreement
Energieagenda	Energy Agenda
Programma 'Nederland circulair in 2050'	'Netherlands circular by 2050' programme
Nieuwe EU klimaat en energiedoelstellingen voor 2030	New EU climate and energy objectives for 2030
Energieakkoord voor duurzame groei	Energy agreement for sustainable growth
Europese energie efficiency richtlijn	EU Energy Efficiency Directive
Koepelconvenant inclusief herijking Lenteakkoord	Umbrella covenant including review of the Spring Agreement
Lokale Klimaatagenda	Local Climate Agenda
Programma Schoon en Zuinig	'Clean and Thrifty' Programme
Convenanten	Covenants
Energiebesparing bestaande gebouwen	Energy saving existing buildings
Lente-akkoord	Spring Agreement
Renewable Energy Directive	Renewable Energy Directive
2020 Strategie van de EU	2020 EU strategy
Kyoto verdrag in werking	Kyoto protocol in operation
Europese richtlijn energieprestatie van gebouwen (EPBD)	EU Energy Performance of Buildings Directive (EPBD)
START	START
Nationaal Isolatie-programma (NIP)	National Insulation Programme (NIP)
Nota Energiebeleid	Memorandum on Energy Policy
BANS Klimaatconvenant	BANS Climate Covenant
FINISH	FINISH
2020	2020
Nieuwbouw is energieneutraal	Newbuild energy-neutral
100 PJ Energiebesparing t.o.v.2012	100 PJ energy saving relative to 2012
14% Hernieuwbare energieopwekking	14% renewable energy generation
2023	2023
16% Hernieuwbare energieopwekking	16% renewable energy generation
2030	2030
Besparing 3.4 megaton CO2 in gebouwde omgeving	Saving of 3.4 megatons of CO ₂ in built environment
2050	2050
Energie neutrale gebouwde omgeving CO2 uitstoot is (bijna) nul	Energy-neutral built environment CO ₂ emissions (almost) zero
International	International
National	National
Energie-transitie	Energy transition
Circulaire economie	Circular economy
Klimaat-opgave	Climate task

That dialogue has always been an important input for drawing up national legislation and programmes, such as the National Insulation Programme of 1978 for example. Later the dialogue with the partners led to many covenants and multi-year agreements on energy savings, in which partners undertook to make efforts. This was the case with industry and other businesses, and also with organisations in the built environment. The Government concluded such covenants particularly in the

rental and non-residential sectors, for example with housing associations in the social rental sector.

In 2011 the cabinet's Local Climate Agenda already showed that the Government, municipalities, provinces and water boards were determined to work together to attain national and European objectives in the area of climate and sustainability. In 2013 the Netherlands took a further step towards this with the signing of an Energy Agreement among administrations and dozens of partners, organisations and branches.

1.2 The Climate Agreement

As a follow-up to the Energy Agreement, the cabinet decided in 2017 to put the broader Climate Agreement in place. The central commitment was for the Netherlands to emit 49% less GHGs in 2030 than in 1990, with the further ambition of reaching 95% less emissions by 2050.

On 23 February 2018 the broad social dialogue on this Climate Agreement began. The cabinet opted for an inclusive approach by involving a large number of organisations, businesses and citizens' representatives. This found expression in five climate committees - for Electricity, Industry, Agriculture and Land Use, Built Environment, and Mobility - plus the overarching Climate Council. Additionally, working groups were set up for 'transversal' subjects such as Innovation, Financing, Labour Market and Training, and Regional Energy Strategies.

In the summer of 2019, after more than a year of negotiations, the parties and parliament concluded the Climate Agreement. In it, central government, other public bodies, businesses, nature and environmental organisations, trade unions and other social parties made hundreds of agreements on the transition to a climate-neutral society and reliable, affordable, safe and low-CO₂ energy supply by 2050.

The agreement contains measures that the cabinet actively facilitates or takes itself. It also contains agreements between parties in which the cabinet has no active role. Both are important in order to attain the common goal. The long-term perspective of the Climate Agreement makes a gradual transition possible, prevents shock effects and ensures that the Netherlands can also take advantage of economic opportunities.

All involved parties realise that the transition affects everyday life and is first and foremost a social transition. Citizens and businesses are faced with decisions that influence how we live, how we move about, what we eat, the products we buy and how we earn our money. These are not always easy choices, with citizens and businesses depending on each other and on the government. The transition can only be achieved by combining energy, investment, knowledge and skill.

1.3 Long-Term Renovation Strategy

This Long-Term Renovation Strategy describes how the Netherlands gives substance to the climate transition in the built environment. This strategy meets the requirements of the Energy Performance of Buildings Directive (EPBD). It gives a coherent picture of the broad palette of measures that the Netherlands brings to bear in order to achieve a low-CO₂ built environment by 2050.

This part (A) of the strategy gives an overview in broad lines of the Dutch approach to the built environment and explains a few major points. The second part (B) takes a more in-depth look at the Dutch approach. It also shows the interdependence

between existing instruments for making the built environment more sustainable, which will continue to have an effect in the coming years, and new instruments deriving from the acceleration of the approach agreed in the Dutch Climate Agreement. This second part consists of various chapters in which the Dutch approach is presented by segment, in accordance with the legislative requirements (see introduction to part B for the precise structure).

A summary of the agreements for the built environment in the Dutch Climate Agreement is attached as an appendix to this strategy.

2 Summary of the Dutch Policy

With the Climate Agreement the Netherlands committed to buildings that no longer consume gas. This also eliminates direct CO₂ emissions from buildings. Newbuild will very soon comply; but the biggest challenge is posed by existing buildings. They need deep renovation between now and 2050.

Direct CO₂ emissions from buildings in the Netherlands come almost exclusively from gas-fired heating. There are also indirect emissions from electricity generation. So, for a CO₂-free built environment it is necessary to switch to clean electricity and phase out the use of gas. The transition to clean electricity is taking place both within and beyond the built environment. Within the built environment and in the region the focus is on local generation of renewable electricity from solar (PV panels) and wind sources. At the same time nationally electricity production is being made greener, for example by building large offshore wind farms.

2.1 Mix of measures

Dutch policy encompasses a broad palette of measures, with a mix of thematic and targeted instruments. There are both measures promoting short-term cost-effective energy saving interventions in buildings and measures making deep renovation of buildings possible. There are existing measures that remain in place and new measures from the Climate Agreement which accelerate the approach towards a low-CO₂ built environment. The policy motivation for this acceleration is a reduction in CO₂ emissions, with the CO₂ target taking priority and the instruments and measures being adjusted as and when necessary. All sectors within the built environment must become greener in order to contribute to the desired reduction in emissions.

The Dutch policy has been constructed from a few thematic elements and three sector approaches. Each segment contains existing and new measures. The existing measures are mainly aimed at the implementation of cost-effective improvements and the exploration of the approach to deep renovations. The new measures are primarily aimed at deep renovation and making the built environment gas-free. The overview in the following section gives a picture of the instruments by segment.

Thematic instruments are intended to create an environment that stimulates investments in energy saving and reduction of CO₂ emissions; sub-sector measures are aimed more at addressing specific aspects within such sub-sectors. This section contains an overview of the policy initiatives by theme and by sub-sector, in order to show the breadth of the Dutch approach. Part B of this report deals specifically with the various aspects required in a national Long-Term Renovation Strategy and in doing so gives a cross-section view of the Dutch policy on these subsidiary aspects.

Thematic instruments break down into instruments aimed at a regionally oriented approach to the built environment, tax instruments and innovation instruments and education. Sub-sectors differentiated are private residences, rented homes and the non-residential sector. The social real estate segment is a sub-sector of the non-residential sector, which also encompasses public buildings.

2.2 Approach by theme

A district-oriented approach to the built environment

The built environment is not homogeneous. Solutions for sustainability must dovetail with the local situation and for example make use of locally available sustainable energy sources. This can best be achieved with local leadership, within a regional and national framework. The Dutch approach therefore consists of:

1. National policy (set out in the remainder of this strategy);
2. 30 Regional Energy Strategies that work out supply and demand for sustainable energy supply;
3. Municipal energy visions with district heating plans that work out per district how sustainable energy supply for the built environment will look.

These three elements are supported by a legal amendment whereby homes and districts will no longer obtain gas connections, and by pilot projects for gas-free districts, in which concepts for heating without gas are worked out.

Tax instruments

These instruments directly support investments in energy saving. In the first place there are general tax instruments, such as the energy tax on electricity and gas, the Energy Investment Deduction (EIA), the Environmental Investment Deduction (MIA) and Arbitrary Depreciation of Environmental Investments (Vamil). All these instruments ensure that energy saving is more worthwhile and investments produce better returns. Secondly there are specific tax instruments, such as the VAT reimbursement and net metering for solar panels and the exemption from energy tax for renewable energy generated by cooperatives.

Innovation instruments and education

Innovation and the education of professionals are essential in order to create a construction sector that can carry out a deep renovation of the building stock in an efficient and effective manner. Therefore, innovation is promoted by a Social Real Estate Knowledge and Innovation Platform, the digital template for the built environment, the Integrated Knowledge and Innovation Agenda (IKIA) of the Climate Agreement and the multi-year mission-driven innovation programmes. Lastly, the 'Sustainable heating and cooling of the built environment' programme seeks to address a tough part of the challenge: how to deliver heating and cooling to buildings from sustainable sources.

The training and education of professionals in the construction industry is also given considerable attention, among other things with targeted training on the installation of decentralised sustainable heating and cooling technology. The Declaration of Intent on the Labour Market and Training in the District Approach is aimed at preparing future construction professionals for deep renovations; the Declaration of Intent headed 'People make the transition' offers a comparable framework for today's professionals. Lastly, with the Green Deal for the Development of Decentralised Sustainable heating and Cooling Technologies, important steps are taken in the education of specialists who can design, build and maintain the HVAC systems of the future.

2.3 Approach by sub-sector

The sub-sector approach seeks in the first place to improve buildings in four sub-sectors: private individual residences, rental homes and non-residential buildings, and within it the social buildings sub-sector. Within the approach attention is given to cost-effective improvement of buildings in the short term and the attainment of a low-CO₂ built environment in the longer term.

Specifically for deep renovation, an integral approach, with the bringing together of national, regional and district policies as referred to earlier, is important. Deep renovation aimed at achieving a built environment with no gas and no CO₂ is after all a social challenge, not an individual one. Many measures that assist deep renovation in sub-sectors are therefore put to work primarily from the broader, regionally oriented perspective.

Additionally, there are a few specific measures aimed at deep renovation and the transition to a gas-free and CO₂-free built environment. By sub-sector:

Private residences

For private individual home owners there is a broad approach that addresses many facets. Firstly, there are the requirements of the Building Decree for newbuild homes. From 1 January 2021 newbuild homes (and non-residential buildings) must meet the requirements for 'Nearly Energy-neutral Buildings'. The maximum energy requirement and the maximum primary fossil energy consumption are expressed in kWh/m² per year. A minimum proportion of renewable energy must also be applied.

Admitted these requirements have no direct effect on renovation, but they do make for broader introduction of low-CO₂ and CO₂-free technologies that can subsequently also be used in existing buildings. Requirements in terms of the energy performance of parts of buildings (such as walls, roofs and windows) and of technical systems such as heating installations will ensure improvement of existing homes at natural times such as sale and renovation. Sustainability standards per type of home and target values for the degree of insulation will help private individual owners to improve their homes and with the desired reduction in CO₂ emissions. A digital platform facilitates processes in the construction industry, for renovation too. The expansion of the mortgage rules, specifically for home improvements aimed at reducing CO₂ emissions, a heating fund, building-related financing and energy savings and sustainability loans help private individual owners invest in sustainability. Other measures reduce the costs of investments and help private individual owners to take steps in the direction of a CO₂-neutral home. Examples are the Own House Energy Saving Subsidy, the Sustainable Energy Investment Subsidy, the Reduction of Energy Consumption Scheme and the reduced VAT rate for home improvements.

Residential rental properties

The rental sector also has a broad palette of instruments. Requirements of the Building Decree promote improvement of residential rental buildings at natural junctures just as with owner occupied homes. The rental sector in the Netherlands is dominated by social rental (through 320 housing associations with approximately 2.2 million residential units, CBS 2019) which account for around 67% of the rental market for residential properties.

The social rental sector is playing a pioneering role on the way to gas-free and CO₂-free homes. As well as instruments that apply to the whole sector, various instruments are aimed specifically at the association sector. Specific attention is given to switching association homes from gas connections to heat connections. Attention is also given to being able to pass on part of the investments in energy efficiency to tenants so as to bridge the 'split incentive' between investor and user. An umbrella covenant offers the association sector a framework for improvement of the whole stock of association homes in the long term; various stimulus measures, including the energy performance compensation, the Sustainable Energy Investment Grant and the Reduced Landlord Levy for Sustainability, bring about extra investments. With the Starter motor programme work is being done on the large-scale, thorough sustainability of association homes.

The mandatory standard for rental homes, which applies to all rental homes, ensures that all rental homes will in due course consume less energy and emit less CO₂. Lower energy consumption also makes an important contribution to preventing energy poverty.

Non-residential

All buildings other than residential form a varied group. It comprises offices and schools, and also many business buildings with an administrative or industrial function. This sub-sector also has a wide range of instruments. They are often aimed at a sub-segment so as to be able to fit in with the specific task for a given type of building. For example, there are sector roadmaps which show the way to CO₂ neutrality for each sub-segment. These roadmaps are developed in close coordination with the parties directly involved so as to tie in as much as possible with their preferences and possibilities.

From 2023 offices must comply with a minimum level of energy performance (Energy label C). Many businesses and institutions must also comply with various energy and environmental measures on the basis of the Environmental Management Act. For example, they have an obligation to save energy, worked out in lists of Recognised Measures, and must carry out all measures with a maximum payback period of five years. Mandatory reporting ensures that enforcers can effectively monitor compliance and keep track of the energy savings of non-residential buildings. Energy Efficiency audits and the inspection of heating and air-conditioning systems give building owners an insight into available cost-effective investments. The obligation to install an automating and control system ensures that even the latest buildings will apply this energy saving technology. Lastly, the Sustainable Energy Investment Subsidy supports investment in specific sustainable energy technologies along with various generic tax instruments.

Social real estate (sub-segment)

The Government plays a leading role, which finds expression in the roadmap of the Central Government Real Estate Agency. This has been developed in order to ensure by means of planned investments that Government buildings are quickly made sustainable and that they are made CO₂-free by means of technical and management measures.

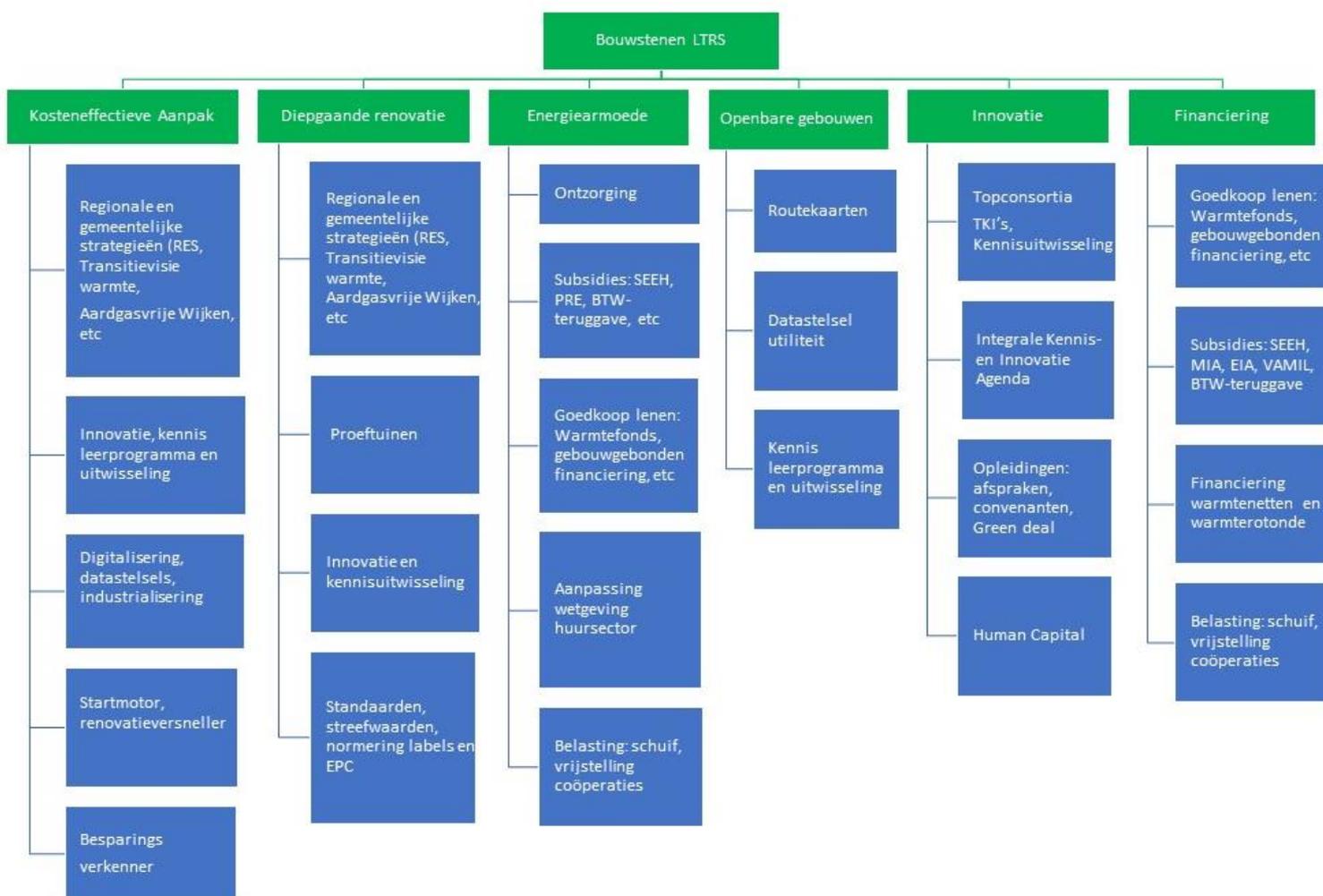
This concerns buildings with a public function such as education, sport, culture, welfare, social healthcare and healthcare. These sectors have taken it upon themselves to draw up a roadmap in which they describe their own contribution to

an energy-neutral built environment in 2050. There are roadmaps for the Central Government Real Estate Agency, the Association of Dutch Municipalities, the Association of Provinces of the Netherlands and the Police, for primary, secondary, intermediate, higher vocational and scientific education, for sport and healthcare and for listed buildings. The Government takes a lead role in order to act as an example and a spur to others. In this way the Netherlands also meets its obligation of renewing 3% of the central government's building stock every year.

3 Integrated overview of strategies, policy and measures

The Dutch approach is characterised by a broad mix of instruments and diverse strategies, policy and measures with which the authorities work together with the sectors concerned towards a low-CO₂ built environment. The figure hereunder presents a cross-section view of these instruments, by theme.

The figure follows the composition of the long-term renovation strategy as indicated in the EPBD. Policy formation in the Netherlands mainly comes about through another approach based on target groups, within which sector agreements and collaborations ensure that the goal is reached. The ultimate goal, a low-CO₂ built environment, is the same; the different methods sometimes lead to the description of the approach in the Climate Agreement (summarised in an appendix) differing from the main text of this document for example.



Bouwstenen LTRS	LTRS building blocks
Kosteneffectieve Aanpak	Cost-effective approach
Diepgaande renovatie	Deep renovation

Energiearmoede	Energy poverty
Openbare gebouwen	Public buildings
Innovatie	Innovation
Financiering	Financing
Regionale en gemeentelijke strategieën (RES, Transitievisie warmte, Aardgasvrije Wijken, etc)	Regional and municipal strategies (RES, Transition Vision for Heating, Gas-free Districts, etc.
Ontzorging	Reassurance
Routekaarten	Roadmaps
Topconsortia TKI's, Kennisuitwisseling	Top consortiums for knowledge & innovation (TKIs), Exchange of Knowledge
Goedkoop lenen: Warmtefonds, gebouwgebonden financiering, etc	Cheap borrowing : Heating Fund, building-related financing, etc.
Subsidies: SEEH, PRE, BTW-teruggave, etc	Subsidies: SEEH, PRE, VAT refund, etc.
Datastelsel utiliteit	Data template non-residential
Integrale Kennis-en Innovatie Agenda	Integrated Knowledge & Innovation Agenda
Subsidies: SEEH, MIA, EIA, VAMIL, BTW-teruggave	Subsidies: SEEH, MIA, EIA, VAMIL, VAT refunds
Innovatie, kennis Leerprogramma en uitwisseling	Innovation, knowledge Learning programme & exchange
Proeftuinen	Test beds
Goedkoop lenen: Warmtefonds, gebouwgebonden financiering, etc	Cheap borrowing : Heating Fund, building-related financing, etc.
Kennis Leerprogramma en uitwisseling	Knowledge Learning Programme and exchange
Opleidingen: afspraken, convenanten, Green deal	Training: agreements, covenants, Green Deal
Financiering warmtenetten en warmterotonde	Financing district heating & large heating grid
Digitalisering, datastelsels, industrialisering	Digitisation, data templates, industrialisation
Innovatie en kennisuitwisseling	Innovation & exchange of knowledge
Aanpassing wetgeving huursector	Amendments to rental sector legislation
Human Capital	Human Capital
Belasting: schuif, vrijstelling coöperaties	Tax: shift, exemption housing associations
Startmotor, renovatieversneller	Starter motor, renovation accelerator
Standaarden, streefwaarden, normering labels en EPC	Standards, target values, standardisation labels and EPCs
Belasting: schuif, vrijstelling coöperaties	Tax: shift, exemption housing associations
Besparings verkenner	Savings Explorer

Part B: Implementation of the strategy by segment

1 Introduction

The Netherlands aims to have a built environment that is low-CO₂, thus net nearly zero GHG emissions by 2050. This part of the Long-Term Renovation Strategy (LTRS) describes the Dutch approach to the sustainability of the built environment in broad terms. It shows the interdependence between existing instruments, which will continue in the coming years, and new instruments, deriving mainly from the Dutch Climate Agreement. The various chapters in this second part deal with the various components of the approach.

After this introduction (chapter 1), **chapter 2** describes the current national stock of buildings and how it is expected to develop.

Chapter 3 describes how the Netherlands aims to renovate the existing buildings as cost-effectively as possible. This can be done by making use of 'natural' times when renovation or improvements are already planned. This chapter gives an overview of the initiatives and instruments that help building owners and other interested parties to obtain an insight into the cost-effective intervention in buildings in their possession or under their management.

Chapter 4 looks at the Dutch approach to carrying out deep renovation of the built environment. This passes through a coherent package of instruments for the transition to a CO₂- and gas-free built environment.

The following chapters address aspects that are of specific importance for European policy. **Chapter 5** considers what to do about the worst performing buildings and how to prevent energy poverty. It describes the initiatives aimed at these buildings, plus the measures that ensure that vulnerable groups can have good quality homes.

Chapter 6 describes how the Netherlands aims to address social real estate (public buildings). This real estate plays an important exemplary role in sustainability, particularly of non-residential buildings.

Chapter 7 deals specifically with the necessary innovation in the construction industry: use of modern technology, digitisation of the construction process and building management, and education and training of specialists.

Chapter 8 goes on to give an overview of financial measures. These are aimed at improving the cost-effectiveness of interventions in buildings and expanding the investment capacity and readiness of building owners.

Chapter 9 gives an overview of the extensive consultation process that lies at the basis of the Dutch approach to the built environment. The Dutch Climate Agreement came about through a two-year process, with consultation in many ways with representatives of practically every section of Dutch society. In the Built Environment sector committee these representatives made many agreements on

ambitious and executable measures which invite participation and also make the ultimate goal in the built environment attainable. Many citizens took part directly in this discussion.

Lastly, **chapter 10** contains the roadmap for the long-term renovation of the built environment and the expected stages in it. This chapter describes the milestones of the Dutch approach and the indicators with which progress is tracked. It also contains an overview of the expected trends in energy consumption and CO₂ emissions and the savings expected as a result of the Dutch strategy.

2 Overview of the national building stock

Article 4, under a) of the Energy Efficiency Directive (EED) already specified that an overview of the national building stock formed the starting point of long-term renovation strategies. According to Article 2 a, section 1, under a), of the Energy Performance of Buildings Directive (EPBD), each long-term renovation strategy must encompass "an overview of the national building stock, based, as appropriate, on statistical sampling and expected share of renovated buildings in 2020".

The basis for a good renovation strategy is an accurate understanding of the building stock. A detailed, bottom-up distribution by type of owner and age and size of building is necessary in order to support the subsequent stages in the strategy. The level of energy efficiency, expressed in energy labels, makes clear what energy saving measures are still possible. Both residential and non-residential buildings are concerned.

