## EUROPEAN COMMISSION



Brussels, 29.7.2021 C(2021) 5523 final

In the published version of this decision, some information has been omitted, pursuant to articles 30 and 31 of Council Regulation (EU) 2015/1589 of 13 July 2015 laying down detailed rules for the application of Article 108 of the Treaty on the Functioning of the European Union, concerning non-disclosure of information covered by professional secrecy. The omissions are shown thus [...]

#### PUBLIC VERSION

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Subject: State aid SA.61295 (2021/N) – The Netherlands
Aid to TWENCE B. V. for investment in CO2 capture technology

Excellency,

#### 1. PROCEDURE

(1) Following pre-notification contacts, the Dutch authorities notified the abovementioned aid measure on 18 January 2021. Further clarifications were provided on 15 April 2021 and 4 June 2021. By letter of 8 June 2021, the Dutch authorities agreed to have the present decision adopted and notified in the English language.

#### 2. DETAILED DESCRIPTION OF THE MEASURE

## 2.1. Project and beneficiary

(2) The Dutch authorities intend to grant investment aid to TWENCE HOLDING BV (hereafter "Twence") for the building of a Carbon Capture and Use (CCU) facility. The project will enable the removal of CO2 from flue gases at its waste-to-energy installation facility located at Hengelo, in the Dutch easternmost province of Overijssel bordering the German regions of Lower Saxony to the northeast and North Rhine-Westphalia to the southeast.

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- (3) The captured liquid CO2 will primarily be transported to greenhouses situated in the horticultural area called Koekoekspolder, the largest horticultural area in this part of the Netherlands, where it is to be used to enhance crop growth. The notified aid project does not relate to the transportation of the liquefied CO2 but only to the capturing process and equipment. The objective of the project is to preserve, clean and compress the CO2 produced by Twence. After completion of the investment project Twence will market the captured CO2.
- (4) The beneficiary of the aid is Twence, the largest sustainable energy producer in the province of Overijssel. It is a publicly-owned company, the shares of which are held by fifteen Dutch municipalities<sup>1</sup>. Twence is currently involved in the collection and processing of household waste into energy. It generates renewable energy from residual waste flows and biomass. Twence is equipped with installations of a biomass power plant, a waste-to-energy plant, fermenters, a landfill gas extraction system and solar parks.
- (5) Overall, Twence produces sustainable electricity for 164,000 households and heat for 49,000 households, thereby avoiding an annual natural gas consumption of 187 million m3 and 344,000 tonnes of CO2 emissions. Sustainable energy production and avoided CO2 emissions will continue to increase further in the coming years through Twence's investments in efficiency improvement and deployment of CCU<sup>2</sup>.
- (6) The Koekoekspolder is an area of 100 hectares of greenhouse horticulture situated in the province of Overijssel. For their growth enhancement process, the Koekoekspolder greenhouses produce their own CO2 using mainly cogeneration systems or gas fired boilers, even in summer, when heat is not needed (so-called "summer heating", see recital (23) *et sequitur*). The availability of external CO2 and in particular, waste-to-energy recuperated CO2 originating from other industries, enables the greenhouse growers to avoid the "summer heating" and to reduce burning of fossil fuel to produce their own CO2.
- (7) The notified investment project consists of the building of the CCU facility for capture and liquefaction of CO2, with a maximum capacity of 100 kilotonnes CO2 per year and a lifetime of 15 years. According to the Dutch authorities, this will represent around 7% of the national volume of CO2 captured at the moment.
- (8) The total investment costs of the project amount to around EUR 39 million in nominal value. The intended investment aid will amount to around EUR 14.3 million. The requested investment subsidy would represent 37% of the eligible investment costs of the project.
- (9) The process to be implemented in the CCU facility consists of the following steps: in a column of the waste-to-energy installation the flue gas is going to be brought into contact with an amine solution (an absorber) at a low temperature. It

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On 1 May 2020, the shareholders of Twence are the municipalities of Almelo, Berkelland, Borne, Dinkelland, Enschede, Haaksbergen, Hellendoorn, Hengelo, Hof van Twente, Losser, Oldenzaal, Rijssen-Holten, Tubbergen, Twenterand and Wierden.

https://www.twence.nl/en/twence/management-and-supervision.html

<sup>&</sup>lt;sup>2</sup> Carbon Capture and Use (CCU).

is going to cause the CO2 present in the flue gas to be taken up. In a heated column (a desorber) the CO2 is going to be evaporated from the amine solution, allowing the amine solution to be reused later in the absorber. The "wet" CO2 is then extracted from the column<sup>3</sup>. The CO2 will be subsequently liquefied and transported from Twence to the end customers, primarily the greenhouses.

- (10) The primary objective of the aid measure is to increase environmental protection by reducing the use of fossil fuel energy sources for horticultural processes. It will be achieved by employing 'green' CO2 recovered by Twence from municipal waste and delivering it to buyers with CO2 demand, thereby avoiding that greenhouses purchase and burn high volumes of non-renewable resources for CO2 production, as they so far have done.
- (11) The secondary intertwined objective of the aid measure is to market and re-use CO2 produced by Twence: this will be achieved by Twence further commercialising captured CO2 to other clients in the area in other branches of the economy (recital (28) *et sequitur*). The project represents therefore, in the view of the Dutch authorities, a step forward in the development of sustainable and circular product chains for the reutilization and application of CO2. For both objectives, the project would lead to a total CO2 chain emission<sup>4</sup> reduction of 69 kilotonnes a year.
- (12) The trading of CO2 produced in the project will mostly be ensured by [...](\*) intermediary traders, companies [...]. These traders would take the business risk themselves for the further sale of the CO2 to the greenhouse growers and independently search for buyers in the greenhouse horticulture. Twence has contracted with these three traders for the purchase of a given volume per year under the condition that the project is realised. They are also the physical product off-takers, as they organise liquid CO2 transport by truck directly from the premises of Twence.
- (13) The first contracts with the traders will have a duration of [...] or [...] years [...] and can be extended annually after that period. At this point, there are no contracting guarantees agreed with those traders for the following years. However, this could change quickly as the CO2 market operates on the basis of long-term, bilateral contracts, of ten years or more, between CO2 producers and traders and from three to five years between traders and buyers. Traders regularly exchange deliveries amongst themselves, where this is logistically preferable. Transport costs are an important factor, and increase with distance, making the market relatively regional in its orientation.
- (14) Twence potentially will have a direct contract with an end customer for [5-10] kilotonnes per year, whereby the CO2 is transported to the greenhouse horticulture company on its behalf.

