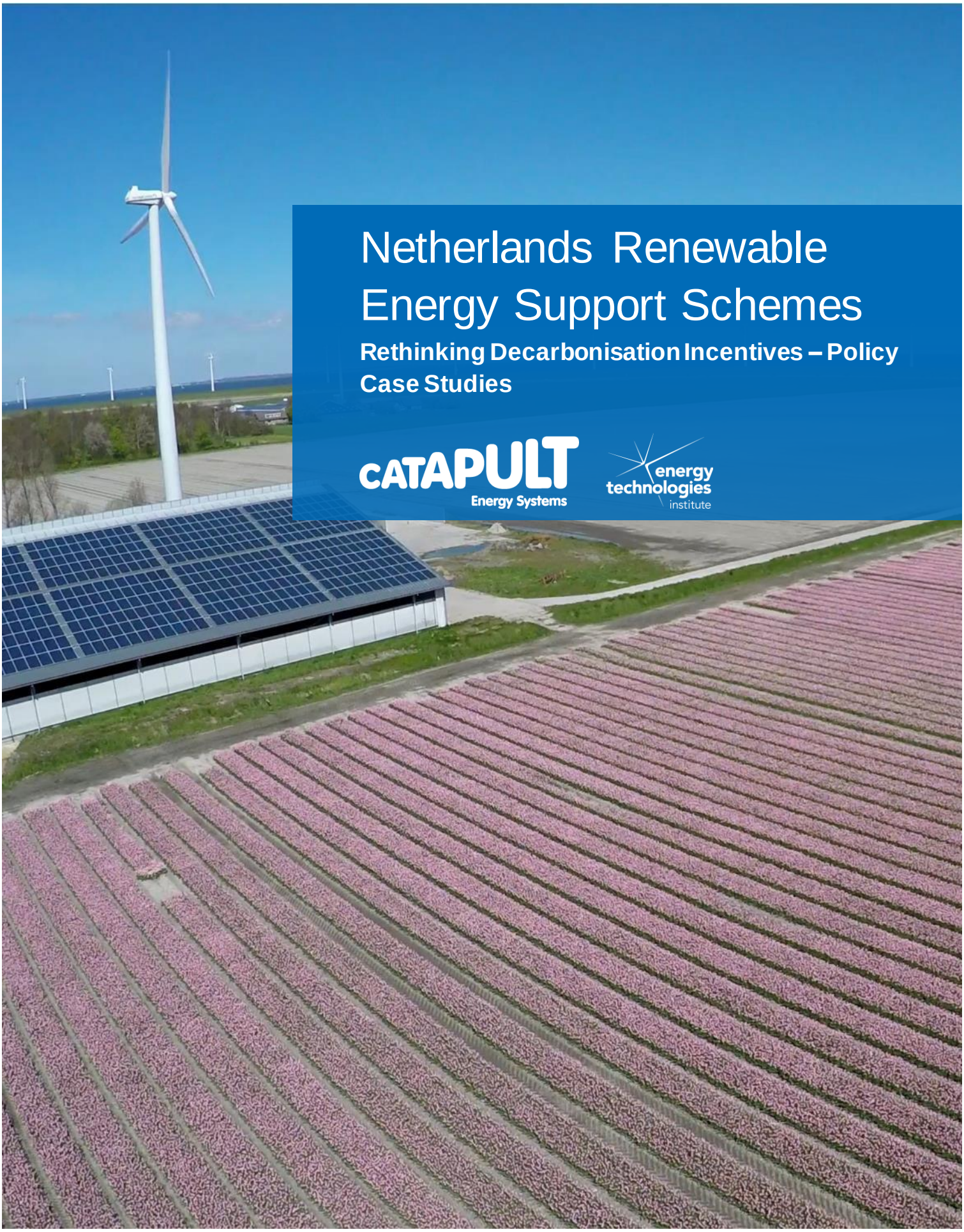

# Netherlands Renewable Energy Support Schemes

## Rethinking Decarbonisation Incentives – Policy Case Studies

CATAPULT Energy Systems

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# Netherlands Renewable Energy Support Schemes

This case study has been developed for the UK's Energy Systems Catapult under the *Rethinking Decarbonisation Incentives* project, aiming to draw lessons from international experience of policies to improve the framework of economic drivers for decarbonisation in the UK.