2.1 Building stock: homes

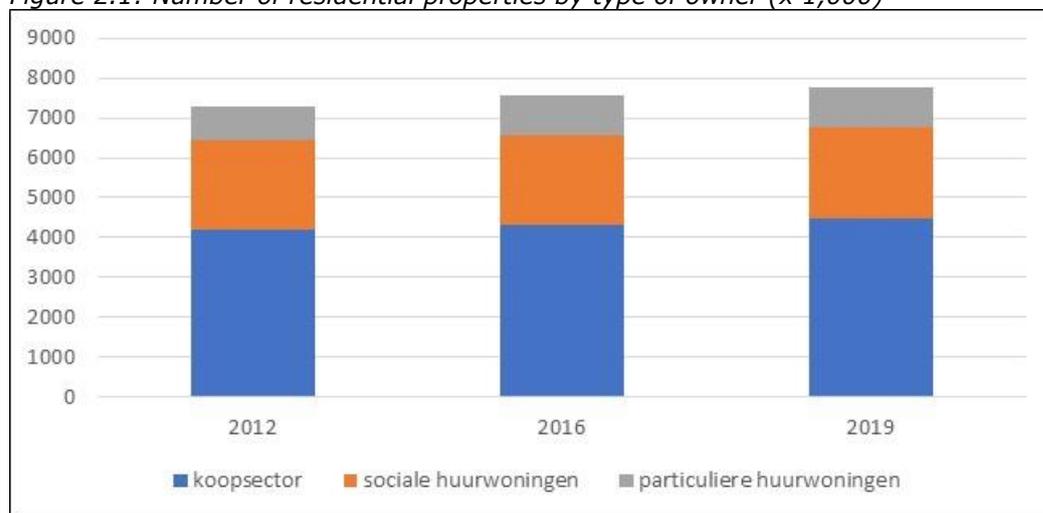
In 2019 there were just over 7.8 million homes in the Netherlands. Demographic trends have a substantial influence on the volume and nature of demand for housing. Important factors are population growth, the number of people per household and the composition of the population.

The number of households in 2019 was 7.9 million. Households are becoming ever smaller, but this contraction is slowing. The average household size fell from 2.2 persons in 2012 to 2.16 in 2019. This refers to private households consisting of people living alone or together in a residential unit and able to take healthcare of their daily needs themselves. (Central Bureau for Statistics, CBS)

The housing stock changes as a result of newbuild and demolition. After the end of the economic crisis housing production increased. The number of residential properties delivered grew from just under 49,000 in 2012 to 71,000 in 2019. The number of homes demolished fluctuates between 9,000 and 14,000 per year. (CBS)

The housing stock can be broken down by type of owner and age and size of the property. The data in figures 2.1 to 2.3 inclusive are presented from 2012 because these data have been based since then on the 'BAG' (Key Register of Addresses and Buildings).

Figure 2.1: Number of residential properties by type of owner (x 1,000)



Source: CBS (2020)

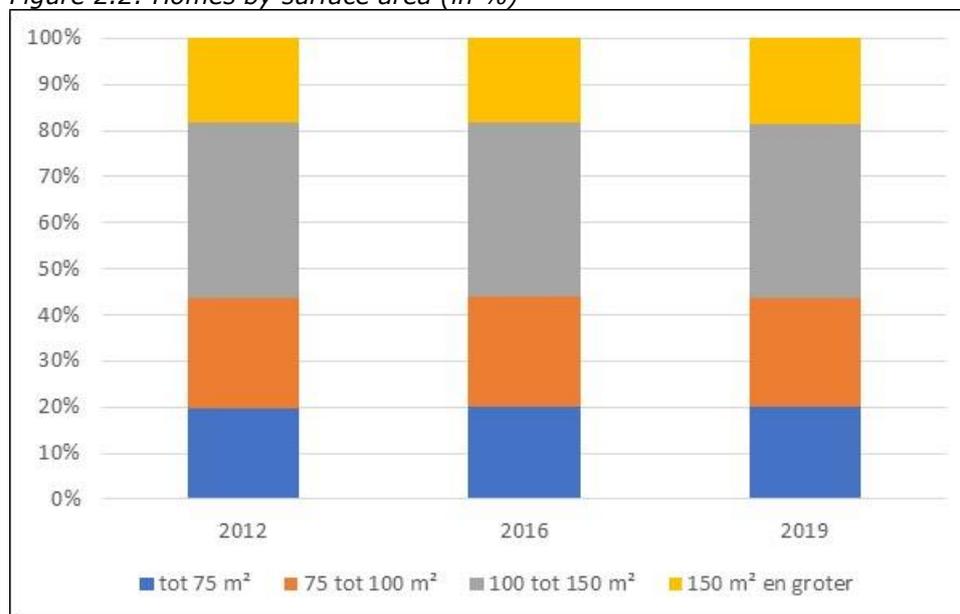
koopsector	owner-occupied
sociale huurwoningen	social rental homes
particuliere huurwoningen	private rental homes

The government policy aimed at energy saving differs depending on the type of owner. Owner-occupied homes accounted for approximately 58% of the housing stock in 2019, rented housing association accommodation for 29% and other rented homes 13%. The proportions have changed very little since 2012. The Netherlands has a large social rental sector compared with other countries.

The energy consumption of a dwelling depends on its size and on the year of its construction. Size is expressed in terms of the surface area of the home. Once the 'Nearly energy-neutral building' ('BENG') requirements come into force, the energy efficiency of homes in the Netherlands will be expressed in 'primary fossil energy' (PFE) consumption. This is the aggregate of the amount of fossil energy in kWh that the home consumes per square metre per year.

Homes with a surface area of 75 m² or less accounted for approximately 20% of the housing stock in 2019. Around 23% of homes are between 75 and 100 m² in area. The biggest proportion, 38%, is that of homes with surface areas of between 100 and 150 m² and the remaining 18% are more than 150 m². The proportions vary very little over time. The average living area is 119 m² (CBS).

Figure 2.2: Homes by surface area (in %)



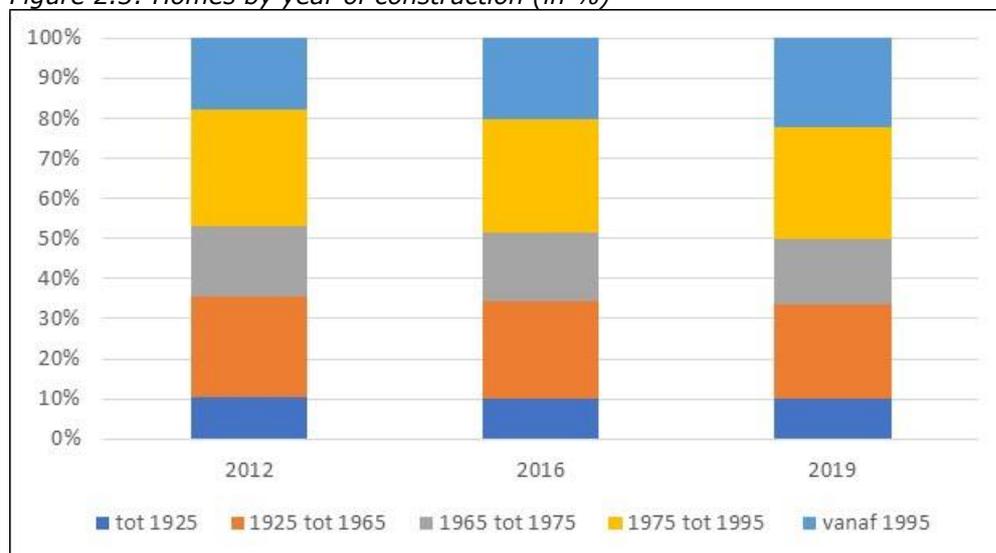
Source: CBS (2020)

150 m ² en groter	150 m ² or more
Tot 75 m ²	75 m ² or less
100 tot 150 m ²	100 to 150 m ²

The division by year of construction has been chosen to tie in with the particular periods in which different energy saving measures were applied. Since about 1925 houses have had cavity walls that can be insulated; with one-brick walls, insulation is possible only at a much higher cost. The first requirements for minimum degrees of insulation in newbuild homes came towards the end of the 1970s. Cavities became steadily wider and better filled.

Homes built before 1975 account for approximately half of the housing stock. Homes built in 1995 or later account for approximately 22%. The percentages do not change much, though obviously the proportion of homes built after 1995 increases every year.

Figure 2.3: Homes by year of construction (in %)



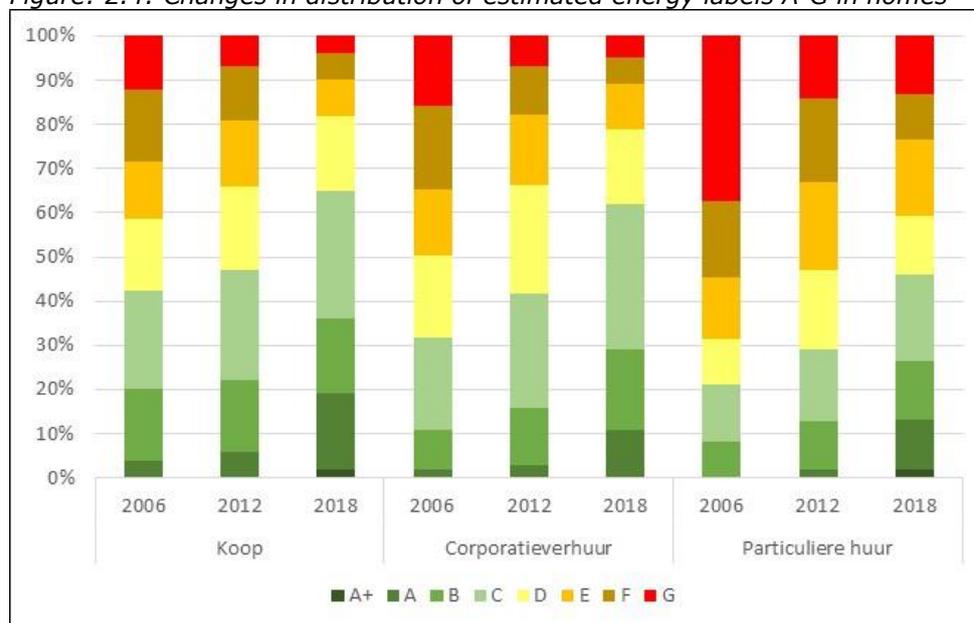
Source: CBS (2020)

tot 1925	1925 or earlier
vanaf 1995	1995 and later
1965 tot 1975	1965 to 1975

When a residential property is sold, rented out or delivered, a valid energy label is required. The energy label shows the energy performance of the building and makes clear what energy saving measures are still possible. The 'WoON' (Netherlands Housing Survey) specifies the energy efficiency of all dwellings in the sample during the physical inventory of dwellings. The energy performance scores are converted into energy labels. The outcomes presented are representative for the entire stock.

Changes in the distribution of the labels have three causes: demolition (mainly of homes with bad labels), newbuild (mainly homes with good labels) and energy saving measures in existing homes.

Figure: 2.4: Changes in distribution of estimated energy labels A-G in homes



Source: ABF Research (2019) Saving energy in the housing stock: insights into the energy module of WoON 2018

Koop	Owner-occupied
Corporatieverhuur	Housing association rental
Particuliere huur	Private rental

Findings of the WoON survey¹:

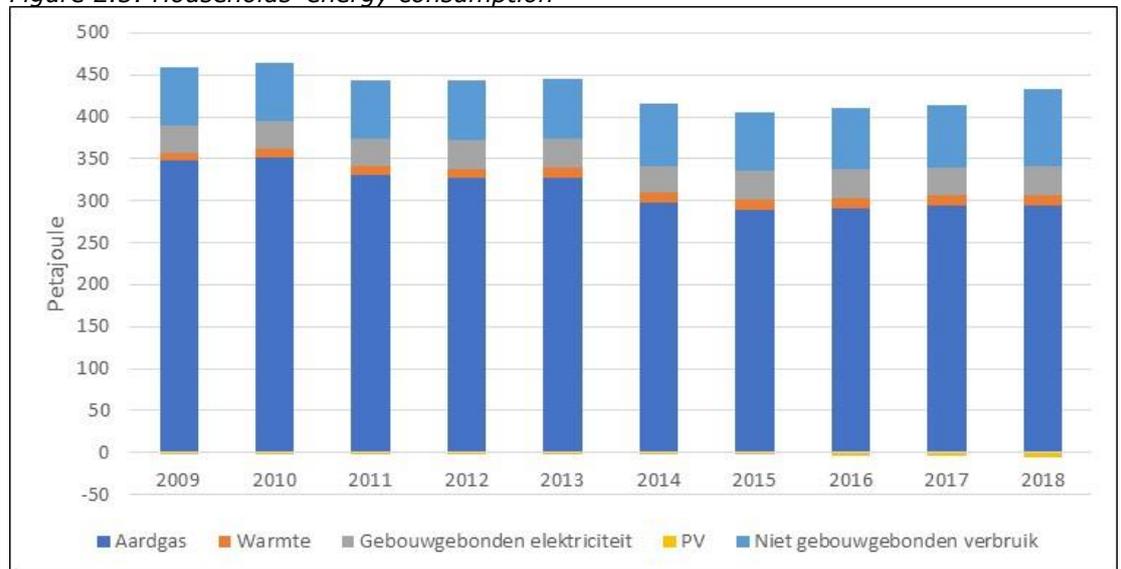
- Older dwellings more often have unfavourable energy labels than do newer ones. Nearly 6 in every 10 homes built in 1995 or later have label A. Only just over 10% have label C or worse.
- In 2018 the proportion of dwellings with a favourable energy label A or B is highest among owner-occupied homes (36%), followed by housing association units (29%) and private rental market homes (27%). Unfavourable energy labels are appreciably more common among private rental market homes than in the remainder of the stock: the percentage with F or G labels is 23%, as against 10% for owner-occupied and housing association dwellings.
- In the past 12 years the housing stock has become more energy efficient. For both purchased and rented homes the proportions with favourable and unfavourable energy labels rose and fell respectively. In the private rental sector, the proportion of homes with a bad label (F or G) fell sharply, from 54% in 2006 to 23% in 2018. Although the private rental sector thus lags behind in energy efficiency, steps have been taken in this sector too to make the stock more sustainable.
- Roofs (86%) and windows (85%) are mostly insulated. Insulation of ground floor floors (63%) and façades (73%) is clearly less common. The highest insulation rates for roofs and floors are to be found in owner-occupied homes and the lowest in the private rental sector. Housing association properties occupy an intermediate position. For façades and glass the

1 ABF (2019) Saving energy in the housing stock: insights into the energy module WoON 2018.

average degree of insulation for owner-occupied and housing association homes is roughly equal, but private sector rental homes have significantly lower scores.

Energy Transition (formerly 'ECN part of TNO') calculates households' annual energy consumption corrected for temperature differences. In so doing it distinguishes between building-related and non-building-related energy consumption. Building-related energy consumption refers to consumption for heating, hot tap water, cooling and ventilation. Other consumption, for example for appliances and lighting, is excluded.

Figure 2.5: Households' energy consumption



Source: Netherlands Enterprise Agency (2019) Energy Saving Monitor Built Environment

Petajoule	Petajoules
Aardgas	Natural gas
Warmte	Heating
Gebouwwgebonden elektriciteit	Building-related electricity
Niet gebouwwgebonden verbruik	Non-building-related consumption

Over the years, households' building-related consumption has fallen, due above all to the declining demand for gas until 2015. Since then building-related consumption has remained more or less the same, although gas consumption has increased again in recent years. Building-related electricity consumption remains practically unchanged, but self-generation of electricity is increasing. The increase in non-building-related consumption is striking. Two causes of this are home ICT use and increasing use of electrical appliances.²

Future expectations for the housing stock and the number of households are shown in table 2.1. The number of households increased in the period 2005-2019 from 7.1 to 7.9 million and is expected to increase further to 8.0 million in 2020 and 8.5 million in 2030.

Because some households have more than one residence and others share a home, the number of residential units differs from the number of households.

2 RVO (Netherlands Enterprise Agency) (2018) Energy Saving Monitor Built Environment.

Table 2.1: Expected numbers of households and dwellings (in millions)

	2020	2030	2050
Households	8.0	8.5	8.8
Dwellings	7.9	8.5	8.9

Source: PRIMOS forecast

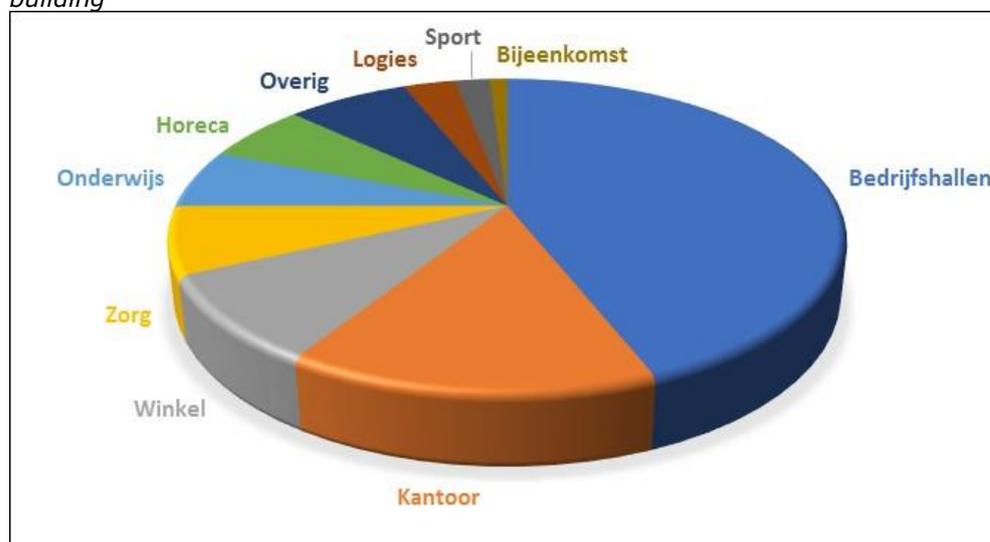
All requests for newbuild permits (residential and non-residential) will have to comply with the requirements for 'Nearly-energy-neutral buildings' ('BENG') once they come into force. Furthermore, the amendment to the Gas Act, effective 1 July 2018, means that most new buildings are no longer connected to the gas mains. This applies to new buildings in the small consumer category for which building permits were applied for on or after 1 July 2018.

2.2 Building stock: non-residential buildings

Non-residential buildings are all buildings in the Netherlands that are not residential. A few examples:

- Buildings for working in, such as industrial halls, offices and schools.
- Buildings for the provision of commercial services, such as shops.
- Healthcare institutions such as hospitals.
- Recreation facilities such as sports buildings and accommodation.

Figure 2.6: Distribution of usable surface area of non-residential buildings by type of building



Source: ECN (2017) Survey of non-residential buildings

Kantoor	Offices
Winkel	Shops
Zorg	Care
Onderwijs	Education
Horeca	Hospitality
Overig	Other
Logies	Accommodation
Sport	Sport
Bijeenkomst	Meeting

Bedrijfshallen	Industrial halls
----------------	------------------

The energy consumption of a non-residential building depends on its size and year of construction.

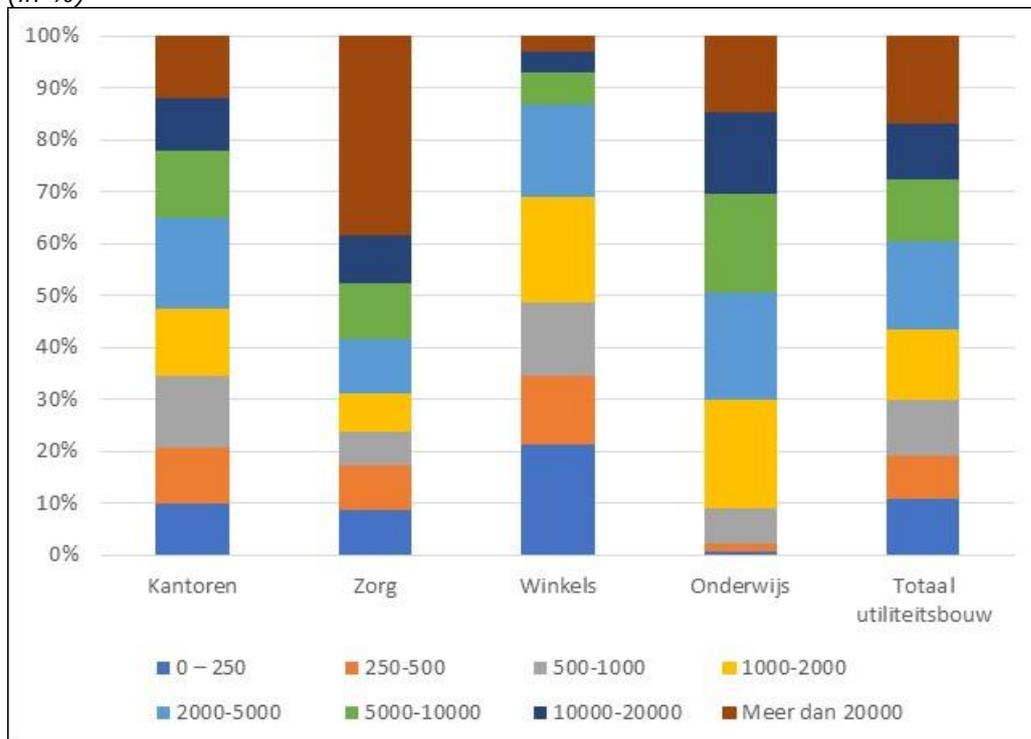
The stock of non-residential buildings is expressed in terms of usable surface area in m². In 2015 this was approximately 600 million m² (including vacancy), spread among 470,000 buildings. The distribution is shown in figure 2.6.

Industrial halls form the biggest group, with 44%; offices come second with 15% of the total surface area. Shops, healthcare, education and hospitality and catering each account for between 6% and 9% of the total surface area. The rest is made up of sports facilities, hotels, prisons and other buildings including stations, car parks and trans-shipment depots. In 2015, 84% of non-residential buildings were in the service sector, which consists of trade, services and government (HDO in the Dutch abbreviation).³ Consequently these buildings fall within the 'built environment' policy domain, the remaining non-residential buildings being in industry, agriculture and other sectors.

The usable surface area of four sectors and the total non-residential buildings is distributed in figure 2.7 by surface area and in figure 2.8 by period of construction. This was done on the basis of the 'BAG' (Key Register of Addresses and Buildings). For the four sectors, the information concerns functionally discrete property units (VBOs) with a single office, healthcare, shopping or educational function, i.e. not combined with other uses. For the total non-residential buildings, it concerns all functionally discrete property units (VBOs) with one or more of the ten non-residential building functions referred to in figure 2.6 and also combinations with residential functions. We have opted to distribute them on the basis of usable surface area rather than of the numbers of functionally discrete property units (VBOs), the reason being that in the Climate and Energy Outlook (KEV) the Netherlands Environmental Assessment Agency (PBL) links the growth in energy demand to the increase in usable surface area.

³ ECN (Energy Research Centre of the Netherlands) (2017) Reconnaissance of non-residential buildings.

Figure 2.7: Distribution of usable surface area in the service sectors by surface area (in %)

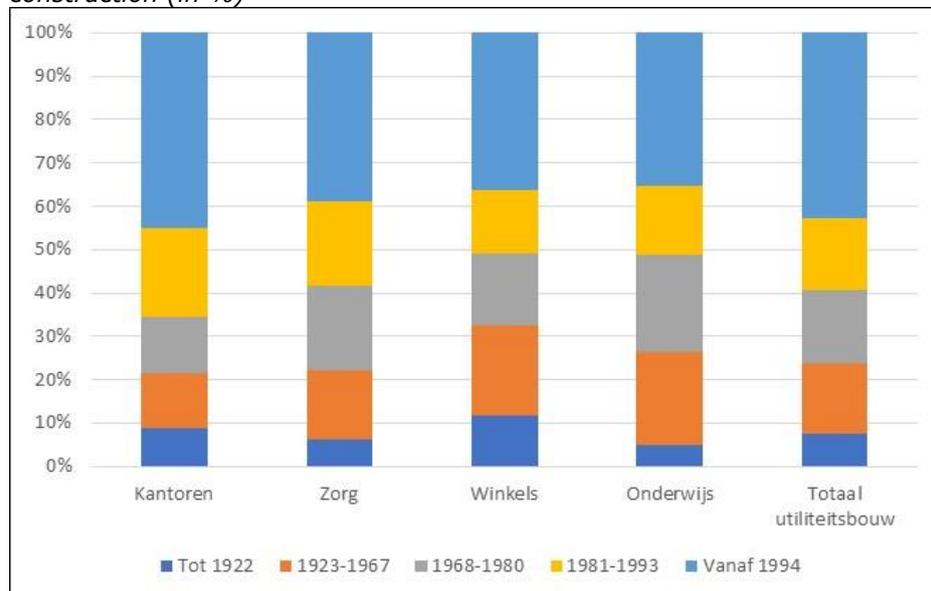


Source: Netherlands Enterprise Agency based on the 'BAG' (2019)

Kantoren	Offices
Zorg	Care
Winkels	Shops
Onderwijs	Education
Totaal utiliteitsbouw	Total non-residential buildings
Meer dan 20000	More than 20,000

The distribution of surface area differs markedly from one sector to another. In healthcare there are some very big functionally discrete property units (VBOs), whereas for shops there are many small or very small buildings and in education there are very few small buildings. In offices we see a wide variety of building sizes.

Figure 2.8: Distribution of usable surface area in the service sectors by year of construction (in %)



Source: Netherlands Enterprise Agency based on the 'BAG' (2019)

Kantoren	Offices
Zorg	Care
Winkels	Shops
Onderwijs	Education
Totaal utiliteitsbouw	Total non-residential buildings
tot 1922	1922 and before
Vanaf 1994	1994 or later

The distribution of usable surface area by construction period shows less marked differences among sectors. Nearly 40% of the usable surface area was built after 1994. Nearly half of shops and about one third of offices were built before 1981.

