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The President of the House of Representatives

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**Our reference**  
DGETM-E2020 / 17177527

Date

Subject Offshore Wind Energy Roadmap 2030

Dear Madam President,

The Dutch North Sea has the potential to play a significant role in achieving the national contribution to the goals of the Paris climate agreement and the necessary sustainable development of our energy supply towards 2050. A number of crucial steps toward achieving this were set out in the Energy Agreement of 2013.<sup>1</sup> The basis for the Netherlands' long-term energy policy was laid down in the Energy Report,<sup>2</sup> the subsequent Energy Dialogue<sup>3</sup> and the Energy Agenda.<sup>4</sup> In the Coalition Agreement, the Dutch Government will continue to develop that policy and will be actively pursuing the implementation thereof.

The current realisation of offshore wind energy under the Energy Agreement has seen and, until 2023, will continue to see crucial steps being taken for the sustainable development of the Dutch energy supply. The prospect of five calls for tender has given market participants the confidence to invest and has altered risk perception. This has resulted in a major reduction in costs. The Government wishes to retain the market's confidence and the current momentum and intends to issue the remaining calls for tender for the Energy Agreement within the next two years to complete the Offshore Wind Energy Roadmap 2023.<sup>5</sup>

At the same time, the national government wishes to take the next step to further develop offshore wind energy for the period 2024 to 2030, and wishes to kick off preparations for this endeavour. To that end, this letter contains the key elements for an Offshore Wind Energy Roadmap for the period 2024 to 2030. In this way, I am honouring the commitment I made to the House during the General Consultation on Energy of 18 January.<sup>6</sup>

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<sup>1</sup> Energy Agreement for Sustainable Growth, Parliamentary Paper 30196, no. 202.

<sup>2</sup> Energy Report "Transition to sustainable energy", Parliamentary paper 31510, no. 50.

<sup>3</sup> Parliamentary Paper 30196, no. 484.

<sup>4</sup> Energy Agenda "Towards a low carbon energy supply", Parliamentary Paper 31510, no. 64.

<sup>5</sup> Parliamentary Paper 33561, no. A/11.

<sup>6</sup> Parliamentary Paper 29023, no. 229.

The development of offshore wind energy takes place within the context of a broader transition towards a sustainable energy supply by 2050 and the role of the North Sea within that project, but also in relation to other existing functions and values on which offshore wind energy will have an impact, such as nature and biodiversity, fisheries and aquaculture. The North Sea is subject to highly intensive use and is one of the busiest seas in the world. For that reason, a broader vision on the North Sea is required to ensure effective management of this body of water. Such a vision is currently being developed in the form of a North Sea Strategy 2030. The Strategy centres on ecological recovery, a future-proof food supply and a sustainable energy supply. The Offshore Wind Energy Roadmap 2030 will be a key starting point for that strategy.

In anticipation of that broader vision, this letter provides initial insight into the preconditions necessary from the perspective of the North Sea as a(n) (sustainable) energy source and the corresponding further growth of offshore wind energy beyond 2030 moving towards 2050. The key preconditions relate to ecology, the interfaces with other interests in the North Sea, the integration on land of the connections with the high-voltage grid and the coordination with energy demand. The challenge we face is to find sustainable solutions for these issues in conjunction with food production (fisheries and aquaculture) and the conservation and restoration of ecology and biodiversity. The Ministers of Infrastructure and Water Management, the Interior and Kingdom Relations and Agriculture, Nature and Food Quality and I will be collaborating on this endeavour. As such, this letter to the House is also sent on behalf of my colleagues.

It is expected that offshore wind energy will be addressed in the national Climate Agreement. Insofar as the agreements go beyond what is stated in this letter, it goes without saying that an appropriate solution must be found within the preconditions mentioned in this letter.

### **I. The changing role of the North Sea as an energy source**

The Dutch North Sea is over one and a half times the size of the surface of our country and, at present, plays a key role both as a source of energy and food and as a nature area. Current exploitation of the North Sea as an energy source, however, is set to change. In the decades to come, the production of gas and oil will gradually decrease, with a large number of fields to be closed and the corresponding infrastructure to be dismantled. This makes room for other development plans, though this will require planning and coordination. Due to its relatively shallow waters, favourable wind climate and proximity of good ports and (industrial) energy consumers, the Dutch North Sea provides opportunities to facilitate energy transition. As yet, sustainable energy produced from water (waves and tides) and aquatic biomass (algae and seaweed) is not as developed as wind energy, and these production methods still require further research for their development. How much offshore wind energy will be needed in the long term depends in part on the climate reduction goal set and the

interpretation thereof. The scenarios of the PBL Netherlands Environmental Assessment Agency range from 12 to 60 or even 75 Gigawatts in 2050.<sup>7, 8</sup> It is through the ambition set out in the Coalition Agreement – which would result in approx. 11.5 Gigawatts of installed capacity by 2030; see part II of this letter – that the Government will be charting a course corresponding closely to the more ambitious PBL scenarios. This scale would only make sense if the wind farms were not only used to meet the energy demand for electricity and light, but also for the replacement of oil and gas as fossil fuels and raw materials in transportation, heating and industry. I shall be returning to this topic in part III of this letter.