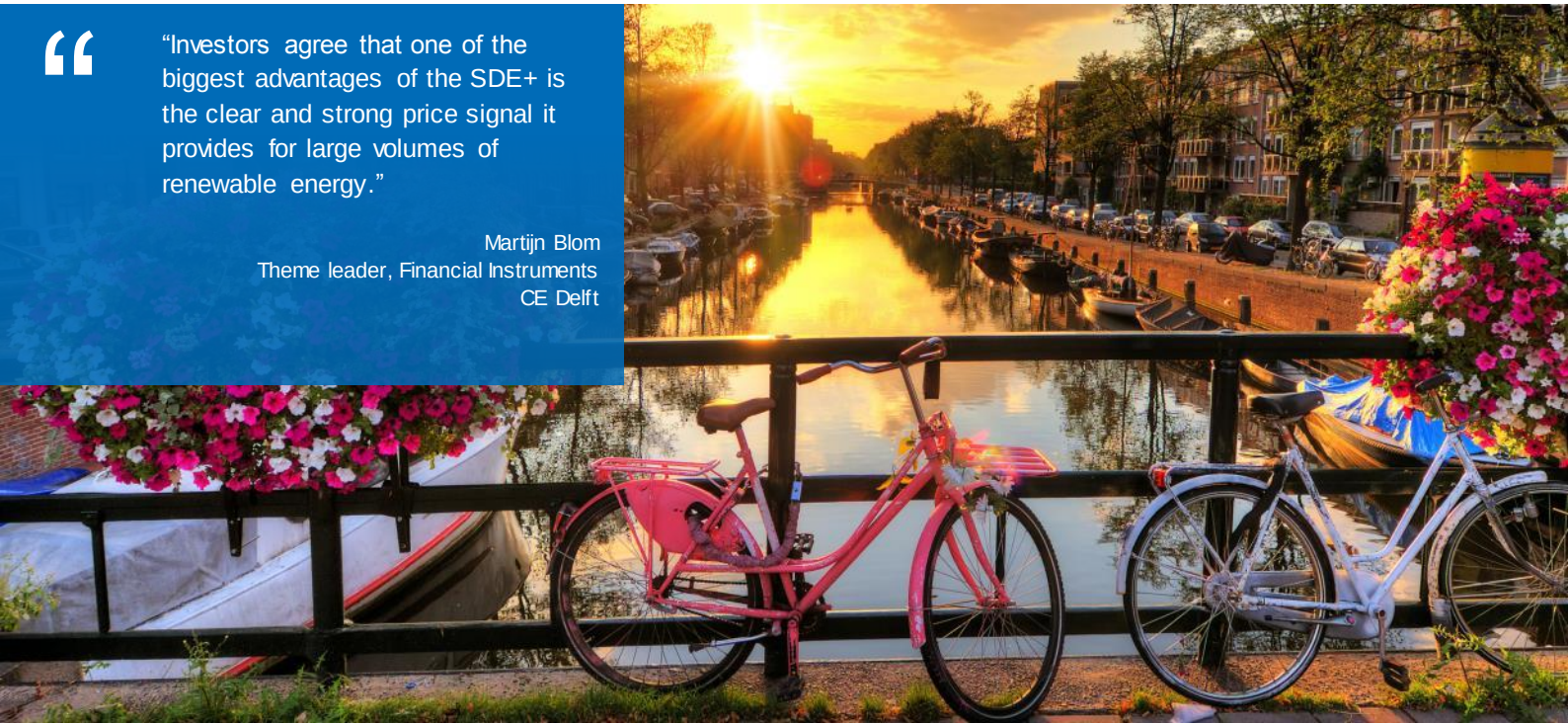
The Netherlands established the SDE+ regulation (Stimulating Renewable Energy) in 2011. This is a scheme whereby the government provides both guarantees and risk reductions to renewable energy developers via subsidies through a tendering scheme. The policy aims to generate as much renewable energy for the lowest costs possible and thereby be in line with the various goals of the government and European Union (EU) Directives. The government recognises that the achievement of significant additional renewable energy generation will involve use of more expensive sources, such as offshore wind.

This case study focuses on how decisions around policy targets have led to different levels of economic signal arising for renewables. It also examines what factors can create an overlap in incentive measures for decarbonisation and renewable support and how any negative consequences from this can be mitigated.

## Key findings

- The political arguments in favour of renewable energy support mechanisms cite benefits that extend beyond the carbon saved. This argument was used by the Dutch government for the case for applying technology specific renewables support, and implicitly justify not adopting least cost decarbonisation. The wider benefits of a renewable support scheme may include local economic development, learning by doing for renewable technologies, creating investor confidence in the sector and improving national energy security.
- Targets for renewables and carbon reduction should be set in a mutually consistent way. The Dutch experience of interactions between renewables support and the EU Emissions Trading System (EU ETS) point to the important ways this overlap can be managed. In particular:
    - The EU ETS target anticipates emission reductions from other policies.
    - The Dutch SDE+ system is constructed to provide an incentive that avoids over-subsidy when the EU ETS carbon price is high.
- Renewable incentive measures can be designed to provide a stable investment signal to counter carbon market volatility. The combination of the EU ETS and the SDE+ create a stable investment outlook for renewable energy.

> "Investors agree that one of the biggest advantages of the SDE+ is the clear and strong price signal it provides for large volumes of renewable energy."
>
> Martijn Blom
> Theme leader, Financial Instruments
> CE Delft



# Abbreviations

| | |
|---|---|
| **ETS** | Emissions trading system |
| **EU** | European Union |
| **EUR** | Euros |
| **GHG** | Greenhouse gases |
| **IETA** | International Emissions Trading Association |
| **ODE** | Opslag Duurzame Energie *(Levy for renewable energy on energy bills)* |
| **RVO** | Rijksdienst Voor Ondernemend Nederland *(Government service for an entrepreneurial Netherlands)* |
| **SDE+** | Stimulering Duurzame Energie + *(Stimulating Renewable Energy Plus)* |

# Nomenclature

| | |
|---|---|
| **EUR** | Euros |
| **kWh** | Kilowatt hour |
| **Mt** | Million tonnes |
| **MW** | Megawatt |
| **MWh** | Megawatt hour |
| **$tCO_2e$** | Tonnes of carbon dioxide equivalent |

# Policy overview

**Policy narrative**

Under the Paris Agreement, the Netherlands agreed to reduce its greenhouse gas (GHG) emissions by 49% from 1990 by 2030. Therefore, when the new Dutch government was formed near the end of 2017, it announced that it would make available approximately 4 billion euros (EUR) for energy and climate policy measures in the next four years. Part of this would come from taxes on energy, waste and airline tickets and the rest from government policies that channel investments to industry, which is funded from additional costs paid for by consumers. The measures included in this new policy package include a continuation and strengthening of the SDE+ regulation (Stimulating Renewable Energy), closure of all five coal plants in the Netherlands by 2030 and the decision that all new buildings and houses will no longer be heated by gas.