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<sup>\*</sup> Confidential information.

The process also allows a reduction in other industrial emissions (HCl and SO2) when CO2 is used to produce sodium bicarbonate or the use of a more effective and environmentally friendly solvent in the absorption phase.

Twence's own total emissions equal [400-600] kilograms of CO2 if its CO2 is not captured.

- (15) The traders focus on sales within a radius of 200 km from Hengelo. That could therefore also concern Germany. However, sales to Germany are expected to be limited because no large industry or greenhouse horticulture is situated immediately across the border to the east of Hengelo.
- (16) The Dutch authorities consider that aid to this project should have a limited effect on competition and trade: horticulture and other industries (defined in recitals (28) to (32)) are relatively isolated from one another; moreover the government intends to stipulate that the subsidy will apply to Twence mainly for use by the greenhouse horticultural industry, so the market-disrupting effect on other buyers is expected to be relatively limited.

## 2.2. Background

- (17) According to information provided by the Dutch authorities, greenhouses need CO2 for their crop growth. Over the course of the years, the dosing of CO2 has become an important production factor for growers.
- (18) The Dutch authorities have submitted that the project, aiming at reducing the burning of fossil fuels in the greenhouses by providing an external source of liquid CO2, contributes to the 2016-2020 Energy transition agenda ("Beleidsagenda Energietransitie 2016-2020") and to the National Climate Agreement for 2030<sup>5</sup>. These policy goals related to the transition to a sustainable energy supply require higher use of renewable sources and residual heat for energy supply. For greenhouses growers, this means less burning of fossil fuels, which would result in a lack of internally produced CO2 in greenhouses. Therefore, according to the Dutch authorities, CO2 will have to be brought into greenhouses in an alternative way and collective infrastructure for heat (heat networks, geothermal energy) must be combined with solutions for CO2 delivery (e.g. by capturing, purifying and delivery of CO2 from local industries).
- (19) The local greenhouse horticulturists and municipalities have also set an agenda for the modernisation and restructuring of the greenhouse horticulture. One of their main objectives is to provide for the establishment of sustainable conditions such as a provision of captured CO2 in order to reduce the environmental impact of intensive greenhouse horticulture. A foundation consisting of twenty local greenhouse farmers has set as its primary goal an achievement of a net zero emission by 2030<sup>6</sup>. This is all the more important as, according to the Dutch authorities, the largest consumer of CO2 in the Netherlands is the greenhouse horticultural industry.
- (20) For this industry, in the Netherlands, around half of all CO2 is supplied via the OCAP pipeline, with the other half supplied as liquid CO2 by heavy goods vehicles (HGV). All of the OCAP pipeline supply goes to the greenhouse horticultural industry, plus a further 0.1 0.2 Million tonnes of liquid CO2. The area of Hengelo is not connected to an underground CO2 pipeline of OCAP and no other underground pipeline seems to be an economically viable option for

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https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-thenetherlands

<sup>&</sup>lt;sup>6</sup> Letter of intent 'Koekoekspolder CO2 utilisation at Twence', 22 July 2019.

Twence or for the Koekoekspolder. The liquid CO2 from Twence will be transported from Hengelo to the greenhouses by HGVs.

- (21) The project can contribute to the environmental objective set by the public authorities and the horticulture industry, by enabling a change in the behaviour of the horticulturists, who will use CO2 supplied by Twence instead of using high volumes of natural gas to produce their own CO2 or purchasing external CO2 entirely of fossil origin, which is currently the case.
- (22) The project's aim to realise energy savings and avoid CO2 emissions will contribute to this change in behaviour of the greenhouse growers in two ways: (1) by avoiding "summer heating", and (2) by switching from fossil fuels to renewable energy.

## (1) Avoiding summer heating

- (23) The key problem is that CO2 is mostly needed in the summer when heat demand is low. Because of the importance of CO2 dosing, growers use their energy systems to produce CO2 even though the heat is not needed. This is called "summer heating". The problem of summer heating is growing: much research effort is put into increasing the energy efficiency of greenhouses, for example in developing more energy efficient crop growth strategies. This would reduce the demand for heat in summer even further. In buying the needed CO2 from Twence, the growers can stop using their cogeneration systems or gas fired boilers for the production of CO2 when heat is not needed.
- (24) By avoiding "summer heating", the greenhouse growers that would consume the CO2 supplied by Twence can achieve an annual energy saving of 65 000 m³ of natural gas. In order to estimate the CO2 emission savings linked to the consumption by the greenhouses of the CO2 produced by Twence, the Netherlands have also provided figures relating to chain efficiency of CO2 removal or emission reduction compared to non-capture. The short term (2022) emission reduction performance appears to be 88%. Long-term outlook can be lower, dependent on the pace of transition of greenhouse heating by renewable heat instead of natural gas.

CCU route	Emission reduction compared to non-capture
	(kg CO <sub>2</sub> eq. / ton CO <sub>2</sub> captured)
Horticulture, short-term (2022)	876 kg
Horticulture, long-term (2030)	137 to 475 kg

Chain efficiencies of CCU routes based on Life Cycle Analysis (2019/2020 CE-Delft)

#### (2) Switching from fossil fuels to renewable energy

- (25) The Dutch authorities explained that external CO2 supply is an important precondition for making it possible for greenhouses to use renewable heat (residual heat, geothermal heat, cold storage, etc.) in parallel to renewable CO2. In the absence of external, reliable sources of CO2, greenhouses would not switch to renewable energy to cover their needs and stop using natural gas, as they would lose their own internal source of heat and CO2.
- (26) Therefore, the availability of affordable external CO2 from other sources, such as Twence, is an important prerequisite for the greenhouses to consider this

transition to renewable, which not only would induce savings of primary energy (the natural gas) but also eventually of CO2 emissions.