Vacancy is a problem in various service sectors, such as offices, shops, healthcare and sports buildings. It is important to distinguish between persistent or structural vacancy and temporary or friction vacancy. In 2017 15.9% of the office floor surface area was vacant. Vacancy diminishes mainly because demolition and transformation of obsolete offices have increased strongly. There is excess supply of floor space in retail. In 2017 on average more than 9% of retail shopping floor space stood vacant. For shops too the volume and proportion of structural vacancy increase. Nearly a third of shop vacancy can now be considered as structural.⁴

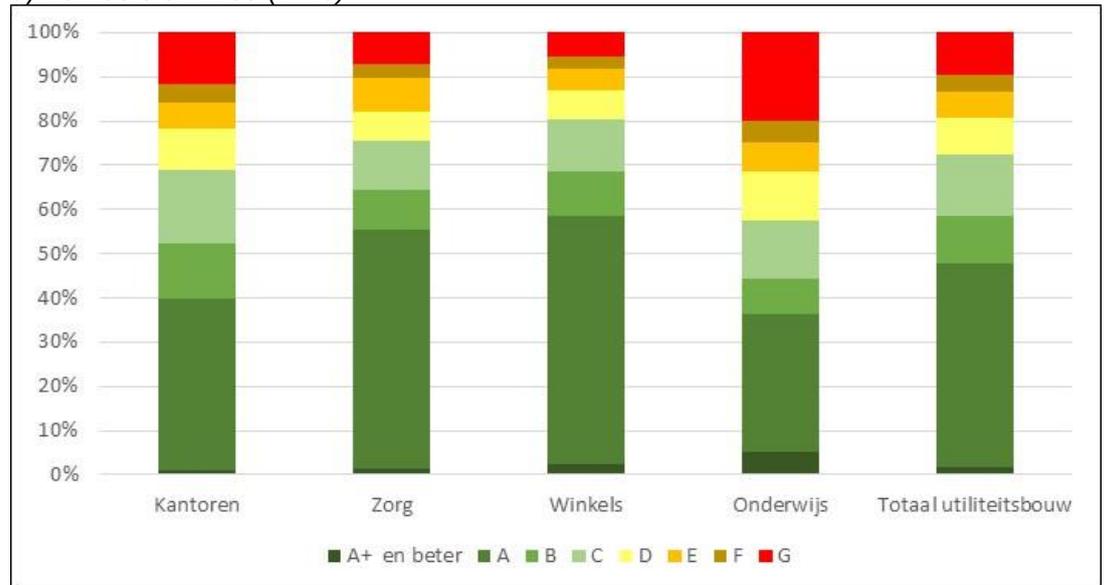
As in the case of residential property, non-residential buildings must have a definitive energy label upon delivery, sale or rental. In public buildings the label must also be visibly displayed. The energy label shows the energy performance of the building and makes clear what energy saving measures are still possible. The distribution of energy labels is based on the EPBD database that the Netherlands Enterprise Agency manages. It concerns functionally discrete property units (VBOs) having as their main function (i.e. to which the biggest proportion of their surface area is dedicated) that of office, healthcare, shop or education (thus including combinations with other uses/functions). Total non-residential buildings refer to all

4 Netherlands Enterprise Agency (2018) Energy Saving Monitor Built Environment.

functionally discrete property units (VBOs) with one or more non-residential building functions but not combined with residential functions, energy labels for residential functions being registered separately.

We have opted to distribute the labels on the basis of the numbers of functionally discrete property units (VBOs) with an energy label.⁵

Figure 2.9: Distribution of registered A-G energy labels in non-residential buildings by numbers of VBOs (in %)



Source: Netherlands Enterprise Agency based on EPBD (2019)

Kantoren	Offices
Zorg	Care
Winkels	Shops
Onderwijs	Education
Totaal utiliteitsbouw	Total non-residential buildings
A+ en beter	A+ and better

A very large proportion of non-residential buildings (82%) still has no registered energy label. The distribution of functionally discrete property units (VBOs) with a registered energy label is shown in Figure 2.9. The number of VBOs with a favourable energy label (A+ or better, A or B) is highest among shops (69%), followed by healthcare (64%), offices (52%) and with education in last place (44%).

A study of energy saving measures in non-residential buildings⁶ by Panteia produced the following results:

- Roof and glass insulation are the most commonly applied forms for non-residential buildings (81%), followed by façade insulation (67%) and floor insulation (48%).
- It is striking that healthcare sector buildings perform above average in all forms of insulation while shops perform below average. Educational -

⁵ A breakdown of registered energy labels weighted for surface area and numbers is included in the W/E consultants report (2019) 'Classification of energy labels for non-residential buildings'. The application of weighting factors does not lead to a radically different distribution of the labels.

⁶ Netherlands Enterprise Agency (2019) Energy Saving Monitor Built Environment.

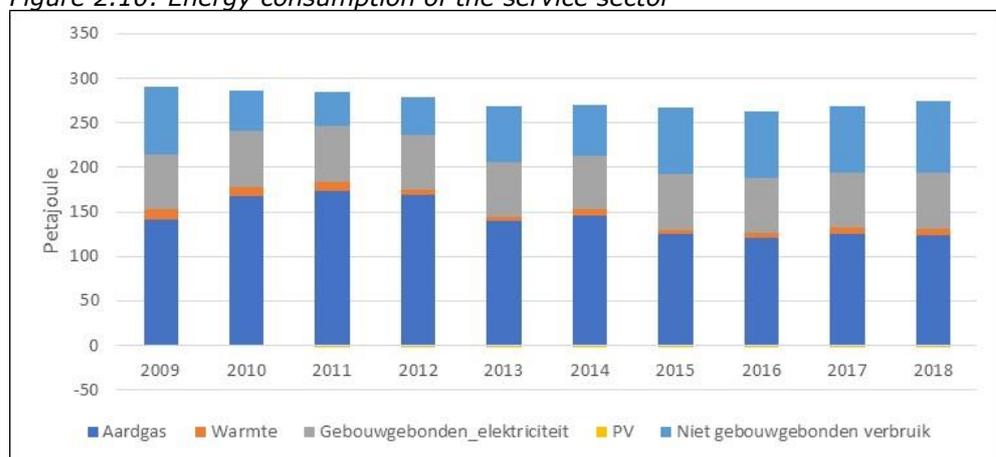
buildings in all sub-segments built before 2000 have poor floor insulation on average, while those built before 1990 have poor façade insulation on average.

- Shop buildings, both food and non-food, have poor floor insulation on average irrespective of when they were built. Those built before 1990 also have poor façade insulation on average.
- Healthcare sector buildings and offices built before 2000 have poor floor insulation, while poor average façade insulation is seen particularly in smaller offices (less than 500 m²) from before 1990.

Energy Transition (formerly 'ECN part of TNO') calculates the annual energy consumption of the service sector, corrected for temperature differences. In so doing it distinguishes between building-related and non-building-related energy consumption. Building-related energy consumption refers to consumption for heating as lighting. Other consumption, for example for tap water heating, is excluded.

Building-related energy consumption in the service sector fell until 2016 since when it has remained more or less the same. Gas consumption for heating has fallen although the decline has levelled off in the last few years. The growth in the building stock could be a plausible explanation for this. Electricity consumption in the service sector has remained practically constant over the years. Non-building-related consumption has grown somewhat. This may have been caused by the increase in economic activities.

Figure 2.10: Energy consumption of the service sector



Source: Netherlands Enterprise Agency (2019) Energy Saving Monitor Built Environment

Petajoule	Petajoule
Aardgas	Natural gas
Warmte	Heating
Gebouwwgebonden-elektriciteit	Building-related electricity
Niet gebouwwgebonden verbruik	Non-building-related consumption

2.3 Conclusions

The Netherlands has nearly 8 million homes and 470,000 non-residential buildings. In the future this number is expected to increase still further. The energy consumption of a home depends on its size and the year of construction.

The size of a dwelling is expressed in terms of its surface area. When the 'BENG' (nearly energy-neutral buildings) requirements come into force, the energy efficiency of dwellings in the Netherlands will be expressed in terms of the volume of fossil energy in kWh per square metre per year that the dwelling consumes. The average living area is 119 m². Older dwellings are more likely to have an unfavourable energy label than newer ones. The proportion of residential units built after 1995 is 22%.

The proportion of dwellings with a favourable energy label (A or B) is highest among owner-occupied properties (36%); for housing association units it is 29% and for private rental sector homes 27%. Approximately 70% of households' energy consumption consists of natural gas. Government policy aimed at energy saving differs from one type of owner to another.

Non-residential buildings are all buildings in the Netherlands that are not residential. The size and year of construction of a building influence energy consumption per m².

The distribution in surface area differs sharply from one sector to another. In the healthcare sector we find very large buildings, with shops we find many small and very small buildings, while in education there are very few small buildings. Offices come in all sizes. The distribution of the usable surface area by construction period shows less marked differences among sectors. Nearly 40% of the usable surface area was built after 1994. Nearly half of all shops and approximately one third of offices were built before 1981.

A very large proportion of non-residential buildings (82%) still has no registered energy label. The number of functionally discrete property units ('VBO') with a favourable energy label (A+ or better, A or B) is highest among shops (69%). Then come healthcare (64%), offices (52%) and last of all education (44%). Approximately half of the energy consumption of the service sector is by way of gas. The government policy on energy saving in non-residential buildings differs from one sector to another.

3 Cost-effective approaches to renovation

Article 4, letter b) of the EED already obliged member states to establish cost-effective ways of approaching renovation in their long-term renovation strategies depending on the type of building and the climate. In accordance with Article 2 a, section 1, letter b) of the EPBD each long-term renovation strategy must contain 'the identification of cost-effective approaches to renovation relevant to the building type and climatic zone, considering potential relevant trigger points, where applicable, in the life-cycle of the building'.

The Dutch policy aims to bring about a low-CO₂ built environment with a combination of initiatives and measures that produce results in the short and long term. This chapter gives an overview of the initiatives and instruments that help building owners and other interested parties to obtain an insight into cost-effective intervention in buildings in their possession or under their management. We also set out the instruments that incentivise the parties involved to take energy saving measures at natural junctures such as planned renovation or improvements or upon acquisition or rental of a building. Only measures primarily aimed at promoting the application of cost-effective measures in the short term are dealt with in this chapter; measures primarily aimed at promoting deep renovation are described in chapter 4.

Attention: Almost all instruments aimed at deep renovation also involve energy-saving interventions in buildings that are already cost-effective in the short term. Many of them also make use, at least partly, of natural junctures. For a comprehensive picture of the Dutch policy it is therefore necessary to look at the different parts of this report.

3.1 Cost indicators

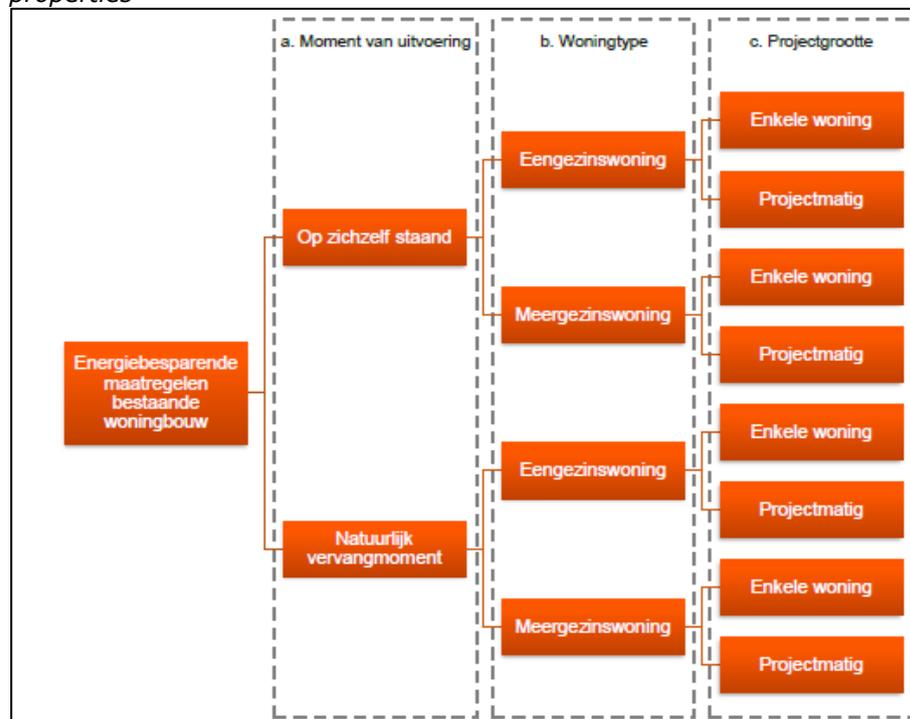
Building owners need insight into the costs and benefits of energy-oriented interventions in their residential or non-residential building. In the Netherlands these cost indicators are established annually by means of a survey with market consultation, differentiated by type of building, which also takes account of changes in the climate (within the Dutch climate zone). These indicators give an idea of the costs associated with energy-saving measures in existing residential and non-residential buildings.⁷

Cost indicators form the basis of the Energy Saving Explorer, which is discussed later in this chapter.

The cost indicators for existing homes are differentiated for each measure by type of dwelling (single-family or more than family), project size (single home or several units/project) and time of execution (*ad hoc* or at a natural juncture) and split into labour and materials. This leads to a differentiation into eight cost sets. A bandwidth is also indicated for each measure.

⁷ Arcadis, Update of investment costs of energy-saving measures for existing residential and non-residential buildings, various years.

Figure 3.1: Differentiation of cost sets for energy-saving measures, residential properties



Energiebesparende maatregelen bestaande woningbouw	Energy-saving measures for existing dwellings
Moment van uitvoering	Time of execution
Op zichzelf staand	Ad hoc
Natuurlijk vervangmoment	Natural replacement juncture
Woningtype	Type of dwelling
Eengezinswoning	Single family
Meergezinswoning	Multi-family
Projectgrootte	Project size
Enkele woning	Single dwelling
Projectmatig	Part of a project

The cost indicators for non-residential buildings are differentiated for each measure by user function (gathering, prison, clinical and non-clinical healthcare, office, accommodation, education, sport and shop) and time of execution (*ad hoc* or at a natural juncture) and split into labour and materials. This leads to a differentiation into 18 cost sets. A bandwidth is also indicated for each measure.

3.2 Cost optimality

In the cost optimality study of February 2018⁸ the main building functions for newbuild and major renovation were investigated:

- Conference, congress, etc.
- Prison
- Healthcare
- Offices
- Educational

⁸ Arcadis (2018) Report on Cost Optimality Study, Arnhem, Arcadis Nederland BV.

- Accommodation
- Sports
- Shops.

The reference types of dwellings used were:

- Gallery apartment
- Block of flats
- Corner house
- Semi-detached house
- Terraced house
- Detached house
- Caravan (single and two-floor)
- Free-standing vacation home

The 2018 Cost Optimality Study used an average of 5 to 9 packages of measures per type of residential unit and 10 to 16 packages of measures per use/function. For non-residential buildings a minimum of 10 packages of measures were calculated per use/function and reference building.

3.3 Existing buildings, major renovation

For major renovation of existing buildings (residential and non-residential) subsequent insulation of envelope parts with an R_c value of between 2.5 and 3.5 m^2K/W and HR++ glazing stand out as cost-effective measures.

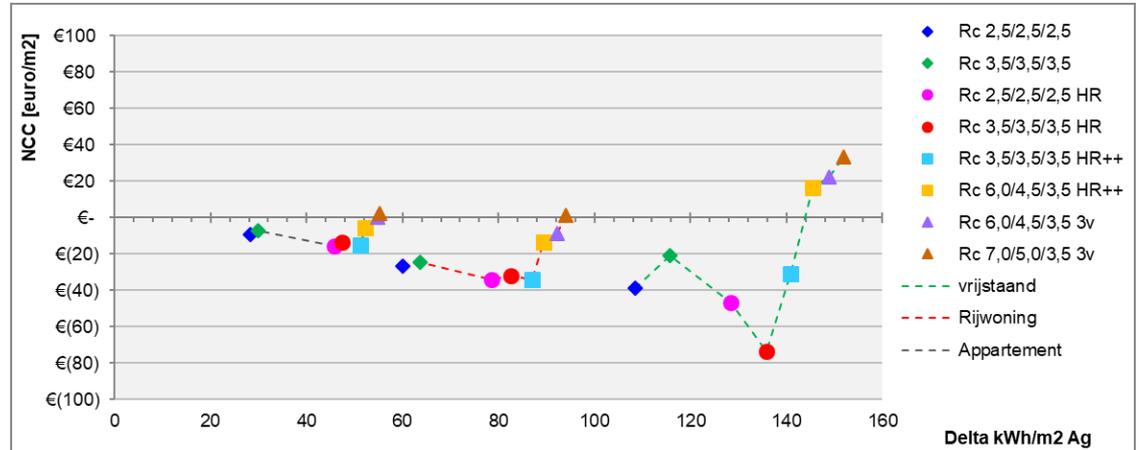
The sensitivity analyses carried out for the discount rate (with which to bring the future costs back to their present value in the base year in which the calculation was made), the energy price scenario and the calculation period do not lead to any other conclusions as to the cost-optimal level of the packages of measures.

A renovation is major if 25% or more of the surface of the building envelope undergoes renovation. Energy performance requirements then apply at the level of components of the envelope. The requirements are for minimum R_c values of 6.0 m^2K/W (roof), 4.5 m^2K/W (façade) or 3.5 m^2K/W (floor) and a maximum U-value for façade openings of 1.65 W/m^2K .

The conclusion is that the required R_c values and U-value for major renovation are stricter than the cost-optimal level of the packages of measures and the individual measures established in this study.

The following graph shows an example calculation for packages of measures for the application of heat pumps in moderately insulated dwellings.

Figure 3.2: NPV of extra costs of energy saving packages of measures in moderately insulated homes (apartments, terraced houses, detached); application of a heat pump.



Source, Arcadis (2018) Report on Cost Optimality Study, Arnhem, Arcadis Nederland BV.

NCC [euro/m²]	Net Constant Costs [€/m²]
vrijstaand	Detached
Rijwoning	Terraced
Appartement	Apartment
Delta	Delta

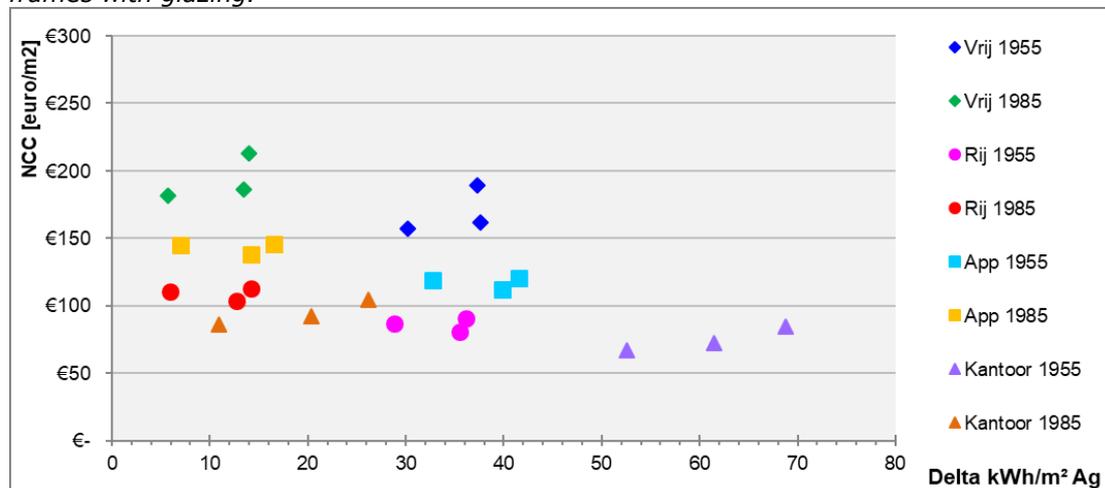
3.4 Existing buildings, non-major renovation (insulation requirements)

In the Netherlands requirements have been in place since 2015 for the replacement of components of the building envelope that have a clear effect on energy performance. In summary terms requirements apply to the replacement of insulation materials and windows.

The following graph shows an example of the calculation of packages of measures in the case of replacement of window frames. For each type of building three results are shown for the replacement of window frames with different types of glazing. A distinction is made among different types of glazing:

- HR glazing (U-value window frame + glass 2.2 m²K/W)
- HR++ glazing (U-value window frame + glass 1.65 m²K/W)
- triple glazing (U-value window frame + glass 1.3 m²K/W)

Figure 3.3 Cost Optimality Study: Net Constant Costs for replacement of window frames with glazing.



Source, Arcadis (2018) Report on Cost Optimality Study, Arnhem, Arcadis Nederland BV.

NCC [euro/m2]	Net constant costs [euro/m2]
kantoor 1955	office 1955
Vrij 1955	Det. 1955
App 1955	Apt. 1955
delta	Delta

3.5 VAT on insulation of homes 9%

Making homes more energy-efficient is subject to lower tax rates. Labour costs for insulating floors, walls and roofs of homes that are more than two years old are subject to VAT at 9% instead of 21%.

3.6 Energy saving explorer

The Energy Saving Explorer gives an insight into the possibilities for energy saving measures and illustrates their effects on energy costs and energy demand of the home(s). The results presented are based on standardised inputs such as the degree of insulation depending on the year of construction and type of dwelling, type of installations and average behaviour of residents as regards the use of heating and hot water. The Energy Saving Explorer distinguishes between dwellings for private individuals and those of landlords such as housing associations. In the case of dwellings for private individuals it shows the energy label for dwellings that is indicated by the online tool; for those of landlords it shows the energy index. The results of the Explorer are indicative, but they do give a fair idea of the possibilities and financial effects of energy saving measures.

The Energy Savings Explorer consists of three variants, each one focusing on a specific target group:

- With the 'Regular Explorer' home owners can calculate the costs and benefits of energy saving measures for their home. They can also obtain advice as to which measures they can take to attain a higher energy performance class (e.g. from F to D, or B to A). <https://energiebesparingsverkenner.rvo.nl/>

- With the 'High Ambitions Explorer' home owners can obtain advice on how to make their home 'nearly energy-neutral'. They can also obtain information about the costs and benefits of the various measures. Home owners can also obtain advice about alternatives to gas-fired heating installations.
<https://energiebesparingsverkenner.rvo.nl/>
- With the 'Energy Savings Explorer for Offices' owners of offices can obtain information on qualifying for energy label class 'C'. The Explorer provides insight into the investment costs, the annual savings in energy costs, the payback time and the environmental effect (CO₂ reduction per m²).
<https://energieslag.rvo.nl/news/view/51138486/snel-inzicht-in-besparingsopties-met-de-energiebesparingsverkenner-kantoren>

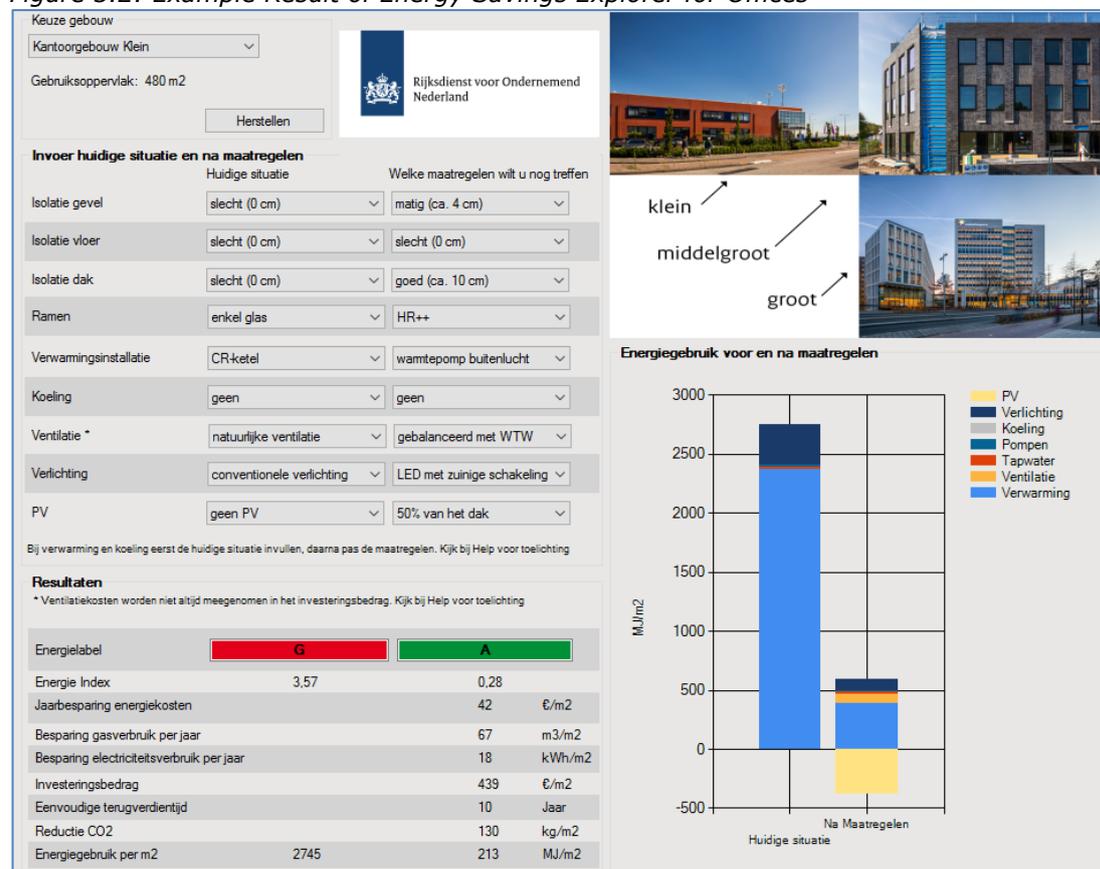
In addition, a government website has been constructed to show examples of projects that will be carried out in the coming years.

(<https://ez.maps.arcgis.com/apps/MapSeries/index.html?appid=6b991a9506804f138139b4938163b1d3>)

The 'Energy Savings Explorer for Offices' is based on standardised inputs such as:

- The degree of insulation, depending on the year of construction and type of building
- Type of installations
- Average user behaviour (use of heating and hot tap water)
- Average investment amounts

Figure 3.2: Example Result of Energy Savings Explorer for Offices



3.7

Digital platform

A digital platform is being developed to help home owners on their journey towards making their home sustainable. An initial version of the platform has been available since 1 January 2020. This version of the platform gives information on sustainability measures, savings effects, possibilities for subsidies and financing and the right level of insulation in order to prepare for living without gas. In 2020 the platform will be expanded to include search and filter functions with which home owners can find sustainable suppliers and financiers. The calculation tool on the platform will be upgraded so as to give a better insight into the real savings effects that individual households can expect if they go sustainable.