The SDE+ scheme was established in 2011[1] and involves the government providing both guarantees and risk reductions to renewable energy developers via subsidies through a tendering scheme. This scheme does not prescribe the technology by which the renewable energy is generated; in general, all technologies can compete, so that the most cost-effective renewable energy mix will be developed (although there are elements designed to favour offshore wind, described later).

The main goal of the SDE+ policy is to encourage the generation of renewable energy in the Netherlands. The policy aims to generate as much renewable energy for the lowest costs possible and thereby be in line with the various goals of the government and the EU Directive as depicted in Figure 1. The government recognises that the achievement of significant additional renewable energy generation will involve use of more expensive sources, such as offshore wind.

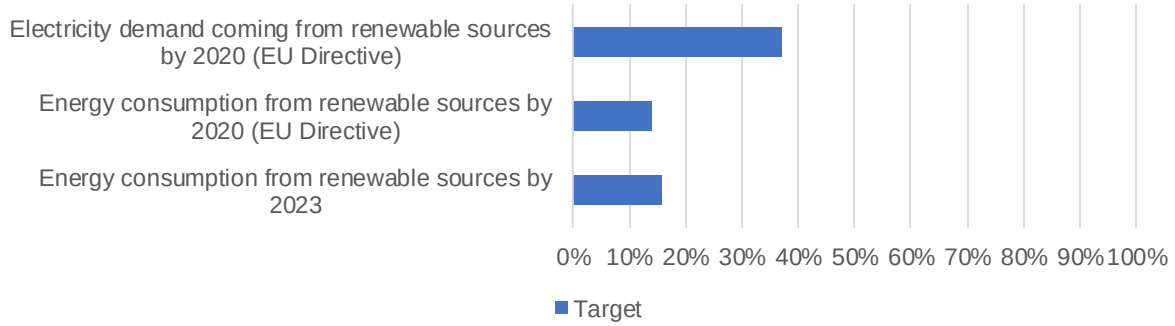



**Figure 1 Renewable electricity targets taken into consideration for the SDE+**

**Coverage, obligated entities and eligibility**

Figure 2 shows the total emissions in the Netherlands in 2014 (note that net land-use change and forestry emissions are excluded). The SDE+ applies only to the renewable sector and therefore does not cover any of the emissions directly.

[1] Legal Sources on Renewable Energy. (2013). Renewable energy policy database and support - Promotion in the Netherlands. Retrieved August 20, 2017, from http://www.res-legal.eu/home/

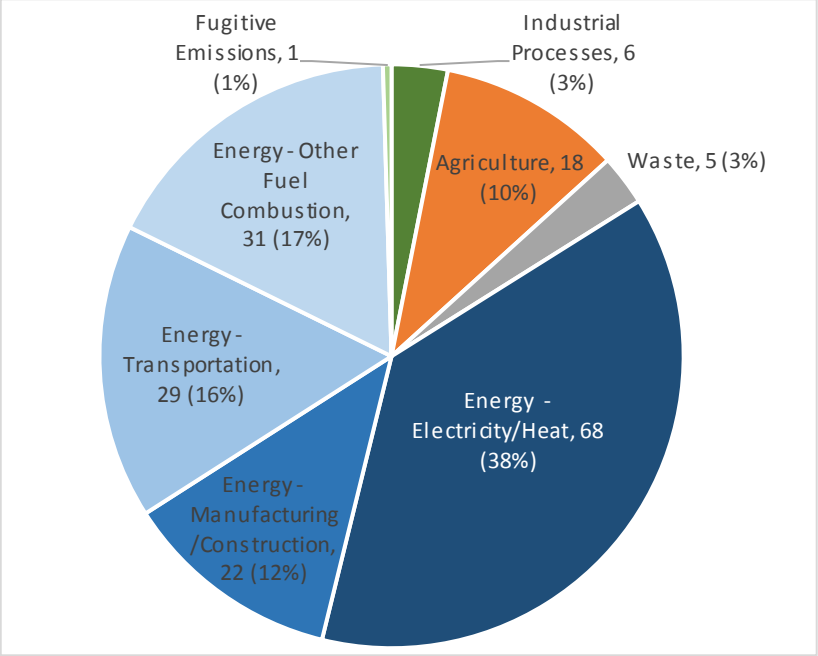



**Figure 2 Total GHG emissions in Netherlands 2014 ($MtCo_2e$)[2]**

Through the SDE+ policy, the government provides compensation to renewable energy generators in cases where their income per kilowatt hour (kWh) generated is lower than the costs of production. The Dutch tendering scheme is designed to target any company and institution that generates renewable electricity and has the ability to realise the size of projects tendered by the government[3].

**Mechanism and economic incentive**

The SDE+ tendering scheme offers to compensate electricity generation companies for the difference in price between the market price and costs for renewable energy generation over a period of 8, 12 or 15 years, depending on the type of technology used. This means that generators will sell their generated electricity for the current market price and receive a premium for the difference between this price and a predetermined price per kWh, also called the strike price.

