Algemene Rekenkamer

Promoting sustainable energy production in the Netherlands

Feasibility and affordability of policy goals

2015

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The original report *Stimulering van duurzame energieproductie (SDE+); Haalbaarheid en betaalbaarheid van de beleidsdoelen* was adopted on 14 April 2015 and presented to the Dutch House of Representatives on 16 April 2015.

Contents

Report summary

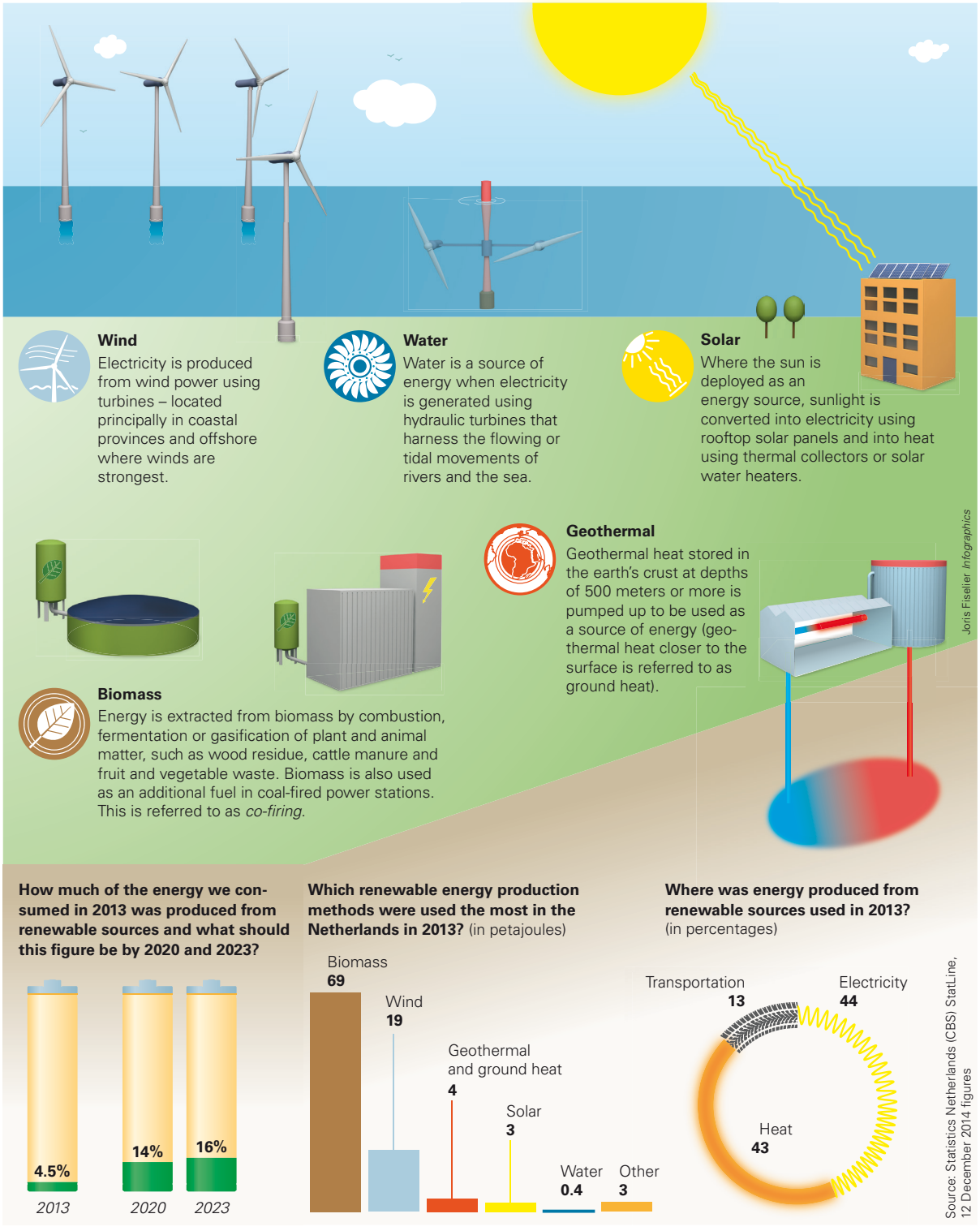
By 2020, 14% of the energy consumption in the Netherlands must be based on renewable sources such as solar, wind, geothermal, water and biomass. This has been agreed with the other EU member states. The Dutch government has set the bar even higher for 2023, when 16% of the country's energy will have to be derived from renewable sources.
The foremost means by which the Netherlands aims to achieve its 2020 and 2023 objectives of 14% and 16% respectively is its SDE+ (Sustainable Energy Production Plus) support scheme. This support scheme encourages businesses to produce renewable energy in the Netherlands. It was introduced in 2011. Two more or less comparable support schemes were in effect in the previous period (2003-2010): MEP (Environmental Quality of Electricity Production) and SDE (Sustainable Energy Production).

In 2013, the Netherlands derived 4.5% of its energy consumption from renewable sources. This means that the country has a long way to go before it reaches its objectives. Recent studies show that it is highly unlikely that the Netherlands will be able to meet these targets. To what extent is this attributable to SDE+? What can the Minister of Economic Affairs, responsible for SDE+, do to ensure the Netherlands does meet its objectives? Are there any options available outside the context of SDE+?

To what extent is SDE+ to blame for not achieving these objectives?

SDE+ will probably result in less renewable energy being produced than the government anticipated when signing the Energy Agreement in 2013. This is partly due to the Minister of Economic Affairs' conservative approach to deploying the support scheme. The annual subsidy level that the minister makes available for developing wind farms, hydroelectric plants, geothermal heat pumps, biomass fermentation plants, etc. is – on paper – intended to achieve the 2020 and 2023 objectives, but does not take practical factors into consideration.
In practice, SDE+ projects often fail or are delayed. An additional factor is that, on average, projects produce less energy than is theoretically possible. This is often the case in energy production from biomass, due either to technical problems or to limited availability of high-grade biomass. Despite performing geological surveys, the potential of geothermal projects is very difficult to predict. Owing to these and other factors, in practice SDE+-subsidised projects often produce far less energy than stated in the forecasts used by the Minister of Economic Affairs to determine his subsidy policies. The forecasts assume that the subsidised projects run exactly according to plan. In reality, it has been calculated that SDE/SDE+-subsidised projects have been underproducing by 26% since 2008.

Figure1 **Energy production from renewable sources: facts and figures**



The Minister of Economic Affairs should base his SDE+ policies on actual results in order to create a more realistic schedule for meeting 2020 and 2023 objectives. Currently, the minister is primarily focused on avoiding excessive expenditure on SDE+ implementation. This is in itself a good thing, as it reduces the risk of overspending. However, doing so is also jeopardising any chance of achieving the 2020 and 2023 objectives.

Various studies have shown that the Netherlands will probably fail to meet its 2020 and 2023 objectives if it continues to pursue its current policies. The most recent study conducted in October 2014 showed that the share of renewable energy will probably be 12.4% (instead of the agreed 14%) and 15.1% (instead of the agreed 16%) by 2020 and 2023 respectively.
These warnings have still not prompted the Minister of Economic Affairs to re-address his policies. He continues to adhere to the most optimistic interpretation of the studies' results, also in the information he presents to the House of Representatives. We believe that the minister should clarify for the House of Representatives what SDE+ *should be achieving* in each intervening year in order to achieve our 2020 and 2023 objectives. We have made this point on numerous occasions (Algemene Rekenkamer, 2013a, 2013b, 2014b).
Similarly, the minister has not been particularly clear about SDE+ expenditure in the information he has been presenting to the House of Representatives. His conservative approach to implementing the support scheme means that actual annual subsidy expenditure is less than the total sum actually allocated for SDE+ in the Ministry of Economic Affairs' budget. Matters would be significantly more transparent for the House if realistic information about anticipated expenditure were incorporated into the draft budget.

What can the minister change to ensure that SDE+ meets its objectives?

As subsidy schemes go, SDE+ is relatively well structured. This could be construed to be positive. Unfortunately, however, it also means that making changes to the scheme itself will not make the policy's objectives any easier to achieve. Nonetheless, several small improvements could be made to the scheme. For example, when allocating subsidies, higher priority could be given to projects that can start producing energy at relatively low subsidy levels. The way in which the maximum subsidy for each energy production method is calculated could also be improved by making it mandatory for subsidy recipients to provide certain technical and financial information. However, any benefits that such adjustments would provide in the short term are expected to be fairly minimal.
Two other adjustments show greater promise – raising the subsidy available and/or making SDE+ available for projects in other countries.

Raising the SDE+ subsidy budget

A lot of additional funding will be required if the 2020 and 2023 objectives are to be met under the SDE+ scheme. The Minister of Economic Affairs would then have to assume €12.8 billion in additional subsidy commitments for offshore wind farms for the period up to 2023. This is 22% more than has been budgeted for under current policy for the period from 2011 to 2023. A total amount of €58.9 billion in commitments has been allocated for this period.

Opening up SDE+ to projects in other countries

Policy objectives could probably be achieved with less additional expenditure. SDE+ would have to be opened up to projects in other EU member states to achieve this. Energy produced by these projects would have to count towards the Netherlands' own balance. This scenario would still require an additional subsidy budget, but approximately €3.5 billion less than the previous scenario.

The 'cross-border' approach does incur indirect costs however, e.g. reduced domestic employment opportunity and technical knowledge development. Investments would also be required for infrastructure and energy transmission in the countries involved. It is not yet possible to estimate these indirect costs.
Opening up SDE+ for energy production projects in other countries could also solve another problem, this being the diminishing effectiveness of the auction mechanism incorporated into SDE+ for subsidy allocation purposes. Projects involving low-cost energy production methods are eligible for a subsidy at an earlier stage in this phased allocation system. This system was conceived to encourage business owners to produce renewable energy at the lowest possible cost. The effect of this incentive is diminishing because subsidy budgets have been increased significantly in recent years in order to achieve the 2020 and 2023 objectives. The less likely it is that a subsidy is no longer available at a later stage, the less likely it is that a business owner will apply for a lower subsidy at an earlier stage. The scheme could be made more efficient if competition was stiffer. This would be the case if SDE+ were opened up to projects in other countries.

What options are available outside the context of SDE+?

Amending the SDE+ scheme is not the only way in which the Minister of Economic Affairs could realign his policy with policy objectives. He could also opt for other policies aimed at meeting targets for renewable energy. It is even conceivable that the minister might decide to abandon trying to achieve policy objectives altogether.

Alternative policies

One option involves polices targeted at *even greater energy savings* meaning that less energy would need to be produced to achieve the 2020 and 2023 objectives. Additionally, *reduced incentives for energy production from fossil fuels* could help matters, as it would make energy production from renewable energy sources more affordable. Other European-wide policy options are also worth considering, e.g. *modifying the European CO2 emissions trading system* or introducing a *carbon tax*. The Netherlands has limited influence in this respect, however.
In general, the question then arises as to whether policy alternatives would actually make any significant contribution towards achieving the 2020 or 2023 objectives. The time needed to develop new policy and the intractability of its implementation constitute a risk. Given the urgency, short-term alternatives with a realistic financial plan and timeline need to be developed.

Abandoning the policy objectives

It is even conceivable that the government might simply decide to abandon trying to achieve the 2020 and 2023 objectives altogether. Doing so would in theory risk incurring sanctions from the European Commission. After all, the Netherlands has pledged to achieve a target whereby 14% of its energy requirements will be met from renewable sources by 2020. Nonetheless, options exist to circumvent this pledge *without* risking sanctions. The Netherlands could in effect *buy up* renewable energy surpluses from other EU countries. These would then count towards its own balance. The costs associated with this conversion will depend on what surpluses (if any) still exist throughout the EU by 2020, and to what extent other EU member states are racing to achieve their own EU policy objectives at that time.

Transition to a 100% sustainable energy supply by 2050

The Netherlands is aiming to derive 100% of its energy requirements from sustainable sources by 2050. This goal has not yet been translated into any form of tangible action plan for the period after 2023. For example, it is not yet clear if and how the use of biomass for energy production purposes will play a role in the transition. Although the urgency of short-term objectives is readily apparent, we should not fail to overlook the fact that the Netherlands still has a long way to go after 2023.

Our recommendations

We would like to present the following recommendations to the Minister of Economic Affairs:

- Opt for a realistic scenario in 2015 to ensure that the Netherlands achieves its 2020 and 2023 objectives for renewable energy. This should include a timeline and a breakdown of expenditure required to bolster the SDE+ scheme and/or other policy options. Alternatively, explicitly decide to fall short of the agreed targets and revise the Energy Agreement.
- When estimating subsidy commitments, take account of the fact that in practice and on average less energy is produced than the theoretical maximum. Opt for a certain degree of *oversubscription*, i.e. approve more subsidy applications than the budget theoretically supports, and/or make more money available in the budget.
- Consider making the order in which projects can bid for SDE+ subsidies dependent on the amount of subsidy dispersed rather than the cost price of the energy produced.
- Determine what information-related obligations could be imposed on SDE+ subsidy recipients in order to assess the actual subsidies required for each energy production technology more accurately. Look to other EU member states for examples.
- Clarify for the House of Representatives on an annual basis the extent to which the Netherlands is straying from its charted SDE+ course. Clarify how much energy production needs to be incentivised by means of SDE+, including annual milestones and any expenditure required to achieve policy objectives.
- Provide the House of Representatives with realistic information about anticipated expenditure on MEP, SDE and SDE+ in any given year. Include this information in the Ministry of Economic Affairs' budget.
- Seek tenable solutions for biomass' role as a renewable energy source.
- Incorporate SDE+ policy intentions into a long-term strategy for the transition to a 100% sustainable energy supply by 2050.

Response from the Minister of Economic Affairs

The Minister of Economic Affairs responded to our audit on 2 April 2015. The minister gives several undertakings in his response. For instance, he will be ensuring that the House of Representatives is better informed. He aims to wait for the results of the *Energy Agreement* review before making a decision about additional policy measures for achieving the 2020 and 2023 objectives. This review will be held in 2016.

Afterword

In our afterword, we reiterate our belief that it will be too late to make a decision about additional policy measures after the *Energy Agreement* review in 2016. SDE+ alternatives outlined in our audit require decisive action *now*; otherwise, they will no longer be attainable before the 2020 deadline.

1 Introduction

1.1 Grounds for this audit

The Netherlands is aiming to achieve a 100% sustainable energy supply by 2050 as part of international efforts and has had a national objective for producing renewable energy since the 1990s.[1] Renewable energy sources are understood to mean those that are inexhaustible and can be used repeatedly to generate energy (electricity, heat and transport) purposes, e.g. solar, wind, geothermal, hydro, tidal energy, etc.
The European Union's (EU) energy policy focuses on increasing the percentage of energy used in the member states that is derived from renewable sources. By 2020, 20% of the EU's energy requirements will have to be met from renewable sources. EU member states have made agreements that translate this 20% objective into binding targets for each individual member state.[2] This means that the Netherlands has to produce 14% of its energy consumption from renewable sources by 2020. The Netherlands has imposed its own additional objective of 16% by 2023.

Additional objective laid down in Energy Agreement: 16% of renewable energy by 2023

In September 2013, over forty organisations – under the direction of the Social and Economic Council of the Netherlands (SER) – signed the *Energy Agreement for Sustainable Growth* (or Energy Agreement for short). Parties to the agreement included the Dutch government, employers, trade associations, and nature conservation and environmental organisations (SER, 2013). The Energy Agreement includes measures relating to energy savings, sustainable energy and climate policy which are intended to ensure that Europe meets its objective of producing 14% renewable energy by 2020. An additional Dutch objective of 16% by 2023 has also been incorporated into the agreement.

In 2012, the Netherlands derived 4.5% of its energy from renewable sources. In 2013, this percentage remained unchanged at 4.5%. This means that the Netherlands still has a long way to go in terms of meeting its objectives for renewable energy. This situation, which we have pointed out before (Algemene Rekenkamer, 2013a, p. 11), is the foremost reason for performing this audit. Shortly after the Energy Agreement was signed, it became clear that it was going to be difficult to achieve its objectives (Londo & Boot, 2013).

1 Mentioned in the Rutte/Asscher government's coalition agreement (Informateur, 2012). The term 'sustainable' has a wider definition than 'renewable'. Sustainable energy is always generated from renewable sources, but also has to meet certain additional criteria. Its use may not have any detrimental side effects on *people*, *planet* or *profit* for current or future generations. This report adopts the definition of energy produced from renewable sources and the corresponding method for measuring the percentage of renewable energy in the total mix as laid down in EU Directive 2009/28/EC (see Appendix 1).

2 Importing *green electricity* does not count towards achieving these 2020 objectives, unless specific agreements have been made with the exporting country in question. The objective for the EU as a whole is 27% by 2030. At the EU level, no agreements have yet been made about 2030 objectives for individual member states.

The main instrument by which the Netherlands aims to achieve its 2020 and 2023 objectives of 14% and 16% respectively is SDE+ (Sustainable Energy Production Plus Support Scheme). Using this scheme the Minister of Economic Affairs encourages energy production from renewable sources. The scheme was established in 2011 and has therefore been in operation for several years now. By the end of 2013 a total of 1,787 energy production project applications had been approved for SDE+ subsidies. In theory, these projects should make 620 petajoules (PJ) of energy available over the entire period of their operation.[3] This is the amount of energy consumed annually by approximately 9.3 million households. The Ministry of Economic Affairs has budgeted a total of €6.2 billion to subsidise these 1,787 projects. This is the maximum subsidy expenditure for these projects over their entire subsidy contract period.
As of August 2014, only 3% of these approved projects were actually producing energy (see § 4.4). The reason why this percentage is so low is the long start-up time required for some energy production technologies, e.g. because of complex plants and systems that need to be built and commissioned.
Given these long start-up times, there is now very limited time available to modify the subsidy scheme in order to accelerate progress towards achieving objectives. This played a role in our decision to perform this audit in 2014.

An additional reason for performing this audit is the fact that the financial stakes involved are considerable. Since 2011, the Ministry of Economic Affairs' annual SDE+ budget has grown from €1.5 billion to €3.5 billion in commitments. This figure is set to increase further given that the Energy Agreement provides for the construction of offshore wind farms that will also be funded using SDE+ (see also § 2.2).

1.2 Objective, audit questions and audit approach

Our audit is intended to contribute towards improving the way in which SDE+ works, thereby increasing the likelihood that the 2020 and 2023 renewable energy objectives can be achieved in a cost-effective fashion.
By 'cost-effective' we mean that objectives need to be achieved with as little government funding as possible, but without any detrimental effects, e.g. no harm to the environment.

The main question that our audit sought to answer is whether SDE+ needs to be adapted in order to make the support scheme more effective and efficient. If so, what exactly needs to be changed?

In order to answer the first half of this question, we analysed what the current scheme can still hope to achieve in the years ahead.

1. In light of other policies, can it be assumed that SDE+ will result in sufficient energy production levels using renewable sources to meet the 2020 and 2023 policy objectives?

In order to answer the second half of the question, we investigated how higher energy production levels from renewable sources could be achieved using SDE+ or otherwise:

2. In what ways could the current structure and implementation of SDE+ be improved?

3 Source: Netherlands Enterprise Agency (RVO) data analysed by the Netherlands Court of Audit.

3. If SDE+ results in production levels which are too low to meet the 2020 and 2023 objectives, what other options exist to achieve these targets and what would be the cost?

An additional question that we addressed in the audit was the information being presented to the House of Representatives.

4. To what extent is the House of Representatives receiving clear information about SDE+'s costs and benefits?

In order to answer these questions, we analysed SDE+ project data provided by the Netherlands Enterprise Agency (RVO), commissioned the Energy Research Centre of the Netherlands (ECN) to perform various calculations and conducted a large-scale survey among all SDE+ subsidy applicants.[4] For more information about our audit methods, please visit the website www.courtofaudit.nl/english/ and refer to our appendix on the methods used as well as the following background documents: *Enquête naar beweegredenen van aanvragers SDE+-subsidie* ['Survey into SDE+ Subsidy Applicants' Motivations'], *Modelberekening ECN* ['ECN Calculation Model'] and Financieel systeem SDE+ ['The SDE+ Financial System'] – (only available in Dutch).

1.3 Reader's guide

Chapter 2 outlines the position of SDE+ among the Netherlands' other energy and climate policies, and explains in general terms how the support scheme works. We explain how SDE+ differs from previous subsidy schemes for producing renewable energy.

Chapter 3 presents actual energy production levels from renewable sources in the Netherlands. We examine how the Netherlands is performing compared to the rest of Europe, and what SDE+ contributes in this respect. We also discuss the risks inherent to specific production methods such as biomass and offshore wind. We conclude by examining the general conditions needed for support schemes to work properly and business owners' motives for implementing (or not implementing) SDE+-subsidised projects.