3.8

Sustainability standard per type of home

In order for individual home owners to feel supported and to be able to take informed, unworried decisions on making their home sustainable, they need to have insight into the technical possibilities and financial support available (see finance and tax). A sustainability standard for each type of home will give people insight into just what is required to make their home sustainable. This standard is translated into target values for each insulation measure. Other measures, such as a digital platform giving home owners information on sustainability measures and the associated indicative energy savings contribute further to this.

3.9 Expansion of mortgage rules

People taking energy saving measures in their own homes and financing them with mortgage loans can borrow more for this investment. An amount can also be left out of the LTV equation if the home has an energy label of at least A++ issued before 1 January 2015 or an energy index or energy performance coefficient of not more than 0.6. An amount can also be left out of the equation if a mortgage loan is granted to finance an energy-neutral home or a 'Zero on the Meter' home as it is popularly known. The scheme is updated annually.

In the Climate Agreement it was agreed that a study would be carried out to see whether there was a way to develop residential cost neutrality, which could be key to granting credit for sustainability. In the early part of 2020, we shall be looking at the extent to which individual energy saving may count in lending criteria for consumer credit. The goal is that in granting consumer credit for sustainability, lenders should be able to take account of the expected energy costs after sustainability. Lending criteria for mortgage loans already offer the possibility of extra financing room for sustainability based on expected energy savings. The lending criteria for consumer credit do not include this possibility. Responsible lending remains the starting point. We are also looking at whether extra safeguards for consumer protection are needed, for example if actual energy savings are disappointing. The study is expected to be completed by the summer of 2020.

3.10 Renovation accelerator

The renovation accelerator brings together housing associations' demand for (hybrid) heat pumps, insulation and other reduction measures. The Ministry of the Interior and Kingdom Relations organises the renovation accelerator in cooperation with various parties such as Techniek NL (installation companies' sector association), Bouwend Nederland (construction companies' sector association), the Bouwagenda (collaboration among various parties related to the construction industry), the Netherlands Enterprise Agency and Aedes (federation of housing associations). In making homes gas-free, apart from the source of energy above all improving the envelope (insulation) is of great importance, since with insulation, better insulating glass and greater air-tightness the heating requirement can be greatly reduced. If associations club together to make up baskets of orders it becomes more attractive for heating suppliers and construction companies to develop a more affordable joint offer. This leads to innovation, more quality, cost reductions and thus lower prices. The renovation accelerator aims to match demand and supply. It also relieves associations of part of the procurement process and work. Of course, the individual association continues to decide on its own orders itself. The renovation accelerator supports associations by bringing part of the demand pooled and in multi-year predictable form to the market in the starter motor. Between now and 2024 €130 million will be made available for the renovation accelerator.

4 Policy and actions in respect of deep renovation

Pursuant to Article 4, letter c) of the EED, member states were already obliged to see to it that long-term renovation strategies also included policy measures and actions to promote cost-effective deep renovation of buildings, including in staged form. In accordance with Article 2a, section 1, letter c) of the EPBD, every long-term renovation strategy must encompass 'policies and actions to stimulate cost-effective deep renovation of buildings, including staged deep renovation, and to support targeted cost-effective measures and renovation for example by introducing an optional scheme for building renovation passports.'

4.1 Introduction

With the Climate Agreement, the Netherlands has committed to bringing about a gas-free built environment. This also addresses direct CO₂ emissions from buildings. For newbuild this will very soon become a reality; but the greatest challenge is the renovation of existing buildings. They need deep renovation between now and 2050. This chapter sets out the instruments and initiatives being applied to this. These of course are in addition to measures that help building owners and other interested parties to start taking steps now towards lower energy consumption and reduction of CO₂ emissions in the current context, as described in chapter 3.

Central to the Dutch strategy is the regionally oriented approach, whereby the transition to a low-CO₂ economy is planned by region. Within this the renovation of buildings takes place using the district-oriented approach, whereby each district is tackled separately. The municipality takes the lead role in this and guides the process on the basis of a 'Transition vision for Heating' and implementation plans. Alongside this there is an individual track on which a growing number of building owners invest alone or together with others in sustainability. They do this for example to save on the energy bill or to prepare now for heating without gas. These 'first movers' obtain support by means of financing and subsidies as well as other measures to relieve them of concerns.

Additionally, the government, together with parties in the rental and non-residential sectors, gives direction and pace to sustainability by means of targets, roadmaps and final standards. With this set of agreements all buildings will in due course be provided with sustainable energy: via district heating, all-electric solutions or hybrid forms with sustainable gas.

4.2 Regionally oriented approach

Regional Energy Strategies (RES)

Some of the national objectives and agreements in the Climate Agreement require customised regional work. At the regional level governments, residents, businesses, grid managers and social organisations all need each other's specialist knowledge or skills or legal authority.

For this reason, the regional governments agreed in the Inter-Administrative Programme (IBP, February 2018) to work out a multi-year programmed national approach with regional energy strategies covering the whole country. For this purpose, the Netherlands is divided into 30 'energy regions'. They also agreed that these strategies would be spatially endorsed through the environmental policy of

municipalities, provinces and central government and of the water boards (including water policy plans). Each energy region develops the agreements from the Climate Agreement made in the Electricity and Built Environment sector committees. Together with social partners, businesses, regional governments and residents a Regional Energy Strategy (RES) is arrived at. This gives insight into:

- Possibilities for regional generation and saving
- Translation of possibilities into choices of specific places, projects and plans
- The adjustments as regards sources of heat
- The consequences for the energy infrastructure
- Projects and plans already carried out.

The RES thus aims to establish the execution of the energy transition. As such it is an instrument for organising the spatial arrangement of the energy transition with social involvement. The RES is also a way of organising durable cooperation among all regional parties, not least in preparing and carrying out projects. This cooperation among provinces, water boards, municipalities, grid managers, businesses, social organisations and citizens' initiatives can encourage joint-responsibility decisions. And it can also help with formulating and establishing environmental policies of municipalities, provinces and central government, for which the RES is a building block. In that environmental policy integrated decision making takes place on the physical milieu, on the basis of which permits can be granted.

4.3 District-oriented approach

Municipalities play a crucial role in the energy transition of the built environment. With the district-oriented approach they tackle each district separately. Together with residents and building owners each municipality will consider the best solution and approach for each district and how the interests of all parties can best be taken into account. The basic principle is that the energy transition in the district must be affordable and manageable for all. First of all, an important process takes place at local level leading to political and other decisions, notably on which districts will be first to make the transition from gas to a form of sustainable heating. For this the municipality goes through a meticulous process together with stakeholders and residents, in which the 'Transition Vision for Heating', the environmental plan and the implementation plan are necessary steps towards eventually ending the supply of gas and being able to offer residents alternative sustainable heating options.

'Transition Vision for Heating'

The municipality, with the involvement of stakeholders, will establish the timeline by 2021 at the latest and designate the districts it will tackle by 2030. The planned insulation of residential and other buildings may also constitute a component of this. This will be established in the municipal 'Transition Vision for Heating'. In it the municipality will indicate, at least for districts to be tackled up to the end of 2030:

1. How many residential and other buildings will be insulated and/or made gas-free by the end of 2030;
2. Which alternative heating solutions look promising;

3. Which heating alternative has the lowest costs for Dutch society as a whole (national costs).

It has also been agreed that municipalities will programme the work as far as possible on the basis of the lowest national costs and costs to end users. The idea is that on an aggregate basis the municipalities' plans in the Transition Visions for Heating should equal the goal of 1.5 million residential and other buildings to be made sustainable by 2030. The commitment is to work out in 2020 in consultation with local and regional governments whether and if so when and how adjustments must be made of this goal looks like not being attained. In drawing up the 'Transition Vision for Heating' municipalities will be supported by the Netherlands Heating Expertise Centre (ECW) and the Knowledge and Learning Programme of the Programme for Natural Gas-Free Districts (PAW).

Environmental plan and implementation plan

The final choice of the municipality will be set out in the environmental plan in application of the Environment Act. The Climate Agreement stipulates that the municipality will prepare the definitive choice by means of an implementation plan.

An implementation plan covers one or more neighbourhoods or districts scheduled by the municipality in the 'Transition Vision for Heating' to be tackled before 2030. Based on the implementation plan the municipality chooses the definitive heating alternative for a district and the timing of the discontinuation of gas consumption. The municipality draws up this implementation plan in consultation with residents, building owners, grid managers and other stakeholders. The implementation plan describes, for the neighbourhood or district concerned, the manner and timing of the transition from fossil gas to a sustainable heating alternative. The municipal council gives these choices legal expression in the environmental plan.

The use of natural gas for central heating, hot water and cooking in a building can only be limited or stopped after a possibility has effectively been offered of connecting the building to a sustainable alternative supply and making any necessary modifications such as installing insulation. For this the municipal sustainability target must be carefully weighed up against the consequences for building owners and users. Rounding off the district-oriented approach, the Climate Agreement stipulates that the municipality must also be able to determine when a district will be disconnected from the gas grid. The grid manager can then discontinue the transmission of gas.

4.4 Non-residential buildings and dwellings

Owner-occupants, landlords and tenants will all be concerned by sustainability measures in the coming years, both within the district-oriented approach and beyond it. Large numbers are involved. In addition to the 1.5 million residential and other buildings coming under the district-oriented approach between now and 2030, there are nearly 7 million not (yet) covered by it but which will also eventually have to be made sustainable. For these, the Climate Agreement distinguishes among owner-occupiers, landlords (whether natural or legal persons), housing associations and owners of non-residential buildings, including social real estate.

4.5 Owner-occupants: standards and targets

Owner-occupants wishing to make their home sustainable, for example outside the district-oriented approach, must have a clear idea of measures that are reasonable in view of the 2030 and 2050 objectives. This may be important for example when

insulating roofs or façades, for home maintenance, renovation or when buying an existing home. To help owner-occupants with this, the Climate Agreement commits to developing standards and target values for the main and characteristic types of residential properties. These standards and target values offer owner-occupants guidance on how to proceed when they decide to make their home sustainable. The standards cover the entire home; target values address one or more components (for example only roof or wall insulation). The standards and target values will be indicated on the energy label.

The standards aimed at for existing owner-occupied homes are not mandatory for the time being, although if owner-occupiers renovate, the obligation to comply with the Building Decree already applies. Thus, there are minimum requirements for home insulation. We are also looking at whether it would make sense to bring these requirements into line with the target values. The Central government intends to further encourage and incentivise owner-occupants to take steps to make their homes sustainable. For this, among other measures financing instruments, some of them new, will be brought into play. These are described in chapter 8.

4.6 Landlords and tenants

Over 40% of homes in the Netherlands are rented. Here too standards and target values can offer guidance for both landlords and tenants. The standards will become mandatory in 2050 for all rented homes. Many landlords will wish to make their residential properties sustainable well before then. They will want to have the possibility of doing so and of consulting with tenants about this. In accordance with the laws and regulations on renting, landlords must reach agreement with tenants on any alterations to the home and any changes in the rent. Any adjustments to the rent must be reasonable and must also take account of any savings on energy costs. Ideally tenants' net housing costs should not increase as a result of sustainability measures.

A first step has already been taken in the Social Rental Agreement between Aedes (the federation of housing associations) and the tenants' organisation Woonbond, signed in 2018. This agreement contains a 'Table of compensations for investments in sustainability', based on the real average saving in energy costs that tenants make after home improvement. Aedes and the Woonbond expect the average savings on the energy bill to amply exceed the regulatory compensation that the tenant pays to the landlord. Their intention is not to alter the rules but to be able to advise tenants to agree to investments in sustainability if the compensation to be paid is based on the agreed table.

The standards and target values can also play a role if the landlord is unable or unwilling to take steps towards sustainability by 2050, by giving landlord and tenants an idea of what a sensible renovation would entail.

To promote the transition in the rental sector, the government is looking into what legal amendments are necessary to the consent requirement, the requirement that at least 70% of the tenants must agree to a renovation of a complex. There are currently no rules that explicitly take account of a district that switches from gas to an alternative source of heating at the direction of the municipality. Together with tenants' and landlords' associations we are looking at whether this consent requirement needs to be amended. This involves the standards and target values and the detailed implementation of the district-oriented approach involved, as well as the housing costs approach included in the Climate Agreement, such that landlords can charge sustainability costs equal to tenants' energy cost reductions.

We are also looking into whether the tenants' right to initiate improvements needs to be strengthened. The Civil Code already offers a solution for certain cases in which the tenant requests energy saving measures. This concerns for example the insulation of the external partition structures and of the crawl space. The landlord is obliged to carry out and pay for these improvements providing the tenant is prepared to accept an increase in the rent that is in reasonable proportion to these costs. We are looking into whether these rules are sufficient for deep renovation of the housing stock and whether the standards and target values might play a role in any possible amendment. Account must also be taken of the fact that in many cases landlords set about sustainability systematically and on a large scale, which calls for reconciliation between tenants' initiatives and landlords' planning.

The association sector is faced with major public housing challenges in the short and long term. The Central government and the associations' umbrella organisation Aedes are looking together at the evolution of the association sector's financial position and how the long-term challenges faced by the sector can be overcome, in the areas of sustainability, affordability, liveability and appropriate supply for the target group. Where necessary, complementary policies will be formulated to ensure a proper balance between financial effectiveness and social commitments.

Lastly we are looking into whether the standards and target values might form the basis for adapting the home valuation system such that homes that have been made more sustainable would be valued higher, allowing higher maximum rentals. This might increase the incentive to make homes more sustainable.

4.7 Owners of non-residential buildings

In the Climate Agreement it was agreed that for non-residential buildings targets, legal rules and instruments would be developed, leading to a 50% reduction in CO₂ emissions in 2030 (relative to 1990) and low-CO₂ non-residential buildings in 2050. Owners of non-residential buildings wishing to take sustainability measures must have a clear idea of measures that are reasonable in view of the 2030 and 2050 objectives. This is particularly relevant when drawing up multi-year maintenance plans, carrying out maintenance, major or otherwise, upon change of tenancy and sale.

To help building owners with this, we are currently considering which measures bring the 2030 objectives within reach for different types of non-residential buildings. There will also be a legal definitive minimum standard with which non-residential buildings will have to comply from 2050. In working out both agreements, cost-effectiveness is an important starting point. The measures aimed at for attaining the 2030 objective are not as yet mandatory for existing non-residential buildings, although we are working on a rule for 2050 which will be mandatory. When renovating buildings or replacing installations, owners must however comply with the current minimum requirements of the Building Decree and the Environmental Management Act.

In parallel with this legislative trajectory, agreements have been made on improving enforcement of new and existing laws and regulations. To this end work is being done in 2020 on an integrated enforcement strategy, harmonisation of laws and regulations in the area of energy saving and standardised reporting to the competent authorities.

Data template

In support of the transition in non-residential buildings the Sustainable Housing Platform has made a start on developing a data template containing available data on energy consumption, construction technology and building use. With help of the data template building owners will be able to make well documented requests for sustainability tenders to suppliers. Furthermore, the data template may facilitate smarter and more cost-efficient enforcement for environmental agencies, with less regulatory pressure on contractors.

Energy performance contracts

The problem of split incentives often acts as a restraining factor in property owners' deciding whether or not to take sustainability or energy saving measures. In a conventional rental contract, the owner assumes the costs of investment, while the benefits of the lower energy bill accrue to the tenant. As a result, owners are less inclined to take far-reaching measures in the short term. A performance contract added as a rider to a Green Lease can establish agreements on performance guarantees, the sharing of the benefits of the sustainability measures and the means of monitoring, enabling both tenant and landlord to benefit from the sustainability measures taken.

The Sustainable Housing Platform supports parties wishing to go ahead with this by offering the Performance Contract Menu. This menu offers parties, both client and contractor, a framework for setting up a performance contract for the management and upkeep of building-related installations of whole buildings.

4.8 Social real estate

Social real estate constitutes a specific category within non-residential buildings. Twelve social real estate sectors have agreed in the Climate Agreement to draw up sector roadmaps making clear how their properties will become low-CO₂ by 2050. This involves education (primary and secondary, intermediate and higher vocational and scientific education) healthcare, sport, police, municipalities, provinces, central government and listed buildings. These road maps were delivered in the first half of 2019. The first versions of the sector roadmaps revealed bottlenecks in financing. We are currently looking at the necessary conditions and the bottlenecks for financing, legislation and organisation, the aim being to offer practical solutions wherever possible.

The approach for social real estate is extensively described in chapter 6 (part B), section Roadmaps for social real estate and listed buildings.

4.9 Agreements with landlords: starter motor and renovation accelerator

As well as the general agreements on making residential properties more sustainable, the Climate Agreement also contains specific agreements with landlords on making rented accommodation gas-free. It has been agreed that landlords will make 100,000 rented homes gas-free or 'gas-free-ready' in the next four years. This is the starter motor for the energy transition. Much experience will be obtained in a short time of making large numbers of rented homes gas-free, enabling lessons to be drawn for further acceleration and scaling up.

The Central government supports this starter motor by contributing to the costs of making rented dwellings gas-free. In all this involves €200 million of the money for the Energy Investment Deduction (EIA). This contribution scheme is currently being given form in consultation with landlords. It will be called the Incentive Scheme for Gas-free Rented Accommodation (SAH). This scheme supports the connection of rented dwellings to a district heating grid.

Additionally, money is available to landlords for making rented properties more sustainable and insulating them. This comes about through *inter alia* the ISDE sustainable energy investment subsidy and, starting in 2022, the Reduction of Landlord Levy (RVV) scheme for sustainability investments, comparable with the current STEP (Incentive Scheme for Energy Performance in the Rental Sector).

Associations can also benefit from the money for test beds for gas-free districts and for acceleration and scaling up of the sustainability task by means of the renovation accelerator. This depends on how the pioneering municipalities give form to it and the proposals made by the associations.

The Climate Agreement contains the commitment to pooling the sustainability demand of housing associations and standardising the supply, so as to make sustainability affordable. The renovation accelerator is a joint initiative of sector organisations Aedes (housing associations), Bouwend Nederland (construction), Techniek NL (technical service providers and installation contractors) and the Government. The accelerator consists of, among other things, a subsidy tender and a support programme aimed at obtaining active commitments from housing associations and contractors for large-scale bidding processes and standardisation and cost reduction in the construction industry.

Also, in early 2020 a subsidy tender will be published with which consortiums of associations and innovative contractors will be able to submit applications in the first half of 2020 for subsidies aimed at standard packages of measures with great potential for scaling up.

5 Policy and actions aimed at the worst performing buildings and at energy poverty

In accordance with Article 2a, section 1, letter d) of the EEBD, every long-term renovation strategy must encompass 'an overview of policies and actions to target the worst performing segments of the national building stock, split-incentive dilemmas and market failures, and an outline of relevant national actions that contribute to the alleviation of energy poverty.' This is a new element that was not included in Article 4 of the EED.

Tackling the worst performing buildings in the Netherlands can be divided into office buildings and dwellings. Offices must have the 'C' energy label as a minimum by 2023. Split incentives in the residential sector will be addressed by amending the laws on renting. To prevent market failures the Dutch government involves all stakeholders intensively in the transformation of buildings, by means of the district-oriented approach and well organised participation. Energy poverty will be combated by a housing cost-neutral approach to the transformation: after renovation tenants must not be worse off on balance than before, while for home owners the goal is for monthly costs of servicing the sustainability loan not to exceed the associated savings in energy costs.

5.1 Worst performing buildings

By 1 January 2023, every office bigger than 100 m² must have an energy label of at least 'C'. This obligation is set out in the Building Decree. For the residential sector we tackle the worst performing homes by improving the average energy label of the whole stock. In the Energy Saving Covenant for the Rental Sector of 2012 the housing associations, the Woonbond (tenants' organisation) and the government agreed that the total rental housing stock would attain an average Energy Index of 1.25 (average energy label B) by 2021. The number of very badly performing homes is limited due to the attention paid to energy saving in the Netherlands ever since the oil crisis of 1973. For insulating existing homes there have long been subsidy schemes in place. For newbuild the Building Decree has long given great attention to the energy performance of buildings.

5.2 Split incentives and market failures

With split incentives between the owner and the tenant(s) of a building or between owners, the party paying for energy renovation does not obtain the full benefits and savings deriving from it. For example, a landlord invests in energy saving measures but the user of the building benefits from the reduced energy costs. In order to nudge landlords towards energy saving, the Climate Agreement announced an amendment to the rental legislation. The regulations – including the points-based rental system – will be amended in such a way as to provide the right incentives to renovate residential properties and bring them up to the standard. It will be important for landlords to set about sustainability without delay so as to avoid high energy costs for current and subsequent tenants. Therefore, the landlord will be made responsible for renovating the dwelling to the standard for sustainability when the dwelling forms part of a district that is converting from gas. In this case the tenants' cooperation is indeed necessary, and for that reason we are looking at whether the reciprocal rights and duties of tenants and landlords need to be amended.

Making the built environment more sustainable requires a new perspective for owners and users of buildings, in which investments in energy saving go together with lower energy costs. Without that perspective a municipality cannot install district heating grids or persuade landlords and home owners in a district to invest in sustainability. The aim after all is housing cost-neutrality for house owners. Nor can associations carry out housing cost-neutral sustainability for tenants without that perspective. We will be providing this perspective by creating the conditions for scaling matters up, innovation, greater efficiency and cost savings, by making funding available and by putting forward proposals to alleviate the remaining operating shortfall of building-specific measures, infrastructure and sustainable energy sources through pricing and subsidising measures. This will mean a shift in energy tax to encourage investment in sustainability and attractive financing options that ensure investments are actually affordable. Further incentives and frameworks for action will be offered by means of standards describing the target specifications buildings will need to meet to be able to heat them without natural gas in future. These measures will help to prevent further steps for deep renovation from being hampered by split incentives or blocked by market mechanisms that are not aligned with the goals for the future. In chapter 7 (part B), in the section headed Innovation and cost reduction, this is further elaborated.

Continuing existing policy:

- Since May 2016 landlords and tenants have been able to agree an Energy Performance Compensation (EPV). The EPV is for housing associations and other landlords of social rental accommodation. Landlords can ask tenants for compensation for energy-neutral or 'Zero on the Meter' homes as they are popularly known and also for 'nearly energy-neutral' homes. In this way they recover part of their investments in turning social rental homes into energy-neutral homes.
- The Sustainable Housing Platform has drawn up a guide with a number of stakeholders aimed at making it easier for supervisors to initiate dialogue with tenants and landlords. The guide features a specific check list that is easy for all supervisors to understand and use.

5.3 Energy poverty

The affordability of an energy bill depends not only on expenditure on energy but also on households' disposable income and other necessary outgoings. In a study by the Netherlands Environmental Assessment Agency (PBL) the affordability of the energy bill was looked at with two mutually complementary indicators:⁹

- The proportion of disposable income that a household spends on energy
- The risk that after paying housing and energy costs a household will have insufficient money left for minimum necessary living expenses.

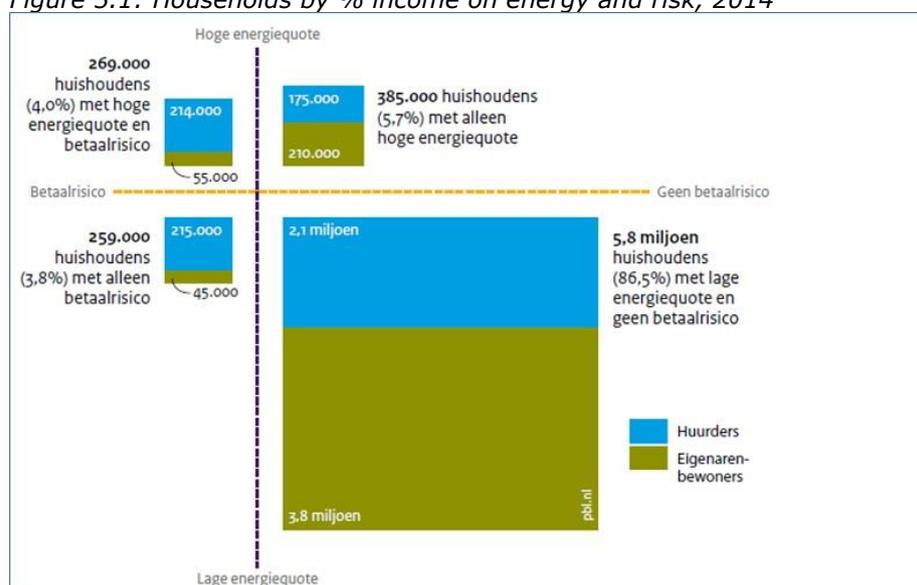
In 2014-2015 the Netherlands had a total of 528,000 households at risk (see Figure 5.1). At the end of the month after paying housing and energy costs they did not have enough left for minimum necessary living expenses. Approximately half of these households also spent a large proportion of their disposable income on energy (269,000 households, 4% of the total). The other 259,000 households did not spend a particularly large proportion of their disposable income on energy, but many of them did have relatively high housing costs (with low incomes). This may point to a form of hidden energy poverty, but it might also be the result of an put-and-about

⁹ PBL (2018) Double standards. A study of the affordability of households' energy bills.

lifestyle or an energy-efficient newbuild home, meaning energy consumption is relatively low. The other 6.2 million households were not at risk in 2014-2015. Although some of them did have rather high energy costs relative to their incomes.