Recently some contracted projects have not been delivered, after which the government has decided to make some adjustments in the SDE+. Non-realisation can lead to significant delays in delivery, as new bidding rounds for the allocated subsidy need to be organised. The new adjustments follow the principle that a strict monitoring and control mechanism is necessary to ensure that projects that have won the auction will also be developed and will deliver expected energy generation. This will avoid high costs for the government that would be incurred should it need to source the required electricity elsewhere.

The Dutch government creates a budget plan annually that includes the available funding for tendering schemes that will be opened in that year. This budget is created from a levy on energy bills called *opslag duurzame energie* (ODE). This levy is a fixed rate that does not vary with the amount consumed. The Dutch government aims to open two tendering schemes per year.

The tendering scheme is categorised as a '*floating premium determination*' mechanism. This means that the premium depends on the level of the electricity price. By receiving a higher premium when

[2] Based on data from CAIT Climate Data Explorer. 2017. Washington, DC: World Resources Institute. Available online at: http://cait.wri.org
[3] Held, A., Ragwitz, M., Gephart, M., de Visser, E., & Klessmann, C. (2014). Design features of support schemes for renewable electricity. https://doi.org/DESNL13116

electricity prices are lower, generators will not be exposed to the risk of electricity market price fluctuations. The scheme consists of sequential bidding rounds where the government defines a base amount with predetermined prices and generators can offer a respective volume.

While most of the SDE+ tendering schemes are technology-neutral, there are SDE+ schemes that are exclusively focused on offshore wind generation. The aim of these schemes is to incentivise the growth of offshore wind power capacity to 4500 MW in 2023[4]. Offshore wind is separated because of its high costs and because the government recognises the necessity to grow offshore wind capacity in order to achieve the 2020 targets.

Consumers of electricity are required to pay for the scheme, through the surcharge of the SDE+ regulation via the energy bill levy ODE. It is expected that the average household contribution for the SDE+ regulation will rise from 25 EUR annually in 2015 to 120-240 EUR in 2020. Moreover, the more a consumer uses, the less it will pay proportionally in surcharges. This means lower-income groups are impacted disproportionally, because they consume less electricity on average than higher-income groups, but proportionally pay more via the ODE[5].

**Compliance**

The SDE+ has a list of eligibility requirements to apply for the subsidy. These include documentation for feasibility studies and environmental permits. The winner of the auction round is obliged to ensure its financial capability to execute the project within four weeks of signing the agreement[6]. In addition, there are penalties in place for the failure to realise projects within the required period[7]. The progress of realisation of projects is monitored and checked one year after the agreement has been signed by the department Rijksdienst voor Ondernemend Nederland (RVO, Government service for an entrepreneurial Netherlands).

**Institutional set-up**

The Ministry for Economic Affairs and Climate and its sub-department RVO are responsible for the design and management of the SDE+ regulation and the rest of the policy measures that need to ensure the Netherlands achieves its climate targets.

The Ministry for Economic Affairs requires every policy to be evaluated by an independent party approximately every four years to assess its effectiveness and cost-effectiveness. The last evaluation of the SDE+ took place in 2016, was conducted by CE Delft and included a stakeholder consultation. In addition, the interviewee from RVO indicates that since 2011, it has been carrying out a substantial market consultation on an annual basis to discuss and review any amendments in the policy.

**Effectiveness and cost effectiveness**

In total, up to January 1st 2018 the SDE+ has realised approximately 5,823.6 MW of new installed energy capacity (including electricity and heat) with 3,185.2 MW for electricity[8].

In a study commissioned by the Ministry of Economic Affairs, the cost-effectiveness of the SDE+ from 2011 to 2015 was reviewed[9]. It concluded that without funding from the SDE+, most projects under the scheme

[4] RVO. (2017). Stimulation of Sustainable Energy Production (SDE+) | RVO.nl. Retrieved from http://english.rvo.nl/subsidies-programmes/sde
[5] Noothout, P., & Winkel, T. (2016). Auctions for Renewable Energy Support in the Netherlands: Instruments and lessons learnt.
[6] AURES. (2016). Auctions for Renewable Energy Support in the Netherlands: Instruments and lessons learnt. Report D4.1-NL, March 2016.
[7] RVO. (2016). Uitvoeringsovereenkomst. Available from: https://mijn.rvo.nl/documents/20448/56456/Uitvoeringsovereenkomst+Stimulering+Duurzame+Energieproductie+SDE.pdf/869384c8-57dc-4900-a228-1f5093dc85c2
[8] RVO. (2018). Gerealiseerd vermogen Stimulering Duurzame Energieproductie. Available from: https://www.rvo.nl/sites/default/files/2018/02/Gerealiseerd%20vermogen%20SDE%20januari%202018.pdf
[9] Blom, M., Schep, E., Vergeer, R., Wielders, L. (2016). Review of the Dutch SDE plus Renewable Energy Scheme. CE Delft and SEO Economisch Onderzoek. Delft, the Netherlands.

would not have been realised. This conclusion is based on a study of the financial data and investment plans of individual projects under SDE+. It states that the rates used for compensation of generators are broadly in line with market values, thereby minimising the number of free riders in the system. The study estimates the system includes around 5-15% free riders in total, which is considered low compared to energy policies in the EU. The review also concluded that the administrative costs of managing the scheme were seen as reasonable in comparison with the amount in EUR of subsidies provided.

The realisation rate of projects under SDE+ has in general been low as has the utilisation of the budget. In general, around 20-25% of the SDE+ budget has not been utilised per year[6]. The reasons for this will be explained in research question 1 below.