Chapter 4 examines the way in which SDE+ works, and how efficiently it does so, compared to previous support schemes in the Netherlands and/or elsewhere in Europe. We also evaluate the operation of the auction mechanism that SDE+ uses for subsidy allocation purposes. We conclude with a discussion on the changes required to achieve higher energy production from renewable sources.

Chapter 5 deals with the provision of information to the House of Representatives. This includes both financial and policy-related information that the Minister of Economic Affairs presents to the House about SDE+.

4 In addition to this survey, we also performed two smaller surveys among energy companies eligible for subsidies to construct offshore wind farms and among companies eligible for biomass co-firing subsidies as of 2015.

Chapter 6 outlines several short-term future policy scenarios.
We start by discussing how SDE+ could be modified in order to achieve 2020 and 2023 objectives by significantly raising the SDE+ subsidy budget level and/or by opening up SDE+ to energy production from renewable sources abroad. We then examine alternatives outside the context of SDE+ including other policy instruments that could be used to achieve our objectives for renewable energy. We also address the implications of a scenario in which the government decides to abandon attempts to achieve the 2020 and 2023 objectives altogether.

Chapter 7 contains our conclusions and recommendations.

And finally, chapter 8 contains a brief summary of the letter we received from the Minister of Economic Affairs on 2 April 2015 in response to our audit. Our afterword is also included in this section.

A methodological account and an annex with the standards used in this audit can be found at www.courtofaudit.nl/english/ (only available in Dutch).

2 The SDE+ support scheme in general

2.1 Position of SDE+ in energy and climate policies

Dutch incentive policy for producing renewable energy is by no means a standalone policy. It is closely linked to other elements found in energy and climate policies such as energy savings, CO_2 emission level reduction and development of new sustainable energy production technologies.

Fig. 2 illustrates the position of SDE+ in the context of other energy and climate policies.

Transitioning to energy production from renewable sources and, in the meantime, being as economical as possible with remaining essential fossil fuel reserves addresses three social problems relating to energy supplies: climate change, fossil fuel depletion and dependence on other nations for our energy supplies. In this light, climate policy and policy aimed at producing renewable energy are closely related.

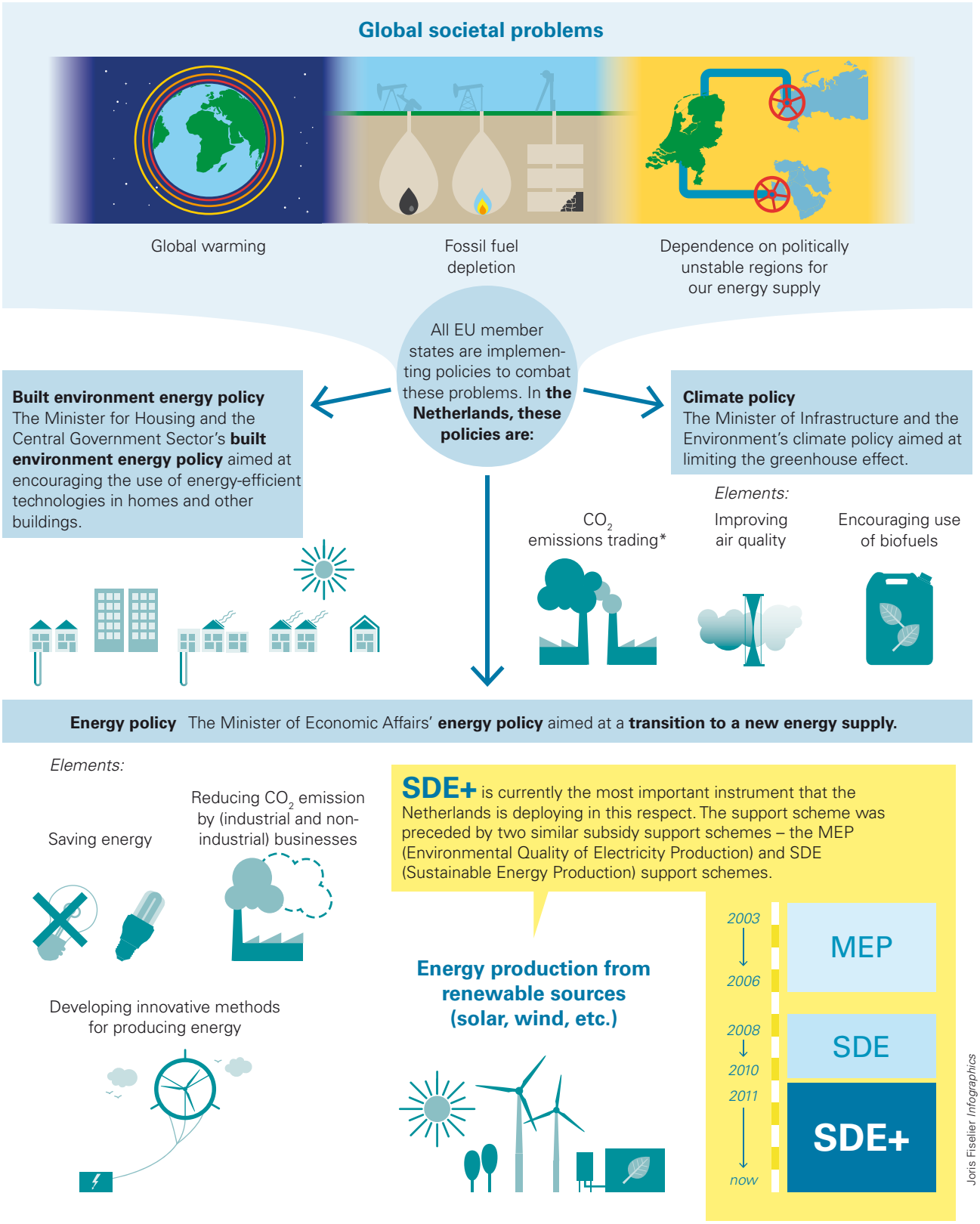
It should however be noted that producing more renewable energy will not immediately result in a reduction of CO_2 emissions at a European level. A potentially counter-productive reciprocity exists between policies aimed at encouraging energy production from renewable sources and the European Commission's instrument designed to encourage companies to reduce their CO_2 emission levels, the *carbon emissions trading* system (see inset).

Counter-productive reciprocity between carbon emissions trading and policy on energy production from renewable sources

In 2005, the European Commission set a maximum of CO_2 released by industrial companies in the EU by issuing carbon credits. These credits can be traded. If companies produce less CO_2 than they are entitled to produce, then they can sell their surplus carbon credits. If companies want to produce more CO_2, then they have to buy up these surplus carbon credits. Because the EU is gradually lowering the maximum, fewer and fewer carbon credits remain available. This is intended to force industrial companies to reduce their CO_2 emission levels.

The system is far from perfect in terms of how it operates, partly due to a counter-productive reciprocity between policies set by member states to promote energy production from renewable sources (Centraal Planbureau, 2013). Why is this? If one company reduces its CO_2 emissions, e.g. by producing energy from renewable sources or by implementing energy-saving measures, then this allows other companies in the Netherlands or elsewhere in Europe to produce more CO_2 emissions. This is referred to as the waterbed effect. In other words, the net effect is zero. In order to counteract this *waterbed effect*, additional measures need to be taken, e.g. buying up and definitively withdrawing surplus carbon credits from the market.

Figure 2 **Position of SDE+ in energy and climate policies**



* This is a system that the European Commission introduced in 2005 to make companies pay for their CO_2 emissions and to simultaneously

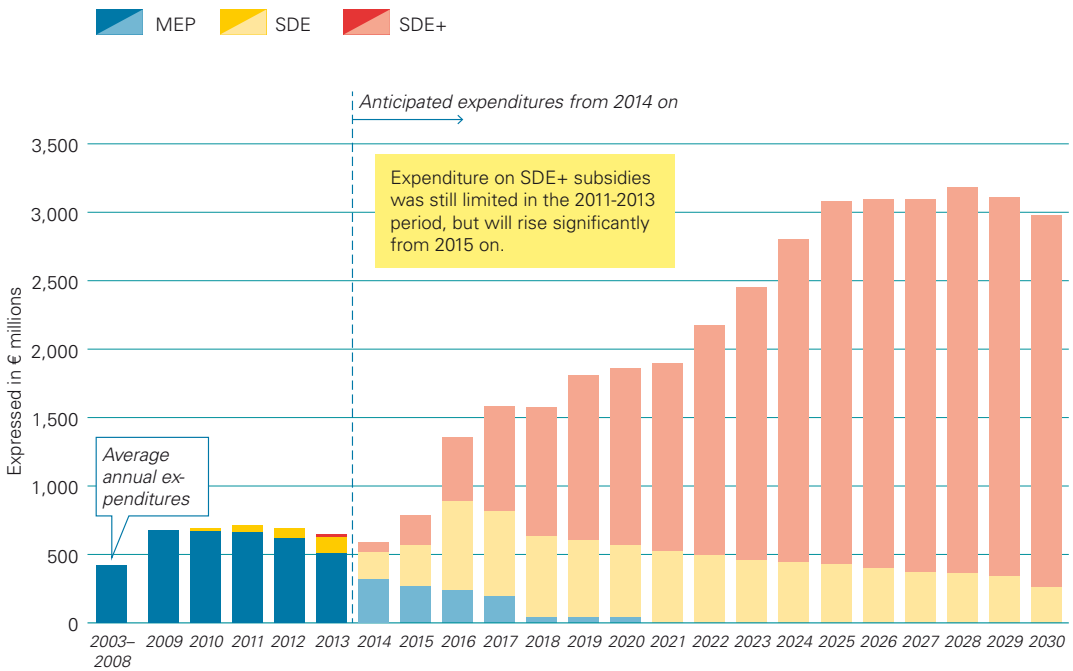
2.2 The scheme's financial stakes

How much money is involved in SDE+? As previously mentioned, the support scheme was introduced in 2011. Since then, the Minister of Economic Affairs has been reserving an amount in his budget for subsidies to projects producing energy from renewable sources. These annual amounts are *commitments*. Together they form the maximum budgeted expenditure on subsidies for approved projects for the entire subsidy contract period.
Commitments therefore differ from actual *expenditure*. SDE+ expenditure could be less than annual commitments, e.g. when projects produce less energy than for which subsidy is available.

Businesses can only receive SDE+ subsidy if they are actually producing renewable energy. When project applications are approved and subsidies are allocated no actual payment is made yet. At this point, only a commitment is made and the project has to be made ready for actual energy production. Therefore new SDE+ commitments do not generally result in any form of expenditure until several years later.

In most cases, subsidies for approved applications are granted over a period of 12 to 15 years. There was barely any expenditure in 2011, the subsidy scheme's first year of operation. Fig. 3 illustrates this clearly.

Figure 3 **Actual and anticipated subsidy support scheme expenditures** *2003-2030*



Sources: 2003–2013: EnerQ and Netherlands Enterprise Agency (RVO). After 2014: Energy Research Centre of the Netherlands (ECN) model (scenario 0) calculated on behalf of the Netherlands Court of Audit.

Fig. 3 shows not only SDE+ expenditure but also the expenditure for two comparable support schemes that preceded SDE+. These were the MEP (Environmental Quality of Electricity Production, 2003–2006) and SDE (Sustainable Energy Production, 2008-2010) schemes.

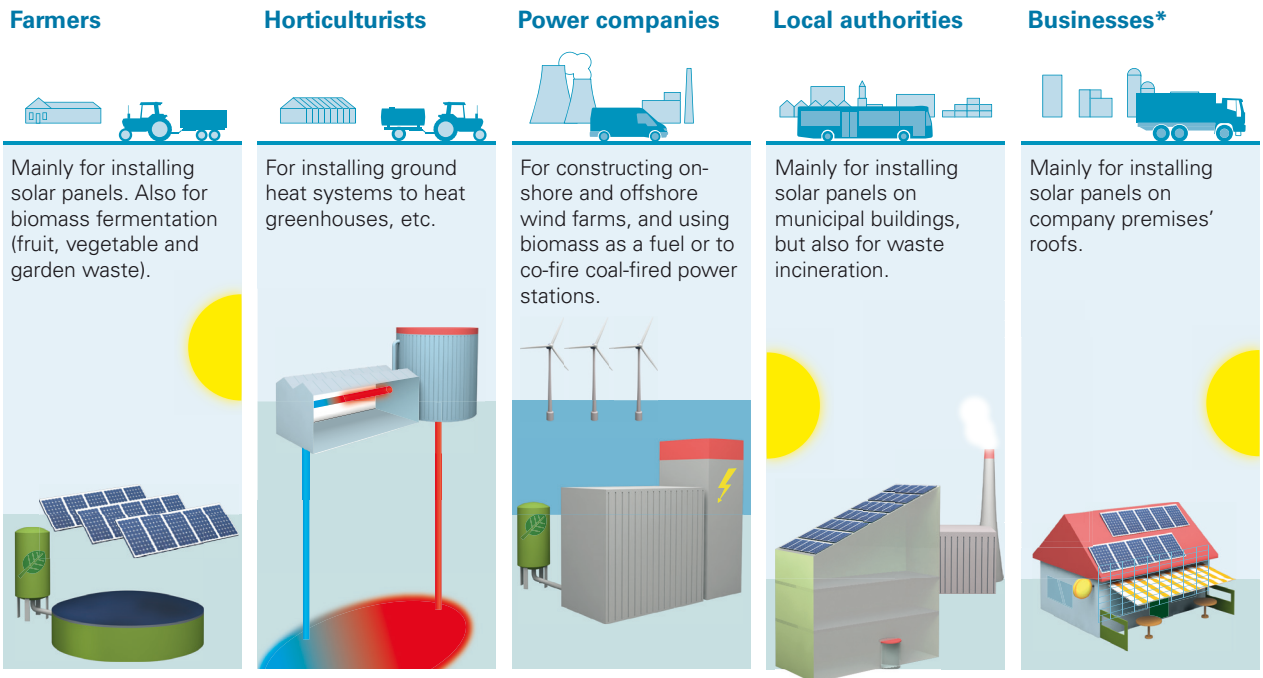
The Ministry of Economic Affairs assumed commitments totalling €10.5 billion and €10 billion for MEP and SDE respectively. The Minister of Economic Affairs assumed commitments totalling €6.2 billion for SDE+ in the period from 2011 to 2013. Additional commitments totalling €52.6 billion are anticipated for the period from 2014 to 2023.[5]

2.3 The SDE+ instrument explained

2.3.1 SDE+ target groups and projects

Who is applying for SDE+ subsidy? Fig. 4 shows the different types of applicants.

Figure 4 **Who is applying for this subsidy?**



* Large and small businesses, e.g. small catering establishments

Joris Fiselier *Infographics*

Following approval of their subsidy application, companies need an average start-up time of one to four years to implement a project in the Netherlands.[6] This is the period between subsidy allocation and project implementation. As might be expected, the throughput time varies from technology to technology, e.g. installing solar panels is less complicated than constructing an offshore wind farm.[7]

5 These estimates are based on calculations by the Energy Research Centre of the Netherlands (ECN) in 2014 on behalf of the Netherlands Court of Audit.

6 The scheme is currently (as of early 2015) only open to projects in the Netherlands.

7 Formally speaking, a tender for several large offshore wind farms also falls under SDE+. Up until November 2014, funding for this project was also part of the integral SDE+ budget. Since 2015, a separate scheme and partial budget have been put in place the construction of these wind farms.

2.3.2 SDE+ versus previous support schemes: MEP and SDE

SDE+ differs in several respects from its predecessors. MEP (2003-2006) only addressed electricity production from renewable energy sources. SDE (2008-2010) also focussed on biogas production (gas from silt, manure, landfill waste, and kitchen and garden waste). Under the current SDE+ support scheme, it is also possible to apply for subsidies to generate heat from renewable energy sources. For example, heat is being generated from geothermal, solar and biomass fermentation sources.

Another difference involves the objectives of SDE+. These are somewhat more limited than those of previous schemes. Whereas SDE focussed on energy production from renewable sources and innovations (see § 4.1.2), SDE+ focuses exclusively on the former aspect, i.e. achieving the European objective of generating 14% renewable energy in a cost-effective way by 2020 (EZ, 2011). SDE+ also involves several new aspects, prompted in part by the lessons learned from the way previous support schemes operated (see § 2.3.3 below).

2.3.3 'Smart elements' added to SDE+

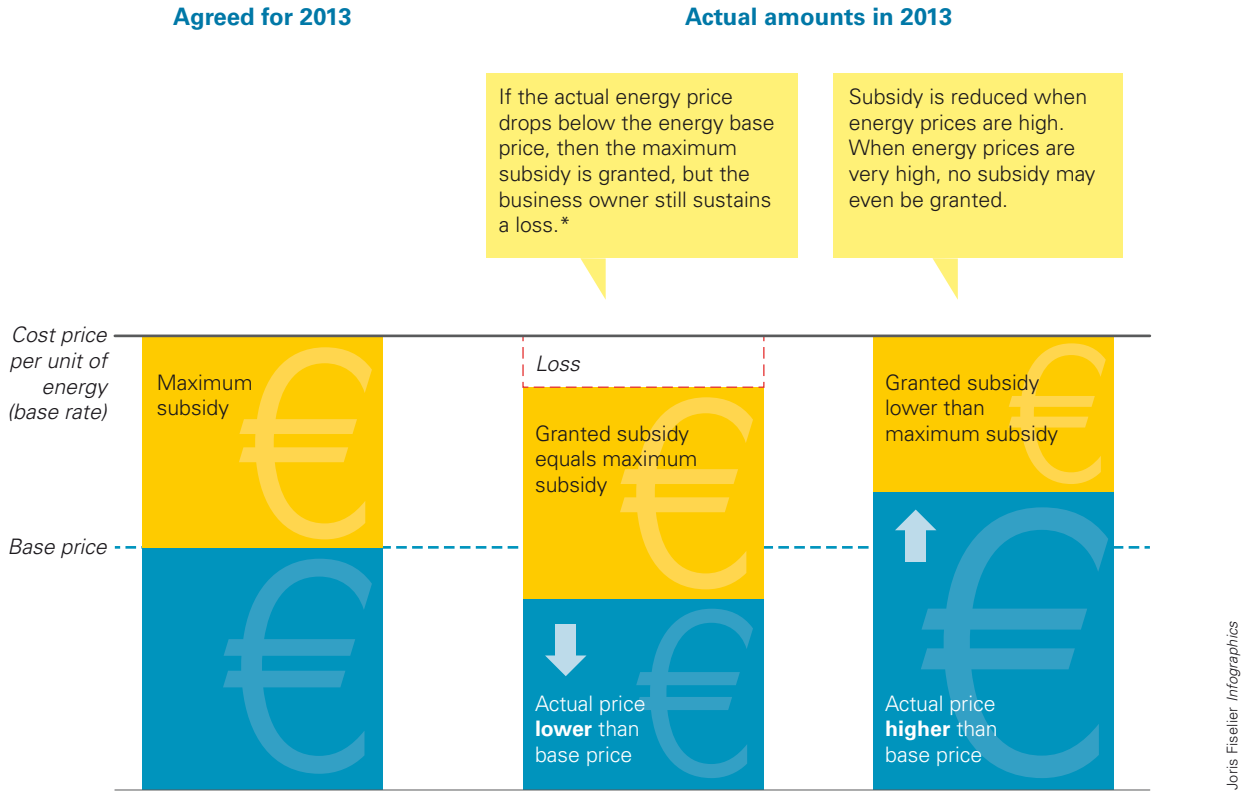
Subsidy level linked to energy price

SDE+ takes fluctuations in energy prices into account, whereas MEP did not. Subsidy levels drop when the energy price increases and vice versa. This avoids a situation in which the government is subsidising energy companies' surplus profits.
This situation arose in the past when energy prices occasionally exceeded the forecasts used to set pre-determined subsidy levels. Producers then received not only a high market price, but also a fixed subsidy.
Under the SDE+ support scheme, a base rate has been set for each technology. This base rate covers the cost price for producing energy using a particular technology.[8] The base rate acts as a subsidy norm. Subsidies are required whenever it costs more to produce renewable energy than producers can earn on the market at a given energy price. SDE+ only subsidises the difference between the standardised cost price and the price that producers can receive on the market for the energy supplied. The government also caps the subsidy level if the market price drops below a certain level. This risk is borne by the producers. This cap is called the *base energy price*.[9]

