

Innovation Missions Report 2023

MAX. OPER. TEMP. 1

Netherlands

NL

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Introduction

Innovation missions are an important driver for reaching the goals set in the Mission-Driven Topsector and Innovation Policy of the Dutch Government. For instance, by organizing innovation missions we can illustrate to potential partners abroad that The Netherlands should be one of the first countries of choice for innovation and technology cooperation. This is important because collaboration between business, universities, and governments from across the world is crucial in tackling national and global challenges such in climate, healthcare, agriculture, and security.

This annual report provides an overview of the innovation missions that were organized in 2023. The report will show a diverse range: outbound as well as inbound missions, driven by different sectors (sometimes co-organised with industry organisations) and in close collaboration with the Netherlands Innovation Network (NIN) and the Netherlands Agricultural Network (LAN)

Missions 2023

With the funding and support by the Ministry of Economic Affairs and Climate Policy and the Ministry of Agriculture, Nature, and Food Quality, the Innovation Missions team of the Department of International Innovation Cooperation of The Netherlands Enterprise Agency was able to organize 21 innovation missions to 13 different countries. By creating opportunities for Dutch firms, universities, and governments to collaborate with partners abroad, the innovation missions have played an important part in building the partnerships that can help to address the societal challenges of today and tomorrow, and to further develop the technologies that are essential in doing so. In the following chapters, we will provide a management summary and more detailed summaries of each of the innovation missions carried out in 2023. We have thematically structured these on the following themes:

- Energy Transition & Sustainability
- Key Enabling Technologies
- Life Sciences & Health
- Cyber, Defence & Water Security
- Agriculture, Nature & Food Quality



Benefits

As this report will show, participation in an innovation mission can bring many benefits in a short time:

- Knowledge about the state of specific research in the target country or a region;
- Meetings with potential partners in the field of innovation and technology;
- Insight into local policy and local investment programs ;
- Advice on possible connection to international (financing) programs like PIB, EEN, Horizon Europe, Eureka/Eurostars;
- Growth of the participants' international network.

Thank you for reading and we are looking forward to another successful innovation mission year in 2024.

Tong Jiang

Coordinator Team International Technology and Innovation Missions
Team MATCH

Management Summary

Energy Transition & Sustainability

In 2023, we organized seven missions on: Battery Technology Electric Vehicles (in United States), Floating Offshore Wind (in France), Hydrogen (in Israel, South-Korea, United States/Canada), Circular Integrated Photovoltaics (in Germany), and Biological Refineries (in Brazil). Each of the missions are of specific interest to the Ministry, the Topsectors, and/or the Dutch network of business, research, and innovation. For instance, each of the hydrogen missions followed-up on past year's missions and helps NL to further strengthen its objective in making hydrogen a key future energy carrier. Both Israel, South-Korea, and United States/Canada are actively investing in hydrogen technologies, and have developed a strong ecosystem of hydrogen-focused organizations. Similarly, the missions on battery technology, offshore wind, circular and integrated photovoltaics, and biological refineries focused on accelerating the energy transition towards a more sustainable society. All missions resulted in several leads for Dutch businesses and research. For instance, memorandum of understandings were signed between individual organizations during the Battery Technology mission to the United States, while opportunities for bilateral collaboration (including) R&D calls between Brazil and The Netherlands, and France and The Netherlands were further strengthened during the Biological Refinery mission to Brazil, and the Floating Offshore Wind mission in France.

Key Enabling Technologies

To strengthen bilateral collaboration in the domain of key enabling technologies, we organized five missions including a Sustainable Aviation mission to Brazil, a Semicon, Quantum, Photonics, Nanotechnology mission to Japan, and missions on Integrated Photonics and Advanced Packaging in Taiwan, Sustainable Aviation in Germany, and Quantum Technology in the United Kingdom. Both Brazil and Germany have vibrant aviation ecosystems and both intend to further innovate in this domain such as on sustainability, autonomous flying, hydrogen technology, and composites. Moreover, the mission in Japan and Taiwan both focused heavily on chip design, heterogeneous integration, packaging and integrated photonics. Both of these missions resulted in ample opportunities for the Dutch ecosystem to collaborate with Japanese and Taiwanese partner organizations due to new GlobalStar calls, and, for Japan in particular, a possible pre-PPS and PIB on DeepTech. Finally, the mission in the United Kingdom on Quantum Technology resulted in strengthened bilateral collaboration between The Netherlands and The United Kingdom as a result of the signing of a NL-UK Memorandum of Understanding.

Life Sciences & Health

We organized two Life Sciences & Health missions, in Switzerland and India. Both were essential for furthering international research and innovation cooperation. In Switzerland, the mission focused on furthering collaboration between local Swiss and Dutch ecosystems such as RegMedXB, and OncoCode-PACT and to work towards a multiannual bilateral agenda. This is a strong ambition for Topsector LSH. Between India and The Netherlands such a strong bilateral agenda is already existing, in which a KIA, amongst others healthcare, is shared by both the countries (WAH!). During this mission, we specifically focused on strengthening collaborations on Oncology & ICT such as sharing and using data in treating patients. Both missions resulted in several leads. For instance, in 2024, NWO and the Indian Council for Medical Research (ICMR) will launch a KIC research call, a mission-driven program, with an intended budget of 3 million euros.

