



Innovate  
UK

# Innovate UK Global Expert Mission Report

## Aviation & Maritime in the Netherlands

September 2023



**PUBLIC**

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**The aviation and maritime sectors are two of the most significant contributors to carbon dioxide (CO<sub>2</sub>) emissions.**

## 01. Summary

The aviation and maritime sectors are two of the most significant contributors to carbon dioxide (CO<sub>2</sub>) emissions. As countries firm up their sustainability agendas to meet their Conference of Parties (COP) commitments, these key sectors pose huge challenges for decarbonisation.

### Aviation

Aviation is responsible for around 2.5% of global CO<sub>2</sub> emissions, and increasing demand for flying is accelerating this.<sup>1</sup> Without action, the International Civil Aviation Organization predicts that by 2050 international aviation emissions could rise more than 300% from 2005 levels.<sup>2</sup> This has pushed many international aviation organisations to push for net-zero aviation emissions by 2050.<sup>3</sup>

The future lies in innovating ways to sustainably meet the burgeoning demand for flying. The International Air Transport Association (IATA) has said that sustainable fuels and carbon offsetting can reduce emissions by more than 80%.<sup>4</sup> Major players such as Airbus are developing other low-emission technologies such as electric and hydrogen power.<sup>5</sup>

<sup>1</sup> <https://ourworldindata.org/co2-emissions-from-aviation>

<sup>2</sup> <https://www.icao.int/environmental-protection/Documents/ICAO%20Environmental%20Report%202016.pdf>

<sup>3</sup> <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/decarbonizing-aviation-executing-on-net-zero-goals>

<sup>4</sup> <https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet---alternative-fuels/>

<sup>5</sup> <https://www.weforum.org/agenda/2022/12/aviation-net-zero-emissions/#:~:text=For%20many%20of%20us%2C%20the,aircraft%20powered%20by%20jet%20gasoline>

## Maritime

The maritime sector is pivotal to the movement of goods – 90% of global trade is transported by sea. The industry contributes to almost 3% of CO<sub>2</sub> emissions every year.<sup>6</sup> The World Economic Forum suggests that if the maritime industry were a country, it would be the sixth largest carbon emitter.<sup>7</sup> To achieve the Paris Agreement's 1.5 degrees Celsius target, the UNFCCC estimates that zero-emission fuels must make up 5% of international shipping fuels by 2030.<sup>8</sup>

## Global Expert Mission

In March 2023, Innovate UK sent a Global Expert Mission (GEM) to the Netherlands, where delegates from the UK's aviation and maritime sectors met with key Dutch stakeholders to share their innovations and achievements and find collaborative pathways towards a decarbonised future.

The UK delegates and Dutch stakeholders comprised a cross-section of key players within the public and private sectors. UK delegates were able to hear first-hand the steps Dutch organisations are taking to decarbonise their maritime and aviation industries, including:

- The main initiatives underway, such as incubators for businesses, research into new technologies and academic support for the sectors.
- How they are funded.
- How business and academia are partnering to develop future energy technologies and designing more efficient aircraft/vessels to accommodate them.

Particularly useful was the opportunity for aviation delegates to learn more about some of the agendas and issues within the maritime sector and vice versa – and how both sectors might share learning and work together to achieve their common goals.

The GEM provided the opportunity to discuss areas of possible collaboration to meet the wider decarbonisation goals of both sectors. This report summarises the Dutch organisations the UK delegation visited, key discussion points, potential collaboration opportunities, and some of the challenges. With their close geographical proximity and historical cooperation, there are high expectations that entities from both countries can find ways to innovate together on what has become one of the world's most pressing issues.

<sup>6</sup> <https://www.oecd.org/ocean/topics/ocean-shipping/>

<sup>7</sup> <https://www.weforum.org/agenda/2022/11/how-the-shipping-industry-is-sailing-towards-zero-emission-targets/>

<sup>8</sup> "Shipping needs 5% zero-carbon fuels by 2030 to meet green goal" (UNFCCC, 2021) <https://climatechampions.unfccc.int/shipping-needs-5-zero-carbon-fuels-by-2030-to-meet-green-goal/>



## 02. Acronyms & Definitions

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<b>AGP</b>	Aerospace Growth Partnership	<b>IMARES</b>	Institute for Marine Resources and Ecosystem Studies
<b>AI</b>	Artificial Intelligence	<b>IMO</b>	International Maritime Organization
<b>ATI</b>	Aerospace Technology Institute (UK)	<b>KiM</b>	Kim Netherlands Institute for Transport Policy Analysis
<b>Bio-LNG</b>	A sustainable version of liquified natural gas	<b>kWh</b>	Kilowatt-Hours
<b>Brexit</b>	The withdrawal of the UK from the European Union	<b>LERU</b>	League of European Research Universities
<b>BRS</b>	Bristol Airport	<b>LNG</b>	Liquefied Natural Gas
<b>CAA</b>	Civil Aviation Authority (UK)	<b>MARIN</b>	Maritime Research Institute Netherlands
<b>Carbon neutral</b>	A state of net zero CO <sub>2</sub> emissions, which can be achieved by balancing CO <sub>2</sub> emissions with its removal or by eliminating emissions	<b>MW</b>	Megawatts
<b>Carbon Sinks</b>	Materials such as plants, the ocean or soil, which absorb more carbon than they release	<b>NAG</b>	Netherlands Aerospace Group
<b>CO<sub>2</sub></b>	Carbon Dioxide	<b>NLR</b>	The Royal Netherlands Aerospace Centre
<b>COP</b>	Conference of the Parties	<b>PoT</b>	Port of Tyne
<b>CMDC</b>	Clean Maritime Demonstration Competition	<b>R&amp;D</b>	Research and Development
<b>D2050</b>	Destination 2050	<b>R&amp;I</b>	Research and Innovation
<b>Decarbonisation</b>	The process of reducing the amount of carbon, mainly CO <sub>2</sub> , sent into the atmosphere	<b>RVO</b>	The Netherlands Enterprise Agency
<b>Digital corridor</b>	A seamless digital trade lane with optimised just-in-time sailing, and improved efficiency, safety and speed	<b>SAF</b>	Sustainable Aviation Fuel
<b>EC</b>	European Commission	<b>SME</b>	Small-to-Medium-Sized Enterprise
<b>ETPS</b>	Empire Test Pilots' School (UK)	<b>SIN</b>	Science and Innovation Network
<b>EU</b>	European Union	<b>STRIA</b>	EU's Strategic Transport Research and Innovation Agenda
<b>FCDO</b>	Foreign, Commonwealth and Development Office	<b>TEN-T</b>	Trans-European Transport Network
<b>GEM</b>	Global Expert Mission	<b>TNO</b>	Netherlands Organisation for Applied Scientific Research
<b>Green corridor</b>	Specific aviation or maritime route that is decarbonised end-to-end	<b>TU Delft</b>	Delft University of Technology
<b>H<sub>2</sub></b>	Hydrogen	<b>tWh</b>	Terawatt-Hours
<b>IATA</b>	International Air Transport Association	<b>UAM</b>	Urban air mobility
		<b>UN</b>	United Nations
		<b>UK</b>	United Kingdom
		<b>UK SHORE</b>	UK Shipping Office for Reducing Emissions
		<b>UKRI</b>	UK Research and Innovation

## 03. Introduction

### Innovate UK, Innovate UK KTN and the Global Expert Missions

Innovate UK supports business-led innovation and is part of UK Research and Innovation (UKRI).<sup>9</sup> UKRI convenes, catalyses and invests in close collaboration with others to build a thriving, inclusive research and innovation system. To this end, Innovate UK helps businesses to identify the commercial potential in new technologies and turn them into new products and services that will generate economic growth and increase productivity. With a strong business focus, Innovate UK drives growth by working with companies to de-risk, enable and support innovation. Innovate UK KTN exists to connect innovators with new partners and new opportunities beyond their existing thinking – accelerating ambitious ideas into real-world solutions. Innovate UK KTN is part of the Innovate UK group.

As innovation is increasingly a global endeavour and the ambition of UK businesses to become truly international enterprises is at its highest, Innovate UK established the GEM<sup>10</sup> programme in 2017. Delivered by Innovate UK KTN, it is run in partnership with the Foreign, Commonwealth and Development Office (FCDO), Department for Business and Trade (DBT) and Science and Innovation Network (SIN).<sup>11</sup> GEMs help further Innovate UK's global strategy by providing the evidence base for where it should invest, and by providing opportunities for UK businesses to build partnerships and collaborations with key economies.

<sup>9</sup> <https://www.ukri.org>

<sup>10</sup> <https://iuk.ktn-uk.org/programme/global-expert-missions/>

<sup>11</sup> <https://www.gov.uk/world/organisations/uk-science-and-innovation-network>

## Mission Overview and Objectives

In March 2023, Innovate UK delivered an in-person GEM to the Netherlands, where a group of UK experts met private and public sector organisations. The objective was to better understand the Netherlands' innovation landscape as a benchmark against UK capability and to support the UK government's drive for zero-emission transport and systems as part of its 2050 net zero commitment.

The UK and Netherlands have historically been strong trading partners with similar world views.<sup>12</sup> While the Netherlands has a smaller footprint than the UK, it has a similar global coverage and a vibrant supply chain. It has also pushed the agenda in developing the sustainable aviation fuels arena<sup>13</sup> – and with its proximity to the UK, there are significant opportunities to develop green corridors (specific routes that are decarbonised end-to-end) in maritime and aviation.

The Netherlands GEM's focus on the aviation and maritime sectors explored these opportunities as a potential part of the Future Economy Net Zero programme.<sup>14</sup> It aimed to provide a greater understanding of the Dutch funding landscape, innovation areas and where there are key innovation and technology gaps.