8 It covers investment and operating costs plus a profit margin.

9 The base energy price is equivalent to two thirds of the anticipated long-term energy price.

Figure 5 **Subsidy variation in relation to energy prices**

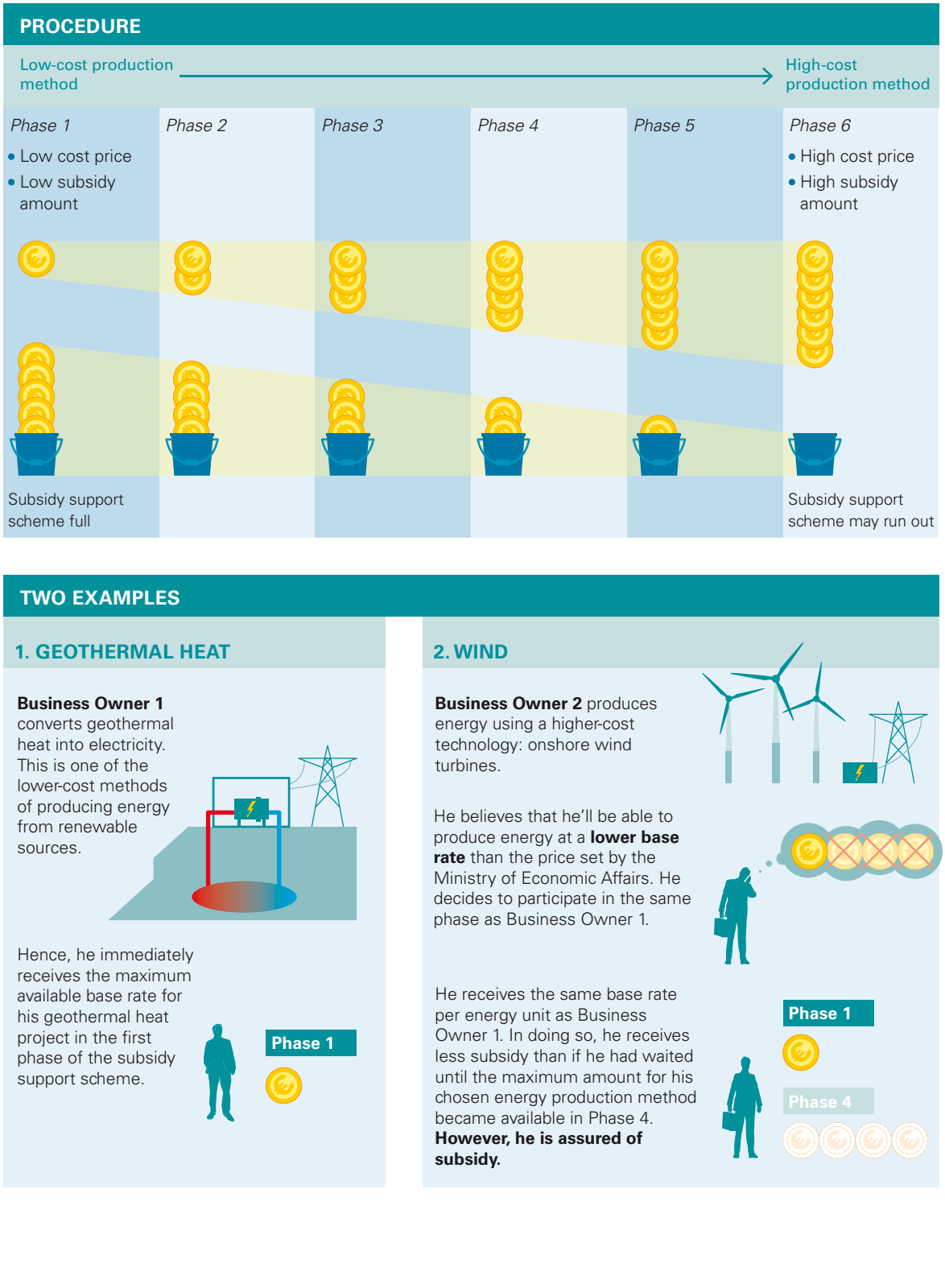


* The risk for the business owner is limited, however, because a risk premium has already been incorporated into the base rate.

Subsidy auctions to promote competition

SDE+ uses an auction system to promote competition between subsidy applicants. This is not an auction in the sense that the highest bidder wins, but a system that opens up subsidy applications in phases. Business owners can decide in which phase to apply for a certain subsidy. During the first phase, subsidies are available for projects involving low-cost technologies. During later phases, higher subsidies are available for projects using higher-cost technologies. The competitive element comes into play because business owners may bid at an earlier stage if they think that they can produce energy from a renewable source at a lower price than the one calculated by ECN on behalf of the Ministry of Economic Affairs. Doing so means that they have a greater chance of their subsidy application being approved. If a business owner waits until later in the year, it is possible that the annual subsidy amount will have run out. The application will then be rejected. This is how business owners are encouraged to produce renewable energy at the lowest possible cost.

Figure 6 **SDE+ subsidy application procedure: incentive for cost-efficient energy production**
Example based on 2013 figures



Joris Fiselier *Infographics*

3 Achieving policy objectives and the role of SDE+

This chapter examines how objectives for producing energy from renewable sources are being achieved. We examine how the Netherlands is performing compared to the rest of Europe, and what SDE+ contributes in this respect. It is clear that the Netherlands is lagging behind other member states. Energy production under SDE+ is lower than anticipated. We will also discuss the risks inherent to two specific energy production methods from which the highest production levels are anticipated – biomass and offshore wind. We will conclude by examining the general conditions needed for support schemes to work properly and businesses' motives for producing (or failing to produce) renewable energy.

3.1 Prospects for achieving the 2020 and 2023 objectives

3.1.1 Progress in the Netherlands

It is no longer realistic to assume that the Netherlands will be able to catch up and achieve its 2020 and 2023 renewable energy objectives. The share of its energy requirement derived from renewable sources will probably be 12.4% and 15.1% by 2020 and 2023 respectively. These were the findings of the 2014 *National Energy Outlook* drafted by ECN on behalf of the Minister of Economic Affairs. ECN made an integral assessment based on established and proposed policy (Hekkenberg & Verdonk, 2014, p. 11). 'Established' policy is understood to mean policy that had been announced in the *Government Gazette* or incorporated into the *Energy Agreement* up until 01 April 2014. 'Proposed' policy is understood to mean policy to which additional intentions have been added. Throughout the rest of this report, we refer to 'proposed' policy as 'policy unchanged'.

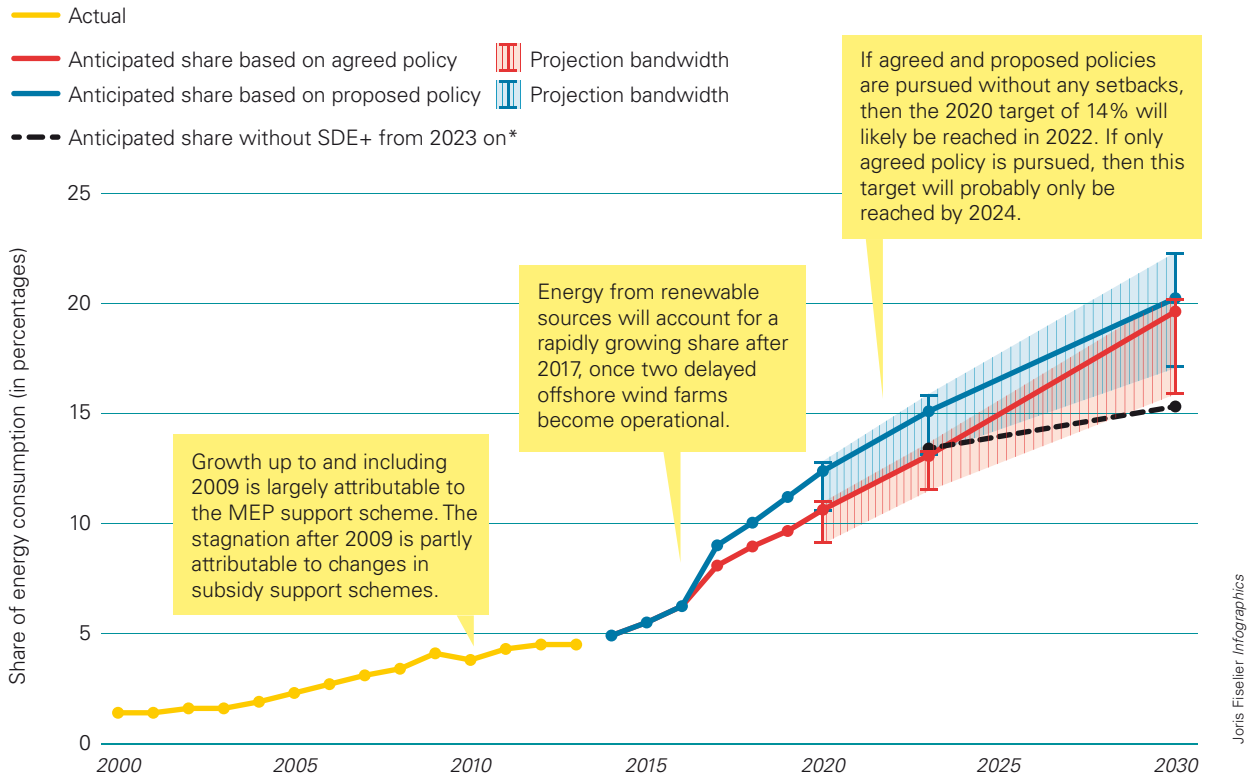
The assessment shows that, without any setbacks, the national policy objective of 14% renewable energy in 2020 will probably be achieved two years later, in 2022, assuming that all established and proposed policies have been implemented.

ECN model uncertainties

The ECN model is based on the most current insights and expert estimates. It is subject to several significant uncertainties however. These uncertainties relate to the effect of policy measures and external influences, e.g. energy prices and total energy consumption. To take account of these uncertainties, we have added bandwidths within which the share of energy from renewable sources will probably[10] lie (Fig. 7). These margins are asymmetric in the sense that *windfalls* have only a limited positive effect, whereas setbacks have an immediate and greater detrimental effect on output derived from renewable sources. For example, if less capital is made available by investors and banks, then this will seriously impede the growth of energy output from renewable sources. However, if more capital were made available, then this does not necessarily mean that more energy production projects will be implemented (Hekkenberg & Verdonk, 2014). There may be too few projects planned or grass-roots support for such projects may be lacking, e.g. in the case of onshore wind farms.

10 The results shown fall within this bandwidth with a certainty of 90% (Hekkenberg & Verdonk, 2014).

Figure 7 **Share of energy produced from renewable sources**
From 2000-2030



* It is still uncertain whether the SDE+ support scheme will remain open for new applications after 2023 because no national objective exists for the subsequent period.

Source: Hekkenberg & Verdonk, 2014 (ECN/PBL)

If energy prices are higher than anticipated, then objectives may be achieved faster. This is because energy produced from renewable sources *without* subsidy (autonomous production) would be more profitable. Moreover, the government would be able to support more projects using the same subsidy because higher energy prices would suppress subsidy levels (see Fig. 5 in Section 2). Low energy consumption would also have a positive effect on achieving the objectives. After all, if total energy consumption were lower, then the same output from renewable sources would constitute a higher percentage of the total requirement. This was the case in two scenarios which ECN assessed on our behalf. Even in these situations, the assessment shows that the 2020 objective will still not be attainable. However, at a lower energy consumption level, the 2023 objective of 16% would be attainable if policies remain unchanged.

Minister of Economic Affairs clinging to negligible likelihood of success

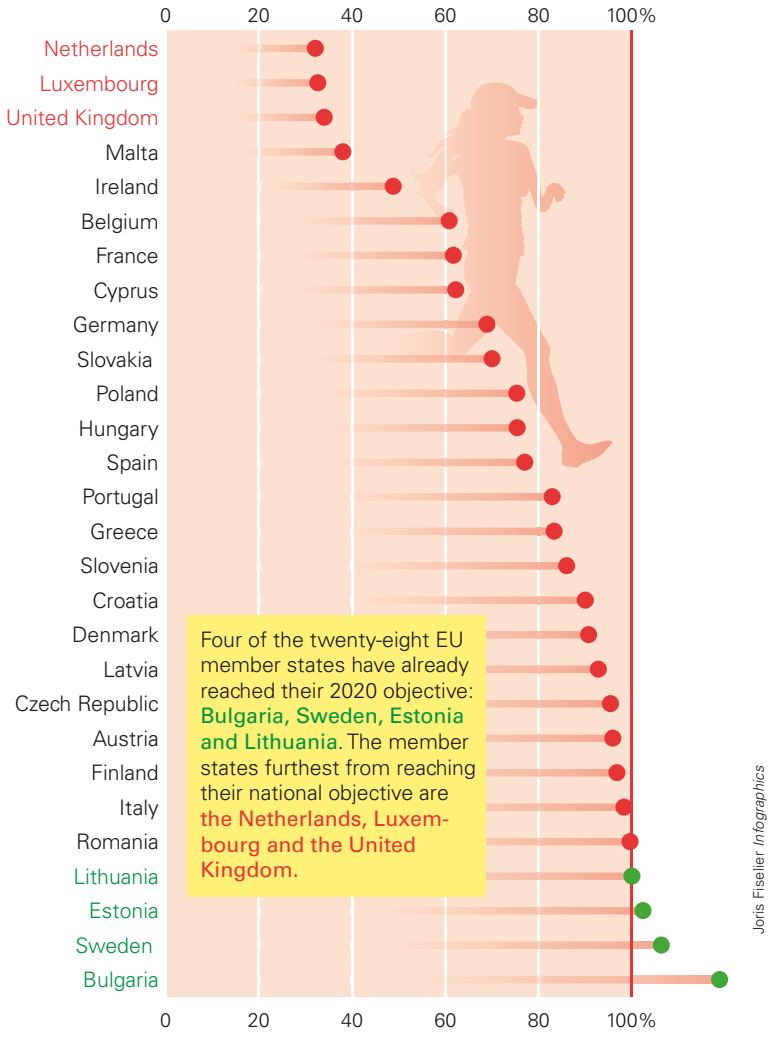
In October 2014, the Minister of Economic Affairs stated that he was still convinced that the 14% objective for renewable energy would be attainable by 2020 (EZ, 2014b, p. 4). By doing so, he continues to ignore the fact that shortly after signing the *Energy Agreement* both ECN and the Netherlands Environmental Assessment Agency (PBL) stated that it would be *difficult* to achieve the 2020 objective (Londo & Boot, 2013, p. 6) and that approximately a year later they both stated in the *2014 National Energy Outlook* that it would actually be *impossible* to achieve this objective (Hekkenberg & Verdonk, 2014). Despite these warning signals, the minister is clinging to the same optimistic estimates that his predecessor made in 2010. In that year, the Minister of Economic Affairs announced to the European Commission that the percentage of

energy produced from renewable sources was expected to be 14.5% by 2020 (EZ, 2010, p. 12). This expectation was based on the most optimistic ECN/PBL scenario available at the time.[11] A 2013 milestone was set at 5.9%. This milestone was not achieved.[12]

3.1.2 Progress in other EU member states

In March 2013, the European Commission published a progress report in which they analysed implementation of EU Directive 2009/28/EC concerning EU member states' renewable energy production. Its foremost conclusion was that the breakthrough of renewable energy was progressing more slowly than anticipated and that many member states would have to make additional efforts in order to achieve their 2020 objectives (Europese Commissie, 2013b). Progress varies from country to country (see Fig. 8).

Figure 8 **How far away are the EU member states from their national objectives?**
Current status (2013)



Source: Eurostat, 2013 figures (http://ec.europa.eu/eurostat)

11 The most pessimistic scenario in the underlying reference forecast was at the time 12% (Daniels & Kruitwagen, 2010).

12 The Ministry of Economic Affairs' forecasts do however change from time to time because since 1990 consecutive governments have been constantly changing their objectives and their associated support schemes and budgets.

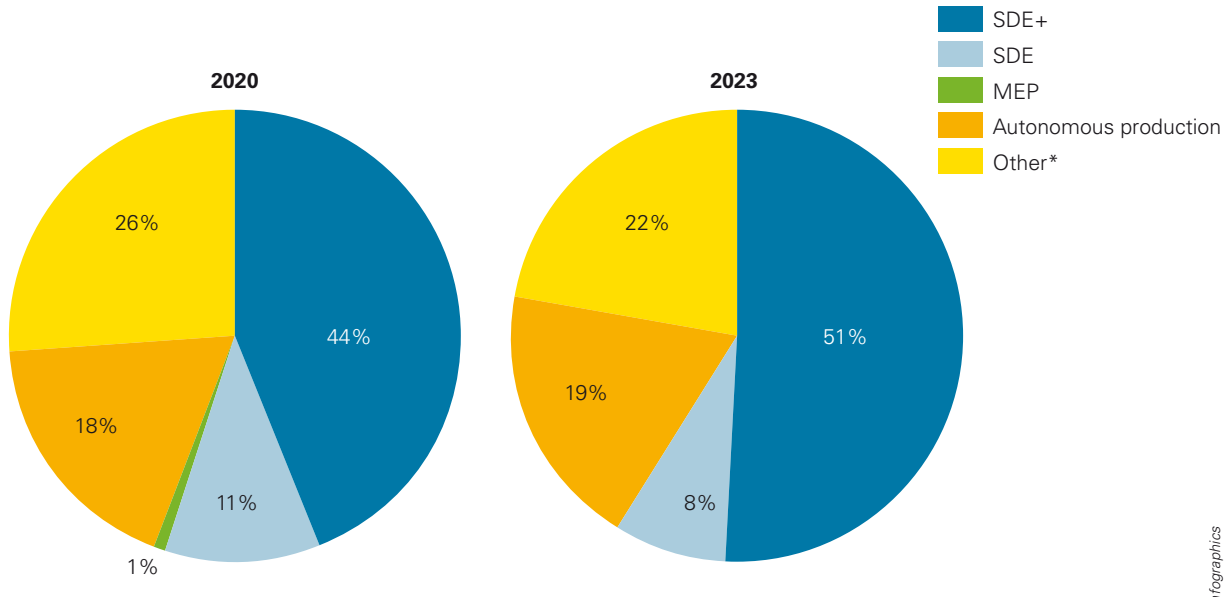
It is clear that the Netherlands still has a long way to go towards its objective in 2020. The Netherlands has a relatively low share of renewable energy and is showing minimal progress (4.5% in 2012 and 2013).

3.2 Contribution of SDE+ towards renewable energy production

3.2.1 SDE+ contribution compared to other support schemes

The Energy Research Centre of the Netherlands (ECN) calculated on our behalf how much of the energy being produced from renewable sources by 2020 and 2023 will be attributable to SDE+. Fig. 9 shows the relative contribution that SDE+ will make compared to *autonomous production* (unsubsidised energy production from renewable sources), as well as subsidised energy production under previous MEP and SDE support schemes.

Figure 9 **Which support scheme contributes the most to energy production from renewable sources?**
SDE+ contribution compared to that of other support schemes in 2020 and 2023



Joris Fiselier *Infographics*

* The 'Other' category includes non-SDE+-subsidised energy production projects using biofuel plants (approx. 50%), water pumps (approx. 30%) and wood-burning stoves (approx. 30%).

Source: Energy Research Centre of the Netherlands (ECN) model (scenario 0) calculated on behalf of the Netherlands Court of Audit.

We can see that SDE+ contributes the most to output from renewable energy sources of any scheme in 2020 and 2023, 44% and 51% respectively.

In other words, slightly over 6% of the 2020 objective of 14% energy output from renewable sources will have to be generated from SDE+ projects.