Cyber, Defence & Water Security

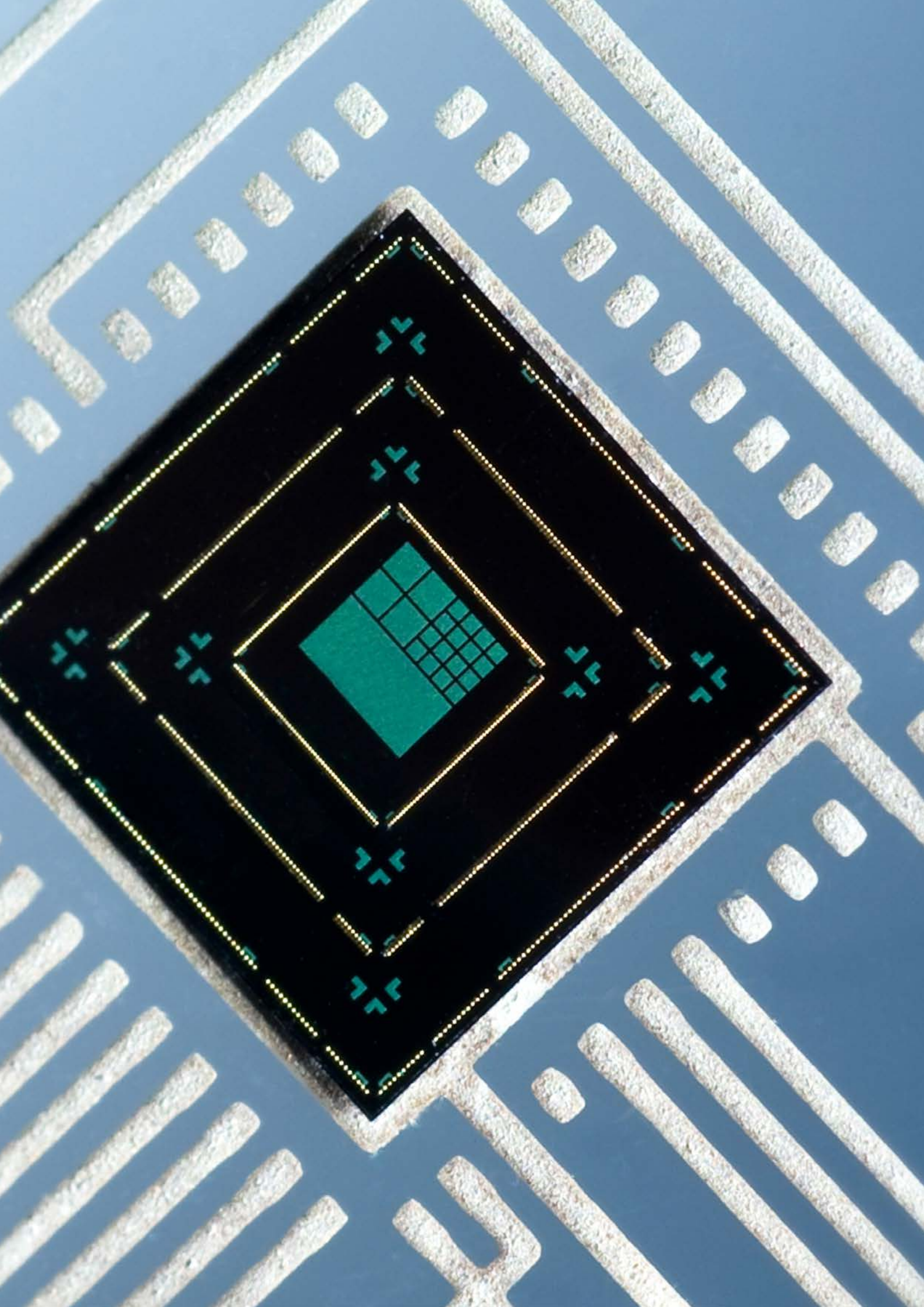
We organized one European Defense Fund mission in France. EDF is set up to develop defense, technological and industrial capabilities on a European level with common technical standards and specifications. France has a large and innovative defense industry with many OEMs, and is therefore a key partner for The Netherlands. The mission helped to further strengthen bilateral relations between both countries.

Agriculture, Nature & Food Quality

For the Ministry of Agriculture, Nature, and Food Quality, we organized six missions on Digitalization and Robotization in France and the United Kingdom, and Alternative Proteins in Canada, Germany, and Chile. We also organized a mission in The Netherlands on Greenhouse Robotics where we received a Japanese delegation. Each of these countries have strong ecosystems, and are important partners for strengthening the Dutch sector and helping Dutch researchers and companies with their internationalization strategies. For instance, the agrifood markets of The Netherlands and Germany are mutually important markets, while the missions in Canada and Chile helped to further strengthen and explore alternative protein markets including seaweed. Alternatively, the missions in France and the United Kingdom helped to further explore opportunities in digitalization and robotization, which is important to further strengthen the transition towards sustainable food production. Each of the missions resulted in concrete leads. For instance, the missions to France and the United Kingdom have resulted in pre-PPS proposals being explored and further specified, whereas the Japan mission has led to a PPP proposal that is currently being prepared to be submitted to Topsector Horticulture & Starting Materials.