The primary outcome was to provide evidence to support private/public funding in the UK and establish areas where UK and Netherlands organisations could collaborate. The main objectives were to:

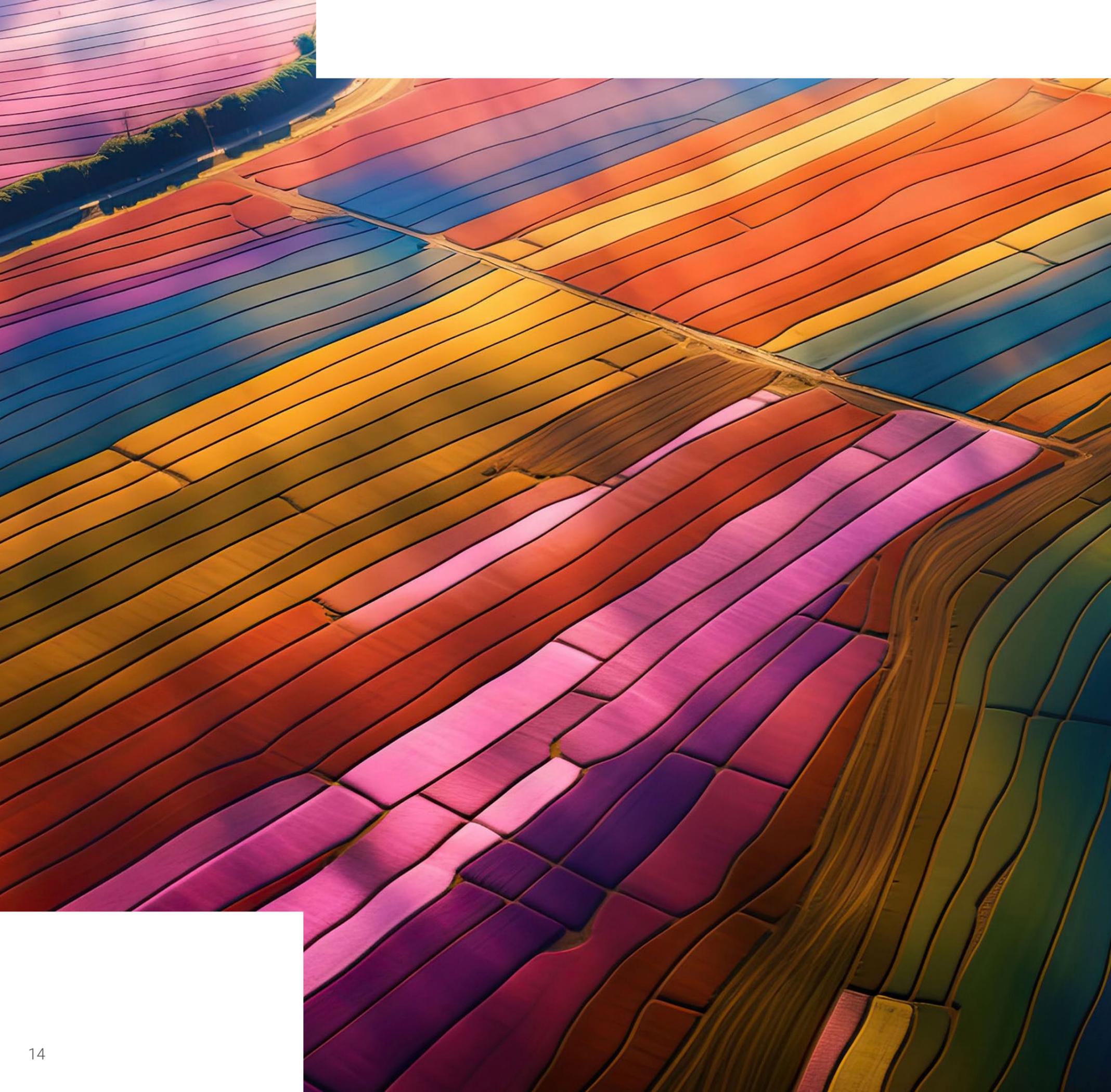
- Help determine how Innovate UK can best support UK businesses more effectively and efficiently when considering innovation partnerships with the Netherlands.
- Provide insights into where there are synergies between the two countries in aviation and maritime, and determine whether there is an appetite for further collaboration.
- Identify and showcase key future market opportunities for innovative products and services to UK businesses that may be interested in collaborating with the Netherlands.
- Capture key UK research and innovation (R&I) and emerging market opportunities/challenges for developing innovative products and services when considering collaboration with the Netherlands.



<sup>12</sup> <https://www.gov.uk/government/publications/uk-netherlands-strategic-dialogue-2022-joint-statement-on-foreign-development-and-security-bilateral-cooperation>

<sup>13</sup> <https://www.government.nl/latest/news/2020/03/04/minister-van-nieuwenhuizen-imposes-use-of-cleaner-fuel-in-aviation-sector>

<sup>14</sup> <https://www.ukri.org/what-we-offer/browse-our-areas-of-investment-and-support/investor-partnerships-future-economy-programme/>



## Mission Scope

The Mission's scope was focused on the Netherlands' aviation and maritime sectors across the following thematic areas:

- Cross-modal opportunities in infrastructure within seaports and airports.
- Zero-emission innovation of vessels and aircraft, and how ports and airports plan to cope with potentially multiple fuels, mainly inside airport/port boundaries.
- Digital opportunities.
- Continuation of the green corridor onto the road network via heavy goods vehicles.

As part of its net zero cross-modal ambition, Innovate UK is funding collaborative propulsion technology research projects for the transportation sector – specifically for maritime, rail, automotive, aerospace, construction and special-use vehicles.<sup>15</sup>

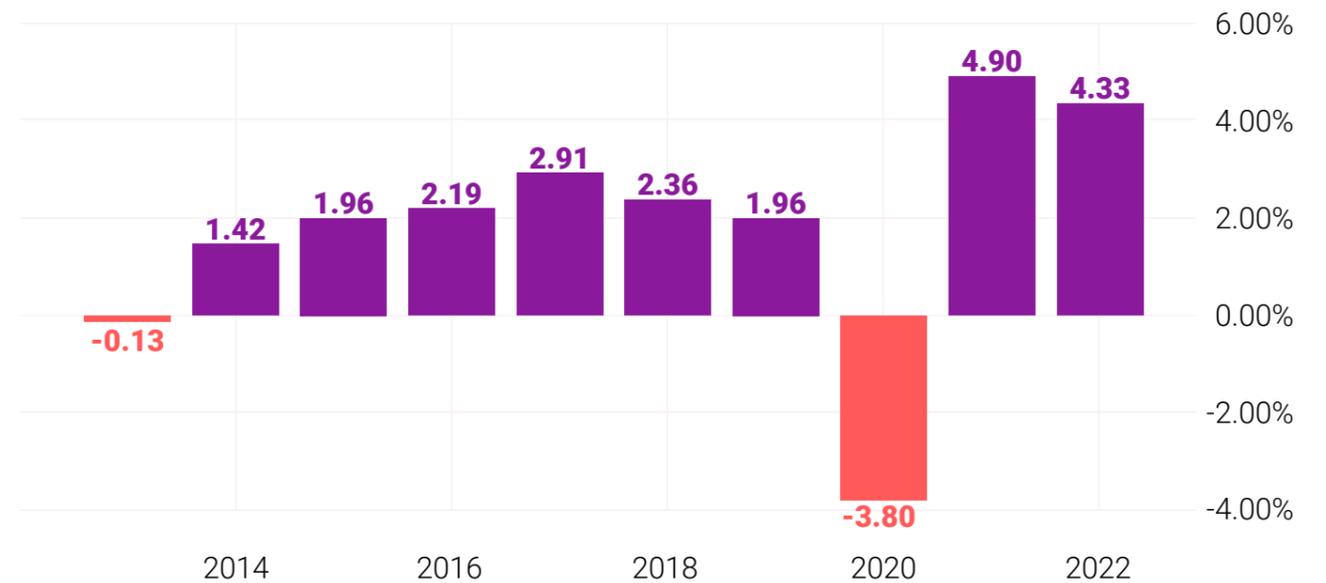
It is important to note that the Mission focused on the innovation landscape – not facilitating trade.

<sup>15</sup> <https://apply-for-innovation-funding.service.gov.uk/competition/1337/overview/e95bd0c9-9cac-4b9f-aec3-f1f6594b43e7#scope>

## 04. Sector Overview

The Netherlands is a small country geographically, with a population of 17.6 million. Despite the comparatively low total population, it punches far above its weight. It is the European Union's (EU's) sixth-largest economy and one of the world's largest foreign direct investment (FDI) recipients.<sup>16</sup> Its record as a highly desirable investment location is illustrated by several accolades it received in 2022: sixth on the IMD's Global Competitiveness Index,<sup>17</sup> fifth on the Global Innovation Index<sup>18</sup> and sixth on the Global Talent Competitiveness Index.<sup>19</sup>

Foreign trade is a key part of the economy. Exports account for 83% of GDP and imports 72%. 2021 and 2022 also marked the country's fastest expansion this century at 4.9% and 4.5% respectively. Notably, household consumption expanded by 6.6%, indicating high levels of consumer confidence and healthy economic growth.<sup>20</sup>



Source: tradingeconomics.com | Statistics Netherlands

<sup>16</sup> <https://www.granthornton.nl/en/service/international-business/expanding-your-business-in-the-netherlands/>

<sup>17</sup> <https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-competitiveness-ranking/>

<sup>18</sup> <https://www.globalinnovationindex.org/gii-2022-report#>

<sup>19</sup> <https://www.insead.edu/sites/default/files/assets/dept/fr/gtci/GTCI-2022-report.pdf>

<sup>20</sup> <https://tradingeconomics.com/netherlands/full-year-gdp-growth>

**“In 2022, the Netherlands was sixth on the Global Competitiveness Index, fifth on the Global Innovation Index and sixth on the Global Talent Competitiveness Index.”**

In 2022, the country marked a milestone with a 20% increase in electricity production from renewable resources (mainly through solar and wind power) and an 11% drop in fossil-fuel production.

It was also a net exporter of electricity at 23 billion kilowatt-hours (kWh), compared to imports of 19 billion kWh.

While electricity imports from some European countries dropped, mainly because of power production in countries such as Germany and Norway, they increased from the UK due to higher wind power production.<sup>21</sup>

<sup>21</sup> <https://www.cbs.nl/en-gb/news/2023/10/renewable-electricity-share-up-by-20-percent-in-2022>



**“By 2030 carbon emissions from aviation must be equal to 2005 levels. By 2050 they must halve compared to 2005 levels and by 2070 they must be reduced to zero.”<sup>22</sup>**

<sup>22</sup> <https://www.government.nl/topics/aviation/aviation-policy>

## Aviation

Aviation is a key sector for the Netherlands, as a major tourist hub and for connecting the country to the global economy. A case in point is Amsterdam Schiphol Airport which has an extensive international and regional route network, with 48.4 million passengers passing through the airport in 2022.<sup>23</sup> This compares to 62 million passengers at Heathrow in 2022.<sup>24</sup>

The Netherlands' aviation industry is significantly smaller than the UK. It has around 183 companies, while the UK is nearer to 760.<sup>25</sup> While having a smaller footprint compared to the UK, the country can bring together expertise and specialists across the country in different areas such as innovation, logistics and aircraft maintenance. For example, TU Delft has one of the world's largest scientific communities focused on aerospace engineering.<sup>26</sup>

<sup>23</sup> <https://schipholairport.org/statistics/>

<sup>24</sup> <https://mediacentre.heathrow.com/pressrelease/detail/14775>

<sup>25</sup> <https://www.lusha.com/company-search/airlines-aviation/83/>

<sup>26</sup> <https://www.tudelft.nl/en/ae/organisation>

Its YES!Delft start-up incubator programme is one of the highest ranked in Europe,<sup>27</sup> providing a platform for the most innovative university students to develop and commercialise their ideas. This innovation is seen across the country, such as ESTEC in Noordwijk, the research centre for the European Space Agency, and the Royal Dutch Aerospace Centre (NLR), which houses wind tunnels to test aircraft from around the world.<sup>28</sup>

NAG is the Netherland's trade association for national and international organisations active in the country's aerospace and airport development. With a remit to maximise the Dutch aviation industry's ability to compete internationally, NAG has more than 100 members who together represent 95% of the Dutch aviation industry's revenue.<sup>29</sup> It operates across the whole aviation transport system, with members in airport development and infrastructure, aircraft manufacturing and maintenance.