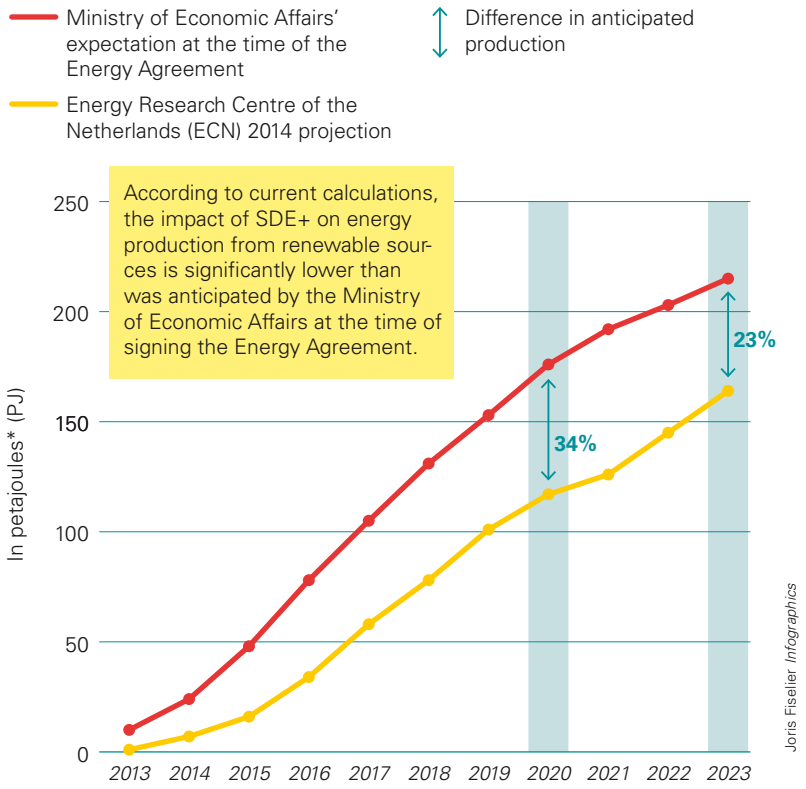
3.2.2 SDE+ contribution compared to production forecasts

According to ECN calculations, renewable energy levels under the SDE+ scheme will be 59 PJ (34%) and 51 PJ (23%) lower in 2020 and 2023 respectively, than the government anticipated in 2013 when signing the *Energy Agreement*. Fig. 10 shows the differences between the minister's expectations when signing the *Energy Agreement* in 2013 and the latest ECN forecast in 2014.[13]

13 Energy Research Centre of the Netherlands (ECN) model (Scenario 0) calculated on behalf of the Netherlands Court of Audit.

Because of disappointing energy production levels, less SDE+ subsidy will be dispersed than originally anticipated when signing the *Energy Agreement*. By 2020 and 2023 respectively, subsidy expenditure will be €809 million (39%) and €544 million (22%) lower than budgeted.

Figure 10 **Disappointing impact SDE+ on energy production**



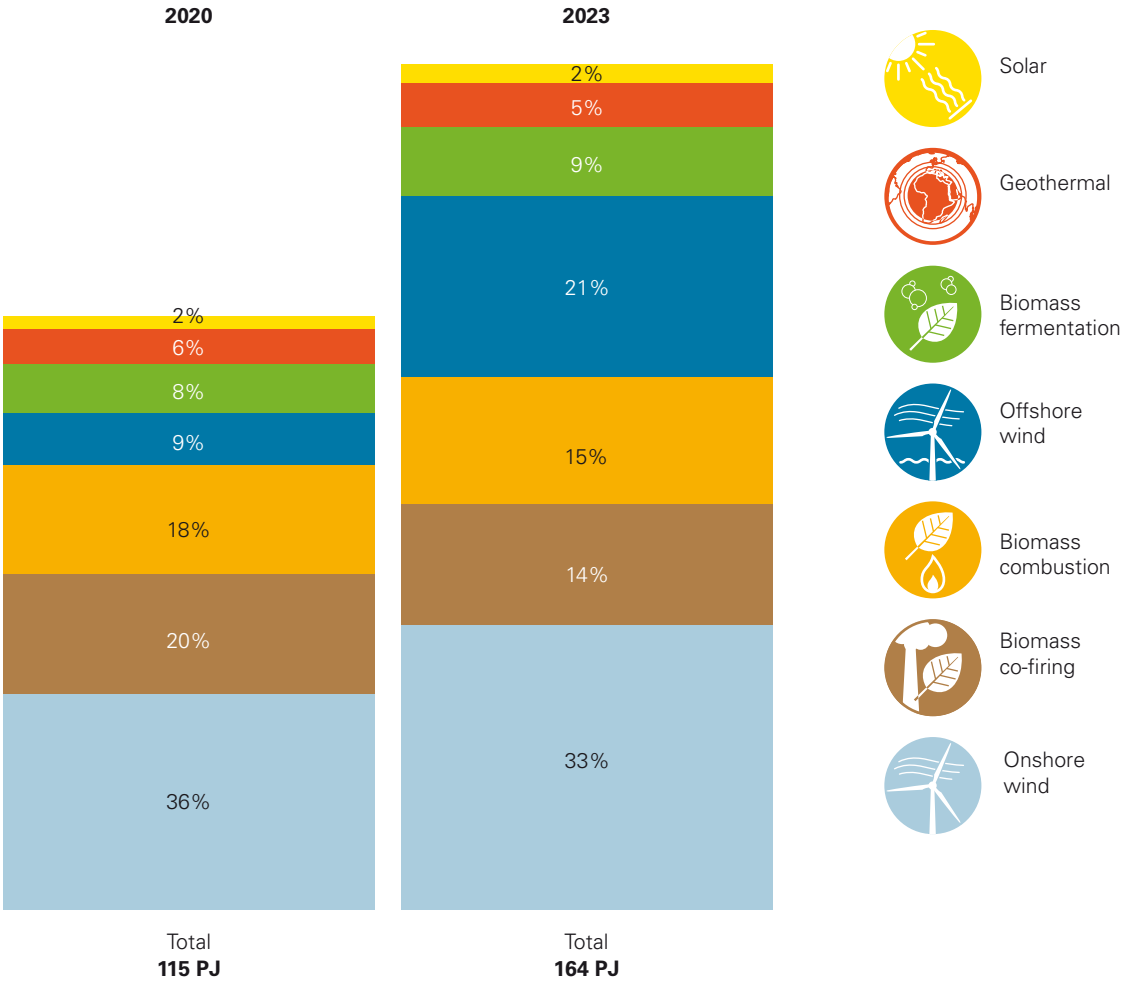
*1 petajoule is equivalent to the energy consumption of approx. 15,000 households.

Sources: Ministry of Economic Affairs calculation model at the time of the Energy Agreement and Energy Research Centre of the Netherlands (ECN) model (scenario 0) calculated on behalf of the Netherlands Court of Audit

3.3 Energy production technologies that make the largest contribution to production levels

Which energy production technologies using renewable sources are expected to make the biggest contribution? We can answer this question by breaking down the energy produced under the SDE+ scheme by method or technology used (see Fig. 11).

Figure 11 **Contributions of energy production methods to SDE+ productio**
Projections for 2020 and 2023



Joris Fiselier *Infographics*

Source: Energy Research Centre of the Netherlands (ECN) model (scenario 0) calculated on behalf of the Netherlands Court of Audit

In 2020, we can see that approximately 75% of the energy produced under SDE+ will be based on one of the following three technologies: onshore wind (36%), biomass co-firing[14] (20%) and other biomass combustion (18%).
In 2023, onshore wind energy (33%) and biomass co-firing in coal-fired power stations (14%) will still be making a significant contribution, but from 2020 to 2023 offshore wind energy levels will increase sharply from 9% to 21%.

Next, we will discuss some specific problems and options associated with biomass and offshore wind energy.

3.3.1 Biomass energy production: longer-term effects

Large-scale use of wood to generate electricity is not wholly appropriate in terms of a longer-term sustainable energy supply. CO_2 emissions are not actually the primary problem in this respect. In the long term, trees absorb as much CO_2 over their lifetimes as is released during combustion. However, it takes a long time before a tree is

14 When biomass is used for direct co-firing, it does not need to be pre-processed and can be mixed directly with the primary fuel, e.g. coal in coal-fired power stations. When biomass is used for indirect co-firing, it needs to be pre-processed.

replaced by a mature specimen. A recent study revealed that re-growing trees takes between five and twenty-five years to compensate for CO_2 emissions from wood waste combustion (Ros, Van Minnen, & Arets, 2013). If forests are logged for immediate combustion purposes, then these figures can rise to over a century. Moreover, replanting forests can cause displacement of agricultural land used for growing crops.

The use of wood-based biomass also raises the question whether this is contributing to the prolonged existence of polluting coal-fired power stations and if so, to what extent. This is unlikely.[15] but more probable is the possibility that large-scale biomass co-firing in coal-fired power stations will have such technical and social implications that it will only make it more difficult to move away from this combination in 2020 and 2023. The power stations and their entire supply chains will have been implemented by this time, not to mention the investment involved (Asveld, Est van, & Stemerding, 2011).[16] This constitutes a risk because it is not sensible to use biomass as a fuel for co-firing purposes. Biomass is more urgently needed for other applications, e.g. as an aviation and transportation fuel, and as a raw material for the chemical industry. Biomass is the only sustainable option in these sectors (Boot & Ros, 2014).

The problem outlined above was acknowledged by the *Energy Agreement's* signatories. This resulted in the agreement that coal-fired power stations would only be allowed to use biomass to produce 25 PJ of energy annually. The parties involved also wanted to set sustainability criteria for the biomass that could be used in coal-fired power stations by the end of 2014.[17]

We commissioned ECN to calculate what the implications would be if biomass co-firing were prohibited as of 2015. This would have seriously detrimental effects: 0.9% and 0.5% less energy production using renewable sources by 2020 and 2023 respectively. Co-firing at coal-fired power stations is therefore indispensable in the short term.

Our survey among SDE+ subsidy applicants revealed that biomass combustion or fermentation projects are being held back because it is difficult to estimate whether sufficient biomass will be available.
Demand for biomass will only continue to grow in the years ahead. Biomass supply is finite and the available volumes will probably not grow as fast as is desirable. This fact may drive up biomass prices.[18] Another factor is the inconsistent quality of biomass.

15 It is highly improbable that closure of the five most polluting coal-fired power stations built in the 1980s and 1990s will be postponed as a result. The Minister of Economic Affairs has tightened up energy efficiency criteria so radically that these power stations will no longer be profitable and will be shut down in 2016 and 2017, according to the ministry.

16 It is likely however that using biomass for co-firing purposes will help establish a solid infrastructure for a bio-based economy with biomass as its basic raw material (Boot & Ros, 2014). In March an agreement has been signed.

17 This goal was not achieved in 2014 and in early 2015 the parties were granted postponement until March.

18 The way in which biomass prices are set is not transparent. Several interviewees warned about the risks of regional monopolies forming.

Still no tenable solution for biomass pricing problem

The Ministry of Economic Affairs is aware of the problems surrounding rising biomass prices and market non-transparency. In 2015, the ministry decided – on a one-off basis – not to adjust the manure fermentation base rate in line with rising biomass prices (EZ, 2014c). Systematic base rate increases and associated subsidy rises might appear to be the obvious response, but they would trigger an upward spiral whereby biomass sellers would be prompted to push up prices still further. The biomass sector also warned of inflationary effects for fermentable biomass if new plants were granted higher SDE+ subsidies than existing plants. Existing plants would go bankrupt as a result. In short, the SDE+ scheme is not geared to rising biomass prices combined with insufficient competition. The ministry could provide the market with greater certainty if it could find a tenable solution for this problem.

3.3.2 Energy production from offshore wind farms

The Netherlands intends to build several large offshore wind farms in its part of the North Sea[19] from 2015 on. Putting these projects out to tender is officially part of SDE+. However, a separate scheme is being developed for this purpose, with its own separate budget. This is a departure from the basic principle of SDE+: implementing options for producing renewable energy as cost-effectively as possible from a single integral budget. The Ministry of Economic Affairs decided to deviate from this principle because it assumed that this technology would not be developed - at all or on time - without putting it out to tender separately, and because without offshore wind energy 2020 and 2023 objectives would not be achieved.

Offshore wind energy projects will be put out to tender annually from 2015 to 2019 so that power companies, project developers and/or consortia can bid. Consolidated licences and subsidies will be issued for pre-determined locations, subject to a 40% cost reduction for the entire sector. In other words, when granting subsidies for the construction of wind farms, it is being assumed that costs across the line will be 40% lower in 2024 than they were in 2014. These 40% cost reductions have to be achieved partially by means of technical innovation and partially by means of policy innovation, such as licence/subsidy consolidation and site survey centralisation (seabed data, waves, wind measurements). This must be a joint effort between private and public sectors as laid down in the *Energy Agreement*. Furthermore, it is still unclear exactly what share of the 40% cost reduction the government is responsible for since it decided, by the end of 2014, to make TenneT (100% state-controlled electricity transmission system operator (TSO)) responsible for connecting offshore wind farms to the national grid. This used to be the responsibility of wind farm owners themselves.

Up until now, the four-year timeline for the construction of offshore wind farms – assumed in the Minister of Economic Affairs' proposed policy – has not yet been achieved in practice. The agreed timeline (including connection to the national grid by TenneT) and cost reduction agreements are ambitious to say the least. If we adopt timelines of seven years, as for existing offshore wind farms, then this will have a highly detrimental effect on energy production from renewable sources in 2020 and 2023. A timeline of seven years – rather than four years – means that 0.4% and 1.1% less energy will be produced in 2020 and 2023 respectively with respect to the plans upon which the Ministry of Economic Affairs' policy has been based.

19 Generally just within the Dutch exclusive economic zone (EEZ), but also along the North and South Holland coasts inside the twelve-mile zone.

Our survey revealed that power companies are generally positive about the separate scheme developed within the context of SDE+ for offshore wind farm construction (consolidated licence and subsidy). They are also positive about TenneT being responsible for connecting wind farms to the national grid. Possible impediments include interest rate rises, higher investment costs, uncertainty about licence irrevocability and uncertainty as to whether TenneT will be able to connect farms to the national grid on time.

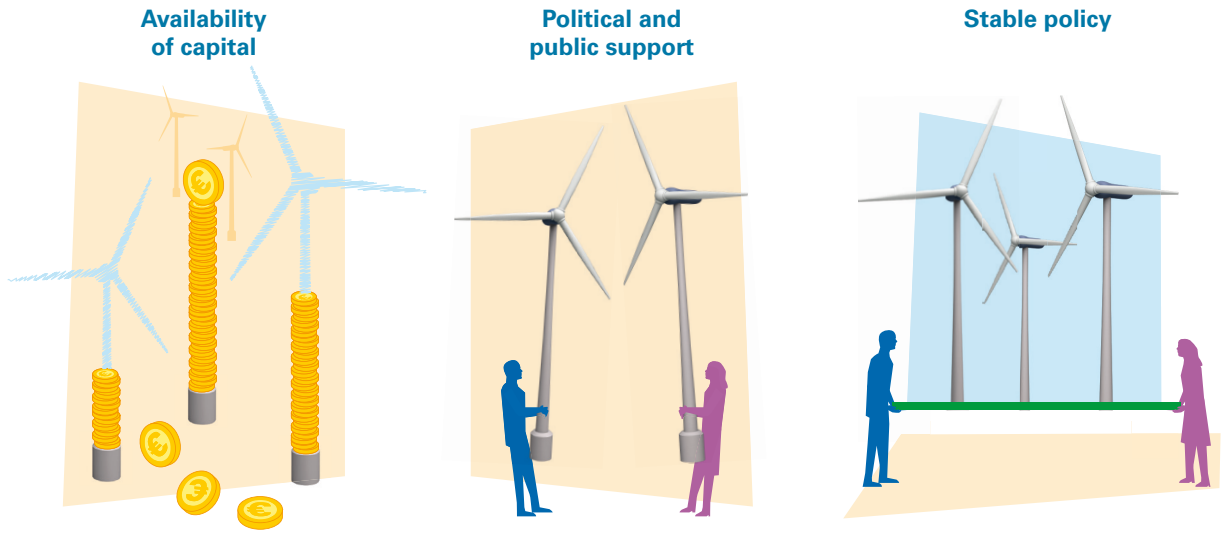
In short, the most critical success factor for the growth of offshore wind energy production is 'time'. Growth plans and timelines for offshore wind energy may be too ambitious. We will address the availability of financial resources in the next section.

3.4 Conditions for achieving objectives

3.4.1 Financial resources and grass-roots support

Developing successful energy production projects using renewable sources requires more than just a well-thought-out subsidy scheme. Several other pre-conditions need to be satisfied. Sufficient availability of financial resources and grass-roots support are two such pre-conditions.

Figure 12 **Pre-conditions for promoting energy production from renewable sources**



Joris Fiselier *Infographics*

According to ECN and the Netherlands Environmental Assessment Agency (PBL), both are currently sufficient (Hekkenberg & Verdonk, 2014, p. 59). However, impediments do exist in some areas. For example, funding and willingness to invest present problems in the biomass fermentation sector.[20] Similarly, grass-roots support for onshore wind energy is not optimal (Hekkenberg & Verdonk, 2014, p. 59). The results of our survey confirm this picture.

20 Fluctuating and unpredictable biomass prices make it difficult to convince banks of a project's long-term viability.

There is potentially enough funding available from banks and institutional investors for *offshore* wind farms because this is a global market (Nationale Investeringinstelling, 2014). Whether financial resources for Dutch wind energy projects are available from institutional investors in particular depends partly on the return on investment for projects in the Netherlands as compared to similar projects in other countries.

3.4.2 Stable policy

Stable policy is another pre-condition for initiating successful energy production projects using renewable sources. Support schemes are more effective if their stability and consistency are guaranteed over the longer term. Legal certainty about the availability of subsidies gives investors the confidence to invest in projects producing renewable energy (Nera Economic Consulting & Sustainable Quality Consult, 2013).
An analysis of the stability of such support schemes in the EU revealed that in the 1997-2012 period mainly France, Italy and the Netherlands were subject to numerous system changes (Europese Commissie, 2013a, p. 24). In most countries, changes were made only once during this period.[21] In the Netherlands, changes were made five times, including the transition from SDE to SDE+. Our incentive policies for producing energy from renewable sources are therefore highly unstable and long-term certainty is lacking. This also came to light when comparing national action plans and progress reports from various other countries (Ecofys Fraunhofer, BBH Energy Economics Groups, & Winrock International, 2012).
When SDE+ was introduced on 1 January 2011, the government's premise was one of minimal change with respect to existing policy and hence only a slight change of name, i.e. from SDE to SDE+. The government opted for *continuity* so as not to shake market confidence unnecessarily. However, on 26 September 2014, the Ministers of Economic Affairs and Infrastructure and the Environment decided to change the support scheme yet again. Since then, it has no longer been possible to apply for offshore wind energy subsidies via the auction mechanism (IenM & EZ, 2014, p. 6), although this had been promised to existing licensees. The modified subsidy scheme is probably more efficient in terms of how it is structured.[22] However, the notion that governmental incentive policies are unstable has possibly gained greater traction once again. This may deter international investors and prompt them to invest in wind energy projects elsewhere in Europe or overseas.

3.4.3 Businesses' motives for participating (or not participating) in SDE+

Our survey among all SDE+ applicants between 2011 and 2013 revealed which factors where either conducive or prohibitive to participating in SDE+.

Conducive factors

The foremost motive among businesses for initiating new renewable energy projects was that it would contribute towards a more sustainable world, help achieve *Energy Agreement* objectives and improve their green image. The expectation that an SDE+ project would help attain or retain a strong market position was also conducive to initiating SDE+ projects. Stakeholders that carried the most weight in this respect

21 Moreover, only 14 of the then 27 member states even had a support scheme for producing renewable energy in 1997.

22 It may be assumed that the modified system makes it possible to save time and money with consolidated licences and subsidies, a more systematic approach to spatial layouts and greater licence condition flexibility. Under the new system, TenneT is responsible for connecting wind farms to the national grid.

were shareholders and customers/consumers.
Another aspect that played a role in business owners' decision-making was whether they would be able to implement their projects adequately, or have them implemented adequately, from a technical perspective. If they had the right in-house expertise and experience, this was conducive to participation. The same applied – although to a lesser extent – to their ability to conduct or have conducted a proper assessment of financial implications.
Business owners also found the support provided by the Netherlands Enterprise Agency (RVO) to be particularly conducive, i.e. assistance solving subsidy application-related problems and providing sound financial and technical argumentation.

Prohibitive factors

Business owners also thought certain aspects were non-conducive to participation.
Business owners who were not opting for wind or solar energy production stated that uncertainty about raw material prices (biomass) was an impediment to initiating projects. This consideration plays a particularly prominent role among business owners generating energy from biomass.
Other business owners stated that they would probably not be starting up any new energy production projects because they could suffice with what they already had or did not have the space available for new plants.[23] The latter applies especially to solar panels, biomass heaters and other biomass combustion plants.
Another frequently mentioned reason why business owners would probably not initiate any new projects was the expectation that funding and investment would prove troublesome. This applies to the purchase of solar panels and biomass combustion or fermentation plants.
Another impediment to participating in SDE+ is the risk that newer, cheaper energy production technologies would be added to the scheme in sectors in which they did not operate and to which a large share of the budget would be appropriated. This factor was mentioned specifically by companies in the geothermal sector.

23 Only 15% of respondents stated that they had no more space available.

4 SDE+ implementation and efficiency

This chapter evaluates the implementation and efficiency of SDE+ by analysing the support scheme and comparing it to previous support schemes and those found elsewhere in Europe. SDE+ appears to be a well-thought-out system that avoids several pitfalls inherent to previous schemes. We do however have comments about the auction system used to allocate subsidies. We also believe that there is a problem with the way in which the Minister of Economic Affairs is managing SDE+. If no account is taken of significant SDE and SDE+ underproduction, then this will seriously jeopardise the chances of achieving the 2020 and 2023 policy objectives.