Table 1. Overview of Innovation Missions

Domain		#	Country	Contacts
Ministry of Economic Affairs and Climate Policy	Energy Transition & Sustainability	7	Brazil, Canada, France, Germany, Israel, South-Korea, United States	117
	Key Enabling Technologies	5	Brazil, Germany, Japan, Taiwan, United Kingdom	79
	Life Sciences & Health	2	India, Switzerland	18
	Cyber, Defence & Water Security	1	France	11
Ministry of Agriculture, Nature, and Food Quality	Agriculture, Nature & Food Quality	6	Canada, Chile, France, Germany, Japan, United Kingdom	68



Ministry of Economic Affairs and Climate Policy

Innovation Missions Ministry of Economic Affairs and Climate Policy 2023



15 Missions

12 Countries



Contribution to SDG's





Energy Transition & Sustainability

Battery Technology Electric Vehicles (Outbound, United States, 07-12 May)

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Background

Next generation battery technologies, as a component of zero-emission vehicles, are widely recognized as a foundation towards meeting zero-emission goals in the United States. Substantial research is being invested in advancing next-generation battery technologies to both transform the energy and mobility economies but also as a means of reinvigorating the US position in innovation. The recently passed Inflation Reduction Act will drive heavy investment opportunities in zero-emission vehicles, particularly in new research to grow and strengthen domestic opportunities in next-generation batteries – creating opportunities for Dutch companies to take advantage of new opportunities in an emerging value chain. An innovation mission will introduce players on the cutting edge of next-generation battery innovation from the design and development of new batteries to strategies for the reuse and recycling of batteries and identify opportunities for Dutch companies large and small to collaborate, grow, and maintain a competitive edge. The Netherlands has specifically identified next generation battery technology on the national level in the Climate Agreement and the associated Multi-year Mission-oriented Innovation Program on Sustainable Mobility and Integral Knowledge and Innovation Agenda. The HTSM Roadmap has also listed next-generation battery systems as a key area. The Netherlands also participates in several multigovernmental initiatives focused on electric vehicle research and adoption, such as the Transport Decarbonization Alliance, the Hybrid and Electric Vehicles Technology Collaboration Program, the Electric Vehicle Initiative, and the ZEV Alliance.

Summary

This fact-finding visit is focused on next generation batteries. Substantial research and business are done in California (both San Francisco and LA). The program and delegation are developed in partnership with the battery competence cluster. In San Francisco the visit kicked off by discussing the US battery landscape, its roadmap, and policies. Under strict NDA signings several companies were visited: from Tesla up to scaleups like Cuberg. On specific topics, university battery labs were visited to get a better understanding of the new battery innovation paths that are currently being explored. Lessons learned and next steps will be input for the international agenda of the growth fund batteries program, starting in January 2024.



Floating Offshore Wind (Outbound, France, 03-06 July)

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Background

Several reports have identified opportunities for NL and FR cooperation in bottom fixed and floating offshore wind structures. With regards to bottom-fixed wind farms the report identified opportunities for Dutch companies in installation, while in floating wind the report pointed towards collaboration opportunities in R&D. France has the ambition to become a leader in floating offshore wind and is the only European country to have allocated revenue support for commercial-scale projects. President Macron announced in February 2022 that the goal is to equip France with about 50 offshore wind farms for a total of 40 gigawatts by 2050. Every year the French government considers allocating additional offshore wind capacity. In April 2022 Wind'OCC invited Dutch knowledge institutes and companies for a learning expedition to Occitanie. During this expedition, a strong wish for cooperation between Dutch (TNO, MARIN) and French research institutes and companies was expressed and a MoU between HHWE and Wind'OCC was signed to strengthen the cooperation on floating wind between NL and Occitanie. France has also started tenders for (commercial) floating wind farms in the deep waters of the Atlantic Ocean (Brittany) and the Mediterranean Sea (Occitanie). Recent activities as described above indicate that there are great opportunities for Dutch knowledge institutes, maritime contractors (installation companies) and suppliers. Moreover, the Netherlands has expertise to offer thanks to our well-established offshore wind and oil & gas sectors.

Summary

The Dutch delegation was a good mix of companies, universities, and knowledge institutes, each having a keen interest in the recent developments in the floating offshore wind (FOW) sector in France and participating actively in all round tables and workshops. The program was organized in close cooperation with organizations from Occitanie including the regional development agency AD'OCC and the FOW association Wind'Occ. The programme comprised round tables and workshops in Toulouse and Montpellier with several companies, the universities INSA Toulouse and Montpellier and the R&D institute CEA. The programme included a field visit to Port-la-Nouvelle, which has 2 pilot farms under construction. The innovation mission brought a lot of new insights into R&D&T, innovations, challenges, need for integration of new technologies. The mission resulted in many new contacts for the Dutch delegation. The delegation was also impressed by the state of the art of innovations and the decisions that France has made in support of FOW, which showed that much importance is on collaboration between government and industry along the value chain to prepare for scaling. On another important note: France is actively searching for collaboration to realize their FOW ambitions. For NL this is relevant because we have a strong maritime industry, while France has a huge potential in the FOW sector. For example, the pilot farms and testing facilities are valuable for collecting experience and generating data for design processes and system requirements.