Dutch government ambitions go beyond reducing its carbon footprint to accommodate social needs. Its draft Civil Aviation Policy Memorandum 2020-2050 stipulates that airports may only expand if safety can be guaranteed, noise nuisance is decreased, and quality of life is not compromised.<sup>30</sup> It has recently capped the number of flight movements at Amsterdam Schiphol Airport to address noise interference in heavily populated areas (see text box).<sup>31</sup>

Within the draft Memorandum, the government refers to speeding up and expanding passenger rail connections between Dutch airports and London, Brussels, Paris, Frankfurt, Düsseldorf, and Berlin. The plan will involve rail, airline, and airport stakeholders to reduce 2030 carbon emissions from aviation to 2005 levels. By 2050 they must be halved compared to 2005 levels, and by 2070 emissions must be reduced to zero. In the meantime, central government and the municipal health services will monitor the perception of aircraft noise in the wider vicinity of airports.

<sup>27</sup> <https://ubi-global.com/rankings-2023/?v=79cba1185463>

<sup>28</sup> <https://nag.aero/nag/ecosystem/>

<sup>29</sup> <https://nag.aero/nag/about-nag/>

<sup>30</sup> <https://www.government.nl/topics/aviation/aviation-policy>

<sup>31</sup> <https://www.government.nl/topics/aviation/news/2022/06/24/government-limits-flight-movements-at-amsterdam-schiphol-airport>

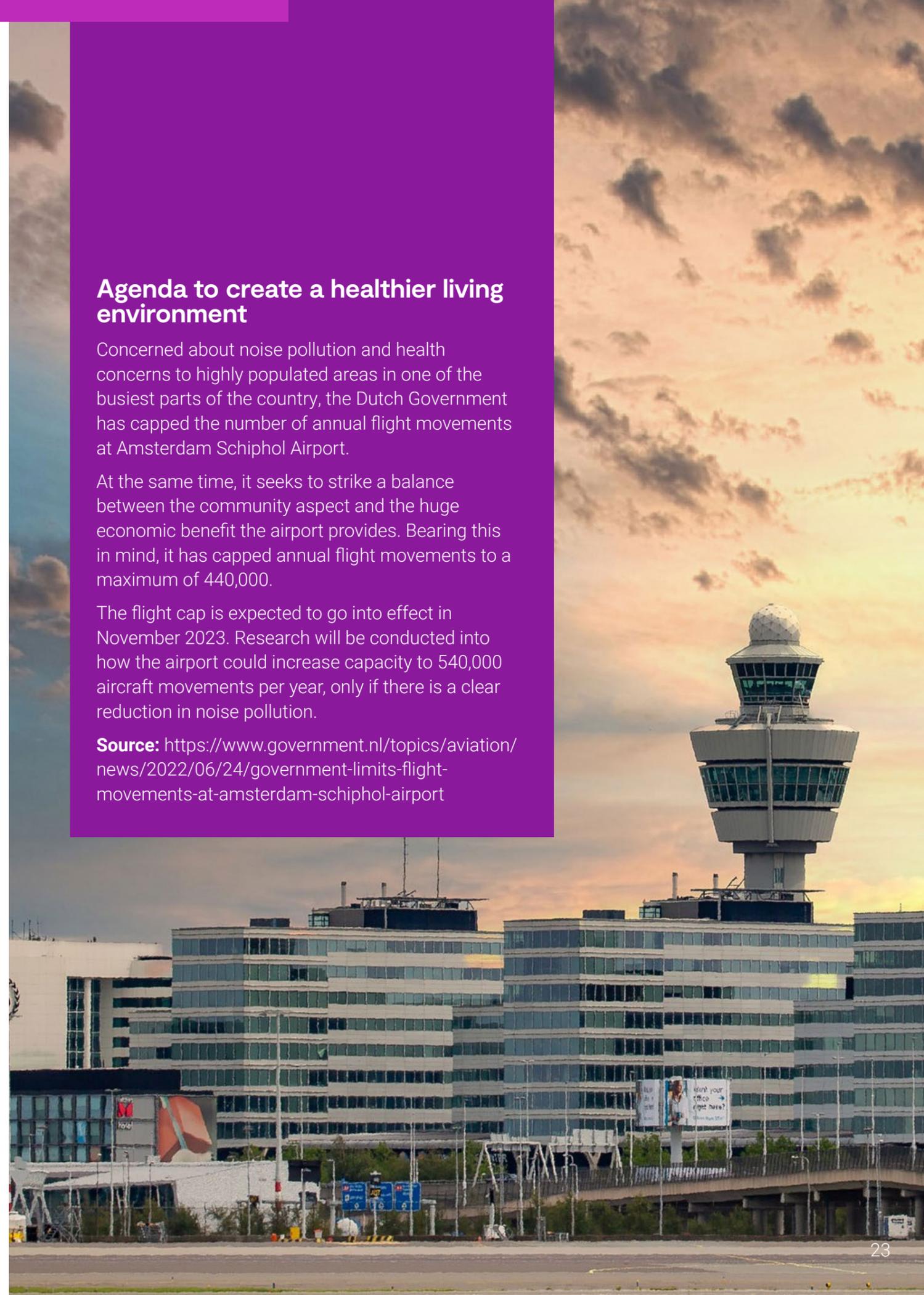
## Agenda to create a healthier living environment

Concerned about noise pollution and health concerns to highly populated areas in one of the busiest parts of the country, the Dutch Government has capped the number of annual flight movements at Amsterdam Schiphol Airport.

At the same time, it seeks to strike a balance between the community aspect and the huge economic benefit the airport provides. Bearing this in mind, it has capped annual flight movements to a maximum of 440,000.

The flight cap is expected to go into effect in November 2023. Research will be conducted into how the airport could increase capacity to 540,000 aircraft movements per year, only if there is a clear reduction in noise pollution.

**Source:** <https://www.government.nl/topics/aviation/news/2022/06/24/government-limits-flight-movements-at-amsterdam-schiphol-airport>



“Shipping in the North Sea is vital for the Netherlands, which has 3,600km<sup>2</sup> of sea routes, approach areas and clearways.”



## Maritime

The Netherlands has always been a strong maritime nation, and a gateway to Europe because of its central position. Its highly advanced maritime sector is of huge importance to the Dutch economy. Subsector clusters include dredging, deep sea, short sea and recreational shipping, as well as maritime supply, shipbuilding, maritime research and hydraulic engineering.<sup>32</sup> The country's maritime sector directly employs around 167,000 people, and indirectly an additional 90,000.<sup>33</sup> Seafaring vessels transport more than half the cargo coming in and out of the Netherlands. Goods are further transported via road, rail, pipelines, and waterways.

<sup>32</sup> <https://maritime-professionals.com/wp-content/uploads/2021/08/The-Netherlands-Home-to-leading-maritime-companies.pdf>

<sup>33</sup> <https://nlflag.nl/business-nl/dutch-maritime-cluster>

Rotterdam Port is Europe's largest port, handling 467.4 million tonnes of cargo in 2022 – only down 0.3% from the previous year despite the significant upheaval to goods flows due to the Russian invasion of Ukraine.<sup>34</sup> It also acts as an external EU border, meaning that freight cleared in Rotterdam can travel freely to other EU member states.<sup>35</sup> It forms a network with the country's other seven major ports,<sup>36</sup> including Port of Amsterdam which has an annual cargo throughput of more than 100 million tonnes.<sup>37</sup>

To boost economic growth, the government wants to invest further in the interconnecting transportation systems.<sup>38</sup> Including further development to Maasvlakte 2 in Rotterdam – a €2.9 billion, 1000-hectare expansion of Rotterdam Port dedicated to distribution facilities, container handling and the chemical industry.<sup>39</sup>

These investments align with the country's social well-being focus, for example, to reduce potential negative air quality from Maasvlakte 2, the government intends to:

- Ban relatively highly polluting inland navigation vessels from 2035,
- Impose a speed limit on various waterway sections,
- Increase port fees for relatively highly polluting inland navigation vessels,
- Establish a low-emissions zone for freight transport – allowing only relatively clean lorries for example.<sup>40</sup>

<sup>34</sup> <https://www.portofrotterdam.com/en/news-and-press-releases/port-of-rotterdam-throughput-virtually-unchanged-in-2022-despite-war-and#:~:text=The%20war%20in%20Ukraine%20led,that%20there%20were%20major%20changes>

<sup>35</sup> <https://www.shipafreight.com/knowledge-series/largest-ports-in-europe/>

<sup>36</sup> <https://www.marineinsight.com/know-more/ports-of-the-netherlands/>

<sup>37</sup> <https://www.portofamsterdam.com/en/business/cargo-flows>

<sup>38</sup> <https://www.government.nl/topics/maritime-transport-and-seaports>

<sup>39</sup> <https://portconsultantsrotterdam.org/portfolio-items/maasvlakte-ii-expansion-of-port-of-rotterdam/>

<sup>40</sup> <https://www.government.nl/topics/maritime-transport-and-seaports/development-of-rotterdam-hub-port>



They also take into account that around one third of the country is below sea level.<sup>41</sup> The Netherlands' draft National Water Programme 2022-2027, sets out a framework for climate adaptation, flood risk management, freshwater distribution and drought, and water quality.<sup>42</sup>

Investments adapting the Netherlands to zero-emission maritime fuels have started to take effect, and in August 2022, the northern Port of IJmuiden was granted the country's first hydrogen bunkering license. This allows Windcat workboats to bunker a Hydrocat 48-crew transfer vessel, powered by hydrogen, to transport construction and maintenance teams to and from offshore wind farms.<sup>43</sup>

On the global stage, the Netherlands plays an active role in shaping international regulations, partnering with the Working Party on Shipping of the Council of the EU,<sup>44</sup> European Maritime Safety Agency (EMSA), and International Maritime Organisation (IMO) (see text box).