National government is working with the Energy Union (EU) to realise the further integration of the energy market and the further sustainability of energy production. In addition, our nation is working alongside nine neighbouring countries that border on the North Sea in the North Seas Energy Cooperation, in order to learn from one another, achieve better coordination of plans and facilitate joint projects. In short, the fact that the North Sea is shared by multiple neighbouring states provides additional opportunities to achieve synergy with each other's wind energy activities during the implementation of the Roadmap. The implementation of the Roadmap, however, need not wait until a final decision is taken on these issues.

## **II. Roadmap for the construction of additional offshore wind farms up to 2030**

### Task regarding offshore wind energy by 2030

The Coalition Agreement contains the task of using offshore wind energy to realise an additional reduction of carbon dioxide emissions by four megatonnes by 2030, relative to the baseline set out in the 2016 National Energy Outlook. This task translates into a total scale of offshore wind farms of approximately 11.5 Gigawatts (GW) by 2030.<sup>9</sup> Taking into account the existing wind farms (approx. 1 GW) and the wind farms to be realised under the current offshore wind energy roadmap to 2023 (approx. 3.5 GW), this means that between 2024 and 2030, wind farms will have to be added that collectively total approx. 7 GW. This is in line with the 2016 Energy Agenda, which assumed the roll-out of approximately 1 GW each year for this period. In addition, the following key principles from the Agenda should be noted:

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<sup>7</sup> *Verkenning van klimaatdoelen; Van lange termijn beelden naar korte termijn actie* (Exploration of Climate Goals: From Long-term Vision to Short-term Action). Policy Brief. PBL/Energy Research Centre of the Netherlands (ECN), 9 October 2017.

<sup>8</sup> *De toekomst van de Noordzee; De Noordzee in 2030 en 2050* (The Future of the North Sea: The North Sea in 2030 and 2050). PBL, 2018.

<sup>9</sup> The PBL Netherlands Environmental Assessment Agency assumed production of 9.4 GW through offshore wind energy by 2030 (National Energy Outlook 2016 – adopted and proposed policy scenario). An emissions reduction of 4.0 megatonnes of carbon dioxide is equivalent to 2.1 GW in additional offshore wind energy. Please see the "*Nationale kosten Energietransitie in 2030*" (National Costs of the Energy Transition in 2030), PBL Netherlands Environmental Assessment Agency, 3 April 2017.

- continuation of the construction of wind farms in areas further out to sea in pre-designated wind farm zones;
- leading role carried out by national government regarding spatial decisions and preparatory studies: TenneT to connect to wind farms;
- further cost price reduction and stimulation of innovation and competition;
- capitalisation of earning opportunities and expansion of employment;
- multiple and multifunctional use of space where possible, insofar as this results in a further reduction of the costs of offshore wind energy or limits the social costs of the energy transition;
- preparation for large-scale multinational wind farms and international connections at sea.

The reason for the Offshore Wind Energy Roadmap 2030 to be drawn up at this point is twofold:

1. First of all, it is vital to maintain continuity in the realisation of offshore wind energy for the timely achievement of the abovementioned task. In order for the first wind farm to become operational in 2024 or 2025, it is crucial that a call for tenders be issued for the relevant site(s) in 2020 or 2021. Experience has shown that there is period of approximately four years between the point at which a permit is issued for the wind farm and the point at which the wind farm becomes operational. Before the call for tenders can be issued, a site decision must be taken that defines the exact location and preconditions for the wind farm. The running time of this process is approximately two years. In conjunction with the necessary preparation and construction time of the wind farm (approximately four years), this means that the overall process must be initiated in 2018. The same applies for the integration plans for the necessary connections of the offshore grid to connect the wind farms with the high-voltage grid on land.  
Due to the fact that the National Water Plan has already designated wind farm sites in the North Sea that are not yet being used (please see the map below), it is possible to achieve the necessary quick start. The designation of entirely new wind farm zones in the National Water Plan through a government structural vision process would likely add an additional two or three years. The same applies to having them included in the National Environmental Vision.
2. In addition, clarity early on regarding the realisation of offshore wind farms is vital to providing market perspective and retaining the confidence of wind farm developers. This would result in cost reductions and willingness to invest.

The wind farm zones designated in the National Water Plan provide sufficient space for the wind farms to be realised between 2024 and 2030, pursuant to the task set by the Coalition Agreement. However, the conservation goals for seabirds and the available capacity to feed and transport electricity from the offshore wind farms to the high-voltage grid on land do impose significant limitations. I shall be outlining these issues in greater detail when I set out the structure of the actual Roadmap later in this letter. First of all, I should like to focus on the consideration of the interests of other users of the Dutch North Sea.