Hydrogen

(Outbound, Israel, 04-09 June)

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Background

Since May 2020 several hydrogen related events have been organized such as hydrogen courses, a series of NL IL mini symposia on hydrogen and energy transition, a hydrogen valley summer school, and an IL hydrogen mission to NL. These activities significantly increased interest in IL. IL recently signed international agreements, such as the Abraham Accords and its regional solar-water and gas agreements with Jordan and Egypt. IL's recently operating gas fields can be a source of blue hydrogen as well as natural gas for NL. IL is part of the Middle East and North Africa (MENA) region and as such gifted with plenty of solar energy which can be used to develop green hydrogen. IL is a technology powerhouse and develops innovative technology in the fields of energy transition in general and particularly hydrogen as well as AI, bigdata and blockchain. These technologies can be used to manage the vast amount of data related to the energy sector, such as its production in different sites worldwide, its transportation around the globe, its storage worldwide, its uses at any given point in time, its origin. IL is a world leader in the field of cybersecurity, which could contribute to the protection of NL's critical infrastructure, such as its seaports, hydrogen & Natural Gas (NG) pipelines and more. Finally, there is a need to reach global climate goals; IL could play an important role in showcase advances at platforms such as COP27 and COP28. In summary, this

mission is geared to develop bilateral R&D cooperation, to facilitate trade opportunities and to contribute to regional geo-political developments in which the NL/EU is already engaged. Additionally, taking the global energy crisis into account, the mission can help NL diversify its energy resources, such as importing green and blue hydrogen from IL as well as natural gas. IL is an excellent partner due to its complementary technology developments which can contribute to all NL's mission-driven innovation policies.

Summary

This mission is a follow-up of the 2022 hydrogen mission to The Netherlands, the NL-IL hydrogen symposium, and the hydrogen valley summer camp. The delegation consisted of TKI New Gas, TU/E, Gasunie Infrastructuur, GroenvermogenN, Hydrogen Architects, Impact Hydrogen, Optics11, Port of Amsterdam, ROSEN Europe, RWE and SoluForce). We visited Israeli companies and institutions to identify opportunities for collaboration. During each visit there was a range of pitches and discussions. In addition, the delegation met 45 Israeli involved in hydrogen related entities during a B2B event, where several topics like Climatech, Energytech and cybersecurity were discussed.



Hydrogen

(Outbound, South-Korea, 12-16 September)

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Background

South-Korea has embraced the hydrogen economy several years before the Netherlands started. It started with the Hyundai hydrogen car, but it has expanded. Billions of euros are being invested by the government and private sector to make hydrogen a large part of the energy mix. The recently elected President has not changed the hydrogen course that his predecessors set out. Technology is being developed, pilot cities are implementing projects and strategic partnership are being forged. Large Korean companies are investing in replacing fossil fuel by hydrogen. Within 10 years, South-Korea should be a big part of the energy mix. South-Korea is actively looking for partners. Production, transportation, storage, and trade of hydrogen are major topics in this. Just like in other major sector such as semiconductor, offshore and electric transportation we are not really competitors; the Netherlands and South-Korea are complementary to each other in hydrogen. This allows for joint R&D projects, joining (pilot) projects in South-Korea, and exchange of knowledge, policy, and experience. For hydrogen, I&W is looking beyond Europe for partnerships. They too see that developments in South-Korea are going fast and they would like to get connected with these in sectors as aviation, maritime (inland and sea) and road transportation. Furthermore, South-Korea has launched the Clean Hydrogen Trade Initiative. Together with other countries (including NL), South-Korea wants to prevent (trade) barriers from making H2 expensive. EZK is connected to this initiative.

Summary

This mission was a follow-up on the 2022 (outbound) Hydrogen Innovation Mission and relates closely to the earlier ROK-NL Hydrogen Webinar as well as the Trade Mission 2023 led by Ms. Liesje Schreinemacher, Minister for Foreign Trade and Development Cooperation of the Netherlands. This year there was a 9-person delegation comprised of companies, namely: Bronkhorst, Demaco, OCI Global, Powall, Prodrive Technologies and Strohm. Some of these companies are already present and active in South Korea. Several new connections were established during the visits. The delegation was present at the H2Meet (largest hydrogen conference in South Korea) with a NL Pavilion. During this conference there were several seminars and presentations as well as many entities representing production, utilization, and deployment & distribution of the hydrogen sector. The conference was coupled with matchmaking facilitated by EEN followed by a visit to Ulsan Free Economic Zone which serves as the national hydrogen test bed city. Throughout the mission many opportunities for collaboration were identified and many potential leads and connections were discussed. The highlights of the mission, amongst several pitches and presentations, were the H2meet matchmaking, hydrogen industry seminar, gala dinner, and knowledge exchange seminar. Another highlight was the visit to the Ulsan Technopark, Fuel Cell Center visit, and Hyundai Heavy Industry visit.