This global stage shapes Dutch legislation, with the IMO Convention for the Prevention of Pollution of the Sea by Oil (MARPOL) regulations being embedded in the Prevention of Pollution (Shipping) Act. The same act regulates the use of port reception facilities for ships' waste and oil.<sup>45</sup> Shipping in the North Sea is vital for the country, which has 3,600km<sup>2</sup> of sea routes, approach areas and clearways. It must, therefore, submit a thoroughly prepared shipping route relocation plan to the IMO.

<sup>41</sup> <https://www.netherlands-tourism.com/netherlands-sea-level/>

<sup>42</sup> <https://www.platformparticipatie.nl/nationaalwaterprogramma/ontwerp+nwp/relevante+documenten+nwp+ontwerp/HandlerDownloadFiles.ashx?idnv=2000965>

<sup>43</sup> <https://www.offshorewind.biz/2022/08/11/hydrogen-bunkering-starts-at-dutch-port-offshore-wind-vessel-first-to-fuel-up/>

<sup>44</sup> <https://www.consilium.europa.eu/en/council-eu/preparatory-bodies/working-party-shipping/>

<sup>45</sup> <https://www.noordzeeloket.nl/en/functions-and-use/scheepvaart/>

## The Netherlands' role in the International Maritime Organisation (IMO)<sup>46</sup>

In 2021, the Netherlands was re-elected as a council member to the IMO, the United Nations (UN) agency that sets international maritime shipping regulations. Part of a group of countries that want the sector to be climate neutral by 2050, the Netherlands actively contributes to working groups addressing environmental, climate and safety concerns. Representatives from the Dutch Ministry of Infrastructure and Water Management fill IMO council seats.<sup>47</sup>

<sup>46</sup> <https://www.imo.org/>

<sup>47</sup> <https://www.government.nl/topics/maritime-transport-and-seaports/news/2021/12/10/the-netherlands-re-elected-to-council-of-imo-international-maritime-organisation>

“There is a strong appetite in the Netherlands in commercialising ideas developed within academia.”



## The Innovation Landscape

### Innovation Support

The Netherlands is home to world-leading clusters in health and life sciences, data and artificial intelligence (AI), water management, the creative industries, chemicals and energy.<sup>48</sup> The country’s highly developed innovation landscape includes strong connections between universities, research institutes, advisory bodies and municipal, regional and national governments.

In academia for example, there are collaborations between Leiden University, TU Delft, Erasmus University Rotterdam, and Erasmus Medical Centre.<sup>49</sup>

Times Higher Education’s World University Rankings 2023 data places five Dutch universities within the world’s top 75.<sup>50</sup>

Netherlands Rank 2023	World University Rank 2023	University	City/town
1	59	Wageningen University & Research	Wageningen
2	60	University of Amsterdam	Amsterdam
3	66	Utrecht University	Utrecht
4	70	Delft University of Technology	Delft
5	75	University of Groningen	Groningen

**Source:** <https://www.timeshighereducation.com/student/best-universities/best-universities-netherlands>

<sup>48</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/997458/S\\_I\\_Netherlands-Country\\_Snapshot.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/997458/S_I_Netherlands-Country_Snapshot.pdf)

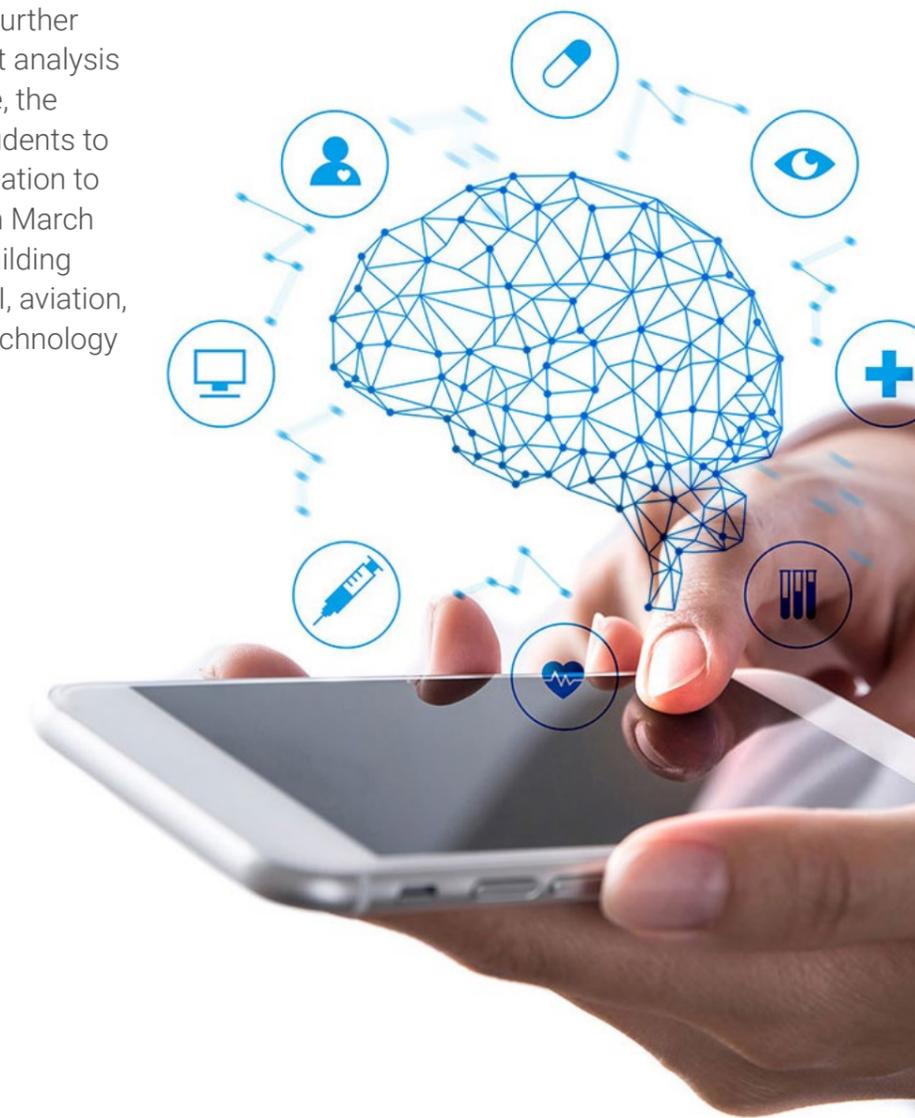
<sup>49</sup> <https://www.government.nl/documents/reports/2021/03/12/dutch-strategy-to-strengthen-research-and-innovation-ecosystems>

<sup>50</sup> <https://www.timeshighereducation.com/student/best-universities/best-universities-netherlands>

Regionally, the country has some strong innovation clusters. Brainport Eindhoven in the Southeast<sup>51</sup> brings together start-ups, knowledge institutes, high-tech businesses, manufacturing companies and the government, in developing high-tech systems, materials and logistics, and areas such as healthcare and life sciences.<sup>52</sup> The city of Wageningen in the central Netherlands, is well-known for its Wageningen University,<sup>53</sup> the only university in the country to focus specifically on 'healthy food and living environment', and Food Valley – one of the world's leading organisations in agri-food.<sup>54</sup> Noordwijk in the west is home to The European Space Research and Technology Centre (ESTEC) – the European Space Agency's main technology development and test centre for spacecraft and space technology.<sup>55</sup> Groningen in the north has been selected as the starting point for nine Hydrogen Valley projects across Europe, to produce clean H<sub>2</sub> for various applications within energy, transport and industry.<sup>56</sup>

The country's wider national research and innovation ecosystem combines talent, financing and public-private partnerships. There are some common areas in the development of ideas between TU Delft, the Netherlands Enterprise Agency (RVO) and the Royal Netherlands Aerospace Centre (NLR), which all work within the area of aerospace innovation. Further information on the organisations the UK GEM delegation visited is provided in Section 6.

There is a strong appetite in the Netherlands in commercialising ideas developed within academia. An example is the YES!Delft incubator developed by TU Delft, where students can pitch their ideas to a committee.<sup>57</sup> If successful, they receive a €2,500 voucher, technical support, and access to coaching so they can further their business – including market analysis and routes to market. From there, the Next Delft programme allows students to take their innovations from incubation to scale-up and growth.<sup>58</sup> Opened in March 2022, the 10,000m<sup>2</sup> Next Delft building includes dedicated clusters for AI, aviation, blockchain, robotics and clean technology amongst others.<sup>59</sup>



<sup>51</sup> <https://brainporteindhoven.com/int/>

<sup>52</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/997458/S\\_I\\_Netherlands-Country\\_Snapshot.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/997458/S_I_Netherlands-Country_Snapshot.pdf)

<sup>53</sup> <https://www.wur.nl/en/wageningen-university.htm>

<sup>54</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/997458/S\\_I\\_Netherlands-Country\\_Snapshot.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/997458/S_I_Netherlands-Country_Snapshot.pdf)

<sup>55</sup> [https://www.esa.int/About\\_Us/ESTEC](https://www.esa.int/About_Us/ESTEC)

<sup>56</sup> <https://www.offshore-energy.biz/nine-hydrogen-valleys-to-repower-europe/>

<sup>57</sup> <https://www.yesdelft.com/about-us/>

<sup>58</sup> <https://www.tudelftcampus.nl/first-tenants-of-next-delft-at-tu-delft-campus-announced/>

<sup>59</sup> <https://nextdelft.com/contact/>



## Funding perspective

The European Commission's Horizon Europe programme is a major source of R&D funding for smart, green and integrated transport, with Dutch organisations being allocated €360 million in the Horizon 2020 programming period of 2014 to 2020.<sup>60</sup> UK organisations were allocated €515 million for the same period.<sup>61</sup>

Another funding initiative supporting the EU's 2030 and 2050 decarbonisation aims is its Connecting Europe Facility (CEF) – an interconnected trans-European transport, energy and digital services network. As well as making travel easier and more sustainable, CEF aims to enhance the EU's energy security, enable the wider use of renewables, and facilitate cross-border interaction between member states. It is funded through financial instruments such as grants, guarantees and project bonds.<sup>62</sup>

In addition to EU funding programmes, an important source of funding in the Netherlands is the National Growth Fund, allocated to projects with the highest potential to yield durable economic growth. A Ministry of Economic Affairs and Climate Policy initiative, the National Growth Fund has earmarked investments of €20 billion into knowledge, research and innovation development projects between 2021 and 2025.<sup>63</sup> The National Growth Fund is very competitive and only open to applications from very large industry consortia, most often including a government department as a project partner. It has the potential to drive impactful, longer-timeframe projects.