# Comparing economic signals

**This section seeks to establish how decisions around policy targets have led to different levels of economic signal arising from the renewable policy and from other measures in the electricity sector, especially the EU ETS.**

The policy target for the SDE+ is to generate 14% of Dutch energy from renewable sources by 2020 and 16% by 2023 in a cost-efficient way. The main signals that allow for this are the risk reduction for the investments and the guaranteed payment during the exploitation phase of the project. According to the review study of the Ministry of Economic Affairs, the SDE+ is generally seen as a crucial instrument to make sure there is a business case for renewable energy investments[9]. It states that participants perceive the SDE+ in general as a stable and consistent instrument. However, the annual changes in policy, including adjustments in eligible categories, have caused significant uncertainty for investment planning. These changes require participants to take more time for their applications, while this extra time is not incorporated in current SDE+ timetable. As a consequence, the changes have caused fewer participants to enter the auction than anticipated.

The Ministry of Economic Affairs review gives an overview of the positive and negative signals given by the SDE+ to participants, summarised in Table 1. The most important positive (economic) incentives provided by the scheme, according to market participants, is the financial or price signal that it gives. The vast majority of participants indicated that the renewable project would not have been realised without the SDE+. Other positive signals are the predictability of the amount of subsidy given over a project lifetime, the continuity of SDE+ budget in general and the clear information provided by the government. From a policy performance perspective, there is a safeguard mechanism to avoid budget risks. This is because the SDE+ establishes a floor electricity price under which no additional subsidy will be provided.

**Table 1 Overview of incentives provided by SDE+[10]**

| Perspective | Stimulating factors / positive incentives | Barriers or negative incentives |
|---|---|---|
| From market participants | Financial or price signal | No clarity on what will happen with SDE+ after 2020 |
| | 'Exploitation subsidy' (predictable amount of subsidy over project lifetime) | Unexpected and ad hoc changes (for example in the categories of capacity) |
| | Continuity of SDE+ | Uncertainty around prices for biomass |
| | Support from government in form of clarity of information provided, e.g. on eligibility | There is a price risk when the energy price goes under the floor price |
| From policy performance | Controllability of budget risk through the possibility of putting part of the price risk (under the floor price) with the SDE+ participant | |

On the negative side, some participants report a lack of clarity of what will happen with the SDE+ after 2020 and that some unexpected changes have taken place, such as with the capacity categories for biomass. Market participants also report there is a price risk when the energy price goes under the price floor. This means that they will not be compensated for the amount between the floor price and the electricity price in cases where it is very low.

In the design of the SDE+ scheme different technology categories are differentiated for each auction round. However, in practice the scheme is almost technology neutral as every auction round includes a 'free category', that is open for all projects that can produce at a lower cost than the base amount calculated for the specific technology of that auction round[6]. As a consequence, in general cheaper technologies more often receive subsidy compared to more expensive technologies. In addition, this design also stimulates more competition and thereby lower budget offerings from the applicants. In reality, this can lead to a higher number of projects that seem unfeasible after they have been successful in the auction. The review shows that non-realisation does occur more often in the free category than in the other categories. Because of this, other realistic projects thereby miss subsidies and payment of subsidies is significantly delayed because the auction needs to be reopened[9].

In contrast, the EU ETS adds a carbon price to energy generation. The purpose of the EU ETS was set to "*promote reduction of greenhouse gas emissions in a cost-effective and economically efficient manner*". However, it was also designed to offer an incentive to invest in renewable energy technology and thereby reduce EU's energy dependency on fossil fuel imports and increase energy security. It is expected that by providing a stable policy environment in the longer-term, the EU ETS incentivises further low carbon investments and clean technology development[11].

Currently the ETS is in its third phase, running from 2013 to 2020. It covers power and heat generators with a total combustion capacity greater than 20MW (thermal), energy-intensive industry sectors such as oil refineries, steel works, metal producers, etc., and commercial aviation (for flights between EU ETS participating countries). Overall, this is estimated to cover around 50% of all GHG emissions within the EU.

[10] Blom, M., Schep, E., Vergeer, R., Wielders, L. (2016). Review of the Dutch SDE plus Renewable Energy Scheme. CE Delft and SEO Economisch Onderzoek. Delft, the Netherlands.
[11] European Commission. (2015). EU ETS Handbook. Climate Action. https://doi.org/10.2834/55480

The system is designed with targets set for a series of phases, such that there is medium term clarity to investors on the level of emissions permitted, and by implication the demand for abatement. Starting in 2005 the first phase was for three years, followed by a five-year phase and now a third phase between 2013 and 2020. The third phase has the aim of reducing the emissions from the covered sectors by 21% in 2020 compared to 2005, which corresponds to an emissions cap that reduces by 1.74% for each year between 2013 and 2020. In the fourth phase the annual emissions reduction rate will be 2.2% between 2021 and 2030.

Through the carbon price the system provides an economic signal for investors in new low carbon electricity generation, since it adds extra costs to fossil-fuel based generation, which also drives up the price received for the sale of renewable generated electricity. In the long-term the EU ETS therefore favours all types of renewable energy investments over fossil-fuel based generation, based on their relative carbon contents. However, this is only realised in practice with a strong carbon price signal that is predictable in the long term.

The SDE+ regulation in the Netherlands and the EU ETS use different policy targets and thereby have different impacts on the consistency and effectiveness of their economic signals. An overview is given in Table 2 below, together with the coal and gas mandate in the Netherlands.