*Consideration of interests in relation to the Roadmap 2030*

As stated previously, the Dutch part of the North Sea is subject to a multitude of values and interests and corresponding designated uses. At the time of the designation of the wind farm zones in the National Water Plan in 2009 (the Borssele and IJmuiden-Ver Wind Farm Zones) and 2014 (the Hollandse Kust and North of the Frysian Islands Wind Farm Zones), an assessment took place of offshore wind energy interests and the interests of other offshore uses. The Government decided that offshore wind energy should take priority in those areas over other activities.

This would be without prejudice to the fact that the national government intends to take into account other activities as much as possible in the development of the Roadmap, and enable multifunctional use of the offshore space where appropriate. To this end, consultations were held with stakeholders in multiple tracks during the preparation of the Roadmap 2030. A number of large meetings were held for this purpose in April and June 2017, during which offshore stakeholders (including stakeholders in the fishing industry, nature conservation and environmental organisations, the shipping industry, oil and gas companies, the recreational sector, coastal municipalities and the wind energy sector) were able to voice their concerns and recommendations. During the North Sea Days, held in October 2017, the foregoing parties and knowledge institutes developed these issues further, and an update was issued on the possibilities that were studied for this Roadmap. In the interim, the various separate interests were primarily discussed in bilateral sessions and consultations. The various stakeholders will be consulted yet again in relation to the further development (including allotment) of the wind farm zones.

The construction of offshore wind farms under the Roadmap 2030 will restrict the possibilities for trawl fishery, if the wind farms remain closed to this type of fishing. The key bottlenecks arise in the Southern North Sea, where the designated wind farm zones are located. The Government recognises this and will be holding consultations with the fishing industry and wind energy sector over the coming period in order to reach an agreement. In addition, the Government will already be meeting the needs of the fishing industry in the Offshore Wind Energy Roadmap 2030 by not (entirely) using all designated wind farm zones, leaving more free space for fishing.

The Government will also be consulting with the fishing industry in the further development of the 2030 Roadmap, such as in relation to determining the options for joint use of the wind farms. The arrival of the wind farms also results in opportunities to engage in other types of fishing, such as through the use of passive fishing gear (traps, pots, gill netting) and aquaculture (for example, mussel farming) within wind farms.

The arrival of the wind farms also provides opportunities for the conservation and recovery of the nature and biodiversity of the North Sea. If seabed disturbance is excluded, future wind farm sites may, in principle, be combined with sites containing protected seabed nature or seabed nature qualifying for protection. The

latter would require careful alignment of trawl fishery and nature conservation interests. In addition, the nature-inclusive construction of wind farms may also contribute to nature restoration and hydraulic engineering innovations.

Shipping conducted in the Dutch North Sea will also be affected by the arrival of new wind farms. The wind farm zones that have already been designated have already been thoroughly considered in terms of spatial integration and location using the assessment framework for "Safe distances between shipping lanes and offshore wind farms".<sup>10</sup> Before the wind farms are tendered, clear agreements must be made regarding the possibility of the wind farms' use as a shipping corridor. The Government will be considering the monitoring and evaluation results for a period of two years from the opening up of the existing wind farms from 2018. Depending on the shipping corridor decision, additional facilities, such as nautical radars, may be required to ensure the safety of maritime traffic and for enforcement and supervision purposes. The development thereof will take place within the framework of the implementation agenda to this Roadmap. I shall be discussing this issue in part III of this letter.

Finally, the allotment process for the Hollandse Kust (west) and IJmuiden-Ver Wind Farm Zones will take into account the integration of a shipping corridor for larger vessels, such as the ferry traffic between the United Kingdom and our country. The fact that the wind farm zone north of the North Hinder shipping lane junction (before the 'New Waterway' estuary) is unused ensures that shipping is unrestricted in terms of manoeuvrability and that there is no detrimental impact on the accessibility of the Port of Rotterdam.

It is expected that oil and gas extraction will decrease in the years to come due to the depletion of the fields. The Government aims to have the remaining extraction of oil and gas take place concurrently to the operation of offshore wind farms. A key point of consideration in this regard is the space that would be required for helicopter traffic to and from the oil and gas platforms. To this end, a review of the accessibility and safety aspects was conducted in consultation with the stakeholders, on which basis agreements will be made with mining companies, likewise regarding the dismantling and removal of oil and gas infrastructure that is no longer used for the extraction of oil and gas and that cannot be used for sustainable energy facilities. It will also be reviewed whether or not and how any gas infrastructure may be (re-)used for the storage of CO<sub>2</sub> (CCS). The Government, alongside the relevant mining companies, is currently also reviewing whether a number of platforms that will be remaining in the North Sea for a longer period of time will be able to draw the energy required for the installations on those platforms from the offshore wind farms. This way, additional savings could be made on CO<sub>2</sub> emissions. Given the estimated distances between the wind farm zones and most mining platforms, the required additional investment and the brief time period expected within which wind farms will be present while the mining platforms are still operational, there is a real chance that electrification of

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<sup>10</sup> Parliamentary Paper 33561, no. 11, encl. 384771.

the oil and gas platforms would ultimately make no economic sense in most cases. The announced revision and integration of the Electricity Act 1998 (*Elektriciteitswet 1998*) and the Gas Act (*Gaswet*) into a new Energy Act<sup>11</sup> should allow offshore mining platforms to be connected to the grid.