Hydrogen

(Outbound, United States/Canada, 02-06 October)

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Background

Hydrogen takes a central role in the energy and decarbonization strategies of the U.S. and Canadian governments at both the federal and local level. At the U.S. federal level, the Bipartisan Infrastructure Law of 2021 and the recent Inflation Reduction Act make billions of dollars available for hydrogen hubs and hydrogen innovation. In Canada, hydrogen innovation is accelerating due to the establishment of a multi-billion Strategic Innovation Fund. Similar support for hydrogen innovation is found at the local level in the regions targeted for this mission: British Columbia and California. British Columbia has a world-leading hydrogen and fuel cell sector with several high-profile companies with headquarters located in the province. Investments in British Columbia are stimulated by a CAD 500 million investment fund and a CAD 100 million investment in a new Centre for Innovation and Clean Energy. In California, investments in hydrogen projects have primarily been in the context of California's strong history of air quality regulations, cap, and trade program and its zero emission vehicle goals. California already has the largest fleet of Zero Emission Buses in the USA and aims to build a network of 100 hydrogen refueling stations. Several market studies show ample opportunities for cooperation and connections in the field of innovation in relation to electrolysis and fuel cell technology, storage, and mobility. Equally important, the existing ties between the North American and Dutch hydrogen sector are living testimonies of the potential of a mission of Dutch companies and institutes to California and British Columbia. Since the publication of the Dutch hydrogen strategy in March 2020, hydrogen has become a key topic in the energy, climate, industrial and innovation policy of

EZK. International collaboration is an important part of the Dutch hydrogen strategy. Not only for securing sufficient imports of hydrogen, but also in the field of innovation. Another relevant aspect is that NL already has agreements (MoU and Statement of Intent) with both Canada, and U.S., to work together on hydrogen technology innovation. Both agreements focus on innovation/R&D, infrastructure, offshore energy/hydrogen, and joint action at the multilateral level. The mission would thus be an important part of the implementation efforts for both agreements.

Summary

This mission was partly a follow-up to the 2022 Virtual Hydrogen Mission and partly a factfinding mission as there was no prior physical visit to the hydrogen sector in this region. A small but representative delegation of hydrogen experts, from Brainport Eindhoven, EoxTractors B.V., Port of Rotterdam, RWE, Summit Engineering and TNO Holst Centre, spent 5 days in Vancouver and San Francisco. In this time the delegation met with several academic researchers, government representatives and officials. Several visits also took place to a factory for fuel cells, electrolysis, and heavy-duty vehicles. An important conclusion of the delegation was the clear focus in North America on the immediate reduction of emission, instead of the European long-term goal of zero-emissions. The Dutch companies were impressed by the scale of investments and activities and the variety of technologies used (including H₂ from municipal waste) in the limited number of projects carried out by commercial companies in North America. Europe is focusing more on high-tech solutions.



Circular and Integrated Photovoltaics (Outbound, Germany, 28-30 November)

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Background

Germany heavily invested in research and innovation on different types of PV technology for many years. Recently, R&D spending began to pay off and PV industry is emerging again including production capacity for PV modules in Germany (Meyer Burger and others). German policy makers see the need to set up a complete production chain to speed up production and to become less dependent in energy supply as well in the production of PV installations. In addition, PV is still a growth market and there are opportunities to start producing innovative and R&D intensive type of cells and modules in EU such as heterojunction and perovskite. The new (green) minister of BMWK Habeck is discussing the foundation of a IPCEI PV with the industry and research institutions. Besides, German government recently removed several legal obstacles to the expansion of roof-mounted photovoltaics. Registration with the grid operators is to be simplified, small systems are to be allowed to feed in an unlimited amount of electricity, tenant electricity PV is to be allowed to be larger in size, and certain systems operated by citizen energy companies are to be exempted from the tendering obligation. Partial feed-in from building integrated PV systems is to become more lucrative. EZK has similar policy goals as the German government and supports the production of PV in the Netherlands to (1) enable to reach climate goals, (2) promote strategic autonomy in the energy-domain and (3) create a future proof industry with a strong position in the value chain for PV production. The Netherlands are – just like Germany – currently discussing participation in the European IPCEI on PV. Foremost, EZK is developing a

National Growth Fund proposal on solar energy covering PV integrated in the build environment, circularity, lightweight PV, and improved solar cell efficiency. The Innovation mission to Germany in 2023 can accelerate these activities within the National Growth Fund proposal by strengthening its international ambitions.

Summary

Businesses in Europe have built a strong position in new technologies such as tandem solar cells, integrated solar cells and circular solar panels. This is particularly the case for Germany. For instance, new German policies support the development of solar panels along the entire value chain. Regulations have been amended to facilitate the expansion of PV in buildings. Goal of this innovation mission was to learn more about these developments and to make contacts with parties in Berlin, Bitterfeld, Halle and Dresden. In these regions in particular, R&D and the production of solar cells and solar panels play an important role. The mission was coordinated in close collaboration with members of the SolarNL consortium and partly tailored to their interests. During the mission, we visited the Helmholtz Institute Berlin, Meyer Burger GmbH, Fraunhofer Center for Silicon PV CSP, and LuxChemTech. Besides these visits, there was ample opportunity for networking specifically during the DE-NL networking event on Solar PV organized by the NL Embassy in Berlin, and NL and Saxony Solar PV networking event in Dresden, organized by Saxony.