4.1 SDE+ implementation and efficiency compared to previous schemes

4.1.1 MEP: overfunding and expenditure out of control

In 2007, we conducted an audit of the MEP support scheme's implementation and results at the request of the House of Representatives. This audit revealed two major limitations. Subsidy recipients were making surplus profits because energy prices rose higher than expected and because government expenditure was difficult to control (Netherlands Court of Audit, 2007a).

Overfunding

Subsidies granted to energy producers were sometimes too high.
This situation arose primarily because a fixed subsidy level had been set for the entire ten-year period for each unit of renewable energy produced. This subsidy level had been set based on anticipated energy price trends. In practice, energy prices rose much higher. Producers then received a fixed subsidy as well as a high market price. It was estimated that up until 2007 an excess of €208 million in subsidies were paid out for onshore wind energy alone, 48% of the total expenditure in this category (CE Delft, 2007).

Expenditure out of control

MEP expenditure was very difficult to predict. There were two main causes. Firstly, MEP was an open-ended support scheme; it remained open to new applications. The commitment levels assumed were based on the number of business owners applying. Secondly, financial management of the scheme was poorly implemented. MEP expenditure was not well monitored within the Ministry of Economic Affairs. This meant that the scheme was prone to financial setbacks.

4.2.1 SDE: expensive projects and unpredictable policies

The risk of overfunding was mitigated in the SDE scheme introduced in 2008 because subsidy levels were set annually in arrears based on actual energy prices. Additionally, an annual ceiling was set on commitments, making SDE much more manageable financially than MEP.

Nonetheless, SDE also had its limitations, which related to the fact that separate SDE budgets were set for each energy production technology. The idea behind separate budgets was to encourage different types of technology, so that various technical options would be able to develop and grow for longer-term implementation.

In practice, these partial budgets had three disadvantages. Firstly, both low-cost and relatively high-cost technologies were eligible for subsidy, which was at odds with the goal of producing energy as efficiently as possible. Secondly, there were frequent debates about partial budget levels in the House of Representatives, prompted by lobbyists for specific energy production sectors. This resulted in unpredictable policies (Roosdorp, 2012). Thirdly, not all partial budgets were always fully dispersed. Transferring funds from one partial budget to another required separate decisions. Hence it was difficult to use the entire budget fully.

4.1.3 SDE+: progress with room for improvement

The design of SDE+ demonstrates that lessons have been learned from the problems that arose with the previous MEP and SDE support schemes. In practice, SDE+ works relatively well. Several aspects could be improved however.

Setting the correct subsidy level remains a challenge

As discussed in Chapter 2, SDE+ includes a mechanism to prevent overfunding. A base rate has been set for each type of energy production technology. SDE+ subsidises the difference between the base rate and the market energy price. The higher the market price, the lower the SDE+ subsidy. At very high market prices, subsidies are no longer available. This prevents the combination of high market prices and subsidies that resulted in overfunding under MEP.

This mechanism relies on a good calculation of the cost price of renewable energy. ECN and DNV-GL[24] advise the ministry about base rates and perform market consultation to gain a better understanding of the costs of producing renewable energy.[25]

Although we have not found any systematic deficiencies in the process by which ECN and DNV-GL calculate base rates, there is a risk concerning dependence on information provided voluntarily. It is in energy producers' interests to suggest a cost price that is higher than the actual price. This is mainly a problem concerning the costs of producing energy from wind and biomass, where there is a lack of market transparency.[26]

We have raised this point before (Netherlands Court of Audit, 2007a & 2010b). The government would be in a better position to prevent overfunding if it included a mandatory requirement for the provision of information as a condition for receiving SDE+ subsidies. The Netherlands could follow the example of how such issues are managed in Germany. Under German law, producers are obliged to submit information relevant to determining costs (Lensink, Van Tilburg, Mozaffarian, & Cleijne, 2008). This means that a producer has to submit cost and output figures if it wants to apply for a subsidy.

24 DNV-GL is an international technical consultancy and certification agency operating in the energy sector. Originally, DNV stood for 'Det Norske Veritas' and GL for 'Germanische Lloyd'. These two companies merged in 2012 to form DNV-GL.

25 The process for setting base rates for the following year is performed during the current implementation year. This consists of a set of draft recommendations from ECN followed by market consultation conducted in June and a non-public, external review of recommendations by international experts. In mid-November, the Minister of Economic Affairs publishes its *SDE+ Opening Letter* containing the available budget for the following year (final recommendations)

26 This came to light in discussions with ECN and in the external review conducted by the German Institute for Energy and Environmental Research (IFEU) into base rate calculation methods (Institut für Energie- und Umwelforschung, 2013).

Responding to project diversity requires greater budgeting flexibility
SDE+ uses an integral budget for applications from all technology categories. This has both advantages and disadvantages. Integral budgets ensure better expenditure control because partial budgets no longer have to be adjusted and there is a greater likelihood that the subsidy will be fully utilised. However, integral budgets mean that it is not known in advance which energy production technologies will be eligible for subsidy. This results in major uncertainty about how much budget is required. After all, subsidy levels required to produce a given amount of energy from renewable sources vary from technology to technology. The Ministry of Economic Affairs has a very limited view of the range or scope of projects in the years ahead. Consequently, if objectives for producing renewable energy remain unchanged, available expenditure budgets will have to be adjusted constantly. In practice, this is not being done frequently enough (see § 4.5).

Furthermore, the ministry's decision to work with an integral budget means that business owners have very little certainty as to whether subsidies will be available for their particular technology. They can repeatedly miss the boat if the budget has already been dispersed on projects using other energy production technologies than theirs. Our survey revealed that this form of uncertainty is a particular impediment to initiating new projects in the geothermal sector.

4.2 SDE+ implementation and efficiency compared to support schemes in other EU countries

4.2.1 Effectiveness and efficiency of the support scheme

Various systems are in place throughout the EU to promote energy production from renewable sources.

- Some member states have opted for a scheme based on a *quota-obligation system*. Energy suppliers in these countries are obliged to supply a fixed quota using renewable sources.
- Other member states have adopted a *feed-in tariff*. Energy suppliers in these countries are obliged to purchase renewable energy at government-set generating costs.
- There are also member states with support schemes based on a *feed-in premium*. Feed-in premiums provide energy suppliers with a subsidy for producing renewable energy. Under this system, the supplier itself sells the power it generates on the market and receives a government premium to cover the difference between the market price and the price for regularly produced energy.

The Dutch SDE+ support scheme is an example of the latter type of system – subsidies are in effect premiums. Other EU member states that have adopted a premium system include Estonia, Finland and Denmark (see Fig. 13).

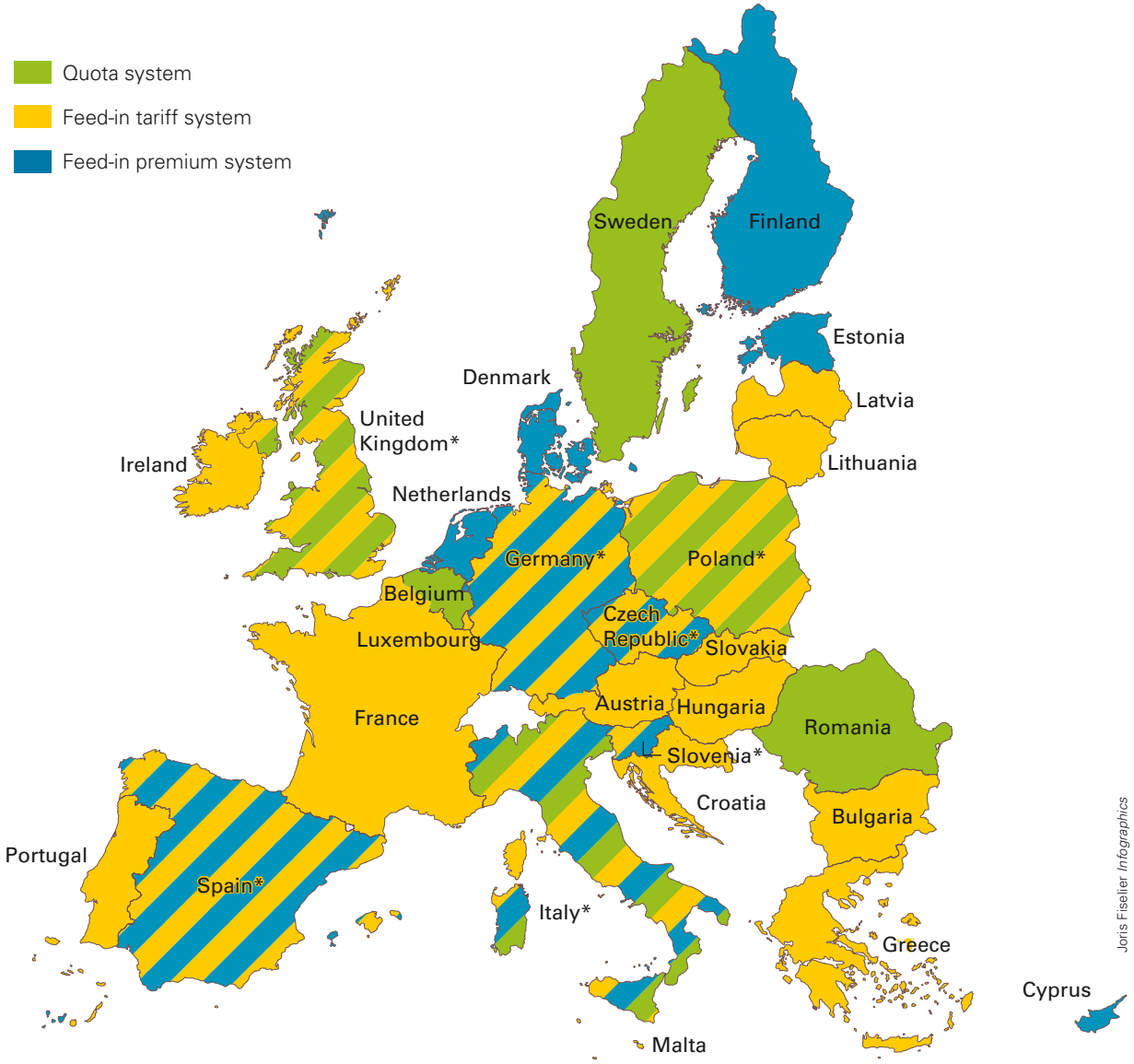
Tariff systems are currently more common in the EU. However, in recent years these systems have been making way for premium systems (Europese Commissie, 2013a).

Which support system is the most effective or efficient is a subject of debate. Feed-in premium systems (and specifically SDE+) perform well insofar as researchers have been able to establish any correlation between the system used, its associated costs

and its degree of success in achieving its objectives. These systems encourage competition and prevent subsidy recipients making surplus profits (Internationaal Energieagentschap, 2014; Klessmann, 2012).

In 2013, the European Commission called on EU member states using tariff-based systems to scrap them and move to premium-based systems by 2016 (Europese Commissie, 2013a). The Dutch SDE+ scheme is a prime example of the current trend within the EU and the direction in which the European Commission wishes to proceed.

Figure 13 **Spread of renewable energy support schemess throughout the EU in 2012**



* Multiple support schemes are used concurrently.

Source: European Commission, 2013b

4.2.2 Auctions and tenders on the rise

The European Commission's energy policies are focused on promoting free competition in the internal market. This applies equally to renewable energy. This saves costs, as greater competition leads to lower prices, or so it is thought.
As well as the type of support scheme used, the way in which production/subsidy rights are allocated is also critical to creating competition and avoiding surplus profits. The European Commission intends production and subsidy rights to be assigned based on competition mechanisms such as auctions and tenders. Such systems must have been implemented in all member states by 2017 (Europese Commissie, 2014). In this respect, the Dutch system is aligned with this European trend.

4.3 Comments on the SDE+ auction mechanism

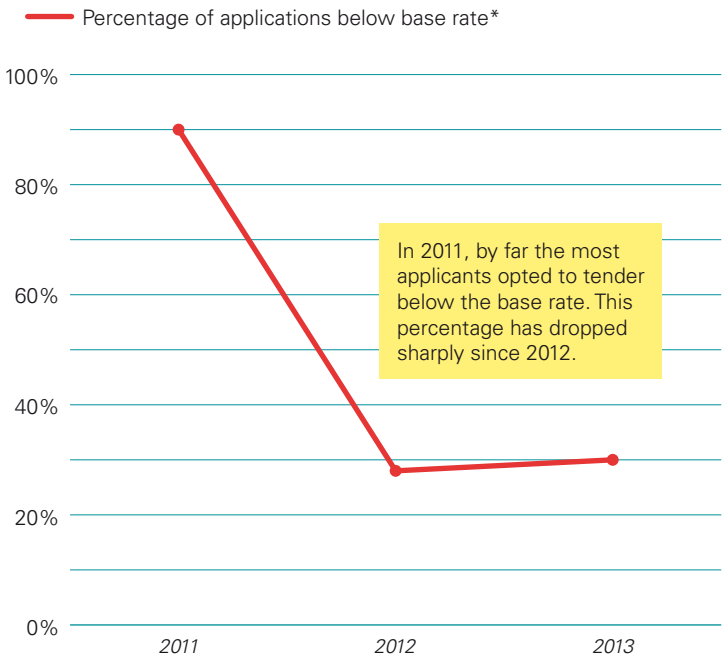
4.3.1 Diminishing auction mechanism efficiency

SDE+'s phased auction system (see § 2.3.3) of prioritising low-cost energy production technologies worked well, especially from 2011 to 2013. This is indicated by the interest that initially existed in the early stages of the auction. This was the phase in which relatively low-cost energy production technology such as geothermal systems were eligible for subsidy. Additional evidence is the fact that many businesses voluntarily tendered below the base rate, even for higher-cost technologies.
In 2011 and 2012, nearly all project applications were submitted in Phase 1. In 2013, there was a lot of interest for the first three phases (EZ, 2011, 2013). In 2014, interest in the early stages began to wane. Many business owners appeared to be marking time in anticipation of higher subsidies later in the year. The available SDE+ budget ultimately only ran out by Phase 6 (EZ, 2014c). Business owners using higher-cost energy production technology who wanted to claim higher subsidies were succeeding in doing so before budgets had ran out.

A sharper decline in the auction mechanism's effectiveness is also discernible if we look at the scope of the projects tendering below the base rate.
In 2011, projects tendering below the base rate accounted for 90% of energy production (potential output) for all the projects applied for in that year. In 2012, this figure had dropped to 28% and in 2013 it rose only slightly to 30% (see Fig. 14).[27]

27 This figure illustrates the potential output per project, so that a standalone manure fermentation unit does not carry as much weight as a large-scale wind farm.

Figure 14 **Decline in SDE+ auction mechanism operation**



* The scope of subsidy applications expressed as a percentage is weighted for potential energy production for each project over the whole subsidy contract period.

Source: Netherlands Enterprise Agency (RVO) project data processed by the Netherlands Court of Audit.

Our survey revealed that only 17% of respondents were planning to apply for a subsidy for a subsequent project at an early stage. Particularly businesses that believed they would be able to produce energy at lower costs or implement technical installations quickly, or businesses supported by a local authority or province, were more inclined to apply at an earlier stage in return for a lower subsidy.

The auction system's effectiveness is expected to diminish further in the future. Subsidy budgets will probably be raised in order to achieve the 2020 and 2023 objectives.[28] The risk of subsidies being unavailable at a later stage will therefore decrease. Hence, business owners will be less inclined to apply for lower subsidies at an earlier stage. As a result, the added value of the auction system is diminishing. This trend was already discernible between 2011 and 2013 (see Fig. 14).

Now that the system's effectiveness is waning, it is even more important to calculate base rates (see § 4.1.3) correctly in order to prevent surplus profits being made using government subsidies.

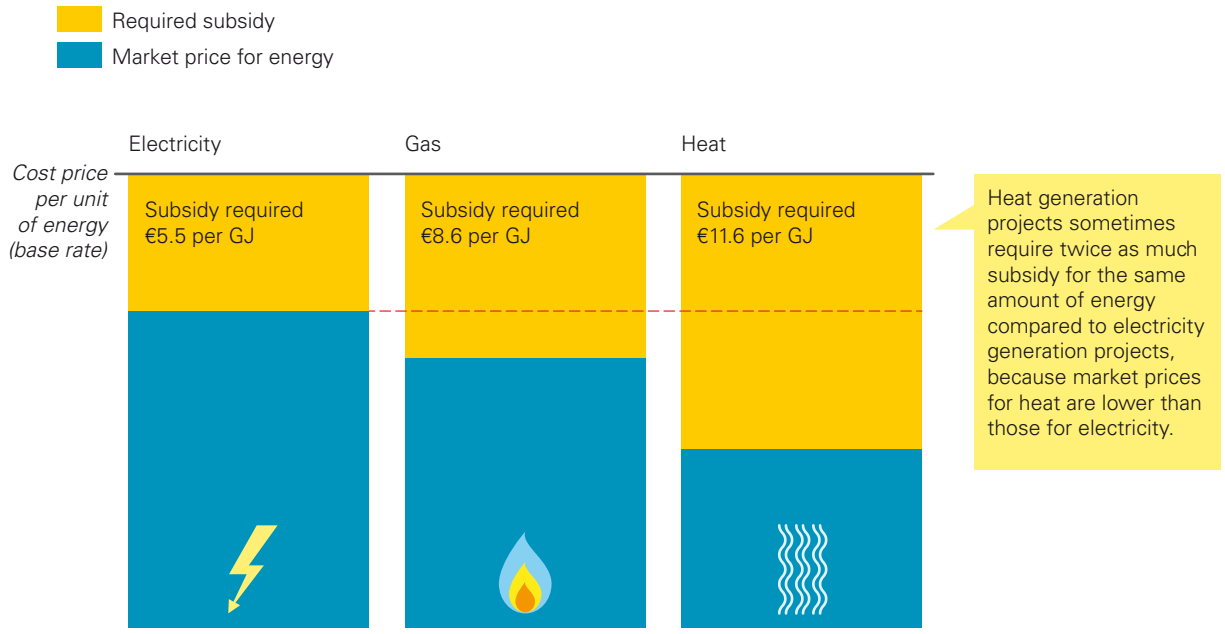
4.3.2 Lowest-cost projects not being prioritised

The SDE+ auction system prioritises projects based on cost price per unit of energy. It would be more cost-effective to prioritise the projects requiring the lowest subsidy. The subsidies required for projects with the same cost price per unit of energy vary greatly because market prices for different forms of power supply (electricity, gas and heat) vary greatly as well (see Fig. 15). This means that the lowest-cost projects in terms of subsidy required do not always receive priority. Consequently, SDE+ is not working as efficiently as it could. This does not directly result in higher expenditure,

28 This was revealed in internal documents and discussions with Ministry of Economic Affairs policy advisers.

but it does decrease energy production under SDE+. The government could have generated more renewable energy for the same money if it had prioritised low-subsidy-requirement projects instead of low-cost-price, high-subsidy-requirement projects.

Figure 15 **Impact of energy market prices on subsidy level**
Illustration based on 2013 energy prices



Source: internal Ministry of Economic Affairs calculation at the time of the Energy Agreement (SDE+ Phase 1, 2013)

Joris Fiselier *Infographics*

The Ministry of Economic Affairs opts not to do so because different energy production technologies would constantly be prioritised for subsidy allocation in the application phase given that energy prices fluctuate so much. This could cause unrest among applicants. This is an understandable concern.
A second reason why the Ministry of Economic Affairs does not prioritise low-subsidy-requirement projects is that the cost to society as a whole (not just the government) would be higher. We dispute this second argument. Even for society as a whole, the additional costs of renewable energy produced equal the subsidies. After all, the difference between the market price and the cost to produce 1 PJ of renewable energy is equivalent to the subsidy dispersed under SDE+.

Modifying the auction system will have little effect on government expenditure or achieving objectives in the short term because subsidy budgets are increasing and the likelihood that subsidies will run out is decreasing (see above). If all projects end up receiving subsidy, then the order in which they do so is irrelevant. Modifying the auction system could be beneficial, however, if the number of projects applying for subsidies were to increase in the future with respect to the subsidy budget available.