From the perspective of the other interests and values in play in the North Sea, such as in relation to defence, telecommunications and other cables, aviation, sand and shell extraction, recreation and cultural and historical values, there are no preconditions that would guide the decision of (the sequence of) use of all the designated wind farm zones for this Roadmap 2030. Naturally, the relevant parties will be consulted once again for the allotment process for these areas.

#### Roadmap 2030

The Roadmap 2030 provides a number of wind farms with a total output of approximately 6.1 GW. This 6.1 GW makes optimum use of the ecological offshore space available and of the availability of transport capacity on the high-voltage grid on land:

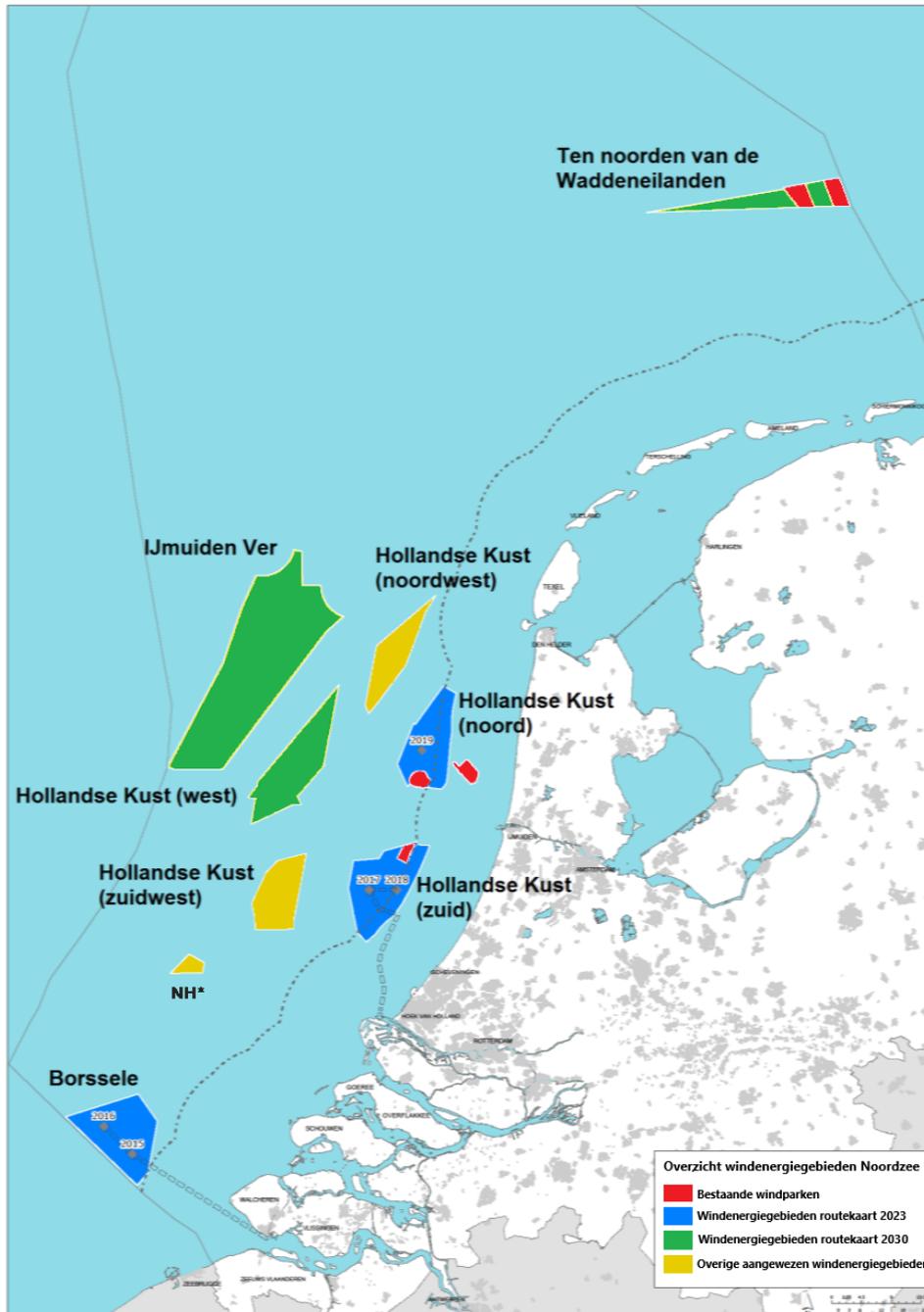
- Based on the data currently available and the relationship with the conservation goals for species of birds and mammals that arise from the European Birds Directive and Habitats Directive, the conservation goal for seabirds constitutes a limiting factor. In addition, the largest additional capacity (being 6.1 GW worth of additional offshore wind farms) can be achieved if the wind farms are located in the Hollandse Kust (west), IJmuiden-Ver and North of the Frysian Islands wind farm zones. A condition designed to limit the number of fatalities among seabirds is the installation of wind turbines with a capacity of at least 10 MW. Such large turbines are set to be introduced onto the market shortly.
- The supply of electricity from offshore wind farms and the supply thereof into the high-voltage grid on land will also increasingly result in congestion. A capacity of 2.1 GW worth of wind farms that can be connected close to the coast using the current alternating current concept can be integrated before substantial congestion should occur. In addition, 4 GW can be connected to shore beyond the congestion-sensitive parts of the high-voltage grid. Other options with shorter high-voltage routes on shore for the 4 GW are currently being reviewed.