Biological Refineries

(Outbound, Brazil, 11-15 December)

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Background

Bio-based materials are a crucial factor to enable a climate-neutral and circular economy. They can replace primary fossil and mineral resources in the chemical industry, construction of buildings and other infrastructures or in the production of fuels for aviation and shipping. Brazil is a world leader in the production and use of biomass. It has a strong innovation cluster with expertise of upgrading and efficiently using biomass for, among other things, the production of biopolymers. The Brazilian government identified bioenergy and biorefinery as one of the top priorities for strengthening Brazil's competitiveness and contributing to climate goals.

The Netherlands and Brazil have a long-standing cooperation on innovations for the use of biomass energy. The visit of Prime Minister Mark Rutte to Brazil in May 2023 has pushed biorefineries and biobased chemicals and materials to the top of the bilateral agenda, and ChemistryNL has identified Brazil as a priority country for cooperation on innovation to use bio-based materials for chemical products with maximum added value. The innovation mission is part of a longer cooperation linked to ChemistryNL, the growth fund proposal BioBased Circular and Mission Innovation for Integrated Biorefineries.

Summary

A delegation of over thirty representatives of companies, knowledge institutes and governments visited Brazil to intensify the ties in the transition to a biobased economy. Different site-visits include sugar mills with 2nd generation bio-ethanol production facility, research centers with focus on feedstock for biorefinery processes, Braskem the largest chemical company of South America, renowned for its production of biopolymers. Just to name a few. A matchmaking session was organized to connect the Dutch delegation with its potential partners from Brazil.

During the mission, EZK signed an agreement with Brazilian ministry of science, technology and innovation to intensify collaboration with respect to the greenification of their economies, meaning that both countries will partner to exchange expertise, to set up new bilateral R&D and pilot projects and to collaborate for global regulations and incentives.

Table 2. Overview of Energy Transition & Sustainability Innovation Missions (1)

Country	Objectives	Topics	Participants	Rating	Contacts
United States	<ul style="list-style-type: none"> Acquire insight into next-generation battery technologies, and share best practices in technology development Acquire insight into demands and priorities for the US battery ecosystem Present NL as a leader and attractive country Identify a draft roadmap for R&D cooperation between industry and academic sectors. 	<ul style="list-style-type: none"> Innovations in battery design, production, manufacturing, packaging, recycling Novel battery monitoring systems and technologies Emission guidelines 	14	7.6	12
France	<ul style="list-style-type: none"> Bring industry, knowledge institutes (TO2), start-ups & scale-ups, SMEs and (local) government of both countries together to exchange information on research and development (R&D) in France and the Netherlands on floating wind Exchange knowledge on cutting edge technology Identify potential collaboration partners in R&D and develop projects. 	<ul style="list-style-type: none"> Turbine optimization Operational design methods Port logistics & strategy Heavy lift maintenance FOW capacity densities Serial production and automation 	18	8.4	13
Israel	<ul style="list-style-type: none"> Identify areas for collaboration in the field of hydrogen production, transportation, and storage with public, private and government institutions Learn from IL's startups in the field of green hydrogen production Discuss possible contribution of IL's desalination and/or cybersecurity industry to NL's electrolyzer and protection of hydrogen infrastructure Identify open Horizon Europe and FCH-JU calls to apply for EU funding Explore whether IL could supply NL with blue hydrogen by conversion of IL natural gas exported to Egypt to hydrogen. 	<ul style="list-style-type: none"> Hydrogen production (H2Pro, Hydrolite, QD-Sol) Academic cooperation Hydrogen off-takers (Bazan, Sonol, GenCell) Hydrogen transportation Hydrogen valleys (ICL, MAFAT) Policy and regulation Cybersecurity 	11	9.1	31
South-Korea	<ul style="list-style-type: none"> Further explore and develop concrete projects and research collaboration Work on leads developed during previous missions and webinars Find concrete new business leads in Korean projects Further the position of NL as a strategic partner 	<ul style="list-style-type: none"> Development, production, and recycling of batteries Application of lightweight materials Technologies for connected, and automated mobility 	6	8.6	20

Table 2. Overview of Energy Transition & Sustainability Innovation Missions (2)