4.4 From subsidy application to energy production

The time between applying for a subsidy and actually producing renewable energy varies in practice from several months to seven years depending on the energy production technology in question. Projects may withdraw their application or suffer delays

along the way. Fig. 16 shows the steps involved and phases in which projects are withdrawn.[29]

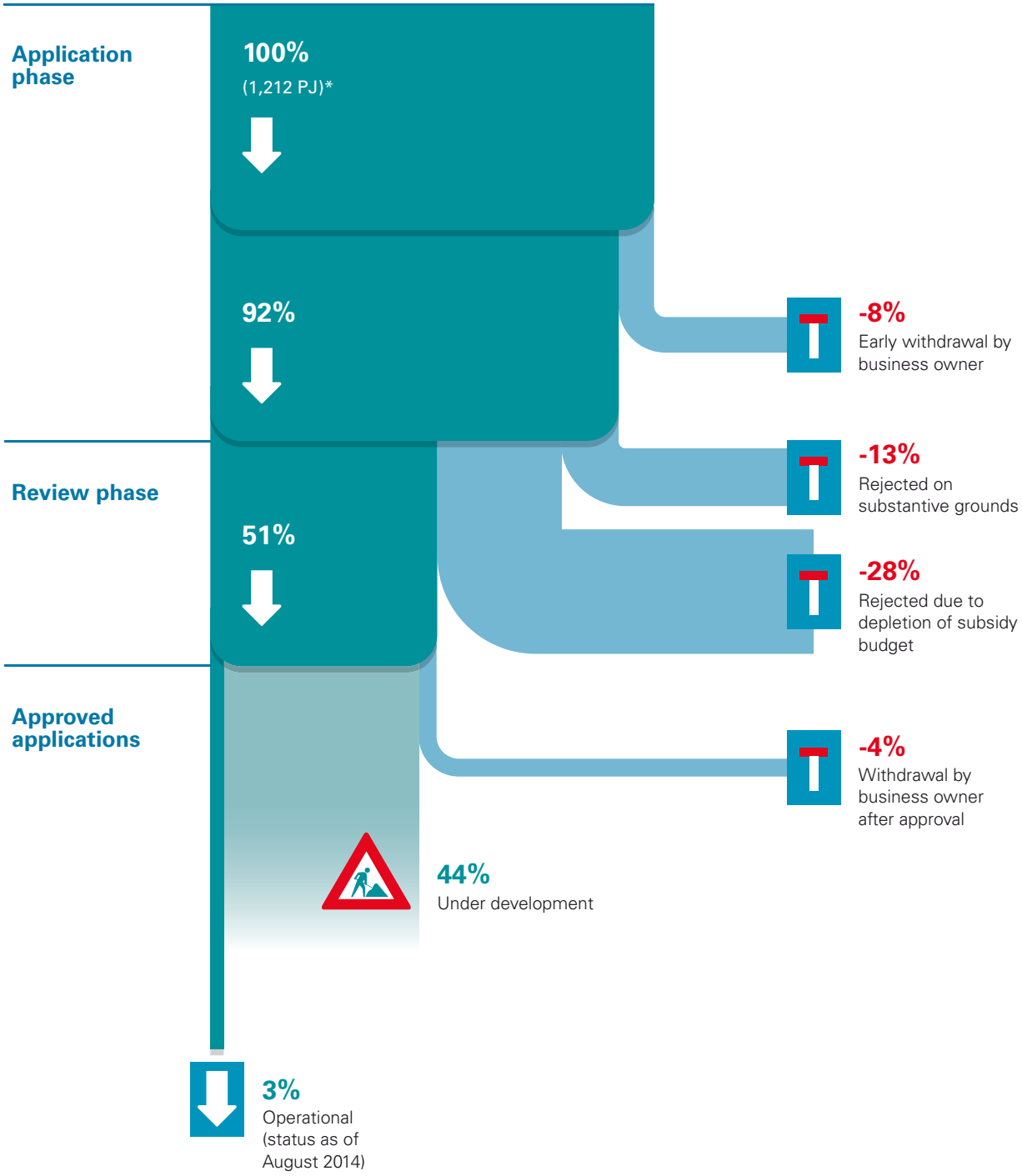
Fig. 16 shows that approved projects account for 51% of the energy production that all projects applying for subsidies could potentially generate. Most project applications (28%) are rejected because subsidies have run out. Rejections based on substantive grounds are far less common (13%). Sometimes, businesses withdraw their applications before the RVO has even evaluated their application (8%). Projects sometimes drop out at a later stage (4%), e.g. because building permission for a fermentation plant has been denied. Businesses then withdraw their application and the reserved subsidy amount is released.

As of August 2014, most of the approved energy production projects were still under development (44%). 'Under development' means that construction of the wind farm or plant is still in progress. These projects do not yet receive subsidy, but are entitled to receive subsidy as soon as they start producing energy. Only 3% of SDE+ projects were actually producing energy as of August 2014.

In its subsidy expenditure estimates, the Ministry of Economic Affairs takes no account of the fact that businesses sometimes withdraw their application or delay their projects. Consequently, actual subsidy expenditure is lower than budgeted subsidy expenditure (see § 5.1).

29 As in Fig. 14, we examined this based on project scope, i.e. in terms of maximum potential energy production.

Figure 16 **From subsidy application to energy production**
Applications from 2011 to 2013



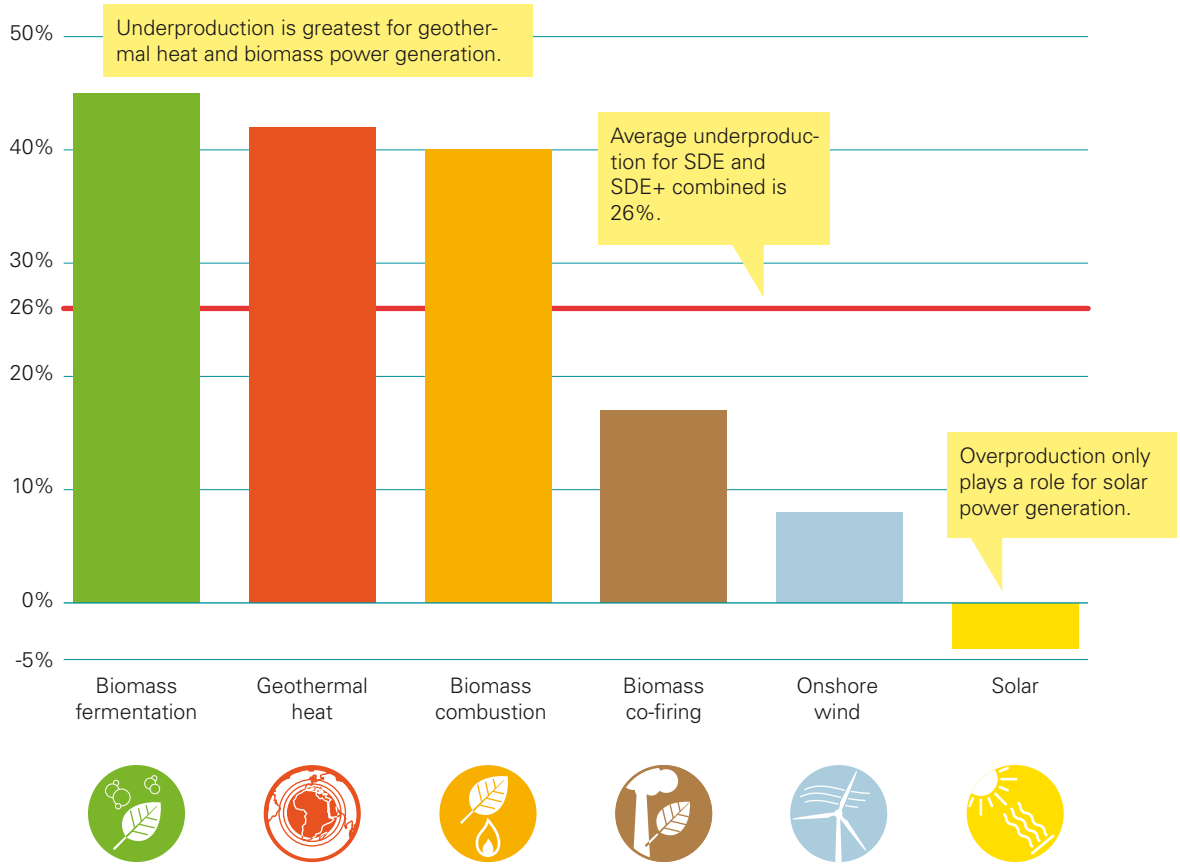
Joris Fiselier *Infographics*

* The no. of petajoules listed above equate to maximum potential production levels for the whole subsidy contract period.
Source: Netherlands Enterprise Agency (RVO) project data processed by the Netherlands Court of Audit

4.5 Significant underproduction: adjustment options

In practice, SDE+-subsidised projects produce less energy than stated in the forecasts which the Minister of Economic Affairs uses to determine his subsidy policies. This was also the case for projects previously subsidised under SDE, prior to SDE+. According our analysis of RVO data, the consolidated SDE and SDE+ energy output is on average 26% lower than the pre-calculated maximum (see fig. 17).[30]

Figure 17 **SDE and SDE+ underproduction**
From 2008 to 2013 (in percentages)



Source: Netherlands Enterprise Agency (RVO) project data processed by the Netherlands Court of Audit

Underproduction relates to projects that have progressed to the point that they are actually producing energy, but less energy than the maximum subsidisable amount. Annually, based on individual decrees issued and the anticipated energy production levels, the Ministry of Economic Affairs determines how much subsidy needs to be dispersed in order to achieve its policy objectives. However, this estimate is made based on information that takes no account of underproduction, delays and application withdrawals. Consequently, the amount of renewable energy produced is in practice disappointing.

30 Underproduction for SDE+-subsidised projects is currently even higher: 39%. However, this percentage is based on a very small sample because so few projects are actually producing energy at this point in time. This is why in this section we analysed SDE and SDE+ underproduction combined.

Systematic underproduction has significant implications for achieving the Minister of Economic Affairs' policy objectives.

Our analysis revealed that underproduction is most prevalent for geothermal heat and biomass fermentation/combustion projects. Overproduction is also possible, but in practice this has only been the case for solar power projects.
The reasons for underproduction vary from technology to technology. Biomass is hampered by technical problems and a limited availability of high-grade biomass (Algemene Rekenkamer, 2014a; Neeft, Dijkstra, Van Erp, & Leguijt, 2013; Vos & Zwart, 2013). Despite performing geological surveys, the output potential of geothermal projects remains very difficult to predict (EZ & LTO glaskracht Nederland, 2014).

The Minister of Economic Affairs' policies assume 100% implementation and production. If SDE+ projects withdraw their application, then budgets are increased for replacement projects in a later year. This is not the case in the event of delay or underproduction.

The ministry made the decision not to account for delays based on the idea that delays would not affect the 2020 objectives. After all, a project completed in 2018 rather than 2017 would still be producing the same amount of renewable energy by 2020.
However, postponement from 2019 to 2021 does make a difference.

No account is taken of underproduction because the ministry believes this is limited in scope. However, SDE and SDE+ underproduction is actually quite significant, as can be seen in Fig. 17. Hence, underproduction has real implications for achieving objectives. Moreover, the problem is related to tangible underlying causes. The Minister of Economic Affairs should take account of this in managing SDE+ policy implementation in order to establish a more realistic timeline for achieving objectives. Currently, the Minister of Economic Affairs is doing so in a way that minimises the risk of overspending but jeopardises the ability to achieve SDE+ objectives.

The simplest solution to the problem is to take account of underproduction in advance by approving more projects than would theoretically be required to achieve envisaged production levels. The decision would also have to be made as to whether budgeted expenditure should also be adjusted in line with anticipated underproduction (and thereby higher risk of overspending) or more money should be reserved in the budget.

5 Provision of SDE+ information to the House of Representatives

This chapter addresses the information that the Minister of Economic Affairs presents to the House of Representatives about SDE+ expenditure (*financial information*) and the results achieved (*policy information*). We will discuss the large volume of data to which the House has access and the shortfalls that we have nonetheless uncovered in terms of provision of information.

5.1 Financial information

In his annual departmental budget, the Minister of Economic Affairs outlines in global terms his proposed expenditure for incentivising energy production from renewable sources. Actual expenditure is itemised in the departmental annual report, and actual energy production levels are detailed in the annual progress report (such as RVO, 2014).[31] Nonetheless, we have uncovered shortcomings in this financial information. Primarily, the picture painted by the budget concerning anticipated SDE+ expenditure is unrealistic, given the knowledge available on this subject.[32] This relates to the budgeting system used by the Minister of Economic Affairs for this subsidy scheme and its predecessor, SDE.

The minister's SDE/SDE+ budgeting system focuses primarily on minimising the likelihood of any financial setbacks. He does so in two ways:

1. By adopting high, unrealistic expenditure estimates in budget preparations;
2. By keeping available budget funds throughout the term of office the same and by placing and retaining unspent funds in a budgetary reserve for policy implementation later on.

Item 1

SDE/SDE+ expenditure estimates assume that energy production levels specified in the subsidy decision are achieved in full without any delays, application withdrawals or underproduction.

Item 2

The amount of money available each year for the next four years is determined at the start of the term of office based on internal expenditure estimates. This then remains unchanged throughout the remaining term of office. Actual expenditure may not correspond to the budget available, e.g. due to application withdrawals or project delays. Since 2013, these discrepancies have been absorbed by means of a budgetary reserve.[33]

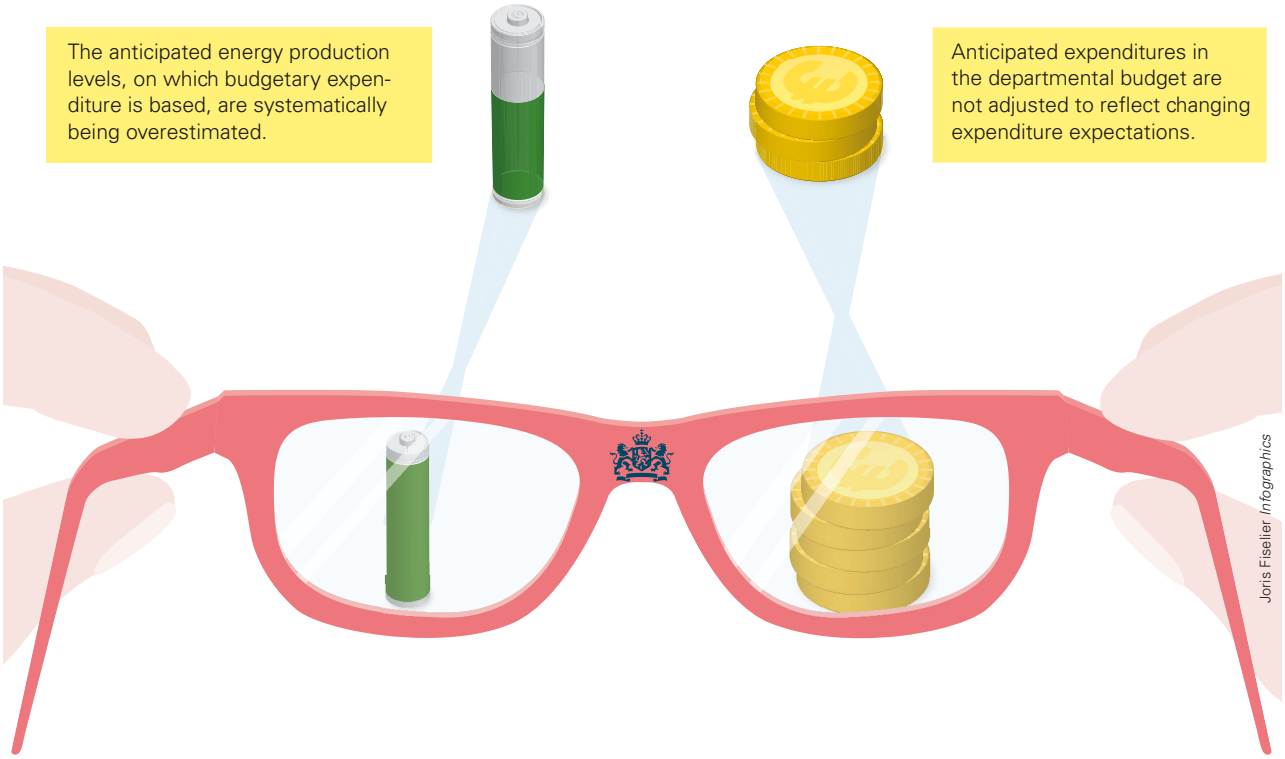
31 This progress report is not a document that is presented to the House of Representatives.

32 Where we use the word 'realistic', we mean that the assumptions made should be based as closely as possible on knowledge available about probable outcomes.

33 The budgetary reserve is intended to help achieve 2020 and 2023 objectives by holding the unused budgeted resources resulting from MEP, SDE and SDE+ project delays and application withdrawals. Underspending resulting from higher than anticipated energy prices may not be deposited in this reserve. Conversely, the reserve may not be called on when energy prices are low. With due regard for the effects on objectives, the minister also reserves the right to re-appropriate underspending for which no commitments exist, e.g. in the case of application withdrawals. The reserve is called upon if total MEP, SDE and SDE+ expenditure is higher than the budgeted resources available. All deposits and withdrawals are managed by the Ministry of Economic Affairs and approved by the Ministry of Finance.

The aim of this reserve is to retain unappropriated funds for the purposes of energy production from renewable sources and to alleviate fluctuations in expenditure without having to amend expenditure frameworks. It is anticipated that this reserve will total €595 million by the end of 2014, of which €370 million was deposited in 2014 alone (EZ, 2014d).

Figure 18 **Double distortion in budgetary information**



It is improbable that the ministry will ever exceed the available budget using this budgeting method.[34] However, it also means that budgeted expenditure will rarely reflect actual anticipated expenditure in any given year. A significant portion of the SDE and SDE+ budgets therefore lands in the budgetary reserve every year. This is not reflected in the draft budget that is presented to the House of Representatives.

Underspending

Our report on the Ministry of Economic Affairs' 2012 *Annual Report* highlighted the fact that 2012 MEP, SDE and SDE+ expenditure was €186.4 million lower than anticipated in the draft budget. In 2013, this variance rose to €225.9 million of which €72.8 million was attributable to SDE+ alone.

34 Only if unforeseen drops in energy prices were to occur, would SDE+ ever exceed its budget by a substantial amount.

2009-2013 Underspending				
[€ × million]	Budgeted	Actual	Absolute Variance	Percentage Variance
2009 MEP/SDE/SDE+	795.5	700.7	-94.8	12%
2010 MEP/SDE/SDE+	773.2	697.6	-75.6	10%
2011 MEP/SDE/SDE+	924.3	716.4	-207.9	22%
2012 MEP/SDE/SDE+	913.8	727.4	-186.4	20%
2013 MEP/SDE/SDE+	899.9	674.0	-225.9	25%

Source (2009-2012): Provided by Ministry of Economic Affairs in preparation for the Report on the 2012 Annual Report | Source (2013): Ministry of Economic Affairs' 2013 Annual Report.

In the period up to and including 2014, not all eligible project applications could be honoured. In other words, SDE+ budget underspending was not caused by a lack of projects. It is difficult however to attribute underspending to any particular causes, e.g. delays, application withdrawals or underproduction, because budgeted figures do not realistically reflect anticipated expenditure. The Netherlands Enterprise Agency (RVO) analysed this on our behalf for 2013 only. In 2013, it was revealed that delays were the foremost reason for underspending.
It is safe to assume that the amount of budgetary reserve will continue to grow in the years ahead. Without making amendments to the Minister of Economic Affairs' conservative approach to deploying SDE+, it is unlikely that the budgetary reserve will ever be used in full. As we stated in Section 4.5, significant underproduction is another factor that the minister is simply not taking into consideration.

In summary, SDE and SDE+ budget figures are based on expenditure estimates that are in turn based on unrealistic assumptions and that are not being updated in response to new insights. The House of Representatives has insufficient insight into actual, anticipated expenditure.

5.2 Policy information

The House of Representatives has access to a huge volume of data about SDE+ objectives and results. The Minister of Economic Affairs outlines his policies in global terms in his budgets and annual reports. Progress towards achieving policy objectives for producing renewable energy has been reported in the *National Energy Outlook* since 2014. SDE+ is also discussed during the scheme's annual review, in letters to parliament, in legislative consultations and in response to parliamentary questions.

As stated in Section 3.1.1, successive governments have in recent years been portraying the likelihood that 2020 and 2023 objectives will be achieved as a 'realistic possibility', whereas various studies have stated this to be 'highly unlikely'. Furthermore, the Minister of Economic Affairs did not – at the end of 2013 – share information about achieving 2020 objectives with the House of Representatives that had been published in renewable energy monitors by the Netherlands Enterprise Agency (RVO) and the Energy Research Centre of the Netherlands (ECN). After the *Energy Agreement* was signed, the minister was informed of the fact that the share of energy production from

renewable sources would probably be 11.9% by 2020 (within a range of 7.8% to 14.1%) (Neeft et al., 2013).[35]
The House of Representatives has only been informed of the RVO monitor's results for the years up to and including 2015 (Neeft et al., 2013). To date, the minister has not provided any information to the House of Representatives about what SDE+ needs to contribute in order to achieve policy objectives. Consequently, the House of Representatives cannot verify the extent to which setbacks along the path towards achieving the policy objectives are attributable to SDE+.