The Government will be making a decision regarding the remaining 0.9 GW, in order to achieve the required 7 GW, at a later point in time (see below). The Roadmap assumes the realisation of wind farms in the following consecutive zones:

- 1.4 GW in the Hollandse Kust (west) Wind Farm Zone. With a potential of 1.4 GW, this zone is the largest zone that has already been designated after IJmuiden-Ver. This scale advantage can be used by tendering the entire zone on one single occasion, which may support a further reduction in costs.

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<sup>11</sup> Parliamentary Paper 30 196, no. 566.



Map listing existing wind farms (red), wind farm zones corresponding to the Roadmap 2023 (blue), wind farm zones corresponding to the Roadmap 2030 (green) and all other designated wind farm zones (yellow). \*NH: wind farm zone north of the North Hinder junction.

The call to tender could take place in 2021. An additional argument in favour of starting with this zone lies in the possibility of partially combining the route of the grid connection with that of the Hollandse Kust (noord) Wind Farm Zone from the current Roadmap 2023. This would yield opportunities for sustainable and limited use of space by infrastructure for both wind farms, both offshore and onshore. This would also allow time to be gained in the permit procedure for Hollandse Kust (west), and ensure as little impact as possible to the environment as a result of the construction works;

- 0.7 GW in the North of the Frysian Islands Wind Farm Zone. This zone is situated approximately 60 kilometres north of Vlieland and partly between the existing Gemini wind farms, Buitengaats and ZeeEnergie. By exploiting this area, the Government will be responding to the ambition of the Province of Groningen to make a larger contribution to the sustainable development of the Netherlands' energy supply. I shall be returning to this issue in due course. The grid connection of the future wind farms in this area requires careful selection of its route and integration, given that it must be installed under the Waddenzee. Given the vulnerability of the ecological capacity of the Waddenzee, the number of cables that can be installed in this area is limited;
- approximately 4 GW in the IJmuiden-Ver Wind Farm Zone. This is the largest continuous area that has already been designated for offshore wind energy. However, part of the southern side of the zone will not be used for wind farms, given the (potential) designation of the partially overlapping "Bruine Bank" area as a Natura 2000 area. The calls for tender are planned for 2023 and thereafter, with the commissioning of the wind farms to take place from 2027. I should like to outline the size of the tender further. For example, two calls for tender can be held, each relating to 2 GW (in 2023 and 2025), but four tenders of 1 GW each can also be held between 2023 and 2026. When choosing the optimum size of the tender, the optimal capacity of this part of the offshore grid to the high-voltage grid on land is expected to play a part, as will the optimum scale size for wind farms of 1 to 1.5 GW expressed by the wind energy sector, and the wish for very large tenders present among some parties and consortiums.

Both the wind farms in the Hollandse Kust (west) zone and in the North of the Frysian Islands zone will be connected to the high-voltage grid on land via offshore substations using the current connection concept as much as possible (alternating current, standardised platforms with a capacity of 0.7 GW). This means that existing transformer substations must be expanded and/or that sites must be found for new substations.

Given the significant size of the IJmuiden-Ver zone and the relatively large distance of connection sites to the high-voltage grid onshore, a new connection concept is required. The current AC concept would result in too much power loss.

In 2018, a separate assessment and selection process will take place for grid connections in order to arrive at (variants for) connection sites, taking into account the routes to gain access to land from the water. In addition, multiple solutions are being considered for the IJmuiden-Ver Wind Farm Zone regarding

transmission of the electricity produced, including direct current transmission connections (HVDC) with a link to the high-voltage grid further inland, but also non-electric options (such as conversion and transmission in the form of hydrogen). The Government wishes to make this decision with the early involvement of stakeholders and regional authorities. Given the call to tender in 2023 and the required certainty regarding consumption of the electricity produced (in the near future, approximately 13% of electricity consumption in the Netherlands will be provided by the 4 GW produced in IJmuiden-Ver), it is likely that the non-electric option would at that point be too immature to serve as an alternative.