**Table 2 Comparison of SDE+, coal and gas mandates and the EU ETS**

| Element | SDE+ | Coal and gas mandates | EU ETS |
|---|---|---|---|
| **Policy target** | 16% of energy consumption from renewables by 2023 | Close all coal plants by 2030 and no new gas consumption by buildings | Reducing GHGs from covered sectors by 21% in 2020 compared to 2005 |
| **Target group** | Only renewable energy | Coal and gas | Multi sector |
| **Technology focus** | Technology specific bid rounds, each with a free category. | Technology specific | Technology neutral |
| **Continuity** | Participants mention policy often changes unexpectedly and ad hoc.<br><br>Future of policy after 2023 is uncertain. | Clear targets and timelines | Price signal defined per 'phase' of the EU ETS |
| **Effectiveness and cost-effectiveness** | • Resulted in 5,823.6 MW of installed capacity with 3,185.2 MW for electricity<br>• 10-15% free riders (projects that would have been realised also without subsidy)<br>• Low utilisation budget<br>• Low-medium realisation of projects | No results yet | Low price signal that makes renewable energy investments more favourable than fossil-fuel based generation in the long-term |

Table 2 shows the differences in policy targets for the SDE+ regulation, the mandates to close all coal plants and reduce gas consumption in the Netherlands and the EU ETS. This comparison shows that these policy measures have different types of economic signals that lead to different impacts on investor confidence and on cost-effectiveness. Issues concerning policy target, continuity, effectiveness and cost-effectiveness are described further below.

**Policy target**

The SDE+ only targets renewable energy actors (and the mandates only coal and gas participants), whereas the EU ETS applies to a much wider group of sectors. It can therefore be argued that the EU ETS has more consistent signalling as it is the same for all actors within different sectors and subsectors.

**Continuity**

The review of the SDE+ regulation illustrated that some participants found that the policy changes unexpected and ad hoc and that the future after 2020 is uncertain. This is due to the inherent design of the SDE+, as the government is able to make a change to the policy in any year. However, a significant positive factor that was reported according to the interviewee is that subsidy amounts once allocated are certain and very predictable over at least a 10-year period.

In comparison, the EU ETS aimed to have a predictable regulatory regime per phase. Phase 1 (2005-2007) and 2 (2008 – 2012) fixed the allowance cap in line with national targets for a foreseeable future to gain investor confidence. Instead, in Phase 3 (2013 – 2020) and Phase 4 (2021 – 2031) a single, EU-wide cap was put in place that in aimed to provide a policy signal over longer time periods.

**Effectiveness and cost-effectiveness**

The SDE+ has had (up to 2015) an average efficiency of 32.6 EUR/MWh (total amount of subsidies allocated divided by total amount of realised energy generation)[9]. With the average emission factor in the Netherlands of 0.53 kg CO2 / kWh in 2015, this translates to about 62 EUR per $tCO_2e$[12].In contrast, the EU ETS price at the time of writing is about 11 EUR per tCO2e. This shows the direct price signal of the SDE+ via a subsidy provides a substantially higher additional level of support for renewable energy investments compared to the carbon cost added by the EU ETS.

In addition, the SDE+ can also overcome barriers that are not addressed by a carbon price, such as high upfront costs, security of take-off and promotion of cost-reductions in technologies that are not yet completely developed. According to the interviewee from CE Delft, the effectiveness of SDE+ to reduce costs and promote learning by doing for renewable technologies is said to have been evidenced by the linear reduction in basic amounts of subsidy requested in the system over time.

The political arguments used for designing the SDE+ policy approach include the point that there are wider benefits for a strong renewables incentive mechanism that extend beyond the carbon saved. This is a reason given by the government for the case for applying technology specific renewables support. These wider benefits of a renewable support scheme may include local economic development, learning by doing for renewable technologies, creating investor confidence in the sector and improving national energy security.

In addition, the targets set by the EU Renewable Energy directive were quoted by the interviewee of CE Delft to function as one of the most important motivations for the government to maintain a strong SDE+ programme with a significant budget.

[12] Centraal Bureau voor de Statistiek. (2017). Rendementen en CO2-emissie elektriciteitsproductie 2015. Available from: https://www.cbs.nl/nl-nl/achtergrond/2017/06/rendementen-en-co2-emissie-elektriciteitsproductie-2015

In a previous phase of the SDE+, when technologies were separated in terms of budgets, there was an aggressive lobby taking place of different parties to significantly increase the available budget under SDE+ for their specific technology according to the interviewee from RVO. This has led to a change in design for the current SDE+, so that now all technologies are bundled in one budget plan. Technologies can compete among themselves for this budget, which leads to significant price reductions and thereby a more cost-effective policy, indicated by interviewees from both RVO and CE Delft.

The high level of competition in the SDE+ auctions, arising because any technology can participate via the 'free category' in the technology specific bid rounds, leads to a high level of non-realisation or under-utilisation of budgets. This can make the SDE+ less cost-effective than the EU ETS. The EU ETS by its nature has no issues with non-realisation of projects or under-utilisation of budgets. In addition, it is estimated that the SDE+ regulation also has 10-15% of free riders, i.e. projects that would be realised without the policy support. An issue that does not occur for the EU ETS (although it has had its own concerns over windfall profits).

# Overlap with the EU ETS

**The renewable energy support schemes overlap with the aims of the EU ETS since both provide incentives for low carbon generation[13].** The expectation at the time of design of the SDE+ was that the stimulation of renewable energy would cause more emission reductions, thereby significantly reducing the demand for EU ETS allowances and therefore weakening its emissions price. The negative impact of such a weakened price signal would cause a spill-over effect of increased emissions in other (non-electricity) sectors.