It would be sensible for the minister to clarify to the House of Representatives what SDE+ *should be achieving* in each intervening year in order to achieve the 2020 and 2023 objectives, and what expenditure levels can be anticipated in this respect. Without this information, the House of Representatives has no basis upon which to adequately determine whether SDE+ expenditure and results, and the degree to which SDE+ is contributing towards achieving policy objectives, are positive or negative. We have made this point on numerous occasions (Algemene Rekenkamer, 2013a, 2013b, 2014b).

35 In the draft version dated (Neeft et al., 2013). The monitor stated that the *Energy Agreement* had indeed been used as a blue print for future policymaking, but also that it was likely that not all points from the *Energy Agreement* would be implemented precisely as agreed. According to ECN, its monitor takes account of the most probable developments.

6 Scenarios in the foreseeable future (until 2020/2023)

The government has set itself a goal of producing at least 14% renewable ' energy in the Netherlands by 2020, thereby complying with its EU commitment. The *Energy Agreement* (2013) explicitly states that additional measures would be taken if it became evident that this objective could not be achieved. The goal to generate 16% renewable energy by 2023 was also explicitly set in the *Energy Agreement*. As we explained in the previous chapters, the Netherlands will probably not be able to achieve its objectives under unchanged policy. What options does the government have to address this issue? This is the key question that we aim to answer in this chapter.

Firstly, we will discuss how SDE+ could be modified to achieve the objectives. Previous sections stated that the scheme itself is actually relatively well structured. It would therefore have very little effect to tinker with its structure. Increasing its effectiveness by *increasing its budget* would however make objectives more attainable. We will analyse the financial implications of this option. Another option would be to open up the SDE+ scheme to *projects in other countries*. Again, we will also examine the financial repercussions of this option.
We will then discuss any alternatives available outside the SDE+ framework, e.g. *other policy instruments* aimed at making targets for producing energy from renewable sources more attainable. Because such alternatives fall outside the scope of the current SDE+ audit, we will limit ourselves to a cursory outline of these other options.
We will also address the implications of a scenario in which the government decides to *abandon attempts to achieve the 2020 and 2023 objectives* altogether.
We will conclude this chapter with a concise reflection on the long-term policies required in order to achieve a 100% sustainable energy supply for the Netherlands by 2050, as proposed by the government.

6.1 Options for modified SDE+ implementation

6.1.1 Option 1: Increased SDE+ budget

It would be possible to achieve the 2020 and 2023 objectives by reserving substantial amounts of extra money for SDE+.

Higher subsidies for offshore wind farms

ECN calculated on our behalf that 37.4 PJ of additional energy would have to be found from renewable sources in order to achieve the 2020 objective. This means that 32% more energy needs to be produced from renewable sources than the 115 PJ of energy that would be available under unchanged policy. In order to achieve the 2023 objective, an additional 22.8 PJ of energy would need to be found from renewable sources. This is 14% more than the 164 PJ of energy that would be available under unchanged policy.

The ECN's calculation models reveal that producing more renewable energy would primarily have to be achieved using incentives to rapidly increase offshore wind energy production. This would involve adopting a higher subsidy budget in tenders in 2015 and 2016, and higher maximum base rates for the entire tender period (2015-2019).

The time-consuming search for suitable locations would not have to be restarted, because according to ECN the areas already selected by the central government in its *National Water Plan* and its draft structural vision for offshore wind energy (Ministry of Infrastructure and the Environment) provide sufficient possibilities. Higher base rates make it possible to increase offshore wind energy production in one of two ways. Firstly, projects in 'difficult'[36] and therefore relatively expensive locations would become eligible. Secondly, more wind turbines could be built in those areas for which calls for tender will shortly be issued (Ministry of Infrastructure and the Environment & Ministry of Economic Affairs).[37]

This scenario would entail additional central government commitments of €12.8 billion in the period from 2015 to 2019. This €12.8 billion includes the agreed 40% cost savings (see Section 3.3.2) and previously announced wind farm construction projects. Central government costs could be even lower if electricity producers were to apply for lower subsidies in the pending call for tenders than currently being used in calculations.[38]
Under current policies, government commitments are expected to total €58.9 billion for the period from the start of the SDE+ scheme in 2011 up to and including 2023 (fig. 20). Commitments for this entire period (2011–2023) would increase by 22% under this scenario.
The impact of the additional €12.8 billion would also be enough to achieve the 2023 objectives. Subsidies would only be paid out once projects were producing energy, i.e. at a later date. Central government expenditure for the period from 2015 to 2030 would be €9.6 billion higher, 33% more than under current policy (all amounts ex. inflation).[39]

Are the additional offshore wind farms in this scenario any more expensive than the offshore wind farms already planned under unchanged policy? Yes, every PJ that the additional wind farms would have to provide would - according to ECN's calculation model - cost €31.1 million in subsidy expenditure, whereas the offshore wind farms under current planning would cost €23.9 million in subsidies per PJ.[40] The additional wind energy required to achieve the objectives would therefore cost 30% more in subsidies per energy unit.

36 Difficult locations include those farther offshore, e.g. *IJmuiden Ver*, where wind turbine construction is hampered by longer delivery routes by sea and more extensive foundation works in deeper waters.

37 These wind farms are closer to the coast, but wind losses cause them to be less efficient. Hence, they require a higher base rate.

38 It is impossible to estimate the potential size of these cost savings in advance (lower subsidy-level applications). Given the ambitious agreements about 40% cost savings that have been made, it is highly unlikely that the impact will be very large.

39 The difference between commitments and expenditure arise in part because commitments assume *maximum* subsidy expenditure without any compensation for higher energy prices. Expenditure arising from these commitments would also continue beyond 2030 - probably until 2038. This is due to the four-year throughput time required to commission offshore wind farm projects and their fifteen-year subsidy period.

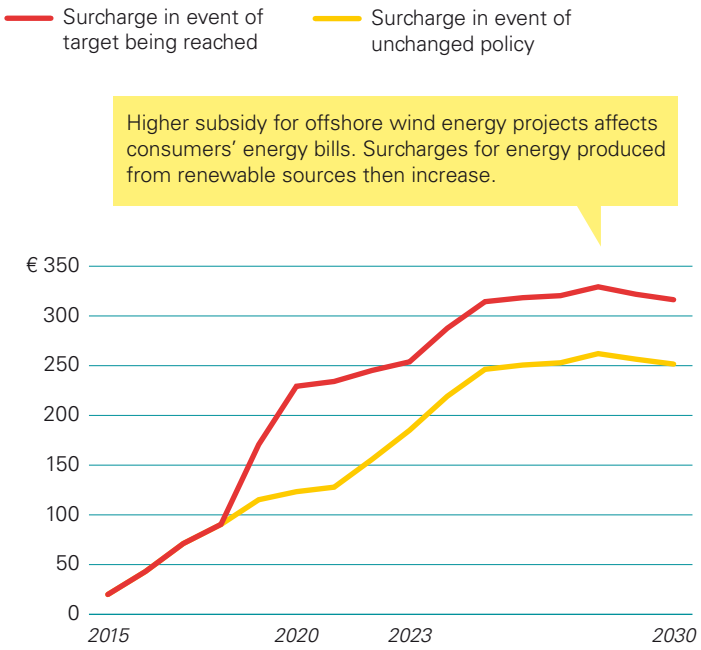
40 Expenditure on current offshore wind farms is linked to a maximum base rate of €0.15 per kWh. In this scenario, this maximum threshold would have to be abandoned as part of 2015 and 2016 calls for tender in order to implement these additional wind farms.

Consequences for consumers' and businesses' energy bills

SDE+ expenditure has been covered by a surcharge on consumers' and businesses' energy bills since 2013. Increased subsidies for offshore wind farms would inevitably result in a higher surcharge being imposed on consumers and businesses. Assuming that this renewable energy surcharge were to be calculated in the same way as the current surcharge, then this would increase in keeping with increased central government expenditure (EZ, 2012). This means that under current policy the surcharge would already have increased to €123 per average household by 2020. Under the proposed scenario for additional SDE+ subsidies for offshore wind farms, this surcharge would increase to €229 and €254 by 2020 and 2023 respectively.

Figure 19 illustrates what this would mean in concrete terms for an average household. The trend would be the same for businesses.

Figure 19 **Rising surcharge on consumers' energy bills**
*In euros per average household**



* An average household comprises 2.2 people consuming 1,600 m³ of gas and 3,500 kWh of electricity

Source: Ministry of Economic Affairs calculation model (2012) based on expenditures in the Energy Research Centre of the Netherlands (ECN) model (Scenarios 0 & 5) calculated on behalf of the Netherlands Court of Audit

6.1.2 Option 2: Opening up SDE+ to projects in other countries

The government could opt to open up SDE+ to projects in other countries than the Netherlands. The European Commission explicitly stated that it is permitted to attribute energy generated from renewable sources to the member state subsidising such projects (Directive 2009/28/EC).

Calculation model for three cases

ECN developed models on our behalf for three scenarios in which the Netherlands could partner with other countries, calculating their potential subsidy expenditure levels and results. In doing so, ECN assumed that agreements made under the *Energy Agreement* regarding offshore wind farms would be honoured.

The calculation was performed on the basis of projects in:

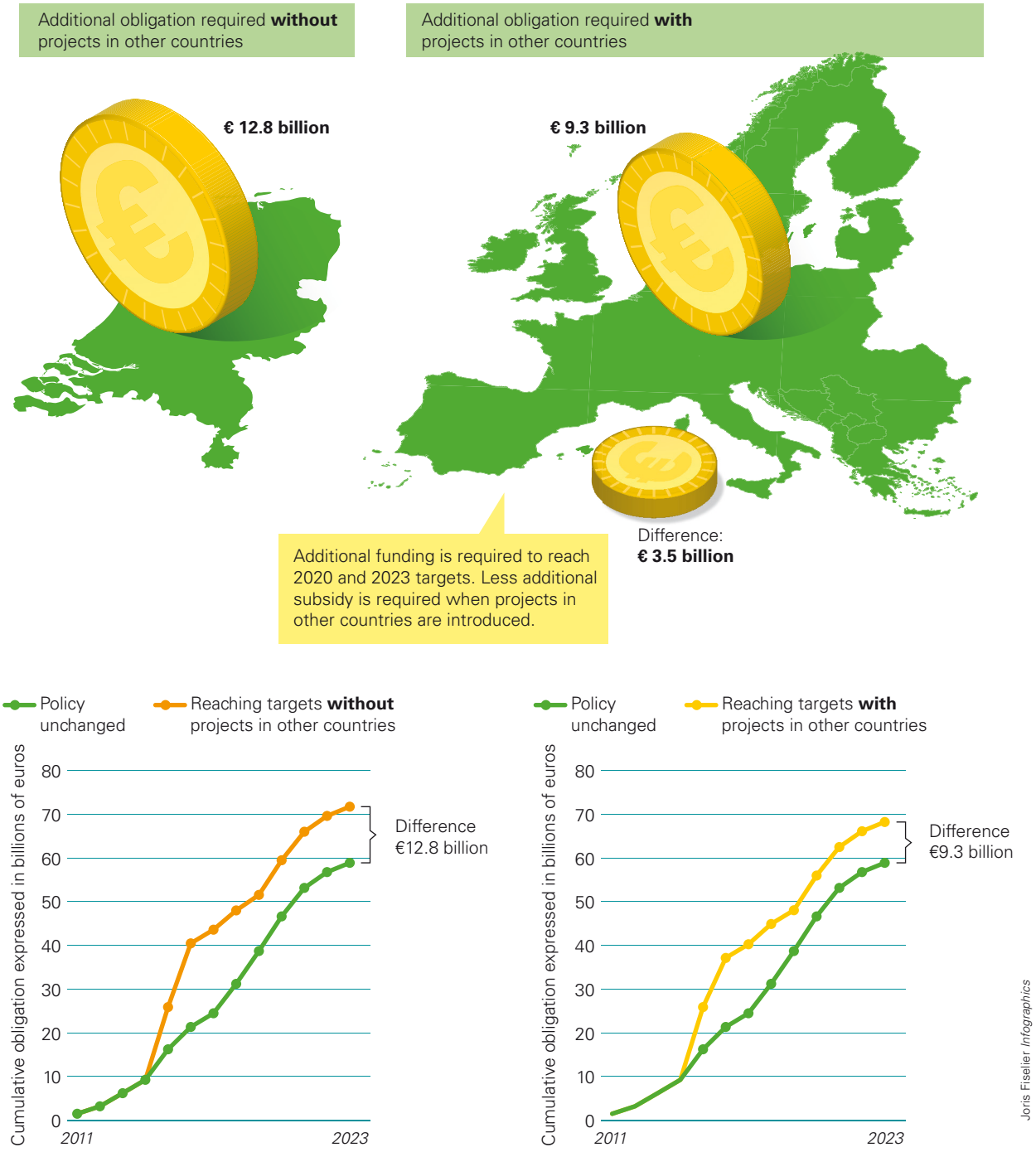
- Denmark - offshore wind farms;
- Romania - biomass combustion;
- Spain - thermal collectors.

Less expensive than in the Netherlands alone

The ECN calculation demonstrates that opening up SDE+ to projects in other countries would cost less extra money than if SDE+ remained confined to projects in the Netherlands alone.

This scenario would mean that the government would have to assume an additional €9.3 billion in commitments from 2015 up to and including 2019 in order to meet 2020 and 2023 objectives. This is over 25% less than the €12.8 million in additional commitments that would be required if SDE+ were not opened up to projects in other countries (see fig. 20). Similarly, expenditure arising from these commitments would only be made once energy was actually being produced. Expenditure would also be less than in the scenario in which SDE+ projects remained confined to the Netherlands alone. For the 2015-2030 period, savings would total €2.7 billion with respect to €9.6 billion.

Figure 20 **SDE+ access for projects in other countries – financial implications**



Source: Energy Research Centre of the Netherlands (ECN) model (scenarios 0, 5 & 10) calculated on behalf of the Netherlands Court of Audit

Opening up SDE+ to projects in other countries would make achieving objectives less expensive because it would increase the number of projects available to us. This would mean that the most expensive Dutch projects would not have to participate. This can also be seen in expenditure per PJ. The additional energy available from this scenario's additional projects, i.e. both in the Netherlands and other countries,[41] would cost €24.7 million per PJ. Expenditure for the offshore wind farms already planned would as previously stated be €23.9 million per PJ. Additional energy would therefore require

41 Projects in other countries consist mainly of offshore wind farms in Denmark (see fig. 21).

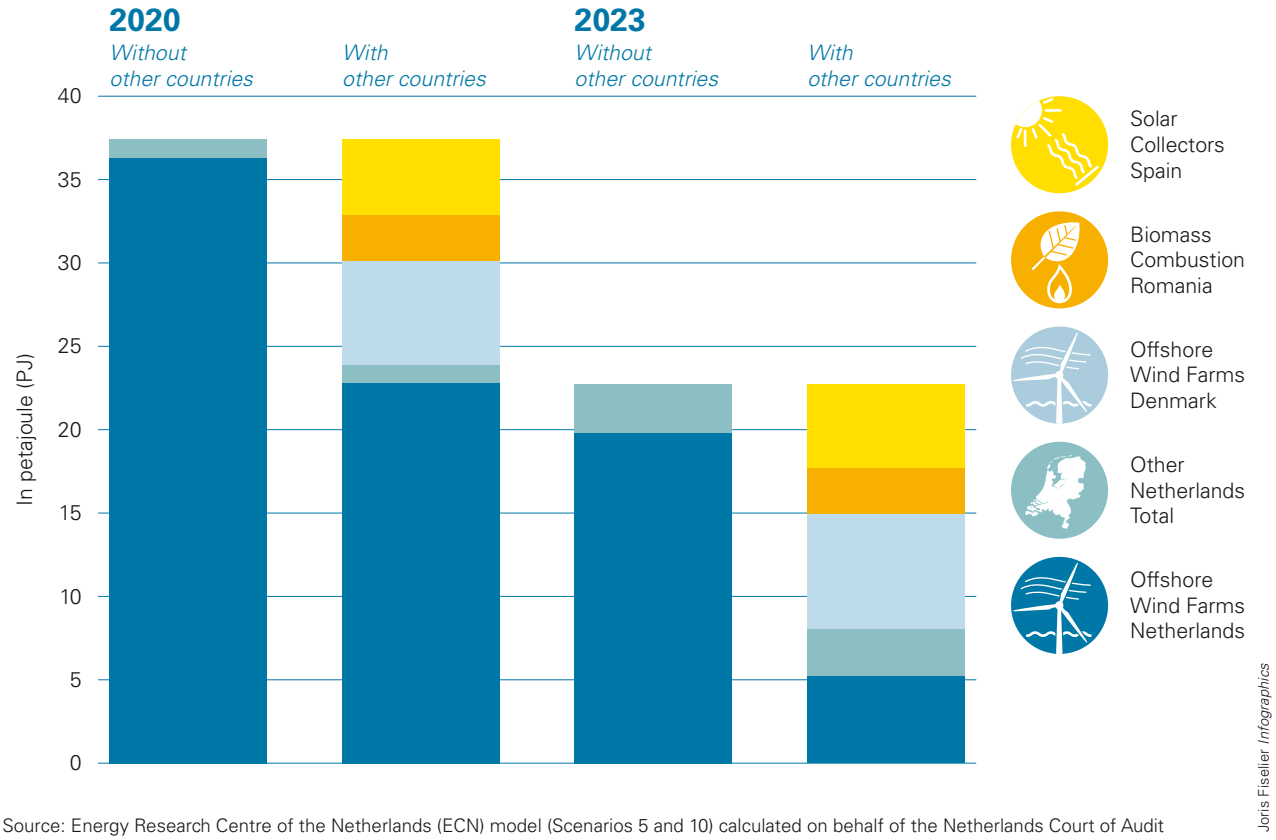
3% extra subsidy per PJ. The difference compared to increasing the SDE+ budget without opening up SDE+ to projects in other countries (Option 1) is considerable: 21% lower expenditure per PJ of additional energy.

Side notes: additional 'hidden' costs

In this scenario, positive developments arising from subsidised projects in terms of increased employment and technical knowledge levels would be partially realised abroad rather than in the Netherlands. Economically speaking, a loss of or a reduced increase in employment and technical knowledge levels would constitute a cost item for the Netherlands, but it would be difficult to estimate its size.

In the scenario outlined above, offshore wind farms in the Dutch North Sea would still account for by far the largest portion of the additional renewable energy in 2020, supplemented by comparable projects in Denmark. In 2023, wind energy from Denmark would account for a larger portion of the additional energy requirements. Thermal collector projects in Spain and biomass combustion in Romania would account for the remaining requirement.

Figure 21 **Opening up SDE+ to projects in other countries: implications for additional energy production by technology**
Calculation model based on projects in Denmark, Romania and Spain



Source: Energy Research Centre of the Netherlands (ECN) model (Scenarios 5 and 10) calculated on behalf of the Netherlands Court of Audit

Another 'hidden' cost item associated with opening up SDE+ to projects in other countries is the infrastructure required. It is conceivable that the high-voltage infrastructure in the countries in question, possibly linking to the Netherlands, would have to be upgraded. The associated costs and who would pay for which costs would depend on negotiations between the Netherlands and each of these countries. Lastly, there would also be additional, yet limited costs incurred for control and management.

Greater financial benefits for the Netherlands

Other studies have also revealed that partnerships with projects in other countries could potentially be very beneficial (Gephard, Klessman, & Nysten, 2014). The three examples calculated on our behalf are not particularly beneficial in financial terms. The more heavily the Netherlands can rely on cheaper technologies for which there is space in other countries, the greater the financial benefits.

A potential disadvantage for host countries is that favourable locations would then no longer be available to produce renewable energy themselves. The cheaper the technology involved, the greater the disadvantage for the host country, or the greater the advantage for the guest country – in this case, the Netherlands (Gephard & Klessman, 2014, p. 3).

6.2 Options outside the context of SDE+

Chapter 3 demonstrated how SDE+ contributes by far the most of all the policy measures towards generating the anticipated required renewable energy for 2020 and 2023. However, it also demonstrated that this was still inadequate in terms of achieving these policy objectives. The question remains whether there are any alternatives that can run alongside or instead of SDE+.

6.2.1 Option 3: Alternative and additional policies

There are countless ways in which to directly or indirectly influence the share of renewable energy. Below, we have listed a few alternatives to SDE+.