In this context, I shall also have further research conducted into the option that was explored at the behest of TenneT of constructing a relatively small island in IJmuiden-Ver on which direct current converters and transformers can be placed, as an alternative to the large and relatively costly HVDC platforms offshore. In addition, the potential role of such an island for other functions and interests in the North Sea will be considered as well as possible future international cooperation with the wind farms of the United Kingdom.

This island concept should not be confused with a concept put forward by a number of parties (including TenneT, GasUnie and the Port of Rotterdam Authority) for a (large) international energy island far out at sea at Dogger Bank. Such a proposition could come into play in conjunction with the possible growth of offshore wind energy beyond 2030, but does not play a role in the Offshore Wind Energy Roadmap 2030. An island located at IJmuiden-Ver, however, may yield crucial experience for a potential energy island far out at sea in the future. In the autumn of 2018, a decision will be made regarding the initiation of the permit procedure for an island within the IJmuiden-Ver zone. At that juncture, the design of the offshore grid for the Roadmap will also be laid down in the Development Framework for Offshore Wind Energy, which the Minister of Economic Affairs and Climate Policy will establish under the Electricity Act 1998. In anticipation thereof, I shall be requesting that TenneT further develop the connection of IJmuiden-Ver in regard of both the HVDC platform option and the construction of an island.

Further growth from 6.1 GW to 7 GW (Coalition Agreement task) will become possible upon additional ecological space becoming available. In order to expedite this, and with a view to any future further growth of offshore wind energy, I shall be reviewing this matter with my counterpart at Agriculture, Nature and Food Quality in the current Offshore Wind Energy Ecological Programme (Wozep). The following options are available for the final part of the task to achieve 7 GW, according to current insights available, which must be considered in conjunction with possible further growth of offshore wind energy:

- 0.7 GW in the Hollandse Kust (zuidwest) Wind Farm Zone. However, this zone is relatively valuable to fisheries, and the gas fields in the vicinity of this zone are expected to be considered first for the storage of CO<sub>2</sub>;
- a tender for one or more wind farms in the as yet unused part of the IJmuiden-Ver zone, given that this zone is capable of storing at least approx.

4,8 GW with due consideration of the Bruine Bank, and a possible expansion of this wind farm zone is among the possibilities, in contrast to the Hollandse Kust (zuidwest) Wind Farm Zone, which is surrounded by shipping routes;

- a new wind farm zone elsewhere to be designated in due course.

The Government will make a decision regarding one of these options in due course, in conjunction with possible further growth of wind energy beyond 2030 and in coordination with stakeholders and international cooperation with neighbouring states. In addition, the optimum size of the tender for the IJmuiden-Ver zone, as yet to be determined, also plays a role within this context. This has resulted in the following schedule for the Roadmap 2030.

*Roadmap 2030 schedule*

<b>Capacity (GW)</b>	<b>Wind farm zone</b>	<b>Shortest distance from the coast</b>	<b>Start of procedure Wind Farm Site Decisions</b>	<b>Year of tender</b>	<b>Year of commissioning</b>
1.4	Hollandse Kust (noord)	51 km from Petten	2018	2020/2021	2024 to 2025
0.7	North of the Frysian Islands.	56 km from Schiermonnikoog	2019	2022	2026
approx. 4.0	IJmuiden-Ver	53 km from Den Helder; 80 km from IJmuiden	2020	2023 to 2026	2027 to 2030
approx. 0.9	to be determined				

Please note: the schedule assumes the developments will fit within the ecological frameworks and that the permit procedures for the export and supply of electricity into the high-voltage grid will have been completed in a timely manner.

The Hollandse Kust (noordwest) Wind Farm Zone will (as yet) not be used under the Offshore Wind Energy Roadmap 2030, given that this would take up a(n) (overly) large part of the total amount of ecological space available. In addition, it is an area subject to relatively intensive fishing. The wind farm zone north of the North Hinder junction, upstream of the Rotterdam estuary, is too small (approx. 30 km<sup>2</sup>) for offshore wind energy to be used effectively. For that reason, the Government intends to withdraw the wind energy designation of this zone. This will be implemented in the National Water Plan or the National Environmental Vision in due course.

The Government wishes to initiate the necessary exploratory steps no later than 2021, with a view to the possible expansion of offshore wind energy beyond 2030. A later start will allow national government to better respond to the current state of the requirements for new wind farm zones, both in the interest of wind energy itself and with regard to other interests in the North Sea. Within that context,

ecology and energy system integration are the greatest challenges, although spatial integration and interactions with other functions, activities and values on the North Sea (primarily fishing and nature) also require a thorough consideration of the various interests involved in the search for and identification of new wind farm zones. This new consideration process will take place alongside the parties involved.

In this search, the Government will be responding to the Province of Groningen's desire to develop offshore wind energy projects on a large scale to the north of the Frysian islands. In the Coalition Agreement, the Government indicated a desire to work alongside the province to improve the region's economic prospects. National government wishes to work with the province and stakeholders to study how offshore wind energy can contribute to that objective.