The number of households spending a high percentage of disposable income on energy and at risk is thus limited. A much smaller proportion of Dutch people report having difficulty paying to heat their homes than is the case with other Europeans. In 2016 only 2.6% of Dutch households said they had this problem. The percentage of households with overdue energy bills is also exceptionally low in the Netherlands (2%). The proportion of Dutch households with overdue bills in 2016 was actually the lowest of all EU countries.¹⁰

Figure 5.1: Households by % income on energy and risk, 2014



Source: PBL (2019) Double standards. A study of the affordability of households' energy bills.

Hoge energiequote	High % of income on energy
269.000 huishoudens (4.0%) met hoge energiequote en betaalrisico	269,000 households (4.0%) with high % of income on energy & at risk
385.000 huishoudens (5.7%) met alleen hoge energiequote	385,000 households (5.7%) with high % of income on energy but not at risk
Betaalrisico	At risk
Geen betaalrisico	Not at risk
259.000 huishoudens (3.8%) met alleen betaalrisico	259,000 households (3.8%) at risk but not high % of income on energy
5.8 miljoen huishoudens (86.5%) met lage energiequote en geen betaalrisico	5.8 million households (86.5%) with low % of income on energy and not at risk
2.1 miljoen	2.1 million
Huurders	Tenants
Eigenaren-bewoners	Owner-occupants
Lage energiequote	Low % of income on energy

¹⁰ PBL (2018) Double standards. A study of the affordability of households' energy bills, p. 17.

The Dutch policy is based on the premise that lower income households can best be supported by general social policy, since people who cannot pay their energy bill are likely to have difficulty paying other fixed costs such as rental and healthcare. The Netherlands attaches considerable value to a balanced development of income and is constantly attentive to this, among other things by measuring purchasing power. Also, the Netherlands is not in favour of conducting income policy through energy bills. The Netherlands does not have a definition of energy poverty.¹¹ Continuing existing policy¹²:

- There are extensive regulations on the cutting off of gas, heating and/or electricity. In accordance with the legal provisions, Dutch consumers with overdue payments cannot simply have their gas, heating or electricity cut off. The energy company must refer them to the municipal debt counselling service. Sometimes the debt problem can also lead to households subsequently being helped with energy saving. Furthermore, people in poor health cannot have their power cut off in winter, by virtue of the cut-off policy for small consumers of electricity and gas from 2011. A side effect of these strict regulations is that households with early stage overdues end up in local debt counselling and consequently their problem is no longer visible as a form of energy poverty.
- The Dutch government's energy saving policy is focused on the social rental sector, in which many households are financial at risk (see figure 5.1). Improving sustainability goes hand-in-hand with shifting energy costs into housing costs. This can be favourable for low income groups since the affordability of their housing costs is regulated through the rental supplement, whereas energy costs are entirely for their own account.

A premise of the energy transition is that all households, including low-income households, must be able to take part in the transition in their owned or rented homes. A number of measures contribute to this:

- Housing cost-neutrality. The tax shift (gas taxed more, electricity less) is cost-neutral. On average the total energy costs for building owners will not increase. This acts as an incentive for building owners, who currently make extensive use of gas for heating, hot water and cooking, to save energy and/or switch to sustainable or more sustainable sources of energy.
- Obligation for landlords to improve residential properties up to the 'standard' so as to protect tenants from high energy costs. See the section on standards and target values in chapter 4 (part B) for further discussion of this obligation.
- The Starter motor, with which associations' residential properties can be made gas-free or gas-free-ready. These dwellings are specifically intended for people with low incomes. This is more extensively described in the section headed Agreements with landlords: Starter motor and Renovation Accelerator in chapter 4 (part B).

When further elaborating the provisions of the Climate Agreement, attention will be given to the financial consequences for households and any gaps in the measures. In anticipation of this, a start is already being made with a heating fund, with which

11 Draft Integrated National Energy and Climate Plan 2021-2030, p. 34

12 PBL (2018) Double standards. A study of the affordability of households' energy bills.

financing is made available to home owners for making their homes more sustainable (see further part B, section 8.2).

5.4 Linking the district-oriented approach to the socio-economic task before us

In the gas-free districts programme is emphatic attention is given to the linkage with the socio-economic task. The Knowledge and Learning Programme contains a separate theme 'The linking of the socio-economic task'. Within this theme municipalities can share knowledge and experience of dealing with vulnerable groups in the energy transition. An extensive description of the district-oriented approach is contained in chapter 4 (part B), in the section headed District-oriented approach.

6 Policy measures and actions aimed at public buildings

Pursuant to Article 2a, section 1, letter e) of the EPBD, all long-term renovation strategies must encompass 'policies and actions to target all public buildings'. By virtue of Article 4 of the EED certain public buildings already fell within the scope of application of the long-term renovation strategies. Article 2a of the EPBD now specifies however that long-term renovation strategies must encompass specific policy measures and actions aimed at all public buildings. Member states' current initiatives must also fall under this so as to comply with the obligations deriving from the EPBD and the EED.

Social real estate or public buildings are used to provide services of social importance. These buildings have an exemplary role for the sustainability of the sector. In tackling its social real estate, the Netherlands creates a pioneer for increasing the sustainability of non-residential buildings in particular.

Social real estate is paid for in whole or in part with public money and is designed for the service providers and the users of the service to regularly come together physically. Examples include schools, hospitals, government buildings (central and local governments) and police stations. Listed buildings also fall within this category.

By virtue of Article 5 of the Energy Efficiency Directive (EED), Member states are obliged to renovate 3% of the central government building stock every year, or to achieve the same effect with an alternative approach. The Netherlands meets this obligation by means of sector roadmaps, which are developed from the Sector Roadmap for the Central Government Real Estate Agency. A customised roadmap for listed buildings is also being developed. These roadmaps are aimed at achieving savings well in excess of those that would be obtained by renovating 3% of the building stock every year.

This chapter describes the Dutch approach with roadmaps and the associated policy measures and actions for social real estate deriving from the Climate Agreement.

6.1 Roadmaps for social real estate and listed buildings

For the various sectors of social real estate, sector roadmaps are being developed, describing how each sector can contribute to an energy-neutral built environment in 2050. These roadmaps show the starting point of the sector concerned and the planning and steps through which the sector will work cost-effectively towards a low-CO₂ property portfolio in 2050, via an intermediate target for 2030. Building owners develop the roadmaps in cooperation with umbrella organisations.

The Knowledge and Innovation Platform for Sustainable Social Real Estate supports the social sectors in implementing the roadmaps.

Eleven sectors are drawing up sector roadmaps: Central government (Central Government Real Estate Agency), municipalities (VNG), provinces (IPO), Police, education (primary and secondary, senior secondary vocational, higher professional and university), the healthcare sector and the sports sector. As well as the planning and the steps, each roadmap also contains an inventory of conditions, frequent bottlenecks (for example financing, legislation and organisation) and where possible offers practical solutions. In this the sectors work together with partners such as the Dutch Banking Association, Techniek Nederland and Bouwend Nederland.

In addition to the roadmaps there will be a legal energy performance standard for all buildings. This consists in a standard to which buildings must conform in 2030 and a definitive standard for 2050. As agreed, the legal definitive standard for energy performance of existing non-residential buildings in 2050 will be based on the new NTA8800 definition method, expressed in kWh/m²/year. This definitive standard will come into force at the beginning of 2021, or possibly even earlier. This gives building owners longer term assurance as to what they must aim for.

There will also be a separate roadmap for listed buildings, regardless of building or usage function. This roadmap gives insight into the maximum attainable reduction in CO₂ emissions for this category of buildings, taking account of cost-effectiveness and conservation values.

Biannual monitoring and recalibration

The sectors submitted their proposals for the roadmaps to the sectoral quality control consultation body of the Climate Agreement on 1 May 2019. This body is assessing whether the sector roadmaps will together attain the 2030 target. In early 2020 the roadmaps submitted will be further developed and made uniform. It will then become clear what investments are necessary for each sector, for four scenarios with different levels of ambition. We can then look at whether any extra central government resources need to be and can be made available.

The sectors will subsequently report on their progress to the sectoral quality control consultation body once every two years.

This is also the time when the roadmaps can be recalibrated, for example in order to establish a link with the district-oriented approach or in order to incorporate the latest developments in the sector. The conditions and bottlenecks may also change.

The first progress report will take place in 2022. The sectoral umbrella organisations will take the initiative in respect of the progress reports, thus keeping the administrative burden for individual institutions to a minimum. It is up to the sectors themselves to determine how they monitor progress so that they can fit in with existing reporting. They will however agree in 2020 on which facets are to be monitored. The provinces will be invited to adopt the same system.

Sustainable Sports Roadmap

In early 2020 the Sustainable Sports Roadmap was signed by the Ministry of Health, Welfare and Sport, NOC*NSF (Dutch Olympic Committee*Dutch Sports Confederation, the umbrella body of organised sport in the Netherlands), the Sport and Municipalities Association, the provinces and the Enterprising Sports Providers Platform. This roadmap sets out how the sports sector will put its ambitions from the Climate Agreement into practice. The Roadmap was produced in cooperation with the VNG (Association of Netherlands Municipalities), sports federations, commercial sport contractors, suppliers, innovators and administrators.

There are two public versions of the Roadmap: for municipalities and associations.
<https://www.allesoversport.nl/duurzame-sportsector/routekaart-verduurzaming-sport/>

Knowledge and Innovation Platform for Social Real Estate

The healthcare, sports, listed buildings and schools sectors have joined forces in the Knowledge and Innovation Platform for Social Real Estate. On this platform, parties exchange knowledge, good examples and innovations.

This platform is not intended to support the preparation of the roadmaps, but to offer help to individual institutions in making their buildings sustainable.

More about the platform: <https://www.rvo.nl/onderwerpen/sustainable-ondernemen/gebouwen/social-vastgoed>

6.2 Description of real estate and aims of the parties involved Central Government Real Estate Agency (RVB)

The RVB manages about 12,000 buildings with a total gross floor area (GFA) of some 12 million m², namely: 11,000 buildings (6 million m² GFA) of the Ministry of Defence, and 1,200 buildings (6 million m²) of other users. The RVB also manages nearly 90,000 hectares of land, of which 40,000 for own use (as Defence locations or Crown or State property). The remaining land is leased out for agricultural use.

The roadmap aims at a CO₂-neutral Central Government portfolio by 2050, with by far the greater part already being achieved in 2040 (at least 85% less emissions than in 1990). The RVB aims to use many energy saving measures. For newbuild the BENG (Nearly Energy-Neutral Buildings) standard applies as a minimum, where possible gas-free or in any case 'gas-free-ready'.

In existing buildings investments for replacement or renovation will be made as far as possible at natural junctures where the legal rules for non-residential buildings allow this. The RVB will also take part in regional initiatives. It will generate sustainable energy on its own land and buy green energy for the rest.

The RVB roadmap will be used to comply with Article 5 of the Energy Efficiency Directive (EED) which establishes the obligation to renovate 3% of the central government building stock each year. After renovation this 3% of the building stock must meet the minimum energy performance requirements established by the relevant member state in the context of Article 4 of the EPBD. The obligation concerns buildings owned and used by central government with a usable surface area of more than 250 m². The directive allows room for the same savings effect to be achieved by alternative means. The savings figures from the RVB sectoral roadmap have been compared with the expected savings for Article 5 of the EED. The savings aimed for in the roadmap amount to 1.3 PJ in 2030. This is far more than the expected savings of 0.2 petajoule if 3% of the buildings with a usable surface area of more than 250 m² owned and used by central government were to be renovated each year.

Dutch government bodies are determined to lead by example with inspirational sustainability trajectories for their own real estate, and the sectoral roadmaps for social real estate are the public expression of this goal.

National Police

The Police currently manage some 900 buildings with a GFA of approximately 1.8 million m². By 2025 this portfolio is expected to have been reduced to around 1.3 million m² GFA.

The Police aim to make its real estate CO₂-neutral by 2050. For making its property portfolio sustainable the watchwords are: 'do what it takes', 'seize opportunities' and

'cost-efficient'. Energy renovation in existing buildings will be carried as far as possible at natural junctures for replacement or renovation, providing this is allowed by the laws governing non-residential buildings and the primary process of the users. Energy savings in buildings are preferred, and where possible the Police will join in local sustainability initiatives.

Provinces

Provinces have limited stocks of social real estate. The provinces aim to make their real estate energy-neutral by 2028. Actual achievement depends on logical investment junctures. Natural replacement junctures have been and will be used to make the properties sustainable, to the extent that the legal rules for non-residential buildings allow this.

Municipalities

The municipalities aim to make their real estate energy-neutral by 2040. Newbuild commissioned by municipalities must already be minimum BENG (nearly energy-neutral) from 2020 and where possible gas-free, or in any case 'gas-free-ready'. For this the municipalities must study their property portfolio by 1 May 2019 including opportunities for making it more sustainable. The VNG supports municipalities with knowledge and communication, such as a format for analysing the property portfolio, a benchmark for municipal real estate, a model approach including a guide for management decision making and by disseminating good examples. For primary and secondary schools, the sustainability ambitions are in the Integrated Housing Plans, in which the municipalities explain how the energy performance and functionality of school buildings can be improved. Together with the parties involved, the VNG strives to find solutions in the short term for the financial and legal hindrances to making educational properties more sustainable.

Healthcare

The total GFA of the healthcare sector is, depending on the definition of the healthcare institution, approximately 40 million m². The real estate is very diverse, ranging from academic hospitals through nursing homes and day care centres to dwellings. The precise volume is currently being analysed. Ownership of the properties is in various hands: healthcare institutions themselves, but also associations and investors.

The healthcare sector aims to make its real estate CO₂-neutral by 2050 by means of investments at natural junctures for replacement or renovation. The roadmap with this sector's energy transition had already been prepared in 2019.

Education

Total GFA in the education sector is approximately 30 million m², but here too the differences among and within the five educational segments are great. School buildings in primary and secondary education are the joint responsibility of municipalities and school boards (see under 'Municipalities'). For senior secondary vocational, higher professional and university education they are the responsibility of the institutions themselves. This latter segment aims to have a CO₂-neutral portfolio by 2050 via natural investment and renovation junctures.

Listed buildings sector

The listed buildings sector covers a highly diverse field, for example managers of listed buildings, knowledge institutes, quality controllers, financiers and restoration funds. The parties in the listed buildings are aiming for reductions in CO₂ emissions of 40% by 2030 and 60% in 2040, as an average for all listed buildings. In so doing they will take advantage as far as possible of natural junctures of replacement or renovation with the owner. They also seek to achieve an optimal balance between energy savings, cost-efficiency and respect for and reinstatement of conservation values.

In each case actual energy consumption is the starting point. As well as energy saving, much attention is given to the generation (collective or otherwise) and exchange of green energy and heating.

7 Incentives for the use of smart technologies and skills

By virtue of Article 2a, section 1, letter f) of the EPBD, long-term renovation strategies must encompass 'an overview of national initiatives to promote smart technologies and well-connected buildings and communities, as well as skills and education in the construction and energy efficiency sectors'. This is a new element that was not included in Article 4 of the EED.

The energy transition in the built environment must be attainable and affordable for all. Therefore, the construction sector wants to attain cost reductions of between 20 and 40 percent. In order to achieve these cost reductions, the construction industry is looking to renew itself, with more digitisation, standardisation, industrialisation and better chain cooperation. Preconditions for structural cost reduction in sustainability are the generation of a pooled and more constant demand from the market and innovation, both in newbuild and in existing buildings. The Netherlands supports this effort by cooperating with the construction industry, contracting authorities and knowledge institutions in know-how, innovation and scaling up programmes.

This chapter specifically describes innovation in the sector. This means in particular the application of modern technologies, digitisation of the construction process and building management and education and training of the many specialists active in the built environment.

7.1 Current situation of the construction sector

The construction sector, together with the government, is faced by a number of major social tasks. The Climate Agreement stipulates that 1.5 million homes and non-residential buildings are to be made sustainable and natural gas is to be gradually phased out, by 2030. To achieve this objective, we need to scale up in the next few years so that we are renovating 200,000 homes per year. After 2030 a further acceleration will be necessary in order for all homes and non-residential buildings to have sustainable heating by 2050.

On top of the sustainability challenge in the coming years at least 75,000 new homes per year will have to be built in order to meet the demand in the housing market. In addition, in these years homes must also be added to the stock by means of transformation. This kind of huge task requires a different way of working in the construction industry, from contracting authorities and contractors, and close cooperation with the government. To achieve the kind of sustainable and affordable scaling up of the newbuild and renovation market that is being aimed at, innovation and more structural chain cooperation are necessary. The European proposals for a Green Deal also emphasise the need to find new ways of working together and to spur innovation in the construction industry.

Sensitive to short-term changes in the economic situation and organised with a view to flexibility

Changes in the production process and chain cooperation are complex and do not come about unaided. The construction sector is sensitive to short-term changes in the economic situation. Partly as a result of this the sector is relatively labour-intensive and organised above all with a view to flexibility. This is now finding expression in an imminent shortage of well qualified technical personnel. Structural

cooperation ties in the development and construction chain, but for example also with knowledge institutions, are still limited. At the same time contracting authorities give contractors little room in which to come up with innovative solutions, preferring to prescribe applications at object level rather than calling for bids meeting specified building performances.

Good starting position for innovation and chain cooperation

The Dutch construction sector has a relatively good starting situation. Compared with other countries the Dutch construction industry performs well. Labour productivity has grown faster in the past 30 years than in other European countries and even compared with the United States and Japan.

The higher level of investment in new and more efficient production processes for example is reflected in the amount of available software per employee.

The energy transition offers opportunities to strengthen this position. The sustainability challenge will make the sector less sensitive to short-term changes in the economic situation and give it new levers for further innovation and more structural chain cooperation. The parties in the built environment work together on this: contracting authorities, market parties in the construction and installation sector and government. The common aim is to scale up so that demand for sustainability and renovation to 2050 will grow and be constant. This extra market drive offers the sector more assurance that investments in innovation and chain cooperation can be recouped.

7.2 Innovation and cost reduction

In the framework of the Climate Agreement and the Building Agenda the government is committed to innovation and a cost reduction of between 20 and 40 percent, together with public and private contracting authorities and parties in the construction industry.

Process and product innovation

With regard to innovation, the government supports process innovation in principle and product innovation as an extension of this. Industrialisation of the production process, such as prefabrication, is a form of process innovation that can bring about the desired cost reduction through an increase in labour productivity and a reduction in quality costs, for both newbuild and renovation. Industrialisation such as prefabrication accelerates and standardises the process, which reduces the risk of quality costs. Structural and digital cooperation in the contract award, design, production, delivery, installation and maintenance chains also produce efficiency gains. Through chain cooperation, digitisation and industrialisation better and cheaper technical and other products and services can also be developed: product innovation. It becomes possible to develop standard solutions, which are widely applicable and therefore suitable for many different kinds of buildings. By not having to develop a unique product every time, the design can be further improved and process and quality costs reduced.

Digitisation is necessary for this. Only by making information digitally available and sharing it throughout the entire chain can standard solutions be effectively and cost-efficiently applied.

Whole-life cost reduction

With innovation we can achieve cost reductions throughout the construction chain, from design through to use. Therefore, in this case the concept of cost reduction applies not just to the investment cost at the time of acquisition, but to the total cost of ownership (TCO) of a product over its whole useful life. So not just the acquisition price of the product but all costs from design through to final disposal or decommissioning, including savings on maintenance and lower energy consumption.

The contribution of the construction sector to the Climate Agreement is based on a relative cost reduction of between 20 and 40 percent. It is possible that cost increases will occur that are beyond the market parties' control, for example as a result of costs of materials or tightness in the labour market. On the one hand adverse market circumstances can thus lead to its being more difficult to make a home sustainable without extra costs, but on the other hand the construction sector's commitment to innovation, if successful, will bring cost benefits anyway.

7.3 Conditions: scaling up and constant demand

In the coming years the government intends to create the necessary conditions for successful innovation and cost reductions to originate from the sector, in thorough consultation with the relevant sector organisations. The most important condition is that the implementation of the agreements in the Climate Agreement leads to sufficient scaling up and constant, pooled demand. This will give contractors in the construction industry assurance that they can recoup their investments in innovation.

For creating scale and a continuous current of construction the Netherlands relies on the district-oriented approach, large-scale renovation and pooling of demand, standards and support for the business case of sustainability measures. In parallel, the government also supports targeted investments in innovation in the framework of the Multi-year Mission-driven Innovation Programmes (MMIPs) and the Built Environment Digitisation Deal. It also focuses on increasing cooperation between knowledge institutions and the design, technical and construction sector through the Building and Technology Innovation Centre (BTIC).

District-oriented approach

The basis for the creation of scale and continuity is the district-oriented approach. Through the Transition Visions for Heating, implementation and environmental plans and Regional Energy Strategies (RES), municipalities and provinces will ensure that at regional level there is clarity on the timing and manner of making buildings sustainable. In this way market parties from the construction industry, and also from the energy sector, will have a clear picture of the heating sources and the energy infrastructure. This will help them to design better solutions for making buildings sustainable and make realistic assessments of the emerging market. This also gives constructors and other market parties the opportunity of bringing the planning of their activities into line with the local planning and participation processes. Implementation is complex, particularly as the Transition Visions for Heating and Regional Energy Strategies are still in development and parties are still learning through the test beds for gas-free districts how the transition can best be organised at the local and regional levels.

The Central government and the partners in the Climate Agreement give priority to the rapid materialisation of the Transition Visions for Heating and the Regional Energy Strategies. Giving the transition district-oriented form makes it simpler to

pool comparable demand for measures to make buildings sustainable and to develop, for that pooled demand, a more standardised, qualitatively good and ever cheaper bid. Relieving residents, and indirectly constructors and fitters, of worry, will be aimed at this. In the next round of test beds in the gas-free districts programme, central government and partners will also be focusing more on a diverse portfolio of technologies and on the quality of the organisation process. In the test beds, questions about the labour market and training will also be on the agenda, so as to strengthen the involvement of the market and of the education sector in the test beds. The threat of a shortage of well qualified personnel will be addressed by the Government together with the sector and educational institutions.

Large-scale renovation and pooling of demand

Another important pillar of the policy for achieving scaling up and more continuous demand is plugging in to the renovation cycle of professional property owners, the aim being to bring about pooling of demand and standardisation. With this approach large landlords in particular, such as housing associations, can also make an important contribution to innovation and cost reduction. In this context 100,000 rented homes will be made gas-free or gas-free-ready over a four-year period with the Starter motor. This offers market parties a certain assurance as to the demand for their products and services and makes investments in industrialisation and scaling up less risky. Furthermore, this contributes to a reduction in sensitivity to short-term changes in the economic situation. The Central government supports this process by incentivising connection to district heating grids through the Incentive Scheme for Gas-free Rented Accommodation (SAH) with €200 million.

Related to the Starter motor, the Central government is also working together with sector organisations Aedes, Bouwend Nederland and Techniek Nederland on the Renovation Accelerator programme. Under this programme it works with landlords, market parties and knowledge institutions on developing knowledge about and on incentivising making dwellings sustainable on an industrial scale. Therefore, the Renovation Accelerator is one the one hand set up as a regional support programme offering a stimulating learning environment. Large landlords and contractors work together on pooling demand and on developing standard packages of measures with which homes can be made sustainable faster and more cheaply. Through the Renovation Accelerator these parties are supported in this by experts and among other things models are developed for housing classification, demand pooling, and calculating total cost of ownership. An amount of €5 million per year has been made available for the support programme up to and including 2025 (total €30 million). Additionally, in the framework of the Renovation Accelerator, a subsidy tender scheme will be launched for the most promising innovative projects. Under this scheme major landlords and innovative contractors will for the first time be able to carry out large-scale standardised renovations. The Ministry of the Interior and Kingdom Relations will conduct a series of four annual bidding processes in the years 2020 to 2024 under the Renovation Accelerator scheme, with a total budget of €100 million.

It is important that not just residential landlords but also owners of social real estate and other non-residential properties cooperate and pool their demand intelligently. The Government is currently talking with the various non-residential sectors on the supply and demand sides about the definitive standard for 2050 and the intermediate target for 2030; by 2021 it must be clear how these will look. In the course of these discussions various parties have referred to the opportunity of innovating and standardising or indeed the necessity of doing so. In order to take advantage of this opportunity the Netherlands has decided to give this an extra push

through the innovation subsidy schemes and cooperation networks (see also Multi-year Mission-driven Innovation programmes, MMIPs). In the next round of test beds for gas-free districts more attention has also been requested for non-residential buildings as part of the district-oriented approach. The Ministry of the Interior and Kingdom Relations and other departments are also looking together with the Central Government Real Estate Agency, the Directorate-General for Public Works and Water Management and other departments at how best to consolidate the role of the government as contracting authority and launching customer.

Standards and arrangements

Home owners wishing to take measures to make their homes sustainable want to have a clear picture as to whether the measures are sensible. This applies for example to maintenance or rebuilding, on purchasing a new home or to improve the comfort of the existing home. To help these owners it was agreed in the Climate Agreement to set standard and target values for dominant and characteristic types of residence. These are now in development. The standard is intended in particular for situations in which it is not yet known to which sustainable source of heat a home will be connected in the future. It relates to the degree of insulation of the whole home and shows the remaining heating requirement of the home. The target values indicate what is a sensible level if one or more components of the home are addressed. These standards and target values can help with the development of standard arrangements and solutions. Standard solutions and arrangements are more easily scalable for the sector and stimulate industrialisation of the construction process and cost reductions.