In the UK and the Netherlands, there are several innovation funding sources. This fragmentation can make it difficult for innovators to source funding. In the Netherlands, the funding competitions are often quite broad, mainly targeted at all ten Topsectors. In the UK, the funding competitions are often more focused on specific areas and industries.

<sup>60</sup> [https://dashboard.tech.ec.europa.eu/qs\\_digit\\_dashboard\\_mt/public/sense/app/d58f3864-d519-4f9f-855e-c34f9860acdd/sheet/KVdtQ/state/analysis](https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/d58f3864-d519-4f9f-855e-c34f9860acdd/sheet/KVdtQ/state/analysis)

<sup>61</sup> [https://dashboard.tech.ec.europa.eu/qs\\_digit\\_dashboard\\_mt/public/sense/app/d58f3864-d519-4f9f-855e-c34f9860acdd/sheet/KVdtQ/state/analysis](https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/d58f3864-d519-4f9f-855e-c34f9860acdd/sheet/KVdtQ/state/analysis)

<sup>62</sup> [https://cinea.ec.europa.eu/programmes/connecting-europe-facility/about-connecting-europe-facility\\_en](https://cinea.ec.europa.eu/programmes/connecting-europe-facility/about-connecting-europe-facility_en)

<sup>63</sup> <https://www.nationaalgroeifonds.nl/english>

## Policies and Roadmaps

This section provides an overview of some of the policies and roadmaps driving the Netherlands' smart and sustainable mobility agenda.



## The Netherlands

### Civil Aviation Policy Memorandum 2020-2050

The Memorandum (currently draft) stipulates airports may only expand if safety can be guaranteed and nuisance and environmental pollution are reduced. The policy identifies the following public interest areas: safety (in the air and ground), good international connections, an attractive and healthy environment, and an aviation sector that supports the climate targets.<sup>64</sup>

### Aviation in Transition<sup>65</sup>

In collaboration with the Ministry of Infrastructure and Water Management and the Ministry of Economic Affairs and Climate Policy, the Aviation in Transition programme aims to accelerate the path to climate-neutral aviation in 2050. It focuses on the development of lightweight structures and electrical systems and flying demonstrators based on hydrogen combustion and hydrogen fuel cells.

Partly financed by €383 million from the National Growth Fund, Aviation in Transition is supplemented by the same amount from the more than 60 cooperating parties from the Dutch aviation sector.

### HAPSS Programme<sup>66</sup>

The biggest recipient of funds from Aviation in Transition is the Hydrogen Aircraft Powertrain and Storage System (HAPSS). A public-private consortium of 17 Dutch organisations, the HAPSS programme is retrofitting a hydrogen fuel cell propulsion system into 40-80 turboprop aircraft and flying the 750-kilometre distance from the Netherlands to London by 2028.<sup>67</sup>

In another project, fuel cell developer, ZeroAvia, aims to retrofit a hydrogen-powered aircraft and conduct a commercial flight between the Netherlands and the UK by 2024. While airlines already signed up include Alaska Airlines, United Airlines and De Havilland Canada, the project is still seeking regulatory approval.

### Action Program Hybrid Electric Flying<sup>68</sup>

In 2020, the Ministry of Infrastructure and Water Management, in cooperation between government, industry and knowledge and educational institutions, initiated the Action Program Hybrid Electric Flying (AHEV) to accelerate the electrification of Dutch aviation.

With the aim of achieving zero-emission aviation by 2070, the initiative is divided into three roadmaps – Commercial Aviation, General Aviation, and Ground-based Operations at Airports. While each roadmap is independently led and has its own timeline, they are interconnected through AHEV program team member representatives or a seat on the Sustainable Aviation Table.

### Maritime Strategy

The Dutch Maritime Strategy 2015-2025 sets the ambition for the Netherlands to achieve an international sustainable leading maritime position through integral cooperation between the national government and the maritime cluster based on a shared strategy.<sup>69</sup>

<sup>64</sup> <https://www.government.nl/topics/aviation/aviation-policy>

<sup>65</sup> <https://luchtvaartintransitie.nl/over-luchtvaart-in-transitie/>

<sup>66</sup> <https://www.innovationquarter.nl/worlds-first-commercial-hydrogen-powered-aircraft-is-made-in-holland-and-zero-emission/>

<sup>67</sup> <https://simpleflying.com/netherlands-london-hydrogen-flight/>

<sup>68</sup> <https://www.rijksoverheid.nl/ministeries/ministerie-van-infrastructuur-en-waterstaat/documenten/rapporten/2020/03/05/bijlage-1-ontwerp-ahev>

<sup>69</sup> <https://www.government.nl/documents/reports/2015/07/07/the-dutch-maritime-strategy-2015-2025>

### Maritime Masterplan

The Maritime Masterplan is a project to take 40 Dutch vessels of all types and make them emission-free by 2030.<sup>70</sup> It is supported in this ambition by PortXL.<sup>71</sup> A Port of Rotterdam initiative, PortXL is a collaboration of start-ups, scale-ups and corporate partners working towards a maritime roadmap to fulfil the national Green Deal for Sea Shipping, Inland Shipping and Ports initiated by the Ministry of Infrastructure and Water Management in 2019. Along with Port of Rotterdam, notable PortXL partners include Shell and offshore construction firms Van Oord and Boskalis.

The Green Deal includes ambitions and goals to meet targets set by the Paris Climate Agreement and IMO, which stipulates a 50% reduction of CO<sub>2</sub> emissions from maritime transport by 2050 compared to 2008 levels.<sup>72</sup>

### KiM Institute for Transport Policy Analysis

KiM Netherlands Institute for Transport Policy Analysis (KiM) consults on policy at the Ministry of Infrastructure and Water Management. Looking at past and new mobility developments, it builds scenarios, develops trends and makes forecasts. While it works closely with the Ministry's policy departments, KiM is entirely independent, meaning there is no political or policy interference in its work. It publishes all its research projects in the public domain.<sup>73</sup>

It has an extensive 2022 programme of work. Its nine main themes are accessibility, sustainable mobility, urbanisation, modalities, digitisation and innovation, uncertain future, assessment frameworks, data and modelling, and methods. Each is further broken down into several detailed sub-themes allocated against different government directorates. Some examples are road safety, aviation, maritime affairs, public transport, and rail.<sup>74</sup>

<sup>70</sup> <https://maritiemland.nl/en/maritime-master-plan/>

<sup>71</sup> <https://portxl.org/programs/rotterdam/>

<sup>72</sup> <https://portxl.org/news/2030-vision-the-dutch-maritime-masterplan/>

<sup>73</sup> <https://english.kimnet.nl/about-kim/how-we-work>

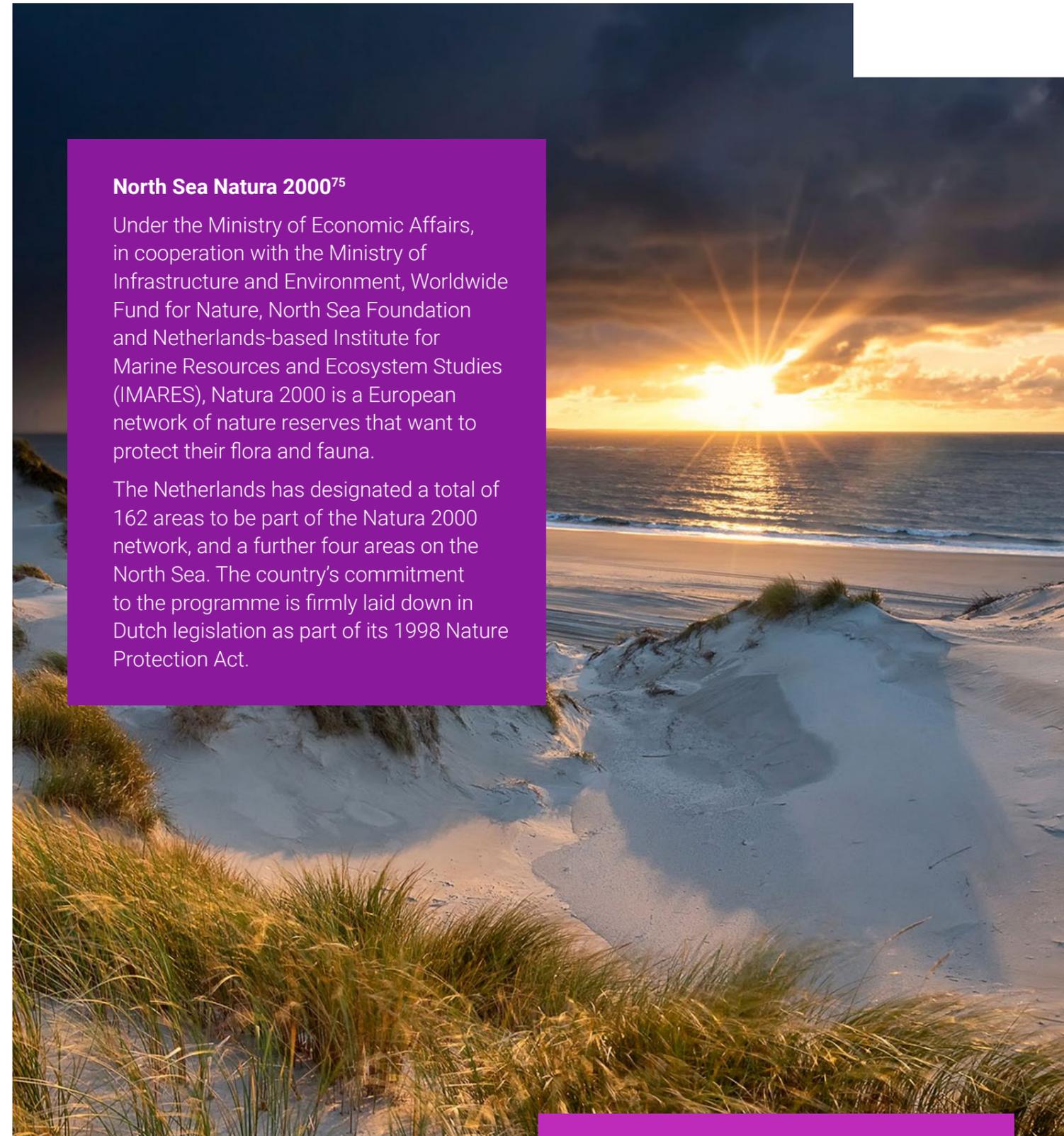
<sup>74</sup> <https://english.kimnet.nl/about-kim/publications/work-programmes/2022/01/11/kim-programme-2022>

### North Sea Natura 2000<sup>75</sup>

Under the Ministry of Economic Affairs, in cooperation with the Ministry of Infrastructure and Environment, Worldwide Fund for Nature, North Sea Foundation and Netherlands-based Institute for Marine Resources and Ecosystem Studies (IMARES), Natura 2000 is a European network of nature reserves that want to protect their flora and fauna.