Country	Objectives	Topics	Participants	Rating	Contacts
United States/ Canada	<ul style="list-style-type: none"> Physical follow-up for the participants of the virtual hydrogen mission to British Columbia and California of December 202 Follow-up of the government-to-government agreements on hydrogen between the Dutch government and Canada/US Showcase the Dutch hydrogen sector and provide confirmation of Dutch leadership position in the field of hydrogen Provide a foundation for new collaborations and investments between Dutch and North American companies and institutions Intensify collaboration between knowledge institutions and companies 	<ul style="list-style-type: none"> Fuel cells Electrolysis Heavy-duty vehicles Emission reduction Investments Bilateral collaboration 	6	8.4	17
Germany	<ul style="list-style-type: none"> Bring together key projects from the built environment (cities, highways, and agriculture) Support National Growth Fund' international ambitions Identify potential areas for collaboration in modular production, construction aspects, flexible specialized local production Build understanding of local developments and key actors in PV industry and applications in build environment Align research activities and identify potential partners for European projects Exchange policy ideas about bilateral or European cooperation (e.g., in EUREKA) 	<ul style="list-style-type: none"> Circularity of solar panels with focus on recycling Integration of solar panels in buildings Tandem solar cells Rebuilding a European PV industry 	22	8.6	11
Brazil	<ul style="list-style-type: none"> Identify areas for collaboration and possible future R&D opportunities and specifically the NWO – FAPESP bilateral PPS call Better understanding of the different actors in the Brazilian ecosystem Better understanding of how the Brazilian ecosystem works and how it is developing Further explore and develop concrete projects and research collaboration within the NWO – FAPESP call and beyond Further explore and develop possible projects and leads developed during the mission, including also bilateral investments 	<ul style="list-style-type: none"> Circular and sustainable bio-based resources, including through recycling of bio-based materials. Integrated biorefineries Innovations for bio-based chemical building blocks, biopolymers, and advanced biofuels 	28	8.4	13



Key Enabling Technologies

Sustainable Aviation (Outbound, Brazil, 16-21 April)

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Background

The world's third largest airplane OEM is based in Brazil: Embraer. Over the past years the relationship between Embraer and the Netherlands has become more profound. The Embraer EMEA headquarters is in Amsterdam, KLM/Air France is the largest customer in Europe, recently the Dutch Ministry of Defense announced to buy 5 Embraer C-390 military transport airplanes. The CEO of Embraer Commercial Aviation is a Dutchman: Arjan Meijer. The relationship is strong. The Brazilian aviation cluster is built around Embraer and Embraer determines the direction. This direction points towards sustainability and innovation in urban mobility. Embraer aims at three lines of sustainable flying in the future: full hydrogen; hybrid (hydrogen and electric) and full electric. Embraer has announced that it plans to strongly participate in the National Growth Fund on sustainable aviation with a significant investment on the development of flying on hydrogen. Next to this high-tech development in military and security is being pursued as well as new innovations in urban mobility concepts (Embraer-X) which involves autonomous flying and AI applications. Several R&D and innovation already links between several knowledge institutes and universities already exist such as with TU Delft, TNO and NLR, and Twente University with ITA, a leading Brazilian technological institute on aviation. The same hold for several high-tech companies. Some of these collaborations have been formalized with MOU's such with the NAG, NLR, TNO and Fokker Services and Fokker Techniek. The C-390 deal, Embraer's engagement and investment in the National Growth Fund and new avenues in autonomous flying and mobility concept

create opportunities for the high-tech Netherlands aerospace ecosystem. The mission contributes to the societal challenge of clean and sustainable aviation and competitive aerospace sector in the Netherlands. It contributes to a political priority of mitigating climate change by making air travel more sustainable. A priority for both the ministry of EZK and I&W.

Summary

This visit is focused on both sustainable aviation and military aviation. The world's 3rd largest airplane OEM is based in Brazil: Embraer. The relationship between Embraer and the Netherlands has become more profound. The EMEA HQ is in Amsterdam, KLM/Air France is its largest European customer, and the Dutch Ministry of Defense announced to buy 5 Embraer C-390 military transport airplanes. The Brazilian aviation cluster is built around Embraer. Therefore, the program is focused on Embraer roadmap discussions and visits with organizations in its value chain. Embraer has announced that it plans to participate in the National Growth Fund on sustainable aviation (LiT) with investments. EZK/I&W will meet board members to discuss commitments. Also new urban mobility concepts are discussed incl autonomous/AI flying (Embraer-X)



Semicon, Quantum, Photonics & Nanotechnology (Outbound, Japan, 18-23 June)

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Background

Japan is one of the major semicon players and has (like US and NL) a domestic ecosystem that covers the whole semicon value chain, from (chemical) materials to (analytical and production) equipment and silicon wafers and from packaging to (end user) applications. JP is internationally in the research forefront for e.g., photonic-electronic convergence and ultra-low voltage equipment. Japan is one of the major investors in next generation semiconductors that answers need in terms of capacity and sustainability. In terms of economic security and resilience, semiconductors are indeed crucial for the Japanese economy that relies much on digitalized sectors like electronics and automotive. Consolidating strategic autonomy, technological leadership and indispensability are keywords for JP government, industry, and knowledge partners in industry and innovation policy, business decision making and research focus. Within polarizing development due to the US-China tech-war, JP is recently increasing attention to the promote side, to international collaboration with (like minded) countries. For example, JP government recently attracted Taiwanese TSMC to JP, for production (with Sony) and research (with AIST). A Netherlands-Japan Working Group Semicon is planned to start in October 2022, to work out concrete plans towards collaboration (promote). Multiple parallels with NL policy: focus on open strategic autonomy, strong knowledge base, future oriented business/innovation etc. This is closely connected to the IPCEI semicon projects and the EU Chips Act, as well as the Growth Fund proposals for integrated photonics.