Multi-year Mission-driven Innovation Programmes

As well as focusing on scaling up and on creating continuous demand, the Central government also supports targeted investments in innovation, both for newbuild and for making buildings sustainable. In the Integrated Knowledge and Innovation Agenda of the Climate Agreement and in the context of the top sector policy, the participants formulated the mission of achieving a CO₂-free built environment by 2050. To achieve this mission three Multi-year Mission-driven Innovation Programmes (MMIPs) were formulated: Acceleration of Energy Renovations in the Built Environment (MMIP 3), Sustainable Heating and Cooling in the Built Environment (MMIP 4) and The New Energy System in the Balanced Built Environment (MMIP5). These programmes provide substantive guidance for the application of resources by businesses, knowledge institutions and the government and reaffirmed in the Knowledge and Innovation Covenant 2020–2023. Deriving from the Climate Agreement, €250 million has been set aside for Multi-year Mission-driven Innovation Programmes 3, 4 and 5 until 2030. This innovation budget is deployed along three paths.

Firstly, the Central government supports investment in R&D by large-scale alliances between market parties and knowledge institutions. The aim is to spur system innovations such as industrialisation and digitisation in the renovation process. The recent initial request for proposals led to multi-year innovation resources for four major knowledge consortiums. The consortiums will be aimed at, inter alia, digitisation within the renovation process and development of industrialised production facilities.

In 2020 the Central government will organise a second request for proposals, with extra emphasis on integrated sustainability solutions that can also be applied to energy infrastructure. It is also the intention that cooperative alliances should be

formed for R&D for example between parties in the non-residential building and social real estate sectors. The Ministry of Economic Affairs and Climate Policy will apply this approach more widely in the innovation policy for making buildings sustainable.

The second path concerns small-scale initiatives in which by means of pilot schemes and demonstration projects innovative SMEs cleverly prepare new and existing technologies for bringing to market. These entrepreneurs and researchers receive support from the Demonstration Energy Innovation (DEI+) scheme. For next year the maximum term of projects in the DEI+ gas-free buildings will be extended to four years and limits on the size of the projects will be relaxed. This will give the market greater assurance as to the support for investments in innovations and pilot schemes.

The third path is the Knowledge and Innovation Platform for Making Social Real Estate Sustainable, developed specifically for social real estate. Through this platform the Government shares knowledge and information and promotes further moves towards making buildings sustainable by actively supporting building owners with questions.

Digitisation as a pre-condition for standardisation and scaling up

For scaling up and industrialisation, sufficient information must be available on the buildings that are to be made sustainable. Digital Building Information Modelling (BIM) can greatly reduce the cost of providing it. The information on the building does not have to be collected separately and the risk of errors is also reduced. This in turn reduces the risk of quality costs. The Netherlands is working through the Building Agenda and the BIM Counter to promote the digitisation of newbuild and existing buildings. To this end the Digitisation Deal for the Built Environment was signed in April 2019. In it, contracting authorities, market actors and administrations make agreements on digitally unlocking the available information and sharing it in more standardised form.

Smart building technology supports users

Owners and especially users of buildings need reliable information in order to reduce the energy consumption of their building. Therefore, in the non-residential sector stress is laid on building automation systems, among other things by means of an obligation for larger buildings to have an extensive energy and building management system from 2026. With such systems, users are better equipped to aim for lower energy consumption while maintaining comfort and a healthy interior climate, by automatically adjusting installation settings in line with demand. Homes and smaller non-residential buildings have been or will be equipped with a smart meter. This gives users a better insight into their current energy consumption and enables them to then tackle energy savings in a more targeted manner.

The Building and Technology Innovation Centre (BTIC) as booster

To bring about system innovations in the construction industry there must ultimately also be more structural arrangements among knowledge institutions, education, government, contracting authorities and contractors. It was with this goal in mind that the Building and Technology Innovation Centre (BTIC) was set up on 27 June 2019: a cooperation among Bouwend Nederland, Techniek Nederland, Royal NL Engineers, 4TUBouw, Vereniging Hogescholen, TNO and the Government. The BTIC aims to act as an initiator and broker so as to bring about R&D programmes in the

design, construction and technological sectors and in so doing establish the links as far as possible with the vocational training sector and address issues relating to the labour market and training. One of the MMIP consortiums mentioned above came about thanks to the efforts of the BTIC. It has led to a research programme of more than €20 million, focused on innovative renovation concepts. In this programme the overall broad focus on energy transition, digitisation, circularity, replacement of infrastructure and climate adaptation is maintained.

Education and training

Sector organisations such as the Dutch Association for Sustainable Energy, Energie Nederland (energy companies), Bouwend Nederland (construction companies), Techniek Nederland (installation contractors) and educational organisations such as secondary schools further disseminate the knowledge that has been developed.

Parties will appreciably strengthen the response of the educational sector to the needs of the construction sector by embedding or involving education in the district-oriented approach. This is the aim of the national 'Declaration of Intent on the Labour Market and Training in the District Approach', and of the covenant between intermediate vocational training institutions and HVAC contractors (a specific implementation of the Declaration of Intent for intermediate vocational training) and the Green Deal for the Development of Decentralised Sustainable Heating and Cooling Technologies. The parties are making great efforts to further build execution capacity, partly through training funds. The agreements of the national 'Declaration of Intent on the Labour Market and Training in the District Approach' will be introduced among other things through regional public-private cooperation. More than twenty national parties from business, government, education and trade unions will work together to ensure that there are enough qualified people for making residential districts sustainable. This cooperation will also lead to technological renewal, an increasingly smart approach and sustainable work.

8 Financial and tax instruments to promote investment

Article 2a, section 3 of the EPBD provides the following: 'To support the mobilisation of investments into the renovation needed to achieve the goals referred to in section 1, Member States shall facilitate access to appropriate mechanisms for:

- (a) the aggregation of projects, including by investment platforms or groups, and by consortia of small and medium-sized enterprises, to enable investor access as well as packaged solutions for potential clients;
- (b) the reduction of the perceived risk of energy efficiency operations for investors and the private sector;
- (c) the use of public funding to leverage additional private-sector investment or address specific market failures;
- (d) guiding investments into an energy efficient public building stock, in line with Eurostat guidance; and
- (e) accessible and transparent advisory tools, such as one-stop-shops for consumers and energy advisory services, on relevant energy efficiency renovations and financing instruments.'

In the Climate Agreement it was agreed that homes, offices, schools and other buildings would be made sustainable in the next 30 years. The ambition is to gradually insulate 1.5 million residential and other buildings by 2030 in the district-oriented approach and to make them gas-free, or at least ready to switch over to another, sustainable source of heat ('gas-free-ready'). Municipalities are leading this move, together with their residents, and receive support from the Association of Dutch Municipalities and the Government. The municipalities draw up Transition Visions for Heating in which they indicate which districts and neighbourhoods will switch from gas by 2030 and what other sustainable sources of heating will replace it. With this district-oriented approach the intention is also to encourage as far as possible home owners that are not (or not yet) taking part in a district-oriented approach to take energy saving measures now. They will also be encouraged to take far-reaching measures to make building sustainable at natural junctures, such when rebuilding or moving house. Subsidies are available for this and residents will be given the best possible support with attractive financing and arrangements to relieve them of worry. The basic idea is that everyone should be able to take steps towards having a more sustainable home and a smaller energy bill.

This chapter gives an overview of financial measures for improving the cost-effectiveness of interventions in buildings and increasing building owners' ability and readiness to invest. Additionally, the Dutch approach has various other measures that help to promote the financing of investments. Important instruments include:

- the Renovation Accelerator, developed to promote the merging of projects into bigger investments that are easier to finance. In this way the government promotes large-scale renovation of rental homes (further described in this chapter). Also 'Energiesprong' (included in Part A), which started some years ago, pools deep renovations of residential properties on a smaller scale and provides valuable lessons on the scaling up of these kinds of investment.
- Investment risks are often difficult to estimate, partly due to lack of insight into future energy systems and the requirements that a building will have to meet in the future. Municipal heating plans and standards and target values

for buildings (both described in chapter 4, part B) offer parties assurance and thereby reduce the risk for public and private investors.

- The Heating Fund and the National Energy Savings Fund pool public and private money in order to make attractive financing possible for building owners. The combination of public and private resources makes for a structure in which large amounts of financing can be made available (though the participation of private parties) and risks shared (through government participation).
- In the public sector the Netherlands works with roadmaps. These make it possible to make targeted investments in improving public buildings. These roadmaps are exhaustively described in chapter 6 (part B).
- Building owners are supported in their investment decisions, for example by the Energy Savings Explorer (for residential and non-residential buildings). These explorers (described in chapter 3, part B) give building owners tailored advice on energy saving measures and illustrate the effects on energy costs and demand for energy of the building.

The background, intention and construction of the Dutch approach to financing investments in low-CO₂ buildings are set out in the remainder of this chapter.

8.1 Background to the Dutch approach

Home owners are a disparate group and their preferences regarding making their homes sustainable vary widely. Some like to do their own home improvements and do not want advice or support, while others gladly let a contractor or energy consultant do the work. Some people combine making their homes sustainable with rebuilding and finance the measures along with the other work in a mortgage loan, while other home owners invest their savings in insulation measures. And although more and more home owners are taking measures on their own initiative, many wait for a collective supply. Various groups in the housing market have other motives and concerns: first-time buyers often just wish to buy their first home and may not be able to afford to then have to make it sustainable too. Some people renovate for comfort, others to reduce the energy bill. Older home owners may wonder whether an investment in making their home sustainable is still worthwhile and will be sufficiently reflected in a higher home value for their heirs. And other households would like to renovate but cannot because they have no unused borrowing capacity.

Given this disparity among home owners a 'one size fits all' approach cannot be applied. In elaborating the agreements of the Climate Agreement around financing and support account has therefore been taken of all those preferences and motives. The goal is to come up with a broad palette of attractive, accessible and responsible financing possibilities, so that everyone can find a suitable form. A heating fund is in the works, and the thresholds for increasing mortgage loans for making homes sustainable will be lowered. We are looking into how individual savings on the energy bill can be taken into account in determining availability of consumer credit. Building-related financing will be made possible. To support home owners in their choices a digital platform will be put in place for prior information and tailor-made advice. When people buy a home, they will be given information and advice by real estate agents and mortgage advisers on sustainability possibilities and how to finance them.

Owners of rental homes and non-residential buildings also need financing instruments to make their investments more affordable. For housing associations, the Renovation Accelerator has been set up. Other building owners can make use of various tax and subsidy instruments and of loans for energy saving. Financing for test beds is also coming via the Gas-free Districts Programme.

8.2 Attractive and accessible financing for all home owners

Everyone must be able to take part in the energy transition. The cabinet maintains the premise that more and more households can recoup the cost of making the home sustainable through lower energy bills. Much work is needed to bring this within reach: the cost of measures to make homes sustainable must be brought down through innovation and scaling up; the structure of the energy tax must support switching to sustainable heating options; subsidy possibilities are needed to make investment attractive and profitable; and attractive financing options are needed. The adaptation of the energy tax has already been carried out in the Tax Plan for 2020.

Financing becomes attractive when the monthly charges are low and long terms match the useful lives of the measures for making homes sustainable. The palette must be accessible in the sense that it must offer all target groups a perspective and fit in with municipalities' district-oriented approach and financing must be easy to secure at acceptable cost. Furthermore, financing for making homes sustainable must always be responsible and not lead to excessive indebtedness: home owners must be able to pay the financing costs and the financing of the measures to make their homes sustainable must not cause them financial problems. To bring about this palette, thresholds are being removed and measures taken to make better use of existing financing possibilities and to make them more accessible. Where necessary, new financing possibilities will be created. The Central government and the VNG Association of Municipalities are working together to make information about housing cost neutrality in the various different types of dwelling and heating solutions available to municipalities in order to support them in developing the 'Transition Vision for Heating'.

A heating fund with attractive financing

There will be a heating fund where all home owners will be able to find attractive financing for making their home sustainable. This heating fund will be accessible to all, including those who currently do not have access to financing. In February 2020 the heating fund will start granting financing with terms of up to 20 years for owner-residents and 30 years for Associations of Owners from eight apartments up (matched to the useful lives of the sustainability measures). The interest rate will be comparable with the rate for mortgage loans with National Mortgage Guarantee at the same term. In combination with the available subsidies for insulation and sustainable heating options the financing costs for making homes sustainable will come down. Owners will thus increasingly be able to recoup the cost of these measures via a lower energy bill (housing cost-neutral).

The goal is for the heating fund to also offer, from July 2020, a financing product for owner-residents who do not qualify for regular financing based on their income. This requires further elaboration in the coming months. The monthly financing charges will be based on the financial position of the applicants, so that they do not get into financial problems (financing in accordance with capacity). In the temporary arrangements for mortgage lending the lending criteria already take account of energy savings made through measures to make homes sustainable. This product will be made available to those who have hitherto had no access to financing but do

need to make their homes sustainable. For example, in a test bed for gas-free districts or for making mixed ownership groups of houses sustainable: owner-occupied homes in a block of housing association homes that are tackled together as one. If the cost of connecting to a district heating grid, or the cost of insulation or of a heat pump constitute a sticking point for the owner-occupied homes, the owners can finance the one-time costs through the heating fund. The intention is to add an offer, yet to be developed, for owners' associations with fewer than eight apartments to the offer of the heating fund as soon as possible.

The heating fund is fed by public and private resources. The government is making a total of €900 million available between now and 2030. In order to be able to make a flying start with the heating fund in 2020 the Government is using the structural and financing proceeds of the current National Energy Saving Funds (NEF). The volume of financing in the heating fund will grow in the short term to more than €1 billion, with private contributions expected to account for around 75% of the total.

To ensure that public money is used responsibly and efficiently, owner-residents' borrowing via the heating fund will be limited to €25,000. For the term of the financing account will be taken of the technical life of the installation and insulation measures to avoid over-indebtedness.

The functioning of the heating fund will be periodically reviewed. An initial intermediate assessment will take place in the early part of 2022, when the government will look at the effectiveness of the approach and the availability of sufficient public resources for the various target groups in the light of market developments for financing products. The key questions will be availability of attractive financing alternatives in the market and possible market distortion caused by the heating fund.

Lower thresholds for increasing the mortgage

The mortgage loan is a trusted and attractive form of financing for practically all home owners. Financing measures to make homes sustainable by increasing the amount of the mortgage loan is therefore a logical route. The intention is to do away with the obligatory knowledge and experience test for increasing mortgages by 'execution only' (concluding a mortgage loan directly, without mortgage advice). The knowledge and experience test aims to ensure that the lender can assess whether the consumer understands the risks associated with the mortgage loan. By doing away with the obligation we expect to see more lenders offering to increase mortgage loans for measures to make homes sustainable on an execution only basis and the cost of such increases fall for many consumers. As a result of the lower completion costs (mortgage advice costs approximately €800 euro) the threshold for increasing the mortgage loan for sustainability measures will be lower. The lender must of course always assess the creditworthiness of the consumer so as to ensure that even with 'execution only' lending the extra credit is responsible.

More customisation in lending room when granting credit for sustainability improvements

In the Climate Agreement it was agreed that a study would be carried out to see whether there was a way to develop residential cost neutrality, which could be key to granting credit for sustainability measures. In the early part of 2020, we shall be looking at the extent to which individual energy saving may count in lending criteria for consumer credit. The goal is that in granting consumer credit for sustainability improvements, lenders should be able to take account of the expected energy costs after the improvements have been made. Lending criteria for mortgage loans already offer the possibility of extra financing room for such measures based on

expected energy savings. The lending criteria for consumer credit do not include this possibility. Responsible lending remains the starting point. We are also looking at whether extra safeguards for consumer protection are needed, for example if actual energy savings are disappointing. The study is expected to be completed by the summer of 2020.

8.3 Building-related financing

Building-related financing is financing of measures to improve sustainability that is linked to the home. This means that if the dwelling is sold, the financing is transferred to the buyer who is then responsible for the remaining debt and payment obligations. A owner thus pays interest and loan repayments only for as long as he or she remains in the home. As agreed in the Climate Agreement the route is being worked out for incorporating a provision in the Civil Code making building-related financing possible. This provision will lay down a generic, private-law principle which will enable all lenders – banks, public-private funds and public authorities – to offer building-related sustainability loans.

For certain groups of home owners this may remove thresholds for sustainability investment, since building-related financing gives present owner the assurance that financing is transferred to the new owner when they move. For example, for a household wishing to scale up to a bigger house within a year, or for older home owners who do not know how long they will remain in the home. With building-related financing there is less need to recoup the investment in the short term and the outstanding debt does not have to be repaid at once upon sale. The loan agreement is registered in the public registers. Building-related financing cannot however be made to fit in with tax arrangements. A building-related loan for sustainability improvements will fall outside the own-home tax scheme and so the interest will not be tax-deductible. It has been agreed with the banks that they will offer building-related sustainability loans that are attractive even without tax advantages. A draft bill to amend the Civil Code is being prepared. A pre-draft should be ready for consultation by the second quarter of 2020.

In the Climate Agreement it was also agreed to carry out a study to examine under what conditions sale and leaseback could be used an extra possibility for building-related financing. In principle sale and leaseback is a good legal basis for this. The owner sells the land and/or the house to a third party and leases it back, thus becoming the lessee. The proceeds of the sale are used to make the home sustainable. For the right of use the (ex-)home owner (now lessee) pays periodic lease rentals over the agreed term of the lease. The study shows that financing by means of sale and leaseback can be an alternative for home owners thanks to the low rental payments and the long maturities. According to the researchers, the products now being developed are responsible. For example, home owners opting for these products will not be faced with unexpected lease rental increases. Lessees can also prepay the remaining rentals and regain freehold at the original sale price. The tax implications of this way of financing sustainability measures will depend on the specific structure and must be examined for each financing model. Potential lessors are consulting with the tax authorities on this. It will then be important for the tax consequences to be properly explained to home owners considering a sale and leaseback.

The study also shows that many parties have objections to the financing of sustainability measures by means of sale and leaseback. These objections relate among other things to the supposed complexity and comprehensibility for the home

owner and the transaction costs associated with the sale. Furthermore, sale and leaseback requires the cooperation of the mortgage lender. Mortgage lenders claim among other things that their creditor rank and risk position are impaired by such transactions and that considerable administrative costs are involved. In view of these objections, large-scale application of sale and leaseback to the financing of sustainability measures is probably not achievable. The researchers recommend carrying out a small-scale, well-secured experiment to see to what extent these objections can be overcome. Potential lessors and mortgage lenders will have to see whether there is sufficient traction for such a trial run.

8.4 Renovation accelerator for association housing

The Renovation Accelerator brings together housing associations' demand for (hybrid) heat pumps, insulation and other reduction measures. The Ministry of the Interior and Kingdom Relations organises the renovation accelerator in cooperation with various parties such as Techniek NL (installation companies' sector association), Bouwend Nederland (construction companies' sector association), the Bouwagenda (collaboration among various parties related to the construction industry), the Netherlands Enterprise Agency and Aedes (federation of housing associations). In making homes gas-free, apart from the source of energy above all improving the envelope (insulation) is of great importance, since with insulation, better insulating glass and greater air-tightness the heating requirement can be greatly reduced. If associations club together to make up baskets of orders this incentivises heating suppliers and construction companies to develop an attractive (joint) offer. This leads to more quality, lower costs and thus lower prices.

The renovation accelerator aims to match demand and supply. It also relieves associations of part of the procurement process and work. Of course, the individual association continues to decide on its own orders itself. The renovation accelerator supports associations by bringing part of the demand bundled and in multi-year predictable form to the market in the starter motor. Calls for tenders for sustainability improvements are being developed for these kinds of homes.

By calling for tenders for large numbers over a longer period (several years) investments in process improvement and industrialisation become profitable for contractors and arrangements (standardised packages or packages that can be manufactured industrially for energy saving and sustainable energy and heating solutions) can be developed for the main types of homes and buildings. By scaling up, cost-effective arrangements and programmed guidance, efficiency improvements can be achieved that will lead to a reduction of the target 20% to possibly as much as 40% of the system cost can be achieved by 2030, depending on the type of package. For the Renovation Accelerator €130 million will be made available between now and 2024.

For associations too an extra budget will be created for investments in making residential properties sustainable. To finance the operating shortfall, the landlord levy will be reduced by €100 million per year and from 2020 to 2023 inclusive €50 million per year in Energy Investment Deductions will be available to landlords.

8.5 Gas-free Districts Programme

In preparation for the Transition Visions for Heating that the municipalities are going to draw up and which contain the choices for the future provision of heating, a start has been made on a programme to make 100 districts gas-free. The aim of the Gas-

free Districts Programme is to find out how the district-oriented approach can be organised and scaled up. In this way inertia will be created to make ever more districts gas-free. The programme consists of large-scale test beds and an associated knowledge and learning programme.

In 2018 the first lot of 27 test beds began. These test beds were each given about €4 million from the Municipal Fund to cover the project shortfall. In the coming years the Government together with the municipalities intends to make approximately 100 existing districts gas-free. Municipalities can propose projects until 1 March 2020.

The aim of the knowledge and learning programme is for participants in the tests to learn from one another and to share learning experiences with all municipalities. The programme is aimed not just at technical solutions, cost and financing but also at management and organisation, data-based planning, legal aspects and communication and participation. The knowledge and learning programme started in 2019.

8.6 Tax and subsidy instruments

As well as specific measures aimed at promoting investments by private home owners and housing associations, the Government is also bringing various generic financial and tax instruments into play so as to promote the investment climate for sustainability improvements. These are partly aimed at businesses, partly at private home owners and partly at all building owners. The most important measures are:

Adaptation of energy tax on gas and electricity (all building owners)

In order to stimulate sustainability measures with a financial incentive, there will be changes in energy taxation and in the Sustainable Energy Surcharge (ODE), which have an effect on the energy bill. This boils down to higher tax on gas and lower tax on electricity. In net terms a household with average consumption will not end up paying more. A reduction in the Sustainable Energy Surcharge (a surcharge on the energy bill) and an extra reduction in the energy bill will make for a total reduction of €100 in the energy bill in 2020.

Energy investment deduction (EIA) (businesses)

This is a financial scheme for businesses to facilitate sustainable/energy-efficient investments and thus accelerate the transition. It concerns investments in sustainable building, insulation and heating, energy-efficient lighting, generation of sustainable energy and improvement of the energy label.

Environmental Investment Deduction (MIA) & Arbitrary Depreciation of Environmental Investments (VAMIL) (businesses)

The government wishes to stimulate investment in new or renovated buildings. The Ministry of Infrastructure and Water Management and the Ministry of Finance have made this extra attractive with two investment schemes. The Arbitrary Depreciation of Environmental Investments (VAMIL) allows entrepreneurs to decide themselves how to depreciate the investment (up to 75% of the investment cost). By choosing a favourable term he or she can thereby obtain an advantage in terms of liquidity and interest. The Environmental Investment Deduction (MIA) offers tax deduction for up

to 36% of the investment amount. This deduction is on top of the usual investment deduction for entrepreneurs.

Sustainable Energy Investment Subsidy (ISDE) (businesses and private individuals)

At the moment this arrangement is intended for sustainable installations such as heat pumps. The ISDE will be expanded to cover insulation too. From now until 2030 €100 million per year is available for the ISDE.

Own Home Energy Saving Subsidy (private individuals)

To help owner-occupants in the short with making their homes sustainable, a total of €90 million is available for 2019 and 2020 through the Own Home Energy Saving Subsidy (SEEH). The SEEH runs into the broader Sustainable Energy Investment Subsidy (ISDE).

VAT refund and PV offset scheme (businesses and private individuals)

The Netherlands encourages small users to install solar panels by refunding the VAT on acquisition and by making supply of electricity at an attractive rate possible through an offset scheme.

Reduced VAT rate (businesses and private individuals)

A reduced VAT rate applies to installing insulation material and (insulation) glazing. The VAT rate is reduced from 21% to 6%.

Energy saving measures programme (private individuals)

With small measures such as better settings for the heating installation and the application of radiator foil, substantial savings on the energy bill can be made for very little outlay and CO₂ emissions directly reduced. Therefore, a start has been made with the Energy Saving Measures Programme in cooperation with municipalities and market actors. For this €93 million is available.

Exemption from energy tax for self-generated energy for energy cooperatives (private individuals)

Members of energy cooperatives (groups of private individuals) do not have to pay tax in the first bracket of the energy tax for the portion of the collectively generated renewable electricity allocated to them. We are also looking into whether a development facility can be set up with which energy cooperatives can finance development costs.

8.7 Energy saving loans and sustainability loans

With the Energy Saving Loan private home owners can obtain a loan at favourable terms for making energy saving improvements. The Dutch Municipalities' Stimulus Fund for Housing (SVn) extends the energy saving loan from the National Energy Savings Fund. This fund is provisioned by the Government, Rabobank, ASN Bank and the Council of Europe Development Bank (CEB). A total of €600 million is available. Interest and repayments go back into the fund so that new energy saving loans can be granted. Energy saving loans are also available to associations of owners of apartments and to schools.

Various local governments also offer sustainability loans to finance investments in sustainability improvements of (mainly) private homes on attractive terms.