The Netherlands has designated a total of 162 areas to be part of the Natura 2000 network, and a further four areas on the North Sea. The country's commitment to the programme is firmly laid down in Dutch legislation as part of its 1998 Nature Protection Act.

<sup>75</sup> <https://www.noordzeeloket.nl/en/policy/north-sea-natura-2000/>



## EU

### EU Climate Law

A strong advocate for an ambitious EU climate policy, the Netherlands lobbies extensively, along with other member states, for the targets specified in the EU Climate Law, formally adopted in July 2021.<sup>76</sup>

Broadly speaking, the legislation's intermediate target is to reduce net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels – leading to complete climate neutrality by 2050. The EU has also established a European Scientific Advisory Board on Climate Change to provide independent scientific advice.

### Sustainable and Smart Mobility Strategy

The European Commission (EC) Sustainable and Smart Mobility Strategy comprises 82 initiatives in total across 10 key “flagships,” or action areas.<sup>77</sup> Key targets are time bound leading through to 2050.

2030 targets include having at least 30 million zero-emission cars in operation on European roads, 100 European cities achieving climate neutrality and doubling high-speed rail traffic across the Continent. By 2035, the strategy aims to have zero-emission large aircraft market-ready. By 2050, nearly all cars, vans, buses and new heavy-duty vehicles should be zero-emission, and a fully operational, multimodal Trans-European Transport Network (TEN-T) for sustainable and smart transport with high-speed connectivity should be in place.<sup>78</sup>

### Zero Pollution Action Plan – Towards Zero Pollution for Air, Water and Soil

The EU's Zero Pollution Action Plan – Towards Zero Pollution for Air, Water and Soil contains key targets to speed up reducing pollution at source by 2030.<sup>79</sup>

The plan aims to reduce premature deaths caused by pollution by 55% by improving air quality, reducing waste and plastic litter at sea by 50% and in the environment by 30%, and reducing nutrient losses and chemical pesticides' use by 50% to improve soil quality. Other measures include reducing chronic disturbance by transport noise by 30% and residual municipal waste by 50%.



<sup>76</sup> [https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-law\\_en](https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-law_en)

<sup>77</sup> [https://transport.ec.europa.eu/transport-themes/mobility-strategy\\_en](https://transport.ec.europa.eu/transport-themes/mobility-strategy_en)

<sup>78</sup> [https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t\\_en](https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en)

<sup>79</sup> [https://environment.ec.europa.eu/strategy/zero-pollution-action-plan\\_en](https://environment.ec.europa.eu/strategy/zero-pollution-action-plan_en)

### EU Aviation Safety Agency

The EU Aviation Safety Agency has released its European Aviation Environmental Report 2022, outlining the European aviation industry's environmental performance, with actions taken and recommendations to improve sustainability in the sector.<sup>80</sup>

The report ties into many of the policies and agendas mentioned above. It also discusses the EC's proposal of a sustainable aviation fuel (SAF) blending mandate for fuel supplied to EU airports. This sets minimum shares of SAF gradually increasing from 2% in 2025 to 63% in 2050 and a sub-mandate for power-to-liquid SAF. To achieve this mandate, says the report, around 2.3 million tonnes of SAF will be required by 2030, 14.8 million tonnes by 2040, and 28.6 million tonnes by 2050.<sup>81</sup>

### Strategic Transport Research and Innovation Agenda (STRIA)

The Netherlands actively participates in the EU's transport and innovation agendas. This includes the Strategic Transport Research and Innovation Agenda (STRIA), which outlines where and how the EU needs to collaborate with member states to, as it describes, "radically change transport."<sup>82</sup>

STRIA's priority areas are within electrification, alternative fuels, vehicle design and manufacturing, connected and automated transport, infrastructure, network and traffic management systems, and smart mobility and services. Each of these areas has its own extensive roadmap.<sup>83</sup>

### Clean Aviation Joint Undertaking

The Clean Aviation Joint Undertaking is the EU's leading research and innovation programme to take the sector towards climate-neutrality.<sup>84</sup> Fokker Technologies Holding BV and GKN Aerospace are founding members, and TU Delft is an associated member.

The programme builds on the success of the Clean Sky Joint Undertaking programme. When it ends in 2024, Clean Sky will have delivered more than 1000 technologies, over 34 flagship demonstrators and 106 contributing demonstrators.

### Working Party on Shipping of the Council of the EU

The Netherlands is represented in the Working Party on Shipping of the Council of the EU, which negotiates and prepares shipping legislation. The Working Party prioritises areas including safety and security levels at sea, protection of the marine environment, maintaining seafarer working/living conditions and training standards, and keeping the European shipping industry competitive.

The country also plays a key role as a council member of the IMO (see earlier in this section).

<sup>80</sup> <https://www.easa.europa.eu/eco/eaer>

<sup>81</sup> [https://www.easa.europa.eu/eco/sites/default/files/2023-02/230217\\_EASA%20EAER%202022.pdf](https://www.easa.europa.eu/eco/sites/default/files/2023-02/230217_EASA%20EAER%202022.pdf)

<sup>82</sup> [https://research-and-innovation.ec.europa.eu/research-area/transport/stria\\_en#stria-priorities](https://research-and-innovation.ec.europa.eu/research-area/transport/stria_en#stria-priorities)

<sup>83</sup> <https://transport.ec.europa.eu/system/files/2017-06/swd20170223-transportresearchandinnovationtomobilitypackage.pdf>

<sup>84</sup> <https://www.clean-aviation.eu/who-we-are>





## Bilateral Cooperation

The Netherlands has long been considered a strong trading partner with the UK. In 2021, it was the UK's fifth largest collaborative partner after research and development (R&D) powerhouses such as Germany, France, Italy, and Spain. In the same year, the UK was the third collaborative partner for the Netherlands in Europe, after France and Germany, with 12,246 collaboration links. Between 2011 and 2015, 32,233 publications were co-authored between UK and Dutch researchers – the UK's ninth highest collaboration worldwide.<sup>85</sup>

The UK and the Netherlands also collaborate through multilateral programmes. The Global Research Council<sup>86</sup> is a virtual organisation comprising heads of science and engineering funding agencies globally, which share data and best practice among funding agencies. Through the Belmont Forum, funding organisations, international science councils and regional consortia partner together to advance research across different scientific disciplines (known as transdisciplinary science).<sup>87</sup>

UK and Dutch universities, research institutes and advisory bodies also collaborate, both one-on-one and through multilateral associations, such as the League of European Research Universities (LERU), Science Europe, and the Young European Research University Network.<sup>88</sup>

In 2015, UK-owned GKN Aerospace acquired the Netherlands' Fokker Technologies. Fokker's extensive capabilities in aerostructures, electrical wiring systems, landing gear and services are now fully integrated into the GKN Aerospace business. This provides greater market leadership, increased exposure to key growth platforms, a more comprehensive global manufacturing footprint and stronger technology platform.<sup>89</sup>

<sup>85</sup> <https://www.gov.uk/government/publications/uk-science-and-innovation-network-country-snapshot-the-netherlands>

<sup>86</sup> <https://globalresearchcouncil.org/about/global-research-council/>

<sup>87</sup> <https://belmontforum.org/about>

<sup>88</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/997458/S\\_L\\_Netherlands-Country\\_Snapshot.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/997458/S_L_Netherlands-Country_Snapshot.pdf)

<sup>89</sup> <https://www.gknaerospace.com/en/about-gkn-aerospace/fokker-technologies/#:~:text=Fokker%20Technologies%2C%20founded%20by%20aviation,into%20the%20GKN%20Aerospace%20business.>

In August 2022, Dutch nuclear energy development company ULC-Energy BV signed an agreement with UK-based nuclear power specialist Rolls-Royce SMR, which specialises in developing applications, to develop small modular reactor (SMR) power plants in the Netherlands.<sup>90 91</sup>

In October 2022, a trade mission of more than 45 Dutch organisations visited London, bringing together AI and mobility innovators to discuss how businesses, knowledge institutes, and local and national governments could enhance the fields of AI and sustainable urban mobility solutions.<sup>92</sup>

Dutch organisations continue to be open to collaboration with the UK and vice versa, despite the impacts of Brexit and uncertainty about the UK's association to the Horizon Europe programme – the EU's main research and innovation funding programme running through to 2027 at a budget of €95.5 billion.<sup>93</sup>

Along with the UK and 20 other countries, the Netherlands is also a signatory to the Clydebank Declaration, established in July 2021 with the aim of creating six green corridors by 2025, to meet the IMO's goals of halving CO<sub>2</sub> emissions from maritime transport by 2050 compared to 2008 levels. This aligns with Paris Agreement targets to keep global average temperature increases to well below 2°C above pre-industrial levels and limit the temperature increase to 1.5°C above pre-industrial levels.<sup>94 95</sup>

<sup>90</sup> <https://world-nuclear-news.org/Articles/Collaboration-for-Rolls-Royce-SMR-deployment-in-th>

<sup>91</sup> <https://www.rolls-royce-smr.com/about-us>

<sup>92</sup> <https://www.netherlandsandyou.nl/latest-news/news/2022/10/13/the-netherlands-and-the-uk-intensify-cooperation-on-ai-and-mobility-solutions>

<sup>93</sup> [https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe\\_en](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en)

<sup>94</sup> <https://allaboutshipping.co.uk/2022/03/30/the-clydebank-declaration-green-corridors-kickstarting-the-adoption-of-long-term-solutions/#:~:text=The%20Clydebank%20Declaration%20was%20launched,the%20UK%20and%20the%20US>

<sup>95</sup> <https://www.gov.uk/government/publications/cop-26-clydebank-declaration-for-green-shipping-corridors/cop-26-clydebank-declaration-for-green-shipping-corridors>

The UK and the Netherlands have a long history of successful R&I collaboration through the European Commission's Framework Programme for R&I (most recently called Horizon 2020 and Horizon Europe)<sup>96</sup> and through Eureka.<sup>97</sup> Horizon 2020 supported 16,000 projects involving organisations from both the UK and the Netherlands across all fields of research including sustainable mobility.<sup>98</sup>