- (27) The target of the project is therefore the greenhouse sector. The research report of Royal Haskoning DHV<sup>7</sup> provided by the Dutch authorities indicates that growth in CO2 sales<sup>8</sup> is expected to take place in greenhouse horticulture until 2030. The demand from the greenhouse horticulture sector will likely increase from current 0.7 Million tonnes per year to 2.5 Million tonnes per year in 2030.
- (28) In the Netherlands, in addition to the greenhouse horticultural industry, the food industry is the second major buyer of CO2. The food industry consumes around 0.15 0.2 Million tonnes of liquid CO2.
- (29) A promising development is found in the construction industry<sup>10</sup>, where CO2 is stored in concrete, thus giving rise to the 'compensation brick' or in the chemical industry<sup>11</sup>. These sectors represent a consumption of around 0.2 Million tonnes per year.
- (30) According to the report, sales other than to greenhouse horticulture, to markets in the food industry and to the chemical industry, are not expected to grow. For Twence, this means that during lifetime of the project (15 years), growth in sales to chemical or food industry is not likely.
- (31) In terms of products, Twence could probably serve all these markets. It will supply liquid CO2, which can replace all currently used CO2 products in the greenhouse horticulture industry. However, quality requirements for the food industry are higher. Nevertheless, Twence indicates that the quality of its CO2 is expected to meet the requirements of the food industry and the company is planning to obtain the food industry certification. The purity of Twence's CO2 is expected to be high due to the type of process that generates the CO2. Twence

A number of uses for CO2 in the production of construction materials are commercially available, such as 'compensation bricks' and Solidia cement. As new products in a relatively conservative market that places great emphasis on safety and certification in this respect, current purchase volumes and production capacity remain limited. Annual production of Solidia, for example, is around 5000 tonnes/year. In view of current safety regulations, Solidia may only be used in non-structural concrete products such as slabs and blocks.

https://www.businesswire.com/news/home/20190423005253/en/Solidia-Technologies-Surpasses-Million-Kilograms-Carbon-Impact "Cement production is the second largest industrial CO2 polluter, representing 5 to 7% of the world's total CO2 emissions. (...) Within five years, Solidia's need for CO2 will more than double the existing CO2 market."

<sup>&</sup>lt;sup>7</sup> 'The market of CO2. Royal Haskoning DHV', December 2020.

For product characteristics, substitutability and market structure see recital (28) *et sequitur* and recital (31) *et sequitur*.

<sup>9 [...]</sup> 

There are a number of immediately implementable options for beneficial use of CO2 in chemicals, such as the production of electrolytes from ethylene oxide and CO2 and increasing production capacity for methanol by mixing CO2 with syngas. These uses require only smaller quantities of CO2. Market participants indicate that – for the time being – it is unlikely that there is any major change in quantities for these new uses.

- wants to start preparing the product's certification from the autumn of 2021. This will assess its CO2 suitability for the food industry, among others.
- (32) The quality requirements of applications in minerals or building materials will most likely not be higher than those of greenhouse horticulture, meaning Twence should be able to meet them.
- (33) The Royal Haskoning DHV study provided by the Dutch authorities shows that there are three major traders of liquid CO2 in the Netherlands: Linde, Air Liquide and Nippon Gases. Nippon Gases uses CO2 from [...] in Zeelandic Flanders<sup>12</sup> and mainly focuses on export of CO2 by ship. Therefore, it is not likely that Nippon Gases becomes active on the market in Overijssel province.
- (34) Some Koekoekspolder horticulturists in the province of Overijssel are already purchasing CO2 from traders. Twence estimates that these traders are probably Linde and Air Liquide. There is no insight in the use of CO2 by customers other than greenhouse horticulture in Overijssel.
- (35) The average price per tonne of liquid CO2 depends on the industry and the position of the company in the chain of producers, traders and growers. A greenhouse horticulture company<sup>13</sup> pays 50-70 euros/tonne of liquid CO2 (Royal Haskoning DHV). This does not include the possible rental of a CO2 storage and dosing installation at the greenhouse horticulture company. Greenhouse horticulture companies have the option of taking on a service package from incumbent traders such as Air Liquide and Linde, which includes the provision of installation for storage of CO2 and dosing of CO2.
- (36) The Netherlands Environmental Assessment Agency (PBL)<sup>14</sup> estimates that the final price for the greenhouse horticulture company is 80 to 140 EUR per tonne including rental of the CO2 storage and dosing installation.
- (37) The average price of CO2 that Twence will ask to traders is [subject to commercial negotiations] EUR/tonne. PBL bases its calculations on 40 EUR/tonne. The differences are caused by the fact that PBL only calculates delivery to greenhouse horticulture companies in the growing season and Twence also intends to deliver to other sectors in the winter months.
- (38) This has to be compared to the costs of internal production for a greenhouse company. A greenhouse horticulture company can produce the CO2 itself by burning natural gas in a Combined Heat and Power (CHP) installation or in a heating boiler. In summer, there will often be no heat utilization. With the CHP installation, a possibility exists for the greenhouse horticulture companies to generate revenue from the electricity produced. Royal Haskoning DHV estimates costs of CO2 from a CHP installation at 30-60 EUR/tonne, the price being reduced by revenue from electricity production and heat utilization. PBL

The southernmost region of the province of Zeeland in the south-western Netherlands.

In other industries, the prices range from 80 to 200 EUR per tonne, with the food industry paying around 80 EUR per tonne and smaller buyers, where CO2 delivery is of rather low interest, towards the top of the range.