During the target setting period for phase 3 (2013 – 2020) of the EU ETS, the renewable energy generation targets of the EU (20% by 2020) and therefore the Member States were taken into account. The European Commission has estimated that aggregated emission reductions from existing renewable energy support schemes across the EU could amount to over 1 billion $tCO_2e$ up to 2020. It also estimated that over half of the renewables target would come from technologies in EU ETS sectors. The targets for the EU ETS were set on the basis of the sectors covered by the system incurring the same marginal cost as those not covered. Thus, the allocation of targets can be seen as being based on the principle of least cost abatement, even if the presence of overlapping policies to achieve these targets results in a deviation from that principle, because of the preferential support for certain technologies.

The SDE+ regulation was expected to contribute to the consolidated EU 20% renewables target and not overachieve it[4]. A potential concern, however, is whether the presence of overlapping policies leads to the double subsidy of the same renewable generation. Renewable generation in the Netherlands receives support from the EU ETS by adding a carbon cost that may increase electricity prices. The SDE+ regulation also supports the Dutch renewable generation as it adds an additional premium above the electricity price necessary to hit the strike price, as depicted in Figure 3 Overview of level of subsidy provided by SDE+ with fluctuating pricesBoth the EU ETS and SDE+ regulations are ultimately paid for by the consumer. However, the design of the SDE+ system limits excessive subsidies should EU ETS prices become very high, as the SDE+ only adds an additional premium to help achieve a strike price. Therefore, any increases in electricity price as a result of EU ETS price rises will correspondingly reduce the subsidy received under SDE+.

[13] World Bank. (2014). State and Trends of Carbon Pricing. Washington, DC: World Bank. (Vol. 88284). https://doi.org/10.1596/978-1-4648-0268-3

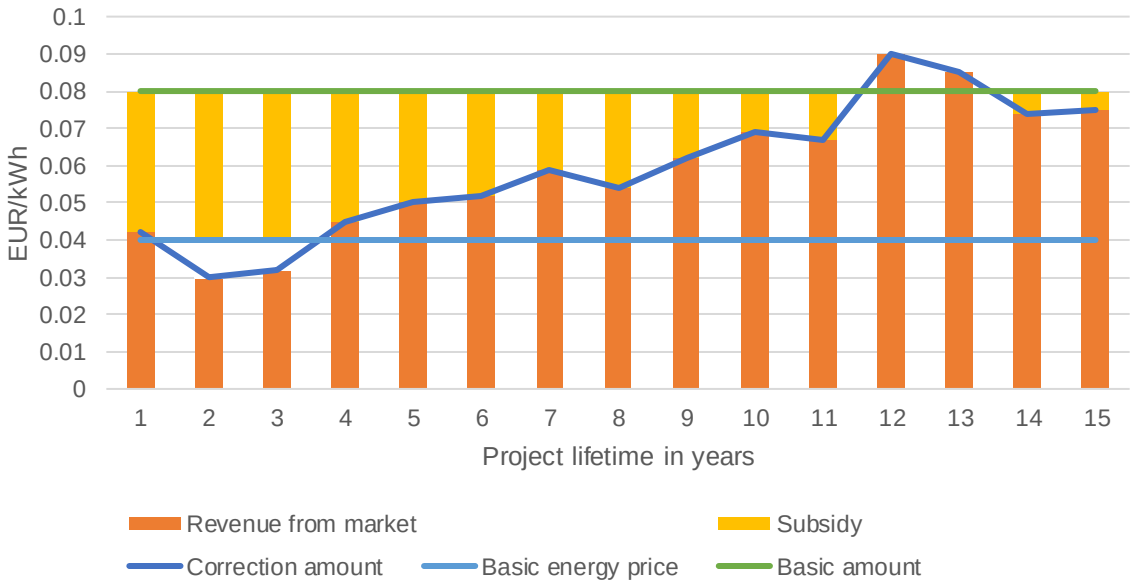



**Figure 3 Overview of level of subsidy provided by SDE+ with fluctuating prices**

As a consequence, the combination of the EU ETS and the SDE+ create a stable investment outlook for renewable energy. The EU ETS creates a carbon cost that favours renewable energy investments compared to fossil-fuel based generation. In contrast, the SDE+ provides a direct subsidy signal for renewable energy investments and thereby acts as a 'price floor' to incentivise renewable investments. In combination, the two policies create a more stable outlook for investors. However, the interviewee from CE Delft comments that this combination might only work effectively once renewable technologies are more mature and do not need to be strongly supported by subsidy programmes such as the SDE+.

In the broader perspective, however, this preferential support for renewables means that EU ETS targets will not be achieved at lowest cost.

The International Emissions Trading Association (IETA) has drafted several recommendations on how to correct for some interactions that inhibit market based policies such as EU ETS from achieving their objectives[14]. The first recommendation was to avoid overlapping policies as much as possible. Secondly, the policies should be designed in a consistent way. With regard target setting, IETA note that resetting the EU ETS cap at the start of each phase accounts for the expected emission reductions of other policies (including renewable energy support schemes) across the EU. In particular, the 20% renewable energy share target on final consumption in the EU was embedded in the original EU ETS 2020 cap in line with the Renewable Energy Directive. However, despite this consideration IETA argued that there was still about 300 TWh of renewable energy generation in the EU not considered in the EU ETS cap design between 2008 and 2015. This was stated to have led to a reduction in EU ETS allowance demand (and emissions) of approximately 210 $MtCO_2e$[14].