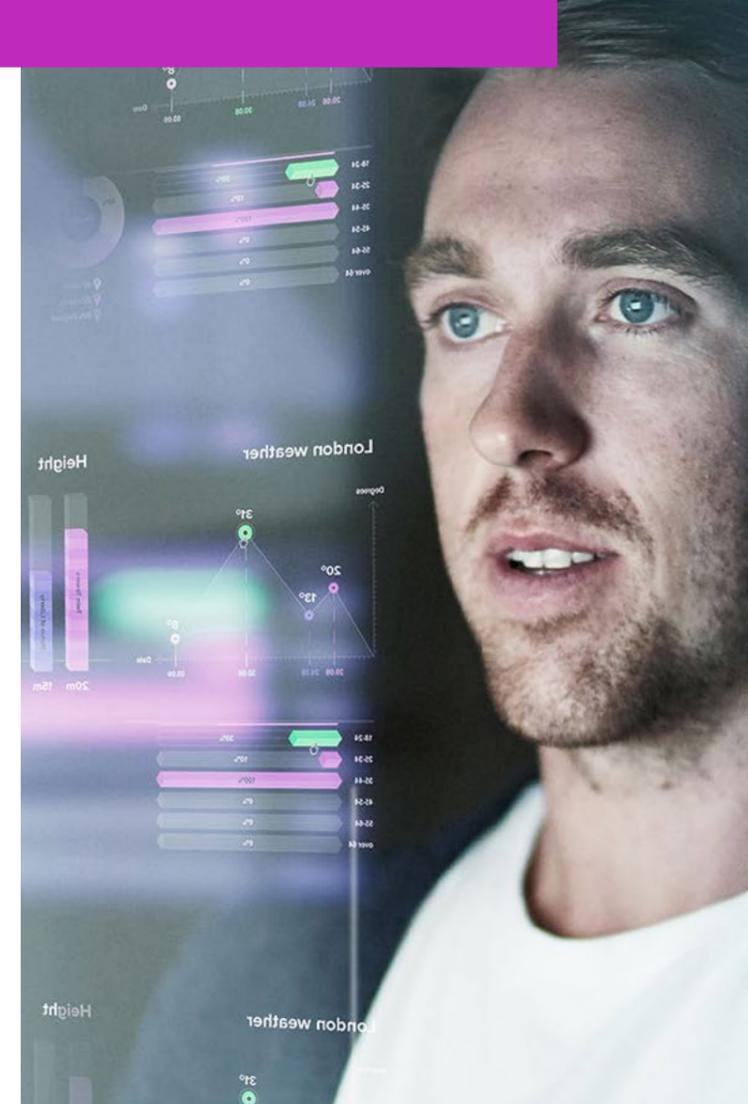
On 7 September 2023, the UK associated to Horizon Europe.

Details can be found at <https://iuk.ktn-uk.org/news/innovate-uk-welcomes-horizon-europe-association-as-a-boost-for-uk-research-and-innovation/>

<sup>96</sup> [https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe\\_en](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en)

<sup>97</sup> <https://www.eurekanetwork.org/>

<sup>98</sup> <https://webgate.ec.europa.eu/dashboard/extensions/CountryProfile/CountryProfile.html?Country=NL>





**“At a budget of €150 million, the Mission D+ initiative is what the Ministry describes as a “sustainable and future proof mobility system.””**

Ministry of Infrastructure and Water Management, The Hague

## In-country stakeholders

### Ministry of Infrastructure and Water Management, The Hague

Within the Ministry of Infrastructure and Water Management (hereafter “Ministry”) are several collaborative Directorates, including the Directorate-General for Aviation and Maritime Affairs, Directorate-General for Mobility, and Directorate-General for the Environment and International Affairs.<sup>99</sup>

In 2018, a new climate agreement was formed and two separate government departments became the Ministry of Economic Affairs and Climate Policy. Public-private partnerships are now at the heart of a new mission-oriented, cross-sectoral innovation policy prioritising societal areas, including affordable and accessible healthcare, sustainable agriculture, climate adaptation and water management, and smart, sustainable mobility. Policymaking involves a wide range of stakeholders across public authorities, industry and academia in a ‘quadruple helix’ innovation model.

With a budget of €150 million for 2022, Mission D+ is what the Ministry describes as a “sustainable and future-proof mobility system,” which aims to bring together a cross-functional team of societal and private partners to keep innovation at the core of policy and the country on the track of decarbonisation.

The visit focused on understanding the policy context and the Netherlands plans for hydrogen and electricity production as key components in the country’s transition to green mobility.

<sup>99</sup> <https://www.government.nl/ministries/ministry-of-infrastructure-and-water-management/organisation>

## Netherlands Enterprise Agency (RVO), The Hague

With five departments across the country, RVO is an agency of the Ministry of Economic Affairs and Climate Policy. It connects government and entrepreneurs to create a network of “collective specialists.”

RVO works with organisations and research centres to understand their challenges and find practical solutions. It issues loans, subsidy schemes, grants and other financial vehicles. Similar to Innovate UK, RVO also works to put policy into practice. It has a vast network and therefore access to contacts, knowledge and funding. With a 6000-strong headcount, it considers its role to be an innovation enabler, while strengthening the country’s economy.

Within maritime, RVO works with the Ministry of Economic Affairs and Climate, with links to the Ministry of Infrastructure and Water Management and Ministry of Foreign Affairs. The maritime sector is separated into three parts – inland shipping, seagoing shipping and ports.

The UK delegation learned about RVO’s activity on assessing the engineering and investment challenges associated with decarbonising aviation and shipping and the projects it is delivering with the support of the National Growth Fund.

<sup>100</sup> <https://www.tudelft.nl/en/about-tu-delft>

<sup>101</sup> <https://www.tudelftcampus.nl/entrepreneurship/bk-launch-startup-voucher/>

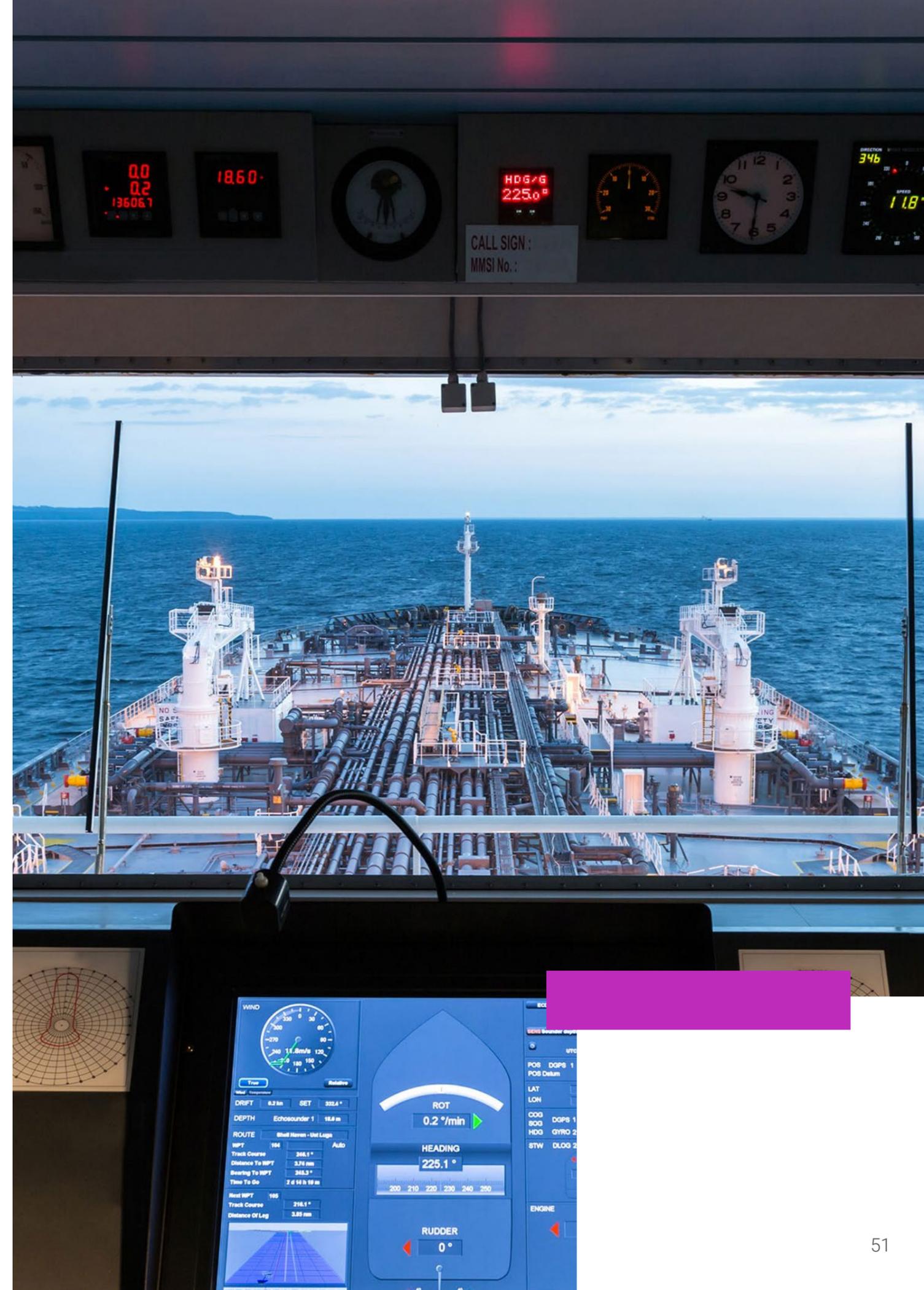
<sup>102</sup> <https://www.yesdelft.com/news/smart-ship-control-decisions-in-real-time/>

## Technical University (TU) Delft

TU Delft is the Netherlands’ highest-ranking technical university. With over 25,000 students, its eight faculties include dedicated Aerospace Engineering and Mechanical, Maritime and Materials Engineering centres.<sup>100</sup>

Like other Netherlands universities, TU Delft has a programme to help students bring innovations to market and develop as entrepreneurs. Through YES!Delft and its BK-Launch Startup Voucher.<sup>101</sup> Third year students can pitch their ideas to a committee. If successful, they receive a €2,500 voucher, technical support, and access to coaches to further their business, including market analysis and routes to market.

TU Delft’s Aerospace faculty specialises in areas including space travel, wind energy and propulsion, and aerospace structures and materials, and has developed some notable innovations. The UK delegation learned about activity related to hydrogen aircraft and drones and about their Smart-Ship<sup>102</sup> innovation.