PBL (Planbureau voor de Leefomgeving) - the Netherlands Environmental Assessment Agency.

- estimates the average cost at 52 EUR/tonne for the production of own CO2 by the greenhouse horticulture companies. For a heating boiler without heat utilization, the cost to a greenhouse horticulture company amounts 70-80 EUR/tonne of CO2.
- (39) In greenhouse horticulture the make-or-buy decision is taken based on the price ratio between co-generation (gas price, spark spread<sup>15</sup>), sustainable heat and externally supplied CO2. For the use of externally supplied CO2, an alternative source of heat during colder months is essential to horticulture.
- (40) Depending on the climate policy in place, changes to the structure of the market are likely, both on the supply and consumption sides. The consumption of externally supplied CO2 by the greenhouse horticultural industry is expected to increase, the quantity of green gas produced is likely to go up, and production from concentrated waste streams is expected to reduce. In case of waste incineration systems, future quantities of waste incineration are expected to be lower. These changes might occur in a wider regulatory context.
- (41) Two national policy instruments to be introduced in 2021 will have a major impact on the market. These are the CO2 levy and the subsidy for CO2 capture and storage (Carbon Capture and Storage, CCS).
- (42) The CO2 levy has been introduced in the Netherlands from 2021, which will have a significant impact on the market for CO2. It applies to industrial greenhouse gas emissions covered by the ETS<sup>16</sup>, substantial nitrous oxide gas emissions and waste incineration systems. The CO2 levy will be imposed on the unavoidable part of emissions, so not on all emissions from a system.
- (43) This national CO2 tax came into effect as of 1 January 2021 for ETS industry companies and waste to energy plants (such as Twence). In the EU ETS, the supply of CO2 to greenhouse horticulture is seen as an emission of the company that captured the CO2. Therefore, Twence is obligated to pay the CO2 tax, even if it captures CO2 and delivers it to greenhouse horticulture.
- (44) The subsidy for CCS (opening of the existing scheme SDE++<sup>17</sup> to these installations) also has implications for the market for the supply of CO2.

Industrial greenhouse gas (GHG) emissions are covered by the Emissions Trade System (ETS) that commenced in 2005. Within the ETS, a yearly, 'falling' ceiling is agreed for the number of emissions rights available. Parties that emit CO2 and that are covered by the ETS must cover their emissions with these rights. They are permitted to trade these rights with one another. This leads to a market price, on the basis of which a party may decide to reduce its CO2 emissions or purchase additional rights. The market price is currently around EUR 25. The Netherlands Environmental Assessment Agency estimates that the CO2 price for 2030 will be EUR 46 per tonne.

The spark spread is the difference between costs of the gas purchased and the yield from the electricity supply. The spark spread is currently favourable, which means that a horticulturist with a co-generation system has an additional source of income. This plays a role when deciding whether or not to install such a system.

The 'SDE++' (Stimulering Duurzame Energieproductie) is an existing aid scheme in the Netherlands which supports not only renewable energy production but also other measures to reduce GHG emissions, for example green hydrogen production and carbon capture and storage (SA.53525).

(45) Both these instruments will increase the attractiveness of storing CO2, which could lead to an increase in the price for use of CO2 in the greenhouse horticultural industry in view of the reduced number of CO2 sources. This will prompt horticulturists to continue using cogeneration systems, which in turn will increase CO2 emissions from horticulture.

## 2.3. Financial viability of the project

- (46) As mentioned in recital (8), the total investment costs of the project amount to EUR 39.147.305 in nominal value. The investment aid from the Ministry of Economic Affairs and Climate Policy will amount to EUR 14.338.138. The requested investment subsidy is a subsidy of 37% of the eligible investment costs of the project.
- (47) Twence will finance the remaining part of the investment by investing [15-25]% of its own resources and will use a loan for the remaining [75-85]% from [...].
- (48) The Dutch authorities presented the calculations in the business plan by Twence. Twence assumes that approximately 50% of its CO2 sales will be directed to greenhouse horticulture during the entire lifetime of the investment project. It is plausible given the expected increase in demand from greenhouse horticulture (recital (27)).
- (49) For the other 50%, especially in the winter months, the demand from greenhouse horticulture is low<sup>18</sup> and other applications for the CO2 are being sought. Twence has updated the recent status of the contracts (30 March 2021). A new potential trader has been included in the calculations but has not been contracted yet.
- (50) From the information submitted, it appears that the Twence business case is based on an expected production of 79 kilotonnes CO2 per year, during 15 years, a realistic sales volume for Twence. The operational costs for the production of 79 kilotonnes CO2 per year comprise: fixed costs (depreciation, personnel, interest, 1/3 maintenance), variable costs (energy, 2/3 maintenance), costs for external capital (6% of total invested capital). The total operational costs are estimated at EUR [subject to commercial negotiations]/tonne CO2 (with an annual production of 79 kilotonnes per year for 15 years).
- (51) When, over a period of 15 years, the operational costs are deducted from the projected revenues, a negative amount of EUR [45-55]/tonne CO2 remains. The subsidy requested from the Dutch Ministry of Economic Affairs and Climate Policy, as well as the reduced costs for external capital, can be deducted from this unprofitable peak, which together add up to an estimated cost reduction of EUR [15-20]/ tonne CO2. The unprofitable top that remains is therefore EUR [30-40]/ tonne CO2 over a period of 15 years.
- (52) The total costs of this project amount to EUR [subject to commercial negotiations] million and the total revenue from the sale of CO2 is EUR [subject to commercial negotiations] million ([...] [...] million = [...] million). After deduction of the requested subsidy (EUR 14.3 million is equivalent to EUR [10-

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Greenhouse horticulture in the Netherlands requires provision of CO2, in principle, between March and October only (later referred to using approximation of Q2 and Q3).