9 Consultation of stakeholders on long-term renovation strategy

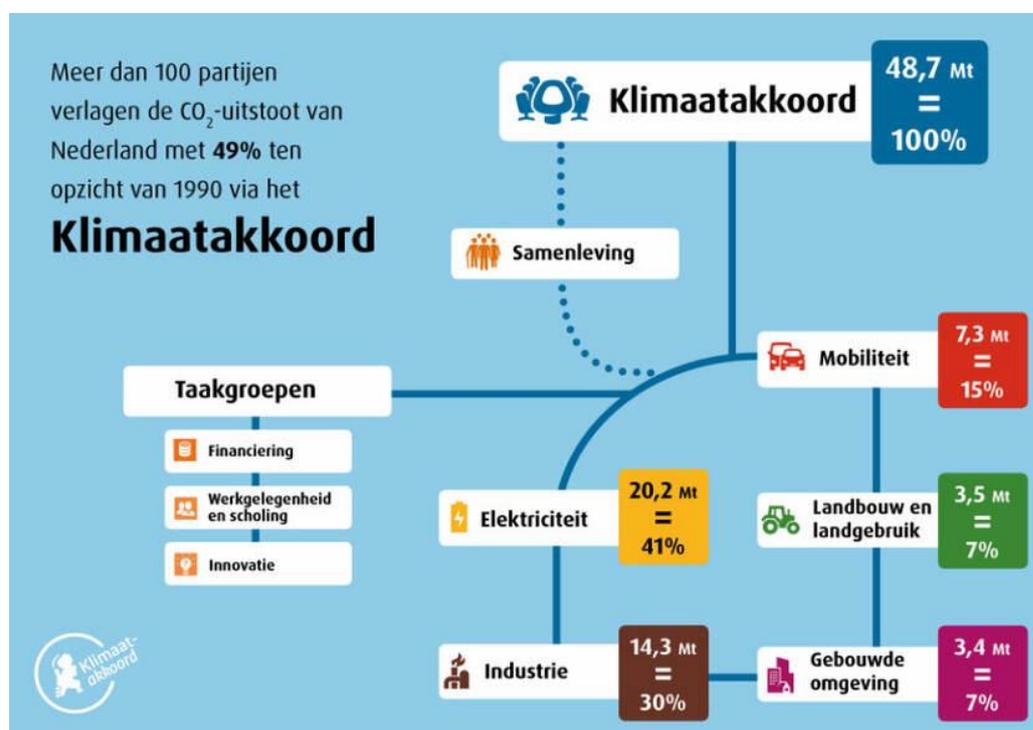
The reduction of GHG emissions affects everyday life. The energy transition is first and foremost a social transition. Citizens and businesses are faced with decisions that influence how we live, how we move about, what we eat, the products we buy and how we earn our money. These are not always easy choices, with citizens and businesses moreover depending on each other and on the government. A combination of energy, investment, knowledge and skill is necessary.

The Dutch cabinet has therefore decided on a broad social agreement as the basis for the policy. Since February 2018 more than 100 parties have been working together on a coherent package of proposals for attaining the long-term objectives for reducing CO₂ emissions, energy saving and generation of renewable energy. Citizens too have been asked for plans, ideas and suggestions and invited to submit questions. This eventually led, on 28 June 2019, to a broadly supported Climate Agreement, with more than 600 agreements for combating GHG emissions. The Climate Agreement is the successor to the Energy Agreement and forms the basis of the long-term renovation strategy.

This section looks in more depth at how the Climate Agreement came about and what role governments, social organisations, businesses and citizens played in it.

9.1 Climate Agreement and the Built Environment sector committee

More than a hundred stakeholders took part in the discussions leading up to the Climate Agreement, spread over five sector committees and three working groups. The five sector committees were: Electricity, Built Environment, Industry, Agriculture & Land Use and Mobility. The three working groups dealt with financing, innovation and labour market and training. The five sector committees were presided over by independent chairpersons, who regularly met in a Climate Council which oversaw the coordination of the sectors and their consistency with the transversal themes. In the sector committee for the Built Environment agreements were made on making the built environment sustainable. The Built Environment sector committee was chaired by Diederik Samsom, former leader of the Dutch Labour Party and currently principal private secretary to European Commissioner Frans Timmermans.



Meer dan 100 partijen verlagen de CO ₂ uitstoot van Nederland met 49% ten opzicht van 1990 via het	More than 100 parties reduce CO ₂ emissions of the Netherlands by 49% relative to 1990 through the
Klimaatakkoord	Climate Agreement
Samenleving	Society
Taakgroepen	Working groups
Mobiliteit	Mobility
Financiering	Financing
Werkgelegenheid en scholing	Employment and training
Innovatie	Innovation
Elektriciteit	Electricity
Landbouw en landgebruik	Agriculture and land use
Industrie	Industry
Gebouwde omgeving	Built environment

Representatives of various parties, organisations and businesses took part in the Built Environment sector committee. They can make concrete contributions to the changes that are necessary in order to attain the climate objectives in the built environment. The participating parties were:

- The Ministry of the Interior and Kingdom Relations
- The Association of Provinces of the Netherlands
- The Association of Dutch Municipalities
- Union of Water Boards
- Bouwagenda
- Eneco (also on behalf of energy companies)
- Ennatuurlijk and HVC
- Nuon
- Triodos Bank
- Aedes (federation of housing associations)
- Bouwend Nederland (association of construction companies)
- FNV (Federation of Dutch Trade Unions)

- Dutch Sustainable Energy Association, also on behalf of TKI Urban Energy
- Netbeheer Nederland (sector organisation for grid managers)
- Primary & Secondary education councils (also on behalf of VSNU (group of government universities))
- Stroomversnelling (non-profit for energy transition)
- Techniek Nederland (association of installation companies)
- Sustainable Housing Platform
- Own Home Association
- Association of Institutional Real Estate Investors
- Woonbond (home o association)

The Built Environment sector committee discussed eight main subjects (each with sub-themes):

- | | |
|--------------------------------|--|
| 1. District-oriented approach | 6. Financing and tax |
| 2. Support for owner-occupants | 7. Cost reduction in construction |
| 3. Rental sector | 8. Sustainable heating and market regulation |
| 4. Dwellings | |
| 5. Non-residential buildings | |

This eventually led to a coherent package of goals and measures for making the built environment sustainable. This package of agreements forms the basis for the long-term renovation strategy.

9.2 Citizens' involvement

Citizens were also asked to contribute to the Climate Agreement. They could send in plans, ideas, suggestions and questions online. In the period from 26 April to 30 September 2018 nearly 500 reactions were received¹³.

These contributions were shared with the Climate Council and the sector committees. Thanks to all these questions, observations, suggestions and ideas the parties in the sector committees gained a good understanding of the issues at stake and the concerns around them. Many people were given personal answers. Many questions, such as those about pellet and wood burning stoves, were answered on the Climate Agreement website.

A delegation of the Climate Council also toured the country. At the end of May and beginning of June 2018 meetings were held in five locations where citizens could share their ideas. In October the Climate Council organised a meeting in every province to talk about the headline subjects of the Climate Agreement. The Netherlands Platform for Citizens' Participation and Government Policy (NPBO) also organised a series of meetings¹⁴.

Organisations representing large groups of citizens, such as the Own Home Association and the Woonbond home owners' association were also involved in the meetings of the Built Environment sector committee.

¹³ An anonymised overview of the reactions can be found at:

<https://www.klimaatakkoord.nl/participatie/documenten/publicaties/2018/11/05/overzicht-inzendingen>

¹⁴ The results of these meetings can be found at: <https://www.klimaatakkoord.nl/themas/draagvlak-en-participatie/documenten/publicaties/2018/09/03/burgers-aan-het-woord-over-klimaatakkoord>

In view of the reactions of citizens and parties in the sector committee, the Climate Agreement took account of a number of aspects in order to promote and maintain the traction of the climate policy. Relevant aspects for the built environment are:

- Balanced sharing of burden: The Climate Agreement looks to cost-efficient measures to keep the transition affordable both for society as a whole and for individual households. The Climate Agreement contains agreements on limiting the income effect for households and sparing lower incomes most. The Climate Agreement also makes financing arrangements possible to ensure that everyone can take part in the transition. In the distribution of tax between households and businesses there is a shift from households to businesses.
- Citizens' monitor: At the moment there is still insufficient visibility of what citizens really think. Therefore, it has been established in the Climate Agreement that the Social and Cultural Planning Bureau will shed light on citizens' knowledge, attitudes, motives, expectations and behaviour with regard to the sustainability transition by means of a programme of surveys on the Sustainable Society. This programme of surveys will look at the relationship between citizens (individually or collectively) and government in the context of these transitions, at processes during and through these transitions that possibly involve Dutch people or groups of them or perhaps exclude them, and at the consequences of these transitions for the quality of life. By regularly bringing citizens' perspective into the equation it should be possible to make solidly underpinned statements about developments over the course of the years.
- Broad public approach: The Climate Agreement establishes that the Central government will develop a broad public approach, with the aim of making citizens aware of their personal role in the transition and encouraging them to change their behaviour. The broad public approach has two elements; a public campaign and a network approach. The public campaign will ensure that citizens are constantly offered a view of how to go about things, so that they can make a contribution at the most convenient time. In the network approach Central government and stakeholders (public and private parties) will together develop concrete and attractive possibilities with which citizens can set about making the transition. With an appropriate offer at the right time it will then be easier for them to take steps themselves.
- Citizens' dialogue: A large group of citizens still react hesitantly, even when the preparation of measures in their own home or surroundings are concerned. This section of the population must not be forgotten when implementing the Climate Agreement. After the exchanges with citizens when preparing the Climate Agreement in 2019 there followed a study of how citizens who are still hesitant or difficult to reach can be engaged in the implementation of the Climate Agreement.
- Participation in the Regional Energy Strategies: In developing a Regional Energy Strategy, public authorities work together with grid managers and social stakeholders on possibilities that are regionally supported, for the generation of sustainable electricity, the heating transition in the built environment and the storage and energy infrastructure needed for this. For each region municipalities, water boards and provinces see to it that citizens are given accurate and timely information. They are also well aware at the

local level that citizens can be very effective in helping to think through and form strategies. Each region determines what facilities are necessary for this. Depending on regional circumstances this may involve access to knowledge, independent accompaniment of processes, financial support or other. In drawing up the Regional Energy Strategy, regional governments must adhere to the agreements established in the Climate Agreement regarding citizens' participation.

- Participation in the district-oriented approach: Municipalities are in charge of the transition to gas-free districts. In a meticulous process they will consider per district what the best solution is if houses are no longer heated with the traditional central heating gas boiler. The solution may vary from one district to another. All practical examples so far indicate that this process is more successful if citizens embark on it together and with the local government. In choosing a suitable form of participation - informing, inviting opinions, consultation or coproduction – it is important to know the socio-cultural profile of the district. In the so-called 'test beds' of the Intergovernmental Programme for Gas-free Districts different district profiles are elaborated and tested. A component of the Gas-free Districts Programme is the Knowledge and Learning Programme, which aims to strengthen the role of the municipalities as coordinator and to pool the experience of municipalities and other stakeholders. In the test beds principles for participation processes are also tested. Partly on the basis of experience with the test beds, the Central government together with the municipalities and other interested parties has drawn up a guide to participation¹⁵.

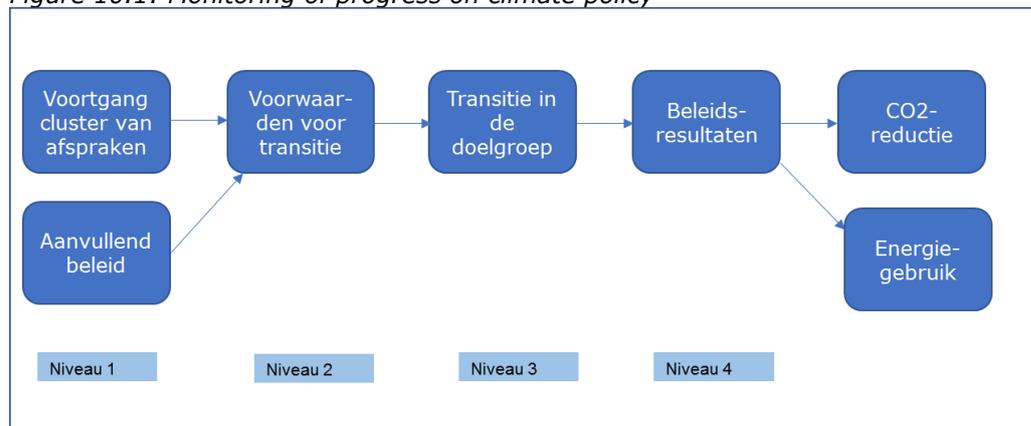
¹⁵ <https://www.aardgasvrijewijken.nl/handreikingparticipatie/default.aspx>

10 Stage plan/roadmap

In accordance with Article 2a, section 2 of the EPBD, 'in its long-term renovation strategy, each Member State shall set out a roadmap with measures and domestically established measurable progress indicators, with a view to the long-term 2050 goal of reducing greenhouse gas emissions in the Union by 80-95% compared to 1990, in order to ensure a highly energy efficient and decarbonised national building stock and in order to facilitate the cost-effective transformation of existing buildings into nearly zero-energy buildings. The roadmap shall include indicative milestones for 2030, 2040 and 2050, and specify how they contribute to achieving the Union's energy efficiency targets in accordance with Directive 2012/27/EU.'

The starting point for the stage plan is formed by the long-term objectives for energy and climate. In line with the broader energy and climate policy of the Netherlands, in making the built environment sustainable the primary aim will be CO₂ reduction (see section 10.1). This means that CO₂ emission ceilings have been chosen as indicative milestones for the making the built environment sustainable.

Figure 10.1: Monitoring of progress on climate policy



Voortgang cluster van afspraken	Progress on clusters of agreements
Voorwaarden voor transitie	Pre-conditions for transition
Transitie in de doelgroep	Transition in the target group
Beleidsresultaten	Policy results
CO ₂ -reductie	CO ₂ reduction
Aanvullend beleid	Complementary policy
Energiegebruik	Energy usage
Niveau	Level

In order to offer stability to all parties involved in implementing the climate policy, the Government aligns its actions with the planning and update cycle established in the Climate Act, which in turn is aligned with the Paris Climate Agreement, the Long Term Strategy and the Integrated National Energy and Climate Plan deriving from EU legislation.¹⁶

¹⁶ <https://www.klimaataakkoord.nl/documenten/publicaties/2019/06/28/klimaataakkoord> p. 8.

In the Climate and Energy Outlook (KEV) which starting in 2019 appears annually in October, the Netherlands Environmental Assessment Agency (PBL) reports on expected CO₂ emissions in 2030. The PBL does this on the basis of the situation regarding climate and energy in the Netherlands and expected future developments. This assures insight into the CO₂ target scope¹⁷. As well as measuring actual and estimated emissions in millions of metric tons of CO₂, energy consumption is also measured (see section 10.2.) Here a distinction is made between gas and electricity consumption of households and the service sector. The advantages in the broader sense are also covered in this section.

In order to be able to make adjustments along the way, monitoring of progress in terms of measures and reporting of intermediate results are important. The step-by-step plan contains progress indicators at four levels:

4. Progress on the implementation programme. This level gives an insight into the progress on commitments from the National Climate Agreement and the broader legislative and regulatory agenda of the government. The insights at this level indicate above all whether the commitments are being met and policy measures have effectively been initiated and are being implemented.
5. Pre-conditions for transition. This level provides insight into the extent to which conditions making the behavioural or other changes in the target group possible have been fulfilled.
6. Changes in target groups. This level concerns the first visible changes in the policy target group.
7. Policy results. This level provides insight into the results of the policy. Attention is also given to advantages in the broader sense.

The indicators at these four levels are in the progress monitor, see sections 10.3 to 10.6. The Climate Policy Progress Monitor serves along with the Climate and Energy Outlook (KEV) as the basis for the Climate Memorandum and the possible biannual calibration of the Climate Plan. The Progress Monitor will give information about the progress of the commitments in the Climate Agreement and any complementary government policy as set out in the Climate Plan. The Progress monitor reports on the climate policy pursued and creates a proven and credible factual basis for adjusting any sticking points in the execution of the policy.^{18, 19}

10.1 Indicative milestones²⁰

The built environment accounts for over 30% of total energy consumption in the Netherlands. To attain the long-term objectives for energy and climate it is also essential to make the national building stock more sustainable in the run-up to 2050. In line with the broader energy and climate policy of the Netherlands, in making the built environment sustainable the Government will focus mainly on CO₂ reduction. This means CO₂ emission ceilings have been chosen as indicative milestones for making the built environment sustainable and that progress will be measured in millions of metric tons of CO₂.

The Netherlands has committed to a 49% CO₂ reduction in 2030 relative to 1990. That means a CO₂ reduction of approximately 49 million metric tons of CO₂

¹⁷ <https://www.klimaataakkoord.nl/documenten/publicaties/2019/06/28/klimaataakkoord> p. 8.

¹⁸ <https://www.klimaataakkoord.nl/documenten/publicaties/2019/06/28/klimaataakkoord> p. 12.

¹⁹ The data collection complies with the obligations referred to in Article 10, section 6 of the EPBD.

²⁰ This section is based on the Integrated National Energy and Climate Plan for 2021-2030

equivalents in 2030 relative to existing policy. The Integrated National Energy and Climate Plan for 2021-2030 (INEK) states the following:

- For the EU renewable energy goal of 32% the European Commission has indicated that it considers a contribution of 26% from the Netherlands reasonable. The Netherlands shows ambition and aims to attain at least a proportion of 27% renewable energy in 2030. The PBL (Netherlands Environmental Assessment Agency) estimates that the proportion of renewable energy in 2030 will be between 30% and 32%.
- The Netherlands aims to achieve a primary energy consumption of 1950 petajoules by 2030 (excluding use for non-energy purposes). In terms of final energy consumption, this contribution can be translated into an expected final energy consumption of 1.837 petajoules by 2030.

These contributions have-not been translated into sector targets. There is however an indicative allocation of CO₂ objectives to sectors in the Climate Agreement. For the built environment this is 3.4 million metric tons of extra CO₂ reduction in 2030 relative to existing and proposed policy. According to this indicative allocation maximum CO₂ emissions for the built environment in 2030 come to 15.3 million metric tons (see figure 10.2). This is the indicative milestone that the Netherlands wishes to maintain for 2030 for the built environment. The Netherlands will achieve the proposed CO₂ reduction of 3.4 million metric tons with a broad range of measures. These measures are aimed at reducing energy consumption and increasing the proportion of renewable energy in the built environment.

The Climate Act indicates that the Netherlands aims for a 95% reduction in GHG emissions in the Netherlands by 2050. The Netherlands still has no indicative assignment of CO₂ objectives to sectors for 2050. There we have chosen, for the indicative milestone for 2050 for the built environment to go for a straight conversion of the general 95% CO₂ reduction target to the built environment. A CO₂ reduction of 95% in 2050 in the built environment relative to 1990 is equal to maximum emissions of 1.5 million metric tons CO₂ equivalent. This is the indicative milestone that the Netherlands uses for 2050.

The Netherlands has also not established any CO₂ reduction targets for 2040. Therefore, to determine the indicative milestone for 2040 for the built environment we assumed a linear reduction in GHG emissions between the indicative milestones for 2030 and 2050. The indicative milestone then amounts to maximum emissions of 8.4 million metric tons CO₂ equivalent.

The Netherlands emphasises that these are indicative objectives. In a subsequent version of the INEK these objectives may be adjusted upwards or downwards if developments (for example concerning the cost-effectiveness of the energy transition or innovation) make it advisable.

10.2 CO₂ emissions, energy consumption in the built environment sector and pre-conditions in the broad sense ²¹

The 'built environment' sector comprises the energy consumption and emissions of households, businesses, and organisations falling under the service sector. It concerns above all energy consumption in homes and buildings. The energy

²¹ The CO₂ emissions and the energy consumption in this section are based on PBL (2019) Climate and Energy Outlook (KEV) 2019 and PBL (2019) KEV Table appendix.

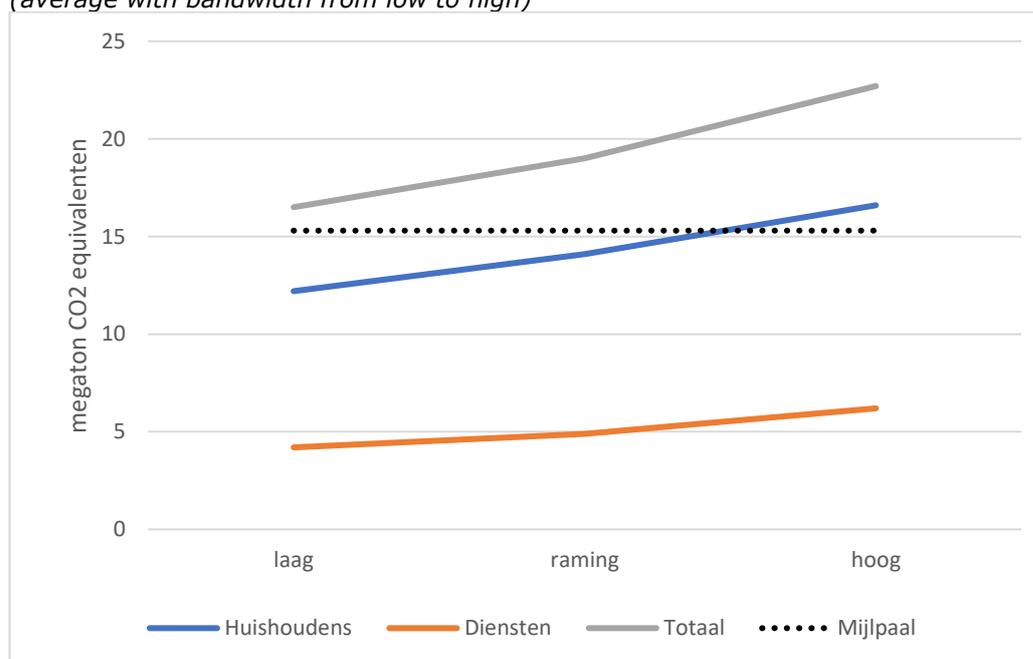
consumption in buildings of businesses not falling within the service sector is counted in the sectors concerned, so not under the 'built environment' sector.

CO₂ emissions

Total GHG emissions from the built environment are expected to fall between 1990 and 2030 by 37 percent to 19.0 million metric tons CO₂ equivalent (with a bandwidth of 16.5-22.7). Estimated emissions in 2030 are thus higher than the indicative milestone, see figure 10.2.

Households' GHG emissions have been decreasing steadily since 2000. This decrease is expected to continue to 15.9 (bandwidth 14.0-18.7) million metric tons of CO₂ equivalent in 2020, and 14.1 (bandwidth 12.2-16.6) million metric tons of CO₂ equivalent in 2030. GHG emissions in the service sector have declined from 8.3 million metric tons of CO₂ equivalent per year in 2000 to 7.2 million metric tons in 2018 and further to 4.9 (bandwidth 4.2-6.2) million metric tons of CO₂ equivalent in 2030, according to the estimate with the proposed policy.

Figure 10.2: Estimated GHG emissions by households and service sector in 2030 (average with bandwidth from low to high)



Source: PBL (2019) Climate and Energy Outlook 2019.

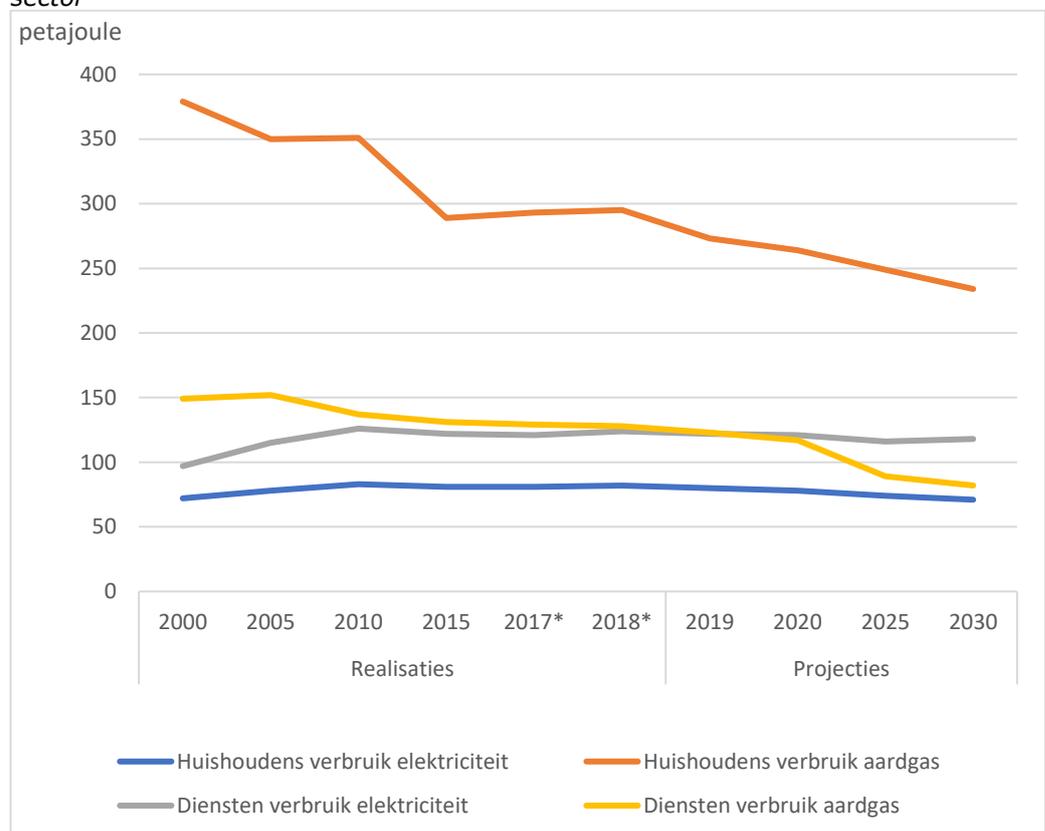
megaton CO ₂ equivalenten	millions of metric tons of CO ₂ equivalent
laag	low
raming	estimate
hoog	high
Huishoudens	Households
Diensten	Service sector
Totaal	Total
Mijlpaal	Milestone

Energy consumption

Households make the biggest contribution (70% in 2000-2030) to total emissions of the built environment. These emissions come almost entirely from the use of gas for heating, hot water and cooking. Year-on-year differences depend among other things on average temperature (heating consumption goes up in a cold year). Gas consumption by households will fall steadily to 264 (bandwidth 249-279) petajoules in 2020, and 234 (bandwidth 214-249) petajoules in 2030. After a long period of rising trend, since 2013 demand for electricity has been falling, due to sharp improvements in the efficiency of household appliances. The use of heat pumps in households will increase to 2030, and with it demand for electricity. On balance demand is expected to fall slightly, to 78 (bandwidth 75-82) petajoules in 2020 and 71 (bandwidth 68-77) petajoules in 2030. As well as the decline in demand for electricity there is also a rapid increase in solar panels installed by households. With these panels households are covering an ever greater proportion of their electricity demand with self-generated power. As a result, on balance supply from the grid will fall faster than demand itself.