### Netherlands Organisations for Applied Scientific Research (TNO)

TNO is an independent organisation that assists both government and industry in innovating to achieve societal goals within what it describes as the “three zeros” – zero emissions, zero casualties and zero losses. The latter refers to moving goods across the supply chain with a minimal transportation footprint. The UK delegation toured the facilities, including the structural dynamics lab and heard about TNO’s involvement in two significant EU projects, TULIPS,<sup>103</sup> on zero emissions and zero waste airports, and MAGPIE<sup>104</sup> on renewable fuel and energy carrier innovations for shipping.

### Groningen Airport Eelde

In the north of the country, Groningen Airport Eelde is extremely important to the region’s economy and has several green innovations underway. It works on a mixed funding model – partly from government and from public-private cooperation. RVO (see above) is an important agency for its public-private funding. It also has its own research arm, NXT Airport, which works with regional academic partners to develop green energy, electric flight, zero-emission ground operation and uncrewed flight projects.<sup>105</sup>

The UK airport incorporates solar energy production and export, green hydrogen production and is preparing to run a ground power unit on hydrogen and to receive hydrogen-propelled aircraft. Of particular interest to UK delegates was the EU’s Hydrogen Valley project – a €105.4 million programme initiated by the public-private Clean Hydrogen Partnership under the umbrella of Horizon Europe, to create nine Hydrogen Valleys across the Continent which will produce clean H<sub>2</sub> for various applications within energy, transport and industry.<sup>106</sup>

<sup>103</sup> <https://tulips-greenairports.eu/about/>

<sup>104</sup> <https://www.magpie-ports.eu/>

<sup>105</sup> <https://www.nxtairport.nl/en/>

<sup>106</sup> <https://www.offshore-energy.biz/nine-hydrogen-valleys-to-repower-europe/>



### The Royal Netherlands Aerospace Centre (NLR)

The not-for-profit NLR has been established for more than 100 years and was involved in the early developments of Fokker – now GKN Aerospace. NLR is an independent research institute linking academia and industry, informing government but equally supporting commercial projects. Its extensive facilities across 200 acres include its own test aircraft, airstrip, autoclaves, wind tunnels to measure flight characteristics under all conditions, and flight simulators to teach students and test new technologies. Much of the European fleet has been tested there.

Working across the civil, defence, security, government, automotive and industry markets, NLR is also playing an instrumental role in Destination 2050 (D2050) – a programme to reach net zero CO<sub>2</sub> flight emissions by the same year for all arrivals to and departures from the EU. NLR works closely with Maritime Research Institute Netherlands (MARIN)<sup>107</sup> on maritime and offshore wind projects. For example, it deploys drones to inspect wind turbine blades.

### World Port Centre Rotterdam

Around 30,000 ships call at the Port of Rotterdam annually, in addition to 100,000 inland barge movements. The port itself spans around 25 miles. As a 'landlord' port, its revenue model is based on leasing land to users and collecting a fee for goods loaded into and offloaded from the port. Income is reinvested back into building new infrastructure. While it is home to refineries, chemical plants and oil storage tanks, it is currently going through a huge energy transition from a carbon to a hydrogen-based port.

The UK delegation learned about the port's target to be carbon neutral by 2050, its green corridor activity and the development of a Port Readiness Level scale. Some interesting cross-modal opportunities were also identified. The MAGPIE project, mentioned earlier, revolves around creating 'smart green ports' – efficient and integrated multimodal hubs using green energy transport carriers to, from and within ports<sup>108</sup> The MAGPIE programme also considers how to use cross-modalities best, reducing traffic by using barges or stimulating train transport, and visualising future modalities such as high-speed hyperloop systems.



<sup>107</sup> <https://www.marin.nl/en>

<sup>108</sup> <https://www.magpie-ports.eu/magpie-project/>

The environment would seem to be conducive to running a Global Business Innovation Programme (GBIP).

## 05. Collaboration Opportunities

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The Netherlands and UK are following a similar path in researching future fuel solutions for aviation and maritime. There was also a strong appetite for further conversations around future collaborations in R&D innovation, green corridors and co-funding.

**Therefore, the environment would seem to be conducive to running a Global Business Innovation Programme (GBIP). This is a possible next step from a GEM, where individual UK companies could travel to the Netherlands to discuss collaboration opportunities with specific Dutch entities.**

The meetings with Dutch stakeholders identified several areas where the countries could collaborate. The GEM was an opportunity to convey the UK's interest in collaboration in this sector and the Dutch are experienced in collaborative working.



### **Bridge commercial barriers by working closely with Dutch incubator and accelerator programmes**

UK delegates observed a strong connection between Dutch academia and industry. Examples are YES!Delft and Next Delft, where TU Delft, in conjunction with industry, provide the most enterprising graduates with office space, testing apparatus and coaches to support them on routes to market and other ways to further their business.

This provides a strong framework to bring innovative ideas to fruition and for looking at an issue from both a current and future perspective. A stipulation of gaining subsidies in the Netherlands is that academic institutions collaborate with industry. There is scope to link this activity with incubator programmes run by UK universities and Innovate UK's Global Incubator Programme. <sup>109</sup>

Both TNO and Port of Rotterdam run accelerator programmes. There is an opportunity to explore synergies with UK accelerators and to develop a cross-country roadmap for SMEs to provide access to markets and minimise duplication between UK and Dutch programmes.

<sup>109</sup> <https://www.innovateukedge.ukri.org/enter-new-markets/Global-Incubator-Programme>

### **Cross-modal opportunities including demand aggregation**

The cross-modal approach to the GEM provided an opportunity for representatives of the maritime sector to visit and talk to stakeholders from the aviation industry and vice versa. Delegates observed that, while Dutch stakeholders briefly mentioned an integrated transport plan – moving goods from vessels to road or rail, for example, there was much less direct cross-modal discussion between maritime and aviation. This is despite the similarities between both sectors when it comes to fuel pathways and decarbonisation challenges. So, there are opportunities to bring both sectors into the same discussion. Topics might include demand aggregation or joined-up thinking on fuel options between seaports and airports within close proximity.

### **Green air and sea corridors**

Given the proximity of the UK and Netherlands, there are significant opportunities to create green air corridors to demonstrate new hydrogen-powered aircraft. There are activities to realising such green corridors where collaborative R&D between the UK and the Netherlands would be beneficial. The two countries could then potentially 'twin' airports to conduct flying demonstrations and share know-how in other R&D areas.

The Netherlands is also a priority country for the development of green shipping corridors with the UK. There is potential to translate the political statements made as part of the Clydebank Declaration into joint projects to develop detailed plans to establish green corridors between the UK and partner countries.

## 06. Potential Barriers to Collaboration

### Delay in Horizon Europe association

During the meetings, there was a strong mutual desire to collaborate through Horizon Europe – the most straightforward way for organisations from the UK and EU member states to collaborate on R&D projects.

In the aftermath of Brexit, UK organisations can still participate in Horizon Europe projects with funding provided by the Horizon Europe Guarantee Scheme while negotiations continue on the UK's association with the scheme. The delegation clearly emphasised that UK businesses are very open to Horizon Europe participation. It is important to ensure this message is widely disseminated to minimise any impact from the delay in association.

On 7 September 2023, the UK associated to Horizon Europe.

Details can be found at <https://iuk.ktn-uk.org/news/innovate-uk-welcomes-horizon-europe-association-as-a-boost-for-uk-research-and-innovation/>

### Differing funding models

The Netherlands's strong alignment with the EU significantly increases the amount of funding available and enables greater access to EU markets to exploit opportunities. The National Growth Fund is a cross-sector fund which allows industry to pitch in for funding across any of the government's strategic priorities. In the UK, funding is split across smaller funds dedicated to particular sectors. This means Dutch organisations can pitch for much higher-value projects, potentially leading to more impactful, ambitious programmes in the longer term. Bidding for funding in the UK is more competitive and strategic.

On the other hand, while funding for Dutch programmes hinges largely on the National Growth Fund, it was less clear in discussions with Dutch stakeholders how and when such funds would be administered. The danger of the Dutch model is that everyone is vying for one single source of funding. Another possible limitation is that while some areas may receive the funding they need, others may be underfunded.

The differing approaches to funding mean that it may be challenging to set up bilateral funding programmes.

### Varying priorities and resources

Despite a willingness from UK delegates, there have been some challenges in connecting with Dutch stakeholders to organise follow-up meetings, e.g. on co-financing R&D projects.

There has been some engagement and interest in holding workshops on particular topics and sharing learnings. The feasibility will depend on finding specific topics of mutual interest and resources being available to deliver the activity.



## 07. Conclusions

Over the five days of the GEM, meetings and discussions between the UK delegates and Dutch stakeholders reinforced the cultural alignments and spirit of cooperation that have historically existed between the two countries. All organisations involved had the opportunity to learn about each other, share their experiences and discuss in some depth how they might be able to align their respective resources and skills to meet their common decarbonisation goals.

It was clear that Dutch organisations welcome the opportunity to establish bilateral activities with the UK. UK delegates also had the opportunity to meet each other and form valuable cross-sector relationships.

Challenges remain, however. The biggest is possibly the status of the UK to the EU's main funding mechanism, Horizon Europe. While UK delegates emphasised they are able and keen to participate in Horizon Europe projects, negotiations at UK government and EU level are still ongoing. In the interim, UK organisations can participate in Horizon Europe with funding from the Horizon Europe Guarantee Scheme. The challenge is ensuring UK organisations and their European counterparts know the facts on UK participation.

With much of the research and technologies to safely create, transport, store, deliver and use future energy sources for mobility still in development, regulation will be a key issue to address. It makes sense for the UK, Netherlands and a wider international network to jointly develop regulatory frameworks that suit cross-border frameworks. A good example of the need for standardisation was at Groningen Airport Eelde, which had found that its electrical charging fittings were sometimes incompatible with those of visiting aircraft.

Regarding the GEM's objectives, it was notable that there was much discussion on decarbonisation technologies and clear opportunities to collaborate in both the aviation and maritime sectors. These could be focus areas for a Global Business Innovation Programme.

There was less opportunity for discussion on cross-modal opportunities, demand aggregation, or the continuation of green corridors through road and rail networks. Further exploration of collaboration on these topics is needed before planning future activities.

Challenges remain, but the Netherlands GEM was an extremely valuable exercise that yielded several ideas and specific recommendations on how both public and private sector entities from both countries can collaborate and form partnerships towards a more sustainable future.

On 7 September 2023, the UK associated to Horizon Europe.

Details can be found at <https://iuk.ktn-uk.org/news/innovate-uk-welcomes-horizon-europe-association-as-a-boost-for-uk-research-and-innovation/>



#### CONTACT

### Helen Fairclough

Knowledge Transfer Manager - Global Alliance  
Innovate UK KTN

[helen.fairclough@iuk.ktn-uk.org](mailto:helen.fairclough@iuk.ktn-uk.org)

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