- 12]/tonne CO2) and the associated avoided capital costs (EUR [5-6] million, or EUR [4-5]/tonne CO2), the remaining unprofitable margin amounts to EUR [25-30] million ([40-50] 14.3 [5-6] million = [25-30] million).
- (53) The project's internal rate of return (IRR) without subsidy amounts to [(-8)-(-6)]%. With an investment subsidy, the IRR increases to [(-2)-(0)]%, [...], in a context where the target value for the IRR of Twence is, according to the information provided by the Dutch authorities, 5.8%.
- (54) With the revenue from the CO2 supply to greenhouse horticulture, the operational costs can be covered, so that viability also appears to be reasonably certain after the fifth year, also taking into account the fact that Twence will likely pay a lower waste tax<sup>19</sup>. However a State aid subsidy is needed to cover the unprofitable margin of the flue gas-captured CO2 that will be sold for reutilization over a period of 15 years, which is an estimated EUR [40-50] per tonne CO2.
- (55) Twence has reaffirmed to the Dutch authorities its intention to take a positive decision regarding this investment, despite a slightly negative NPV, even in the case in which subsidy is included. The slightly negative NPV can be absorbed by the operating profits.
- (56) Twence also indicated that CO2 capture at a waste incineration plant is an innovative development that aligns with the company's strategic development. Twence's shareholders can accept a lower NPV if a project contributes to achieving the company's climate targets. In that regard, Twence has identified opportunities for the application of CO2 in greenhouse horticulture, but also in the manufacture of concrete products/ carbonates as building materials, and as a chemical building block in energy carriers, such as formic acid and methanol.
- (57) For the calculation of the subsidy amount, the Dutch authorities explained that they applied the methodology of an investment subsidy scheme based on the GBER 'Demonstration scheme for energy innovation (DEI+)'20, with a maximum aid intensity of 40%, though the Twence project does not lead to an increase of the level of environmental protection of the company's own activities. By calculating the aid by analogy to this methodology, the Twence project has been required to meet the same conditions and framework as the demonstration projects awarded under the DEI+ itself.
- (58) Mobilisation and implementation of the project will start on 1 September 2021. The subsidy shall be used by 28 February 2023. The testing phase of production will commence on 1 March 2023 and will be completed by 1 August 2023.

The waste tax is an existing tax and must be paid over the amount of waste that is incinerated in a waste incineration plant, determined yearly. The amount of CO2 captured and reused is considered as recycling. For this reason, based on the existing environmental tax law, Twence will not have to pay waste tax for that amount. This measure does not constitute aid and therefore no cumulation rules will apply.

SA.55348 'NL-EZK-KE: DEI+ budgetophoging subsidiemodules inzake de DEI+ juli 2019'. See recital (110) for further details of GBER DEI+ scheme.

## National legal basis

(59) The national legal basis for the aid is Article 2 and 7 "Kaderwet nationale EZK-en LNV subsidies". The aid granting authority is the Dutch Minister of Economic Affairs and Climate Policy. The measure constitutes individual aid, which will be made available to the beneficiary as a direct grant.

## Budget and aid instruments

- (60) The Dutch authorities have notified an aid amount of EUR 14.3 million. The aid will be made available to the beneficiary in the form a direct grant.
- (61) The granting of the aid is subject to approval by the Commission and it will be paid out following the realisation of the project.

## Cumulation

(62) The draft aid decision includes an obligation that cumulation is allowed, insofar as the total amount of State aid for the project does not exceed the limits fixed by the aid ceilings or maximum aid intensities (40%) laid down in the Community Guidelines on State Aid for Environmental Protection and Energy 2014-2020 (hereafter EEAG) for the same eligible costs.

## 3. ASSESSMENT OF THE MEASURE

## 3.1. Presence of State aid pursuant to Article 107 (1) of the TFEU

- (63) According to Article 107(1) of the TFEU, "any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the internal market".
- (64) The measure is funded by the national budget, upon an individual granting decision on the basis of the Framework Act on Subsidies granted by the Minister of Economic Affairs and Climate and Minister of Agriculture, Nature and Fisheries and therefore stems from State resources and is imputable to the State.
- (65) The public funds are made available in the form of a grant to the direct benefit of Twence, and will thus confer it an advantage that it normally would not have had under normal market conditions, and therefore the company benefits from an economic advantage over its competitors.
- (66) As the funding is granted to a single company (i.e. Twence), the measure is selective.
- (67) The measure has the potential to affect trade between Member States and to distort competition because the beneficiary is active in the supply of CO2 to the horticulture sector, where trade between Member States may take place. Furthermore, as the measure is expected to lead to a replacement of natural gas (for the production of CO2, by means of boilers and cogeneration systems) by CO2 recuperated from biomass waste with the technology used by Twence, the measure may also have effects on competition between existing and competing

- operators, directly or indirectly producing CO2, and have the potential to have an adverse effect on trade between Member States.
- (68) Consequently, the Commission considers that the measure constitutes State aid within the meaning of Article 107(1) of the TFEU.