The designation of (and corresponding assessment and decision regarding) new wind farm zones will ultimately be implemented in an amendment to the National Water Plan or under the National Environmental Vision.

#### *Economic opportunities, innovation and required resources for the Roadmap 2030*

The implementation of the Roadmap 2030 provides for a range of opportunities for Dutch businesses and for the economy in the near future:

- Ongoing cost reductions may result in offshore wind energy gaining a competitive advantage for the industry due to the availability of a large volume of cheap, sustainable energy.
- Further large-scale realisation of offshore wind energy may have a long-term positive impact on the earning capacity of the Dutch economy. The Dutch maritime sector holds a market share of approximately 25 percent of the total European offshore wind energy market and will be able to further bolster that strong position. There will also be export opportunities related to the growth of offshore wind energy elsewhere in Europe, as well as in Asia and America.
- Direct employment within offshore wind energy in the Netherlands will see a further increase. It is estimated that this will involve some €15 to 20 billion worth of investments and 10,000 jobs between 2024 and 2030. At present, the government is already working with (coastal) municipalities, ports and provinces to identify the planning and location possibilities and to seize the associated economic opportunities.
- The Roadmap 2030 may also stimulate relevant technologies, such as those relating to transport, storage and application of the electricity produced, its integration in the energy system and its conversion into other energy carriers, such as hydrogen fuel. As a gas-producing country, the Netherlands has a unique position in this regard.

At the same time, innovation is needed to make this possible. In this regard, the focus of offshore wind energy innovation policy will primarily have to be on the issue of the integration of the electricity produced into the energy system and into the environment, including the relevant ecology.

The Government, however, wishes to ensure that offshore wind farms can be realised without state subsidies as soon as possible. The recent call to tender for

the Hollandse Kust I and II sites marks an important step in that direction. To that end, I shall be putting a Bill before the House for the amendment of the Offshore Wind Energy Act, if possible before the summer, as announced in my letter on the legislative agenda on energy transition.<sup>12</sup> Within the context of the announced revision and integration of the Electricity Act 1998 and Gas Act into a new Energy Act, I wish to explore the manner in which the offshore grid can continue to be funded.

### **III. Development prospects for the North Sea as a sustainable energy source**

Given a production capacity of approximately 11.5 GW of offshore wind energy, there will be times in 2030 where the supply of electricity by offshore energy and sources on land is expected to be greater than the demand. Wind energy and the continued increase in the contribution of solar power will lead to a strong growth in the proportion of renewable electricity in national electricity production. By 2025, this share will have increased to around half, and it will be close to two-thirds by 2030.

The realisation of additional offshore wind farms in that case would only be prudent if it could result in the prevention of a surplus supply of electricity, given that an oversupply would undermine the electricity prices – and consequently the profitability of the wind farms – and that energy storage would entail additional costs.

In order to render the entire energy supply of the Netherlands carbon neutral, the non-electricity energy demand would also have to be made more sustainable. At present, electricity makes up roughly 20% of the energy mix of the Netherlands, with 80% of energy provided as a liquid or gas and used for heating at high and low temperatures and for mobility. The Dutch part of the North Sea can potentially fulfil a significant role as a sustainable energy source if the energy derived from wind can also be used for such energy functions.

This can be achieved through electrification of industrial production processes, heating of buildings and mobility purposes, or by realising other energy carriers from electricity derived from offshore energy. These other energy carriers may then be used to heat buildings, but equally as fuels or even as raw materials in industrial processes. Examples of such energy carriers include hydrogen and ammonia, which are produced from electricity derived from offshore wind energy. The North Sea has the potential to play a significant role in the large-scale production of these “green molecules”. An additional advantage is that such molecules can be stored and transported more easily and cheaply in comparison to electrons. Furthermore, these molecules could already be produced at sea and could subsequently be transmitted to the shore in a gaseous state.

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<sup>12</sup> Parliamentary Paper 30196, no. 566.

In the management of the supply of sustainably produced offshore energy, there must be a particular emphasis on the desired interaction with the overall energy system. Hydrogen appears to be particularly suitable as an energy carrier in the process of making gaseous fuels and raw materials more sustainable. At my request, TKI Gas recently published a hydrogen roadmap to map out its potential and to identify what steps should be taken in the short term to realise this potential.

A short while ago, various port authorities expressed their wish to make the industries present in their port more sustainable using electrification of industry processes and the application of hydrogen and ammonia, which are produced from electricity derived from renewable sources. These parties explicitly expressed an interest in purchasing large volumes of electricity from offshore wind farms in this manner. If such an additional demand for sustainable electricity were indeed to come about, this would provide a prospect for a prudent and sensible further expansion of offshore wind farms beyond 2030. The Government wishes to review in what way and within what time frame this transition to sustainable industry can be given shape in consultation with the foregoing parties and similar industrial clusters. For that reason, national government wishes to invite the relevant parties to make mutual agreements in this regard within the Climate Agreement.