The question is actually whether such alternatives would make any significant contribution towards achieving the 2020 or 2023 objectives in time. The time needed to develop new policy and the intractability of its implementation constitute a risk. Given the urgency, the alternatives listed below - if selected - would need a realistic financial plan and timeline *very soon*.

Energy savings

More efficient energy usage could help make 2020 and 2023 policy objectives more attainable. After all, lower energy consumption means less energy would have to be produced to achieve the 14% and 16% targets, hence requiring less effort.

Dutch policy concerning energy savings has until now had a rather limited effect. In earlier audits, we determined that national energy-saving policies in the period from 1995 to 2008 only accounted for a quarter of the total energy savings - about 1.4% per year (Algemene Rekenkamer, 2011). Objectives set in the *Energy Agreement* were calculated based on far more ambitious energy-saving targets. According to PBL and ECN calculations, the envisaged savings are not fully attainable, even if all the agreements made under the *Energy Agreement* were implemented (Londo & Boot, 2013, p. 6). This is why we believe the intention to implement additional energy-saving plans with even higher targets to be very ambitious, especially in the relatively short space of time remaining before 2020.

In the longer term, various experts believe that major savings are attainable, principally as a result of innovation in energy production processes (see Biesboer, 2015).

Reduced incentives for energy production from fossil fuels

Achieving the 2020 and 2023 policy objectives would be far easier if SDE+ subsidies did not have to compete with subsidies and tax breaks for energy production projects using fossil fuels, e.g. reduced energy taxes for the greenhouse horticulture sector and

degressive energy taxes for large consumers.[42] In the current situation, relatively large subsidies are needed to encourage business owners to produce renewable energy, certainly when other competing subsidy options are still available. These measures inflate the difference between market prices and the cost of producing renewable energy. Central government could amend its policies in this respect. Less subsidy would then be required to achieve the objectives.
Estimating the size of the effect that changing this policy would have falls outside the scope of this audit.[43]

Carbon credits
Achieving 2020 and 2023 policy objectives could also be made more attainable by making it more expensive for companies to produce CO_2 emissions. As stated in Chapter 2, a potentially counter-productive reciprocity currently exists between renewable energy support schemes and the CO_2 emissions trading scheme. As part of this system, the European Commission has set a ceiling on CO2 emission levels produced by industrial companies in the EU. This ceiling is currently still very high. A lower ceiling would make projects producing renewable energy more viable. In turn, less subsidy would be required to achieve policy objectives.
The Netherlands has very little influence in terms of lowering the CO_2 emissions ceiling, as this would require decision-making at a European level. It is conceivable however that central government could buy up carbon credits thereby removing them from the market. This type of initiative would have even more effect if it did so together with other EU member states, preferably larger member states. We already suggested this option in our 2011 report on energy savings (Algemene Rekenkamer, 2011).

Carbon tax
An alternative to (or an addition to) the system of CO_2 emission rights discussed above is a *carbon tax*. A *carbon tax* ('polluter pays') has an advantage over *carbon credits* insofar as it would not have any negative effects on national support schemes for producing renewable energy. Leaders of several large companies including DSM and Unilever argued in favour of the introduction of a carbon tax at the Davos World Forum in January 2015 and on previous occasions (Environmental Leader, 2015).
Decision-making could form a stumbling block for the feasibility of such an option. A decision at EU level requires the agreement of all 28 members of the European Council. A unanimous vote is required for tax measures.

Innovation
In the longer term, innovation could contribute significantly to more efficient energy production from renewable sources. However, it will be years before any new energy production technologies are developed and made ready for practical use. These innovations will not have any effect on achieving the 2020 and 2023 objectives.

42 In September 2009, the G20 nations agreed subsidy schemes and tax arrangements that had the unintentional side effect of phasing out environmental taxes (G20 Information Centre, 2009).

43 For more information about this subject, please refer to our letter to the House of Representatives dated 19 March 2015 concerning the relationship between tax incentives (*tax expenditure*) and the environment.

6.2.2 Option 4: Abandoning the 2020 and 2023 objectives

Abandoning 2020 and 2023 objectives altogether without incurring any European Commission sanctions is a potential option. EU sanctions will be imposed if objectives are not achieved. However, the European Commission created an option in 2009 for *statistic transfer*. Member states that generate more renewable energy than they need to achieve their objectives can sell their surpluses to other countries, without the need for physical energy transmission (Directive 2009/28/EC). Formally, the Netherlands would then be able to meet its national objectives, although in practice no additional renewable energy would be produced. *Statistic transfer* involves surpluses already available.

If the Netherlands were to opt for this strategy, then costs would be incurred however, instead of sanctions. Very little information is available about these costs. It is conceivable that countries with surplus renewable energy would charge prices commensurate with demand as the 2020 deadline drew closer and more and more countries started struggling to meet their objectives and the threat of sanctions became more real.[44]

Statistic transfer would seem to be in conflict with the spirit of the *Energy Agreement*, which explicitly sets goals for actual increased energy production levels from renewable sources.

The question also arises as to the extent to which the House of Representatives would agree to the *statistic transfer*. The fear exists in the House that this solution would result in reduced domestic employment levels and economic growth (Tweede Kamer, 2014).[45] Nonetheless, the *static swap* option would not precluded be under European directives.

The threat of sanctions seemed to diminish in 2014, since European government leaders made a decision at the European Council in October 2014 to scrap mandatory renewable energy objectives applicable to individual member states after 2020 (Europese Raad, 2014).[46] The Dutch government still argued in favour of binding national objectives based on a motion passed by the House of Representatives (EZ, 2014a).

6.3 Beyond 2023: the role of long-term policies

Our report focuses on policy objectives for the period up to 2020 and 2023. The government aims to achieve a 100% sustainable energy supply by 2050. It is conceivable that certain options would contribute towards achieving this 2050 goal more quickly and efficiently than others.

The government's intentions have not yet been translated into any form of concrete policy vision and corresponding milestones. It is difficult to analyse the correlation between the short-term options listed above and long-term policy without a post-2023 action plan. Consequently, long-term pros and cons cannot be included in current policymaking in an effective manner. We see the need for a well-founded, long-term vision in which climate change also plays a clearly defined role.

44 Sanctions are applied in phases and could last for years. If a member state were to fail to meet its objectives despite various negotiations, then it would ultimately incur financial sanctions (a fine and/or penalty) imposed by the European Court of Justice. The minimum fine for the Netherlands would be €3,717,000.

45 This concern applies equally to the option of opening up SDE+ to energy production projects in other countries.

46 The objective for the share of renewable energy in the EU as a whole by 2030 is at least 27%.

7 Conclusions and recommendations

7.1 Conclusions

7.1.1 Objectives for 2020 and 2023 in jeopardy

Various studies in recent years have stated that it is highly unlikely that the Netherlands will achieve its 2020 objective to produce 14% of its energy consumption from renewable sources. It is equally unlikely that under unchanged policy the 2023 objective of 16% set in the *Energy Agreement* will be achieved either. The most recent expectation (October 2014) is that levels of 12.4% and 15.1% will be achieved by 2020 and 2023 respectively. These warnings have still not prompted the Minister of Economic Affairs to re-address his policies. The minister clings to the most optimistic interpretations presented in study findings. In practice, there are numerous setbacks.

The SDE+ is by far the most important means with which central government aims to achieve its 2020 and 2023 objectives. As support schemes go, SDE+ is relatively well structured. Hence, modifying SDE+ itself would have very little effect in terms of achieving the objectives. An additional SDE+ budget for offshore wind farms from 2015 on, however, would put them within reach. Opening up SDE+ to projects in other countries would minimise the additional budget required. Alternative policy options, e.g. greater energy savings and phasing out fossil fuel incentive schemes, would need to be prepared as quickly as possible in 2015 given the rapidly approaching deadline. It is uncertain whether sufficient results can be achieved by following this path.

Ministerial SDE+ policy ignores underproduction

SDE+ will probably result in less energy being produced from renewable sources than the government anticipated when signing the *Energy Agreement* in 2013. This is partly due to the Minister of Economic Affairs' conservative approach to deploying the support scheme. The total SDE+ subsidy available is based on the maximum energy production levels that can theoretically be achieved by each individual project. However, current SDE and SDE+ projects produce on average 26% less energy than this maximum level. The few SDE+ projects that are currently operational have even higher underproduction levels (39%). Subsidy recipients could make up for underproduction in the years ahead, but given the underlying causes it is highly unlikely that all projects will start producing energy at maximum output levels in the foreseeable future.

By clinging to maximum theoretical output levels, the Minister of Economic Affairs is reducing the risk of budgets being exceeded, but is thereby jeopardising the likelihood of actually achieving the objectives.

Rising subsidy budgets a risk to SDE+ efficiency

The SDE+ support scheme is an improvement on previous support schemes (MEP and SDE) in numerous respects. The SDE+ phased auction mechanism has been working well up until now, incentivising business owners to produce renewable energy at the lowest possible cost. However, the effect of this incentive is diminishing because subsidy budgets have already been increased significantly in recent years in order to achieve the 2020 and 2023 objectives, and are probably set to increase still further. The less likely it is that a subsidy is unavailable at a later stage, the less likely it is that a business owner will apply for a lower subsidy at an earlier stage. This is why it is now even

more important to set proper base rates on which maximum subsidies depend. The scheme could be made more efficient if competition were increased, e.g. by opening up SDE+ to projects in other countries. If competition were to increase, then the support scheme's efficiency could also be improved by approving applications based on the subsidy level required instead of cost price.

House of Representatives' limited insight into costs and benefits of SDE+

The Minster of Economic Affairs has not made clear what SDE+ is contributing towards achieving policy objectives. This makes it impossible for the House of Representatives to determine whether SDE+ results are positive or negative. SDE and SDE+ budget figures contain no information about actual anticipated expenditure for any given year, because they are based on unrealistic assumptions and they are not being updated throughout the government's term of office.

Opening up SDE+ to other countries reduces subsidy levels

A lot of additional funding will be required if the 2020 and 2023 objectives are to be met. Central government would need to assume an additional €12.8 billion in commitments up until 2023. This is 22% more than budgeted under unchanged policy (2011–2023). With delays, SDE+ subsidy payments could increase sharply by €9.6 billion for the period 2015–2030 alone.

Objectives could be achieved using less money by opening up SDE+ to projects in other EU member states. Calculation model figures are indicative, but they show that differences are substantial. Central government could assume €3.5 billion less in subsidy expenditure commitments that in turn would result in €2.7 billion less in payments by 2030. However, indirect costs are also involved that are as yet unknown and cannot be estimated as indirect cost items. These would arise due to reduced domestic employment and technical knowledge levels, and for investments in expanding the energy transmission infrastructure to and in these other countries.

Cost of abandoning objectives uncertain

It is even conceivable that the government might simply decide to abandon attempts to achieve the 2020 and 2023 objectives altogether. This is possible without the risk of incurring any European Commission sanctions. The Netherlands could buy surplus renewable energy from other EU member states and add this to its own domestic balance. It is uncertain what costs would be incurred for such swaps. This will depend on what surpluses still exist throughout the EU by 2020, and to what extent other EU member states are racing to achieve their own EU policy objectives at that time. It is conceivable that this would have negative implications for achieving other agreements made under the *Energy Agreement*.

No long-term strategy for sustainable energy supply

The government is aiming for a 100% sustainable energy supply by 2050. This has not yet been translated into any form of action plan for the period after 2023.

This makes it difficult to evaluate the correlation between short- and long-term plans. For example, biomass co-firing in coal-fired power stations will still be required to achieve 2020 and 2023 policy objectives. It is important to develop tenable solutions for the problems inherent to the use of biomass for energy production purposes. Firstly, we need to address the issue of which purposes and sectors the limited supply of biomass should be used for. This will be important to the sectors where biomass is

the only sustainable long-term option, e.g. the chemical, aviation and road transportation sectors. It is also important to determine the extent to which growing, harvesting and burning various types of biomass is actually sustainable, given the resulting CO2 emissions and the effect on food supplies. Lastly, increasing demand for biomass will probably result in constantly rising biomass prices. SDE+ cannot deal with these price developments in its current form. Although the urgency of short-term objectives is readily apparent, we should not fail to overlook the fact that the Netherlands still has a long way to go after 2023.

7.1.2 Recommendations

We present the following recommendations to the Minister of Economic Affairs:

- Opt for a realistic scenario in 2015 to ensure that the Netherlands achieves its 2020 and 2023 objectives for renewable energy. This should include a timeline and a breakdown of expenditure required to bolster the SDE+ support scheme and/or other policy options. Alternatively, explicitly decide to fall short of the agreed targets and revise the Energy Agreement.
- When estimating subsidy commitments, take account of the fact that in practice and on average less energy is produced than the theoretical maximum. Opt for a certain degree of oversubscription, i.e. approve more subsidy applications than the budget theoretically supports, and/or make more money available in the budget.
- Consider making the order in which projects can bid for SDE+ subsidies dependent on the amount of subsidy granted rather than the cost price of the energy produced.
- Determine what information-related requirements could be imposed on SDE+ subsidy recipients in order to assess base rates for each technology more accurately. Look to other EU member states for examples.
- Clarify for the House of Representatives on an annual basis the extent to which the Netherlands is straying from its charted SDE+ course. Clarify what energy production technologies need to be incentivised by means of SDE+, including annual milestones and any expenditure required to achieve policy objectives.
- Provide the House of Representatives with realistic information about anticipated expenditure on MEP, SDE and SDE+ in any given year. Include this information in the Ministry of Economic Affairs' budget, together with a forecast of how much will be deposited in the budgetary reserve.
- Seek tenable solutions for biomass' role as a renewable energy source, e.g. distribution of biomass for various uses, and account for rising biomass prices as part of SDE+.
- Incorporate SDE+ policy intentions into a long-term strategy for the transition to a 100% sustainable energy supply by 2050.

8 Response from the Minister of Economic Affairs and afterward of the Netherlands Court of Audit

The Minister of Economic Affairs responded to our audit on 2 April 2015. Below is a summary of his response and our afterword. The minister's full response can be found on our website (www.courtofaudit.nl).

8.1 Response from the Minister of Economic Affairs

In his letter, the minister confirms his goal to increase the share of energy being produced from renewable sources from the 4.5% currently being produced to 14% and 16% in 2020 and 2023 respectively. The minister responds to our conclusion that it is highly unlikely that these objective will be achieved by pointing out that our principle source of information - the *2014 National Energy Outlook* - does not take account of the latest policies that have been in effect since May 2014. The minister expects to be able to achieve at least the 2023 objective pursuing his current policy.

The minister aims to wait until 2016 to determine whether any additional measures will be required, based on the *2015 National Energy Outlook* and the *Energy Agreement* review. In doing so, he concurs with our vision that such measures would have to be implemented imminently. He also states that he will continue examining a potential decision to open up SDE+ to projects in other countries, as he previously announced in the House of Representatives.

The minister concurs with our positive evaluation of the SDE+ structure and our statement that modifying the support scheme would have a negligible impact on achieving the objectives. In response to our recommendation that energy producers provide more financial and technical investment information for the purpose of setting base rates, the minister states that he will be making greater use of information that is already available from several commissioned and operational projects. He will also analyse whether the benefits of imposing a mandatory information requirement on *all* commissioned projects would outweigh the associated administrative burden.
The minster will not be opting to prioritise project applications with the lowest subsidy requirements as we recommended. He wants to leave the scheme unchanged so as not to disrupt the system's continuity or shake project applicants' confidence in investing, whereas financial benefits would be negligible for central government.

In his letter, he also responds to our recommendation that he take account of subsidised project's systematic underproduction when setting SDE+ budgets. The minister acknowledges the importance of realistic information about anticipated energy production levels. He believes that it is too early to assume an underproduction level of 26%, because according to him SDE+ projects are still under construction. He does however state that start-up problems may arise, in which case business owners would be able to make up for lost production at a later stage. The minister states that he will continue to monitor actual levels very closely. He will incorporate new information into his policy decisions as and when it becomes available.

The minister concurs that his SDE+ budgeting methods may have given an unclear picture of the annual contribution made by SDE+ towards achieving policy objectives and the associated costs. He undertakes to present the House of Representatives with a clear overall picture containing all financial and policy information, both in the context of the *Energy Agreement* and renewable energy objectives.
The minister deems it undesirable, however, to present interim SDE+ results in the form of annual milestones on the path towards achieving 2020 and 2023 objectives. He believes that the question as to whether SDE+ is cost-effective depends on the supply of projects that in turn depends on numerous factors including public support. Nonetheless, the minister will be presenting SDE+ project progress more clearly in the overall picture he has promised.

Lastly, the minister concurs with our recommendation to incorporate SDE+ policy intentions into a long-term strategy. He aims to use the pending 2015 Energy Report to examine broader developments and energy policy-related debates, and then to develop an overall vision for energy policy.

8.2 Afterword from the Netherlands Court of Audit

We concur with the Minister of Economic Affairs' plans to incorporate his SDE+ policy intentions into a long-term strategy as part of the pending *2015 Energy Report*. We presume that our audit findings will also be included. We also assume that the minister will address the problems surrounding biomass in his long-term strategy.

We believe it to be a positive move that the minister will be adopting our recommendation to make improvements to his provision of information. Parliament's access to information will be greatly improved, presuming the minister includes in his overall picture information relating to envisaged SDE+ energy production levels and annual anticipated expenditure. Doing so will make it possible to hold informed debates about the progress and feasibility of the 2020 and 2023 objectives.

Contrary to the minister's statement, the average underproduction level of 26% does not refer to SDE+ projects still partly under construction. There is apparently some form of misunderstanding regarding this point. We calculated this percentage taking into account only those projects that were already producing energy. We excluded plants still under construction from our calculations. Moreover, we performed the calculation for SDE and SDE+ combined. We identified the causes of underproduction to be systematic in nature. Underproduction is a phenomenon that will more than likely also arise for the plants that are still under construction.

We believe that the new policies that came into effect in May 2014 are merely a more detailed version of existing policies, confirming previously made agreements. We believe the recently ratified *Offshore Wind Power Act* [Dutch: *Wet windenergie op zee*] and the new offshore wind farm tender system would at best result in slightly lower costs, but virtually unchanged energy production levels.[47]

47 Please refer to Section 6.1.1 for a detailed explanation.

Hence, we still believe that it is questionable whether the 2020 and 2023 objectives can be achieved. The Netherlands is currently at the bottom of the list of EU member states in terms of the progress being made towards achieving national objectives (see fig. 8 in Section 3.1.2).
Judging by his response, the minister is still optimistic about achieving the objectives. We believe that if a decision about additional policy measures were to be postponed until 2016, this would be too late to achieve the objectives before the 2020 deadline. That is why we put forward SDE+ policy options that require decision-making *now*. This probably also applies to policy alternatives outside SDE+. After all, this is in practice an intractable process, and developing and implementing new SDE+ projects in the Netherlands or in other countries will take time.

Appendix Share of energy produced from renewable sources

Renewable or sustainable?

Renewable energy is produced from inexhaustible sources, e.g. wind, solar, hydro, geothermal and certain types of biomass. Sustainable energy is by definition renewable, but also has to meet additional criteria, e.g. no harmful effects on *people*, *planet* or *prosperity* for current and future generations. Our audit is not a social cost-benefit analysis taking account of all of SDE+'s costs, benefits and impacts on people and the planet. In this report, we concur with the definition of renewable energy as defined in EU Renewable Energy Directive 2009/28/EC. This directive adopts the European *comparable gross end-use method* to measure the renewable energy share (Te Buck, Van Keulen, Bosselaar, & Gerlagh, 2010). Two other commonly used methods also exist (see box).

Methods for calculating the share of renewable energy

In practice, three methods exist for calculating the renewable energy share – the (1) gross final consumption, (2) substitution and (3) primary energy methods. The basic premise for the final consumption method (1) is the final domestic energy consumption expressed in terms of energy supplied (output) to end consumers. Next, the portion generated from renewable sources is calculated, e.g. solar, wind, hydro, biomass and geothermal. The substitution method (2) calculates the extent to which fossil fuels have been replaced by renewable sources and its corresponding reduction in CO_2 emission levels. The primary energy method (3) calculates the amount of renewable energy entering the system (input). For example, if wood is burned in a wood-burning stove, the primary energy method calculates the wood's calorific value (input), the final consumption method calculates the heat produced (output) and the substitution method calculates the calorific value of the gas saved by using wood.

According to the gross end-use method, heat is by far the most economical method for achieving renewable energy objectives. In order to move towards a *sustainable* energy supply, we also need to focus on minimising CO_2 emission levels. Renewable heat generally replaces less fossil fuel energy than the same amount of renewable electricity (Daniels & Kruitwagen, 2010) and does little to reduce CO_2 emission levels. In other words, pursuing SDE+ objectives as efficiently as possible does not necessarily mean a maximum reduction in CO_2 emission levels.

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