#### 3.2. Assessment of the aid measure

## 3.2.1 Applicable legal basis for assessment

- (69) In derogation from the general prohibition of State aid laid down in Article 107(1) of the TFEU, aid may be declared compatible with the internal market by the Commission if it can benefit from one of the derogations enumerated in the TFEU. The Dutch authorities invoked Article 107(3)(c) TFEU as the basis for the assessment of the compatibility of the aid measure.
- (70) The Commission has wide discretion in matters falling under Article 107(3) of the TFEU. Exercising this discretion, it has issued guidelines and notices setting forth criteria for declaring certain types of aid compatible with the internal market based on Article 107(3) of the TFEU. It is constant case-law of the Court of Justice that the Commission is bound by the guidelines and notices that it issues in the area of supervision of State aid insofar as they do not depart from the rules in the Treaty. It is, therefore, necessary to, first, assess whether the notified aid falls under the scope of application of one or more guidelines or notices issued by the Commission. If this is not the case, the Commission needs to verify whether the aid can be declared compatible directly based on Article 107(3)(b) and/or 107(3)(c) of the TFEU.
- (71) Given the objective of the measures (reduction of CO2 emissions and energy savings through the direct use of CO2 supplied to the greenhouse horticulture industry and development of further use of CO2) the Commission has examined whether the measure falls within the scope of the EEAG.
- (72) The scope of application of the EEAG is defined in paragraph 13 as follows: "These Guidelines apply to State aid granted for environmental protection or energy objectives in all sectors governed by the Treaty in so far as measures are covered by Section 1.2. They therefore also apply to those sectors that are subject to specific Union rules on State aid (transport, coal, agriculture, forestry, and fisheries and aquaculture) unless such specific rules provide otherwise".
- (73) Section 1.2, paragraph (18), point (g), of the EEAG indicates that the EEAG apply to support measures for Carbon Capture and Storage (CCS) including individual elements of the Carbon Capture and Storage chain, but not for Carbon Capture and Use like in the case at hand.
- (74) Section 1.2 of the EEAG also indicates that the EEAG apply to aid for going beyond Union standards or increasing the level of environmental protection in the absence of Union standards (paragraph 18(a)). Environmental protection is defined in paragraph 19(1) of the EEAG as "any action designed to remedy or prevent damage to physical surroundings or natural resources by a beneficiary's own activities, to reduce the risk of such damage or to lead to more efficient use of natural resources, including energy-saving measures and the use of renewable sources of energy".

- (75) In the present case, the beneficiary will be enabled by the State aid at hand to provide waste recuperated CO2 to greenhouses (and to develop new use of CO2 as material in an ancillary manner). The environmental effect of the aid results from the change in behaviour of the greenhouses that will be using CO2 from Twence instead of burning natural gas to produce their own CO2 from their own boilers or of acquiring CO2 originating from fossil fuels from an external supplier. Such a use will enable them to reduce their energy consumption in summer time and to use green CO2 to enhance plant growth. The capturing of the CO2 and its transfer to the greenhouses also prevents that Twence's CO2 emissions are released into the atmosphere. However, this reduction of CO2 emissions that can be related to the capturing of the CO2 is not due to the capturing in itself, but to the entire Carbon Capture and Use chain, i.e. the transport of the CO2 up to the greenhouses and the consumption of the CO2 by the plants.
- (76) Thus, in the case at hand, the aid measure does not, by itself, reduce Twence's pollution but reduces the consumption of primary energy resources by the greenhouses and contributes to greenhouses gas (GHG) emission savings by switching their consumption to the green CO2. For that reason the aid measure does not correspond to the category of measures referred to in paragraph 18 of the EEAG. The present case therefore falls outside the scope of the EEAG.
- (77) The Commission has in its decision practice assessed State aid for similar infrastructures on the basis of Article 107(3)(c) of the TFEU, applying by analogy the criteria of the Community Guidelines on State Aid for Environmental Protection in several cases<sup>21</sup>.
- (78) There are no other frameworks or guidelines that may apply to the present case. Therefore, the Commission will assess the compatibility of the present measure directly on the basis of Article 107(3)(c) of the TFEU.

## 3.2.2 Assessment directly under Article 107(3)(c) of the TFEU

- (79) Article 107(3)(c) of the TFEU states that "...aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest..." may be considered to be compatible with the internal market.
- (80) In order to declare an aid compatible, first, the aid must be intended to facilitate the development of certain economic activities and, second, the aid must not adversely affect trading conditions to an extent contrary to the common interest.
- (81) Under the first condition, the Commission examines whether the design of the aid measure ensures the development of certain economic activities. Under the second condition, the Commission weighs up the positive effects of the planned aid for the development of the activities that the aid is intended to support and the negative effects that the aid may have on the internal market, in terms of distortions of competition and adverse effects on trade caused by the aid.

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See in particular Commission decision C(2019) 2888 final of 23.04.2019 - State Aid SA.52663 (2018/N) - The Netherlands - Aid to MEERLANDEN for investment in CO2 capture technology

# 3.2.2.1 The aid is intended to facilitate the development of certain economic activities

- (82) The notified measure will facilitate green transition and fossil fuels CO2 reduction through the direct use of liquid CO2 supplied to the greenhouse horticulture industry and will therefore increase environmental protection by reducing, for this industry, the use of primary energy sources for conventional CO2 generation in the horticultural processes. To this end, the measure supports the construction of the necessary infrastructure to capture and liquefy CO2 from flue gasses and fermentation gasses from industrial installations and deliver it to growers with CO2 demand. The measure will also facilitate a better use of waste CO2 from industrial processes in general, as the CO2 will also be delivered for potential other applications.
- (83) According to the calculations of the Dutch authorities, the measure in the end would achieve an annual reduction of CO2 emissions of approximately 69 kilotonnes per year, during 15 years (recital (11)).
- (84) The aid is designed in a way that it effectively facilitates the development of economic activity, for two main reasons: (i) it represents an incentive for Twence for the construction of the carbon capture and use infrastructure; and (ii) it represents an incentive for the horticulture greenhouses to modify their behaviour.
  - (i) Incentive effect on Twence
- (85) The Dutch authorities explained that the market does not provide enough incentives for Twence to make the investment without aid. The infrastructure is costly and the revenues for CO2 are not sufficient to cover the costs. The Dutch authorities demonstrated that, without State aid, the project would not be undertaken by Twence and, therefore, the aid measure provides the incentive necessary for Twence to invest.
- (86) The Dutch authorities explained that without the envisaged investment aid measure, the Managing Board of Twence considers the projected risk-return profile of the project insufficient for a positive investment decision. This insufficient projected risk-return profile is due to technology risks (first of a kind nature investment with deployment of innovative technologies), financial risks (lenders require significant guarantees on technology performance and plant availability, which increase costs) combined with market risks (as the project connects the waste market with greenhouse sector, which are two uncorrelated markets).
- (87) According to the Dutch authorities, the high investment costs are a threshold for the Managing Board of Twence to invest. The profitability calculations made on a 15 year period show a negative NPV of [20-25] million euro without aid, i.e an IRR of [(-8)-(-6)]%. Even with the investment subsidy there is a negative NPV of [10-12] million euro, i.e. an IRR of [(-2)-(0)]%.
- (88) The Commission notes that the investment support measure decreases the risk profile of the project and bridges to normal profitability, when looking in nominal terms. This element, combined with the alignment of the project with the green and climate strategy developed by Twence are sufficient for the Managing Board