The development of the North Sea as a sustainable energy source will also have an impact on spatial planning. First and foremost, it will have an impact on the sea itself, where energy production may impact other uses and values and for which the North Sea Strategy 2030 will offer a vision. In addition, a sharp increase of sustainable energy offshore will also have spatial consequences on land. After all, the energy produced offshore must be exported, for which routes for cables and/or pipelines will be needed. In addition, there must be space for the expansion or construction of transformer substations. Coordination with provincial and local authorities is crucial to ensure that this is managed effectively.

The North Sea as a sustainable energy source will also impact existing energy infrastructure. The input of large volumes of sustainable electricity, for example, may result in congestion in the onshore high-voltage grid. In addition, for offshore connection with the high-voltage grid further inland past the congestion points, the high-voltage grid would require expansion in the long term. These types of expansions require considerable investment and are characterised by lengthy turnaround times; in addition, they have spatial implications. One alternative that could limit congestion would be to convert the electricity produced offshore into other energy carriers either offshore or on the coast, have the electricity stored or have it used in the vicinity of the location where it is exported to shore, instead of supplying it to the high-voltage grid. Finally, a more stable price of the wind energy produced may be obtained as a result of further integration and coordination of the electricity grids and markets of neighbouring countries, with the construction of more international electricity connections (interconnection) for that purpose. The Netherlands is committed to achieving this through its bilateral

contacts with neighbouring countries within the European Union and the North Sea Energy Programme.

Given the scope and complexity of the challenges of the energy transition in general and the role of the Dutch North Sea in this regard, the Roadmap 2030 requires an implementation agenda that sets out the first crucial steps and through which knowledge is collected for the period beyond 2030.

#### **IV Implementation agenda**

On the basis of the key points outlined in this letter for the Offshore Wind Energy Roadmap 2030, national government will undertake the further development, preparation and implementation thereof. Initial essential activities include:

- allotment of the wind farm zones into sites, including the kicking off of the preparatory studies into the geophysical conditions and cultural-historical values offshore;
- further development of the design of the offshore grid by TenneT and any possible alternatives, including the potential application of an island;
- exploration of the connection points and corresponding routes for the offshore grids to and over land;
- update of the Ecology and Cumulation Framework for the offshore wind farms, which includes the Roadmap 2030.

In addition to adopting the conclusions inter alia in the Development Framework for Offshore Energy, the Government may initiate the permit procedures for the wind farms and for corresponding components of the offshore grid. This will be followed by the issuance of the sites in the wind farm zones by way of tenders.

Concurrently, the Government will be undertaking further policy preparation in relation to the wind farm zones of the Roadmap 2030 in consultation with the offshore stakeholders. This includes:

- research into and the definition of guidelines for shipping corridors through wind farms and the necessary measures and facilities to ensure safe shipping traffic, Search and Rescue, monitoring and enforcement. The Government will be reviewing the initial experiences of the existing wind farms in 2018 and 2019 with shipping corridors in relation to this end;
- drafting of an assessment framework for joint use within wind farms subject to permit obligations (fisheries, aquaculture, other forms of energy production, etc.) in relation to shipping corridors through and nature development within wind farms;
- agreements with mining companies regarding accessibility, options regarding electrification and the dismantling of oil and gas platforms. This will also involve a review of the possibilities of (re-)use of carbon dioxide storage infrastructure (CCS). The Government will be producing a CCS roadmap in due course, which will be developed in close cooperation with the market;
- review of the need for an adaptation of the applicable law concerning offshore grids, in consideration of any direct connections to the grid for industrial customers, conversion installations (e.g. power2gas), oil and gas platforms

(electrification) and CCS installations. This will take shape within the framework of the legislative agenda recently submitted to the House.

Furthermore, as part of the foregoing development, preparation and implementation process, I shall be developing a financial section in consultation with the ministers most closely involved. This financial translation of the Roadmap will ensure the further implementation of the proposed wind farm roll-out.

With a view to an expected further growth beyond 2030, the Government's efforts will largely focus on the integration of wind energy into the energy system and demand management, to allow fossil fuels and raw materials to be replaced by alternatives that can be produced using electricity generated by offshore wind farms. It is expected that this will also form part of the national Climate Agreement. Furthermore, as part of the North Sea Strategy 2030, the Government will be conducting a review to identify the most suitable areas for a further expansion of offshore wind energy in light of the other interests and values in play on the North Sea, such as those of the fishing industry and nature development and recovery in particular.

In addition, the Government wishes to intensify international and regional cooperation in relation to sustainable energy in the North Sea, inter alia in the form of an exploratory review conducted jointly with neighbouring North Sea countries regarding the combination of wind farm connection and offshore interconnection.

The Offshore Wind Energy Roadmap 2030 is emblematic of the next step the Netherlands is taking to achieve valuable and responsible use of the North Sea in terms of nature conservation and food supply and the transition to a low CO<sub>2</sub> energy supply by 2050.

Eric Wiebes  
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