Within the Netherlands the government committed to 14% of all final energy consumption by 2020 to come from renewable energy under the Renewable Energy Directive, which includes 37% of electricity demand in 2020 to be met by electricity generated from renewable energy sources. However, the Dutch tendering policy aims to generate 16% of all energy consumption from renewable sources by 2023. This is a different goal that has not specified the amount of electricity generated from renewable sources and it is linked to a different timeline. The difference between both commitments might cause a

[14] IETA. (2015). Overlapping policies with the EU ETS.

weakening of the price signal of the EU ETS, particularly, if the SDE+ results in a more ambitious emission reduction than anticipated in the Renewable Energy Directive.

Overall, it could be argued that renewable energy support in different Member States leads to less cost-effective emission reductions in the EU than would be achieved by only having the EU ETS in place. However, the renewable support schemes have demonstrated to be effective in driving down prices of renewable energy and have additional policy objectives that are not covered by the EU ETS.

# Key findings

The Dutch SDE+ regulation illustrates key differences in economic signals between a renewable energy support mechanism and a carbon pricing instrument. In addition, it shows experience in how an overlap between these two instruments can be managed.

**The political argument for putting a renewable energy support mechanism in place cite wider benefits for a strong renewables incentive mechanism that extend beyond the carbon saved.** This argument was used by the Dutch government for the case for applying technology specific renewables support, and implicitly justify not adopting least cost decarbonisation. The wider benefits of a renewable support scheme may include local economic development, learning by doing for renewable technologies, creating investor confidence in the sector and improving national energy security. According to the interviewee from CE Delft, the SDE+ has triggered cost reductions in deployment of renewable technologies in the Netherlands, evidenced by a linear reduction in basic amounts of subsidy requested in the SDE+ over time.

**Targets for renewables and carbon reduction should be set in a mutually consistent way.** The Dutch experience of interactions between renewables support and the EU ETS point to the important ways this overlap can be managed. In particular:

- The EU ETS target anticipates emission reductions from other policies. During the target setting period for Phase 3 (2013 – 2020) of the EU ETS, the renewable energy generation targets of the EU (20% by 2020) and therefore the Member States were taken into account.
- The SDE+ system is constructed to provide an incentive that limits excessive subsidies should EU ETS prices become very high. By only adding an additional premium to help achieve a strike price, any increases in electricity price as a result of EU ETS price rises will correspondingly reduce the subsidy received under SDE+.

**Renewable incentive measures can be designed to provide a stable investment signal to counter carbon market volatility.** The combination of the EU ETS and the SDE+ create a stable investment outlook for renewable energy, that might have not existed if only the EU ETS was in place. The SDE+ provides a direct subsidy signal for renewable energy investments and thereby acts as a 'price floor' to incentivise renewable investments. The EU ETS in turn adds a carbon cost to make fossil-fuel based generation less attractive compared to renewable investments. Once technologies are more mature and need less direct support from the SDE+, the combination of policies may be most effective in incentivising low carbon energy investments.

**In the broader perspective, however, this preferential support for renewables means that EU ETS targets will not be achieved at lowest cost.** Renewable energy support in different Member States would be expected to result in less cost-effective emission reductions in the EU than would have been achieved by only having the EU ETS in place. However, the renewable energy support schemes have demonstrated to be effective in driving down prices of renewable energy and have additional policy objectives that are not addressed by the EU ETS.

# Bibliography

AURES. (2016). Auctions for Renewable Energy Support in the Netherlands: Instruments and lessons learnt. Report D4.1-NL, March 2016.

Blom, M., Schep, E., Vergeer, R., Wielders, L. (2016). Review of the Dutch SDE plus Renewable Energy Scheme. CE Delft and SEO Economisch Onderzoek. Delft, the Netherlands.

European Commission. (2015). EU ETS Handbook. Climate Action. https://doi.org/10.2834/55480

Held, A., Ragwitz, M., Gephart, M., de Visser, E., & Klessmann, C. (2014). Design features of support schemes for renewable electricity. https://doi.org/DESNL13116

IETA. (2015). Overlapping policies with the EU ETS.

Legal Sources on Renewable Energy. (2013). Renewable energy policy database and support Promotion in the Netherlands. Retrieved August 20, 2017, from http://www.res-legal.eu/home/

Noothout, P., & Winkel, T. (2016). Auctions for Renewable Energy Support in the Netherlands: Instruments and lessons learnt.

RVO. (2016). Uitvoeringsovereenkomst. Available from: https://mijn.rvo.nl/documents/20448/56456/Uitvoeringsovereenkomst+Stimulering+Duurzame+Energieproductie+SDE.pdf/869384c8-57dc-4900-a228-1f5093dc85c2

RVO. (2017). Stimulation of Sustainable Energy Production (SDE+) | RVO.nl. Retrieved from: http://english.rvo.nl/subsidies-programmes/sde

RVO. (2018). Gerealiseerd vermogen Stimulering Duurzame Energieproductie. Available from: https://www.rvo.nl/sites/default/files/2018/02/Gerealiseerd%20vermogen%20SDE%20januari%202018.pdf

World Bank. (2014). State and Trends of Carbon Pricing. Washington, DC: World Bank. (Vol. 88284). https://doi.org/10.1596/978-1-4648-0268-3

Zelf Energie Produceren. (2014). Salderen blijft tot 2020: Energie Zelf Leveren. Retrieved from https://www.zelfenergieproduceren.nl/nieuws/salderen-blijft-tot-2020/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