- of Twence to take a positive investment decision, in spite of the slightly negative NPV even in the case in which subsidy is included (recitals (55) and (56)).
- (89) Based on these elements, the Commission considers that the measure would be a sufficient incentive for Twence to undertake the construction of the CCU facility.
  - (ii) Incentive effect on glasshouse horticultural industry in Overijssel
- (90) The largest consumer of CO2 in the Netherlands is the greenhouse horticultural industry, as CO2 is used to stimulate plant growth (recital (17)). CO2 use is heavily seasonal, with consumption during the growing season (Q2 and Q3) three times higher compared with the rest of the year.
- (91) The Dutch authorities have underlined the current and estimated future needs of liquid CO2 of the greenhouse horticultural in general, and the specific situation of the greenhouses located in Overijssel, situated away from the OCAP pipeline (recital (20)).
- (92) The Commission notes that the project develops a new source of liquid CO2 close to the Koekoeskspolder greenhouses area. The business plan of Twence is built in a way to ensure a secure source of supply to the greenhouses over five and maybe more years, thanks to the contractual arrangements already made with the intermediaries and directly with some greenhouses (recitals (12) to (14)). Additionally it notes that though the final price to the greenhouses is not known, as it depends also on the intermediaries, they should be in the range of prices that greenhouses normally bear (recitals (35) to (37)).
- (93) Based on the information provided by the Dutch authorities, it appears that depending on the climate policy in place<sup>22</sup> (recitals (18) and (41) *et sequitur*), there are likely to be changes to the structure of the market that could well increase the price for use of CO2 in the greenhouse horticultural industry in view of a future reduction of the number of CO2 sources. This will prompt horticulturists to start using cogeneration systems, which in turn will increase CO2 emissions from horticulture (recitals (40) and (45)).
- (94) In this context, the Commission notes that the intended support for Twence carbon capture and use facility could contribute to ensuring an external CO2 source at an acceptable price to the greenhouse horticultural industry in Overijssel. The project would ensure both security of supply and quality over a few years, potentially leading them to reduce their use of cogenerations systems based on conventional energy sources and turn to sustainable external supply sources of CO2, in the context of their commitment to climate change (recital (18) et sequitur).
- (95) Based on these elements, the Commission considers that the aid for the construction of the CCU at Twence would also have an incentive effect for the actors of the greenhouse horticulture industry in Overijssel to modify their behaviour with regard their sources of CO2.

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Especially the introduction of a CO2 levy and the subsidy for CO2 capture and storage (Carbon Capture and Storage, CCS) that will increase the attractiveness of storing CO2.

(96) The Commission concludes that the measure will moreover effectively facilitate an increased environmental protection in the greenhouse sector by contributing to the reduction of the use of primary energy sources for conventional forms of CO2 generation for horticultural processes.

## 3.2.2.2 Activity complies with relevant EU laws

- (97) Based on the information submitted by the Dutch authorities, the Commission has no ground to consider that there could be a breach of any specific provision of EU law.
  - 3.2.2.3 Aid does not adversely affect trading conditions to an extent contrary to the common interest
- (98) In order to balance the positive with the negative effects of the notified aid, the Commission identified positive effects of the planned aid for the development of the abovementioned economic activities, as well as possible negative effects that it may have on the internal market, in terms of distortions of competition and adverse effects on trade

Positive effects of the aid

- (99) On the positive side, the Commission firstly notes, that the aid contributes to the development of certain economic activities (recitals (82) to (96)).
- (100) It also notes that the aid will also contribute to the investigation by Twence, through its CCU, of a variety of use routes in order to be able to serve different markets with CO2 demand. In the short-term, the most mature markets will be supplied with the captured CO2 as mentioned above (horticulture, dry ice, salt). However, other markets for the utilization of CO2 are emerging (construction materials). With that in view, the Commission considers therefore that the project could contribute to the development of sustainable and circular product chains for the reutilization and application of CO2.
- (101) The Commission also notes that as far as the capture and liquefaction process itself is concerned, the project has additional positive environmental impacts (footnote 3).

Limited negative effects of the aid

- (102) Article 107(3)(c) TFEU requires the assessment of any negative effects on competition and on trade. The aid measures must not unduly affect trading conditions to an extent contrary to the common interest. The Commission considers that such negative effects could materialise on the supply of CO2 market for horticulture greenhouses, in which competition is present (recital (33)). The aid could therefore be liable to distort competition and affect trade in this sector.
- (103) In the way the Dutch authorities designed the aid measures, they ensured that their negative effects are as limited as possible. The Commission explains below that the aid is necessary, appropriate and proportionate.

- (104) While it is generally accepted that competitive markets tend to bring about efficient results in terms of prices, output and use of resources, in the presence of market failures, State intervention may improve the efficient functioning of markets.
- (105) As described in recitals (85) to (87) above, the Dutch authorities explained that the market does not provide enough incentives for Twence to make the investment without aid and that absent this support the investment would not take place. As for the greenhouses, they would not go for a reduction of their conventional sources of CO2 without the guarantee of a secure source of supply at an acceptable price, which the project offers, especially in the regulatory context recalled in recitals (39) and (41).
- (106) The Commission recognises that the market fails to coordinate cooperation between suppliers and consumers, preventing the development of a project that could significantly reduce the CO2 footprint of the greenhouse horticulture processes, and contribute to building a business case for future uses of CO2.
- (107) Additionally the investment aid is an appropriate policy instrument to develop the economic activity, as it will make it possible for the beneficiary to realise the project, and take exploitation risks that are inevitably associated with this project, and to obtain a positive investment decision from the shareholders.
- (108) It will also pave the way for greenhouses future investments in renewable energy supply. As the greenhouses would have an external source of CO2 available, they would not need to produce CO2 themselves by means of a combined heat and power installation or boiler and therefore this could open the possibility of considering alternative sources of energy. Thus, it can be concluded that the envisaged aid in the form of a direct grant to the infrastructure operator Twence constitutes an appropriate instrument to achieve the desired CO2 reductions.