In the service sector, gas consumption has declined from 138 petajoules in 2000 to 124 petajoules in 2018, with further declines forecast to 117 (bandwidth 107-125) petajoules in 2020 and 82 (bandwidth 76-93) petajoules in 2030. The electricity consumption of the service sector has increased from 97 petajoules in 2000 to 124 petajoules in 2018. In the estimate of the proposed policy a decline is expected to 118 (bandwidth 114-123) petajoules in 2030.

Figure 10.3: Natural gas and electricity consumption of households and service sector



Source: PBL (2019) Climate and Energy Outlook 2019.

petajoule	Petajoules
Realisaties	Actual
Projecties	Projected
Huishoudens verbruik elektriciteit	Households' electricity consumption
Diensten verbruik elektriciteit	Service sector's electricity consumption
Huishoudens verbruik aardgas	Households' natural gas consumption
Diensten verbruik aardgas	Service sector's natural gas consumption

Advantages in the broad sense

According to the National Institute for Public Health and the Environment (RIVM) the measures in the Climate Agreement can produce benefits for health, safety and nature, through the elimination of fossil sources²². This gain is significant but also limited, because the reduction of CO₂ does not translate directly into reduced air pollution or safer living and working conditions. This is emphatically an initial reconnaissance which gives a rough estimate at national level.

As for safety, this concerns above all the elimination of possible carbon monoxide poisoning from the use of gas installations in the home. If all homes are gas-free in 2050, 10-50 fatalities per year will be prevented. At the same time sources of risk also disappear, eliminating the chance of a disaster with ten or more fatalities from these sources. And above all the disappearance of fuel transport will bring significant improvements.

For health the benefits come above all from the replacement of internal combustion engines (petrol, diesel, LPG and CNG) by electric motors. As a result, less NO_x gases and particulates will be released into the atmosphere. The estimate is that these emissions may fall by 10% by 2030 relative to 2016. The burden of disease from air pollution will thus be reduced by one or several percent. For 2050 a further reduction in NO_x gases and particulates is expected thanks to the climate measures, perhaps doubling the reduction in the burden of disease.

Exposure to diesel fumes in the workplace can lead to lung cancer and other complaints. The elimination of diesel fumes may lead to a reduction of one or several percent in the work-related burden of disease.

Electric cars make less sound at low speeds, so noise pollution in built up areas will decline. This may lead to noise reduction of 1 decibel in 2030 and 3-4 decibels in 2050. With a reduction of 3-4 decibels the burden of disease as a result of noise will decline by 15-25%. A point for attention for the further elaboration of the Climate Agreement is the possible increase in noise in and around the home as a result of heat pumps. Noise pollution from onshore wind turbines is another point for attention.

For nature, benefits derive from the Climate Agreement by way of a further reduction in nitrogen deposition. An extra reduction of around 10% by 2050 is possible. If that is achieved the natural area not critically burdened with nitrogen will increase. This has favourable consequences for nature and biodiversity.

²² RIVM (2019) Climate Agreement: effects on health and safety and nature.

10.3 Level 1: progress of the execution programme

The first level of the progress monitor gives insight into progress on commitments from the Climate Agreement and the government's broader legislative and regulatory agenda. The insights at this level indicate above all whether commitments are being met and policy measures have effectively been initiated and are being implemented.

The policy (see chapters 3 and 4) can be subdivided into 1) thematic and 2) sub-sector-oriented instruments. Thematic instruments are aimed more at organising an environment that helps to bring about investments in energy saving and reduction of CO₂ emissions; sub-sector-oriented instruments are aimed more at tackling specific aspects within the sub-sector. The distinction is partly artificial: many instruments contribute to an environment that promotes investments and also to tackling specific aspects. In the interests of having a clear overview however we opted for a division between thematic and sub-sector-oriented measures in this strategy.

Thematic instruments break down into instruments aimed at:

- Regionally oriented approach: the built environment is not uniform, and sustainability solutions must dovetail with the local situation and for example be designed for locally available sustainable sources of energy. This can best be achieved by a local management, within a regional and national framework. Municipalities work with stakeholders within a participation process on the 'Transition Vision for Heating' and on implementation plans at district level. Municipalities take charge of the district-oriented approach. This role is new for municipalities and requires new knowledge, expertise and skills.
- Tax and financing instrument: these instruments offer direct support for investments in energy saving and are aimed at more than one sector.
- Innovation instruments and education: these promote innovation in the technologies that are available for energy transition in buildings, and also in the processes and ways of working of professionals in the sector.

The (sub)-sector-oriented approach concerns:

- Private homes: the policy for private owner-occupants has a broad approach that brings many facets into play.
- Rental sector: the rental sector has a broad palette of measures, partly similar measures to those for private homes and partly specific measures for housing association dwellings.
- Commercial property: for this sub-sector there is a broad range of measures, often designed for a particular sub-segment so as to be able to meet the specific requirements of a particular type of building.
- Social real estate: this sub-segment of non-residential buildings concerns buildings with a public function.

Table 10.1: Progress on agreements

Subject	Indicator
Themes	
District-oriented approach	Regional Energy Strategies drawn up (RES)
	Guide to 'Transition Vision for Heating' published
	Knowledge and Learning Programme set up
	Expertise Centre for Heating set up
	'Transition Vision for Heating' tool operational
	Amendment of Energy Law to cover competences for the switch to gas-free
	Amendment to Environmental Act in respect of Transition Vision for Heating
	Test beds selected
Tax and financing	Energy tax adapted
	ODE adapted
	EIA, MIA/VAMIL tax benefits and green projects scheme adapted
	ISDE subsidy scheme adapted
	Own home energy saving subsidy (SEEH)
	Energy saving scheme
	Reduction of Energy Consumption scheme (RRE)
	Other: Expansion of mortgage rules to cater to energy saving measures, reduced VAT rate for installing insulation, solar panel offset rules adapted
	Heating fund
	Building-related financing (GGF)
	Incentive scheme for Gas-free rented accommodation (SAH)
	Remuneration for energy performance (EPV)
Innovation and training	Mission-driven R&D+1 (MOOI) scheme started
	Development of common and integrated roadmaps for knowledge and innovation of climate agreement (IKIA)
	Strengthening matching of education to sector

	needs
Sectors	
Private homes	Standard and target values published
	Energy label adapted
	Digital platform – information and calculation tools (incl. Energy Savings Explorer)
	Quality criteria for energy counters elaborated
	ISDE, RRE, SEEH, Energy savings scheme, other
	Building Decree requirements for newbuild (BENG) and existing buildings
	Heating fund set up
	Civil Code amended to cater for building-related financing
	Building-related financing products available in the market
Rental sector	Standard and target values published
	Elaboration of Starter motor route 1: connection of housing association homes to district heating grids
	Elaboration of Starter motor route 2: heat pumps and insulation (Renovation Accelerator)
	SAH, EPV, RVV
	Umbrella covenant: intermediate goals for associations and major landlords formulated
	Amendments to rental regulations
	Building Decree requirements for newbuild (BENG) and existing buildings
Commercial property	Sector roadmaps for commercial property drawn up
	Energy Saving duty activity decree environmental management
	Duty to inform energy saving and recognised list of measures
	Energy audit obligation (EED audit)
	EPBD=inspections
	Integrated enforcement strategy
	Data template for non-residential buildings ready

	Label C obligation offices 2023
	Menu for energy performance contracts
Social real estate	Roadmaps for social real estate drawn up for 11 sectors
	Coherent package of rules
	Knowledge and innovation platform for social real estate

10.4 Level 2: pre-conditions for transition

An important part of the step-by-step LTRS is the path to each objective. The intermediate steps are the conditions that must be with in order to reach the partial or ultimate objective. Level 2 consists of defining factors for:

- energy consumption by households
- energy consumption by users of non-residential buildings
- policy of municipalities
- policy of associations
- innovations

Defining factors for energy consumption are:

- Characteristics of the residential and non-residential buildings, see chapter 2.
- Factors determining energy behaviour of households and users of non-residential buildings: knowledge, attitude, costs and benefits of energy saving measures, resources, skills, legislation and regulations and feedback.

Determining factors for the policy of municipalities and associations are: intention, social influence, degree of professionalism, costs and benefits of energy saving measures, culture and project experience.

Innovation as a condition for transition consists of four components:

1. Agreements.
 - a. Development of common and integrated roadmaps for the Integrated Knowledge and Innovation Agenda (IKIA).
 - b. Drawing up of multi-year mission-driven innovation programmes (MMIPs).
2. Resources. Public-private resources and long-term financial security for potential owners, researchers and developers.
3. Actors and networks. Interaction between potential owners, component and knowledge providers and great diversity of participants are essential for development of an innovation system.
4. Results. Cost reduction and broadly shared technical and non-technical knowledge and skills for a portfolio with future gas-free arrangements for the renovation of the most characteristic types of homes and buildings.

Table 10.2: Pre-conditions for transition

Subject	Indicator
Owner-occupants	Number reached with information provided
	Owner-occupants' attitudes to sustainability measures
	Readiness to make the home gas-free
	Costs & benefits of sustainability measures
	Support measures
Tenants (social and private)	Number reached with information provided
	Attitude to sustainability measures
Housing associations	Number of home equivalents in intermediate goals for associations
	Number of matched homes Starter motor
	Traction for sustainability improvements
	Costs & benefits of sustainability measures
Major landlords	Number of home equivalents in intermediate goals for major landlords
	Number of matched homes Starter motor
	Traction for sustainability improvements
	Costs & benefits of sustainability measures
Owners of non-residential buildings	Number reached with information provided
	Number of home equivalents in intermediate goals for major landlords
	Attitude to sustainability measures
	Costs & benefits of sustainability measures
Tenants of non-residential buildings	Number reached with information provided
	Attitude to sustainability measures
Leading role of municipalities	Number of Transition Visions for Heating (TVW's)
	Number of home equivalents in Transition Vision for Heating
	Number of Implementation Plans
	Number of home equivalents in

	Implementation Plans
	Traction for sustainability measures
Innovation	Financing: proportion private/public per project
	Diversity of participants MMIP's: SBI-diversity, % of young businesses, ratios SME/large cap and domestic/foreign
	Number of innovation activities (technical/non-technical and technical broken down by FO, IO, EO and DEMO))
	Future cost price and its structure per arrangement
	Output MMIP's: Number of collective (popular)-scientific publications, Number of patents
	Demonstration of Energy and Climate Innovation (DEI+) adapted
	Coherence of programme network and quality of interaction
	Chance of success in the market per arrangement
	Construction & Technology Innovation Centre (BTIC) as driver

10.5 Level 3: Changing behaviour of target groups

This level aims to give a picture of the movement in relevant target groups as regards actions and behaviour to bring about reduction. The central point here is the project pipeline and progress on it. Is there sufficient movement on the part of the parties to be able to achieve policy results at level 4?

Table 10.3: Changing behaviour of target groups

Subject	Indicator
General	Sales figures for insulation material, glazing, high performance boilers, heat pumps by target group
	Number of ISDE and SDE++ subsidies approved by type and target group
Owner-occupants	Use of Heating fund (volume, number of loans)
	Average loan amount and percentage of households with access to financing
	Use made of other instruments for home construction

	Amount invested in energy saving measures
	Development of degree of insulation
	Development of non-building-related energy consumption
	Development of renewable energy
Housing associations and major landlords	Number of gas-free housing association homes in Starter motor route 1
	Number of gas-free housing association homes in Starter motor route 2 (Renovation Accelerator)
	Use made of SAH, EPV, RVV
	Progress towards intermediate goals, umbrella covenant
	Development of degree of insulation
	Development of non-building-related energy consumption
	Development of renewable energy
Non-residential buildings	Use made of instruments (EED-energy audit, EIA, Environmental Management Act)
	Progress towards intermediate goals of roadmaps
	Development of degree of insulation
	Development of non-building-related energy consumption
	Development of renewable energy
Municipalities	Number of test beds, gas-free districts

10.6 Level 4: Policy results

This section gives an insight into the results of the policy. Attention is also given to the advantages in the broader sense. Climate policy affects many other areas of policy and vice-versa. This can be mutually advantageous but it can also throw up obstacles to implementation. Positive synergies exist where climate measures contribute to quality improvement in the living environment, such as improved air quality (and therefore health), reduction of nitrogen emissions (ammonia and NOx) and improvement of biodiversity.

Table 10.4: Policy results

Subject	Indicator
Dwellings	Number of sustainable homes in District-oriented approach – total, owner-occupants, private rented homes, housing association homes
	Number of sustainable homes outside District-oriented approach – total, owner-occupants, private rented homes, housing association homes
	Number of gas-free homes (existing/newbuild)
	Development of degree of home insulation – total, broken down by ownership
	Development of energy performance/energy labels
	Development of gas consumption
Non-residential buildings	Number of sustainable buildings – non-residential buildings (broken down by sector, including government buildings)
	Development of energy performance/energy labels (broken down by sector, including government buildings)
	Development of gas consumption
Districts	Number of gas-free districts and neighbourhoods
Energy poverty	Development of energy bill for home owners and tenants
Development of advantages in the broad sense	Job opportunities
	Environmental damage
	Health effects

Appendix: Summary of the Climate Agreement (Built Environment section)

Vision for 2050: all buildings sustainable

The Netherlands stands on the eve a sustainable transformation of the built environment and of the 7 million homes and 1 million buildings we have built, many of which are moderately well insulated and virtually all of which are heated by natural gas, into well insulated homes and buildings that are sustainably heated and supplied with clean electricity which they partly generate themselves. The Dutch government will carry out this process incrementally up to 2050, together with residents, tenants, owners, housing associations, builders, fitting businesses, and any other interested parties.

The Netherlands has opted for a district-oriented approach to this transformation. District heating grids and renovations will be organised at district level. Local residents will collaborate with one another and with the relevant local government authority. This means collectively making the right decisions and collectively organising potential interventions in the local community and in residents' homes and perhaps even jointly owning a new geothermal or other heating source or solar panels. This is easier and cheaper than if each household is left to its own devices.

The municipalities play a crucial role in this regard. Alongside residents and building owners, a meticulous process will have to be completed to determine the best solution for each district, for when houses are no longer heated with traditional central-heating boilers. If the area has been densely developed, contains many high-rise buildings or has homes that were built before 1995, then a district heating grid will often be the solution. If the area contains new homes set out in a spacious district, then an all-electric solution using heat pumps may be better. If the natural gas network remains in place for the time being it may be possible to use it for green gas or hydrogen.

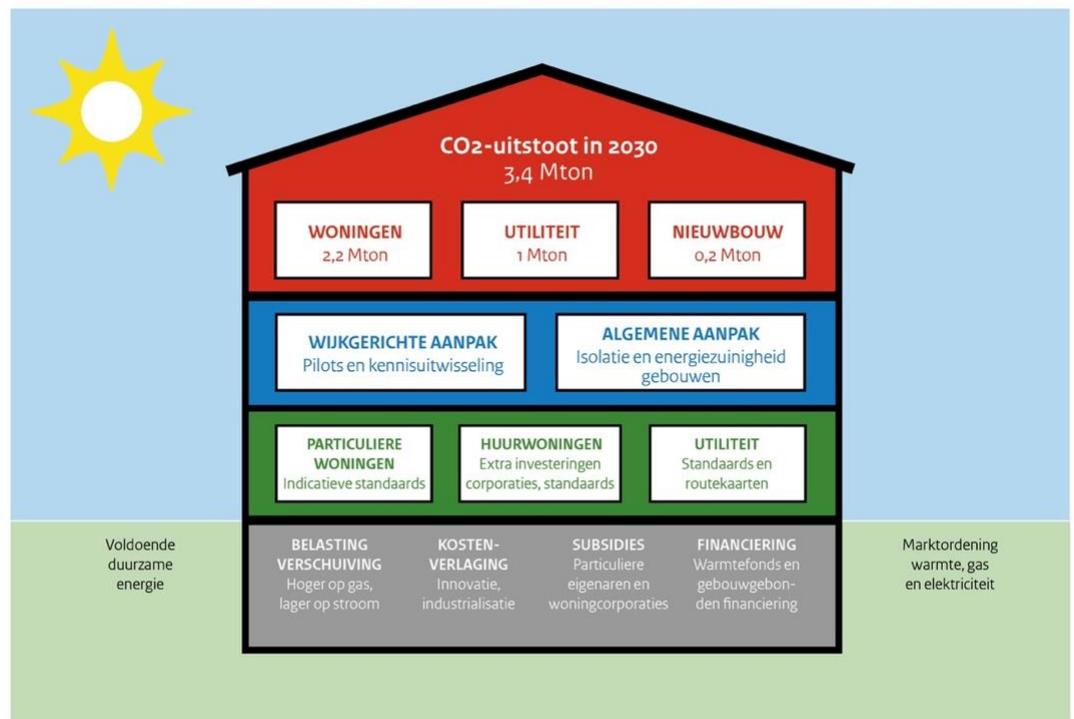
Residents' income is an important factor. The transformation must be affordable for everyone. Living in a transformed house or apartment must on balance be no more expensive than before. The transformation can be made affordable through scaling up through supply-demand pooling, digitisation and innovation and by arranging financing to ensure that the cost of servicing the required loan do not exceed the savings on the energy bill. In cases where this cannot be achieved, the government will provide targeted support.

Target for 2030: 1.5 million sustainable homes, 1 million metric tons less emissions from non-residential buildings

The Climate Agreement, with broad support in Dutch society, sets an objective for 2030: by then CO₂ emissions in the Netherlands must be 49% lower than in 1990. This involves emitting 3.4 million metric tons less CO₂ from buildings in 2030 than in 1990, which in turn means that by 2030 some 1.5 million existing dwellings must be made sustainable. At the same time CO₂ emissions from existing non-residential buildings must be 1 million metric tons lower in 2030 than in the base year. So, there is much work to be done in a limited time. Therefore, the Netherlands has opted for an energetic start. In many places, housing associations will be able to make tens of thousands of homes more sustainable and connect them to a heating supply other than natural gas in the years to come. This is subject to the monthly

costs for rent and energy bills not increasing in principle, not even for first-movers. In this way, tenants get a better home at a monthly cost that is the same as or less than before. Newly built homes also have the possibility of an accelerated departure from gas.

To make all this possible, a large number of commitments are necessary. These commitments are set out in the Climate Agreement. They form an integral whole with which the objective for 2030 can be attained and the vision for 2050 made reality. The commitments are set out hereunder by theme.



CO2-uitstoot in 2030	CO ₂ emissions in 2030
WONINGEN	HOMES
UTILITEIT	NON-RESIDENTIAL BUILDINGS
NIEUWBOUW	NEWBUILD
WIJKGERICHTE AANPAK	DISTRICT-ORIENTED APPROACH
Pilots en kennisuitwisseling	Pilot schemes and exchange of knowledge
ALGEMENE AANPAK	GENERAL APPROACH
Isolatie en energiezuinigheid gebouwen	Insulation and energy efficiency of buildings
PARTICULIERE WONINGEN	PRIVATE HOMES
Indicatieve standaards	Indicative standards
HUURWONINGEN	RENTAL HOMES
Extra investeringen corporaties, standaards	Extra investments associations, standards
UTILITEIT	NON-RESIDENTIAL BUILDINGS
Standaards en routekaarten	Standards and roadmaps
Voldoende duurzame energie	Sufficient sustainable energy
BELASTING VERSCHUIVING	SHIFT IN TAXATION
Hoger op gas, lager op stroom	Higher for gas, lower for electricity
KOSTENVERLAGING	COST REDUCTION

Innovatie, industrialisatie	Innovation, industrialisation
SUBSIDIES	SUBSIDIES
Particuliere eigenaren en woningcorporaties	Private owners and housing associations
FINANCIERING	FINANCING
Warmtefonds en gebouwgebonden financiering	Heating fund and building-related financing
Marktordening warmte, gas en elektriciteit	Market organisation heating, gas and electricity

District-oriented approach

With the district-oriented approach both residents and building owners can take part in the move towards sustainability. The district is also the easiest scale at which to replace gas step by step and at natural junctures and to limit costs. The municipality takes the lead role in this.

The approach is already being tested in the Test Beds for Natural Gas-free Districts. The Association of Dutch Municipalities (VNG) disseminates the experience gained from this. The Netherlands Heating Expertise Centre (ECW) supports municipalities with Guidelines showing the social and economic costs of specific heating options per district. Based on this each municipality will draw up its 'Transition Vision for Heating' before the end of 2021, with the approach to becoming gas-free. The municipalities will then work the transition visions into implementation plans.

Support for owner-occupants

The partners in the Climate Agreement make it easier in a number of ways for home owners to make their house sustainable at a natural juncture. For example, the financial sector is going to add energy saving measures to home valuations and mortgage advice. Home owners will also soon find it easier to obtain a mortgage top-up for sustainability improvements.

Also, municipal energy counters will advise residents and ease their concerns about making their home sustainable. Market actors will be offering arrangements. A digital platform will help owner-occupants with advice on home improvements and also with group procurement. Lastly there will be a Programme for Reducing Energy Consumption (PRE) to help home owners with small energy-saving measures such as better setting up of the heating installation and radiator foil.

Support for the rental sector

Housing associations and other landlords obtain from the central government a reduction of the lessor levy of €100 million per year. As a result, they have more money left over for making their residential properties sustainable. There are also separate intermediate targets for associations and other major landlords for 2030. By the end of 2022, 100,000 residential units must be gas-free or ready to go gas-free. This 'Starter motor' must reduce the costs of sustainability improvements as well as the CO₂ emissions.

Amendments to rental legislation will give landlords the right incentives to bring residential properties up to standard. This standard reflects what 'sensible' sustainability improvements are for a given type of dwelling, with a good trade-off between costs and benefits and the desired reduction in the demand for heating. We are also looking into whether it is necessary to make adjustments to the reciprocal rights and duties of tenants and landlords.

Tackling residential properties

As well as the standard, targets are being introduced for all residential properties for insulation values for roof, floor, façades and glass. Since 1 July 2018 new buildings have in principle not been allowed to be connected to the gas grid. Buildings for which a permit was applied for before 1 July 2018 can still be connected. The commitments in the Climate Agreement provide incentives for such buildings to nevertheless be completed without gas connections.

New buildings must also be 'BENG' ('Nearly Energy-Neutral Buildings'). From now on energy labels for buildings must also indicate the energy performance expressed in kWh/m², so that buyers and residents can make a simple comparison between residential properties.

Tackling other buildings

In order to be able to make schools, hospitals, offices and business buildings sustainable at natural junctures, twelve social real estate sectors are making a roadmap. A 'Knowledge and Innovation Platform for Sustainability Improvements to Social Real Estate' will support them in this. The objective of reducing CO₂ emissions of non-residential buildings by 1 million metric tons is translated into detailed measures by type of building, with the amount of energy that those buildings may consume and the required insulation values. For 2050 there is a legal ultimate standard: all non-residential buildings must then be low-CO₂. To bring together the information on energy consumption, technical construction data of buildings and other data there will be a data template with which building owners will easily be able to launch requests for proposals for sustainability improvements to contractors.

Finance and tax

In order to make the required sustainability improvements to the built environment more affordable, the government is developing a number of financial and tax instruments. A Heating Fund of between €50 million and €80 million will offer owner-occupants and Owners' Associations financing at low interest rates and long terms. The government is also going to make building-related financing possible: the financing of the energy-saving renovation will then be linked not to the person but to the property. And by applying higher *tax* rates to gas and lower ones to electricity, sustainability improvements will be stimulated. In net terms a household with average consumption will not have to pay more. Lastly home owners will soon be able to obtain an ISDE sustainable energy investment subsidy not just for installations such as heat pumps but also for insulation.

Reducing construction costs

Actors in the construction sector are working to reduce the cost of making buildings sustainable by between 20 and 40%. To achieve this, investments are being made in innovation and scaling up. For example, the Building Innovation and Technology Centre has been established and a major innovation programme is under way. Digitisation is also expected to reduce the costs of the transformation. It is also necessary to have sufficient well trained workers in the construction industry; for this a declaration of intent has been drawn up. Market actors will develop further arrangements (packages of measures) for different types of dwelling. Lastly, the Renovation Accelerator is an instrument for pooling demand and matching it with

supply so as to be able to renovate on a larger scale and more cheaply. For this, €130 million is available from now to 2024.

Sustainable heating and market regulation

Sustainable heating, for example from residual heat or geothermal and aquathermal energy is an important alternative to gas. In order to make better use of this heat, heating companies will sharply increase the number of homes connected to district heating grids. For the development and scaling up of sustainable heating and sustainable gases such as biogas and hydrogen, various agreements have been made. There will also be subsidies for this. For the rapid expansion of district heating grids, the government is arranging good market regulation and will define the costs that consumers will pay for heating. Lastly a study will also be carried out of the possibilities for a large-scale heating grid in the province of South Holland.

Targets by sector

The reduction objective of 49% by 2030 relative to 1990 means that the Netherlands must reduce a further 48.7 million metric tons of CO₂ equivalent emissions on top of the existing policy. This concerns all GHG emissions, not just carbon dioxide (CO₂), but also nitrous oxide or laughing gas (N₂O), methane (CH₄) and F-gases. This extra task includes the effects on the current circular economy policy. For the purposes of the discussions on the Climate Agreement each of the five sectors - Industry, Mobility, Built Environment, Agriculture and Land Use, and Electricity - has been assigned an indicative target for reducing CO₂ emissions, which is based on national cost-effectiveness.