### **Proportionality**

- (109) A State aid measure is proportionate if the aid amount is limited to the minimum needed to incentivise the additional investment or activity in the area concerned.
- (110) For the calculation of the subsidy amount, the Dutch authorities have explained that it was made according to the method used by the existing Dutch DEI+ scheme, with a maximum intensity of 40%, without however any reference investment used as a counterfactual, as no investment would be made without support in the Twence case (recitals (51) to (53) and recital (85) *et sequitur*). Therefore, the total costs of the project are considered eligible costs. Based on this, the maximum subsidy based on the total cost of the project being eligible costs is EUR 15,658,922.
- (111) The budget law of the relevant Dutch authorities (in this case the Ministry of Economic Affairs and Climate Policy), as approved by Parliament, allocated a maximum amount of EUR 14,338,138, based on an early-stage calculation made by Twence. This is therefore the maximum available subsidy amount.

- (112) The Dutch authorities also confirmed that cumulation of aid for the same eligible costs is only allowed provided that the total amount of State aid for the project does not exceed the maximum aid intensity (40%). This obligation will be monitored, and if it is not respected, this will result in a clawback of the aid granted exceeding the maximum aid intensity.
- (113) The Commission notes that the methodology used for the determination of the aid amount was made per analogy to the DEI+ scheme, and therefore to the GBER provisions on aid for environmental protection. The Commission considers this approach acceptable in view of the objective of the measure.
- (114) It notes that the intensity reached with the aid planned is below the maximum aid intensity of 40% provided for in Article 36 and that the amount remains in any case below the funding gap of the project as calculated by Twence over a 15 years period (recital (54)).
- (115) The Dutch authorities have also confirmed that Twence is not subject to the EU Emissions Trading Scheme (ETS) so that the investment does not enable Twence to make any cost savings in this regard.
- (116) It can therefore be concluded that the State aid granted for the notified project is proportionate and does not exceed the minimum necessary, in nominal value, to make the aided project sufficiently profitable.
  - Avoidance of undue negative effects on competition and trade between Member States
- (117) For the aid to be compatible with the internal market, the negative effects of the aid measure in terms of distortions of competition and impact on trade between Member States must be limited and outweighed by the positive effects in terms of contribution to the objective of common interest.
- (118) The Commission notes first that the maximum production capacity of Twence will be 7% of the national volume of CO2 captured at the moment (recital (7)). As such, the volume produced by Twence will not have much influence on the national CO2 market. Competition on this market is mainly between different sources/ forms of CO2. Without the ability to use gaseous CO2, which is the case here, the product market is limited to liquid CO2, with the alternative for the greenhouses to produce their own CO2 by means of cogeneration or boilers.
- (119) On this specific market of liquid CO2, the Commission notes that, based on the information provided, the market for the capture and delivery of residual CO2 is by definition bound to the geographical distance to the end customer from Twence for this project. Only greenhouse horticulture in Overijssel and companies that use CO2 within a circle of 200, and preferably 100 km from Twence, could use this new liquid CO2 production. Also, the project has a very limited scale. The Commission considers therefore that Twence is acting on a geographically restricted market.
- (120) The main suppliers of liquid CO2 are Linde and Air Liquide, which are partially dependent on CO2 from fossil energy sources such as natural gas. According to the study Royal Haskoning DHV, there are about four other waste-to-energy companies, which are considering CO2 capture. New suppliers could come to the

market, though the regulatory context recalled in recital (39) *et sequitur* could be a disincentive for these projects. In this context of reduced competition, the production of CO2 by Twence and the agreements it has concluded with new CO2 traders will create a wider range of suppliers of CO2 for greenhouse horticulture. The Commission considers that the effect on competition in greenhouse horticulture or other sectors will be limited or positive.

(121) As for the trade of CO2 between Twence and German companies, it will be limited to serving companies relatively close to the border via road transport and will therefore remain limited.

#### Conclusion on balance

(122) The Commission therefore concludes that any possible distortion of competition or adverse effect on trade between Member States resulting from the envisaged measure would be limited, whereas the environmental benefits are clearly established and could not result from other types of competing initiatives, so that the overall balance with regard to the objective of common interest of environmental protection is positive.

## 3.2.2.4 Transparency of the aid

(123) The Dutch authorities have confirmed that the full text of the aid granting decision will be available on the website www.noord-holland.nl. The information published will contain the full text of the individual granting decision and its implementing provisions (or a link to it), the identity of the aid granting authority, the identity of the individual beneficiary, the aid instrument and the amount of aid granted, the objective of the aid, the date of granting, the type of undertaking, the Commission's aid measure reference number, the region where the beneficiary is located (at NUTS 2 level) and the principal economic sector of the beneficiary (at NACE group level). The information must be published after the decision to grant the aid has been taken, must be kept for at least ten years and must be available to the general public without restrictions.

## 4. CONCLUSION

The Commission has accordingly decided not to raise objections to the aid on the grounds that it is compatible with the internal market pursuant to Article 107 paragraph 3, point (c), of the Treaty on the Functioning of the European Union.

Finally, the Commission notes that the Dutch authorities agreed to have the present decision adopted and notified in the English language.

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Directorate-General Competition
State Aid Greffe
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Yours faithfully,

For the Commission

Margrethe VESTAGER Executive Vice-President