Summary

This innovation mission was particularly large in terms of delegation (with a mix of companies, research institutes, policymakers, and stakeholders of national programs such as QDNL, PDNL and PIB Nano). During the mission we visited several institutes, companies a large conference, and a networking event with 140 participants. A parallel program was organized for bilateral talks between Dutch and Japanese policymakers to further structure semicon collaboration. Finally, we visited the area of Kyushu, which is an important Japanese semicon hub, and we participated in networking events.



Integrated Photonics & Advanced Packaging (Outbound, Taiwan, 04-08 September)

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Background

The Netherlands is a global leader in advanced photonics technology (photonics integrated circuit (PIC), photonics packaging, fiber optic sensing (FOS)) looking for partners for scaling up and developing new applications. Taiwan on the other hand, is world's No. 1 in semiconductor foundry (such as TSMC & UMC, about 70% of global market share) and packaging & testing (ASE Group, about 50% of the global market share). Taiwan is a crucial partner to bring the NL technologies to mass production. Furthermore, Taiwan is very experienced in new product introduction, and cost reduction in this field. Photonics has been identified as one of the KETs in the Dutch HTSM sector for it directly contributes to solutions for our societal challenges, and the Netherlands is well known as a pioneer and innovator in this field for a long time. In 2022, NL announced to invest in the photonic-chip industry from both public and private investment which includes € 470m from NL's National Growth Fund. It will be used to create photonic start-up companies and scale up photonic-chip production to encourage development of new photonic applications. Taiwan is specifically mentioned in its "internationalization" chapter to stimulate further development. Furthermore, NL supports the EU Chip Act and aims to develop chip production in Europe. Taiwan plays a crucial role in the production/ manufacturing of chips and will therefore be the most important partner to establish a local supply chain. NIN Taiwan is actively involved on the topic of Photonics since 2016 with several events that have occurred since then such as missions, EUREKA GlobalStars calls, and the NWO-NSTC partnership.

Summary

The delegation consisted of several key players in the industry including CITC, PITC, TU/E, University of Twente (Mesa+), PHIX, Smart Photonics, SCIL, OostNL and PhotonDelta. During Day 1, NLOT organized a NL-TW Innovation Cooperation Conference in which both NL and TW companies and research institutes were able to present their latest insights on advanced packaging and integrated photonics. On Day 2, we visited the National Taiwan University of Science of Technology (NTUST). As NTUST does not have facilities for chip manufacturing, the Dutch ecosystem could provide them with processed wafers. This visit was followed by a 'Team Semicon NL' Business & Innovation Roundtable in which the Dutch innovation delegation was able to provide input to the Dutch government delegation on the accessibility of semicon and photonics in Taiwan from their perspective. This in turn could be used by the government delegation in high-level conversations with the Taiwanese government. On Day 3, we participated in the SEMICON Taiwan, Taiwan's main conference on semiconductors that aims to connect Taiwan and the global microelectronics ecosystems, and facilitate collaboration between industry, government, academia, and research institutions. On Day 4, we visited the Industrial Technology Research Institute (ITRI), enabling the delegation to learn more about the state-of-the-art research performed at ITRI on packaging and photonics. ITRI saw this as an opportunity to stress the importance of collaboration. This is likely to help in the success of a new GlobalStars call as targeted for 2023/2024. On Day 5, the delegation visited ASE, the leading provider of semiconductor manufacturing services in assembly and testing. This showed us that semicon assembly and testing companies (like ASE) are increasingly exploring the field of integrated photonics. Overall, the participants were satisfied with mission, program, and the opportunities it offered them.



Sustainable Aviation (Outbound, Germany, 11-14 September)

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Background

The strategic goal of the German government is the climate-neutral production, operation, and maintenance of aircraft. By implementing the coalition agreement to “use revenues from the aviation tax to promote the production and use of CO2-neutral electricity-based aviation fuels as well as for research, development and fleet modernization in aviation”, The German government is creating a boost for climate-neutral aviation. The German government is funding and pushing for the several activities to transition. Continuous improvement of the efficiency of aircrafts, their components, and the aviation system. Development of climate-neutral powertrains based on hydrogen and fuel cell technology (technical feasibility to market availability). Promotion of the manufacturer and supplier industry along the entire value chain. Germany and the Netherlands share the same ambitions and strategic goals with respect to innovation and sustainable development for the aviation sector. The Dutch growth fund proposal is in line with the German ambition to consistently direct the Federal Government’s key research and development instruments for aviation and the aviation industry towards technologies that contribute to reducing the climate impact of air transport. The innovation mission to Germany contributes to the ambitions of the Growth Fund proposal. Also, the policy goals of the Dutch Ministry I&W with respect to sustainable, climate-neutral aviation and pollution reduction are targeted by the mission. The missions’ goals and focus will be coordinated with policy advisors from EZK and I&W.

Summary

This visit is focused on the (‘ZEROe’) R&D objectives of the largest Aircraft manufacturer in Europe: Airbus. An important part of its ecosystem is established in Hamburg. Several space technologies, situated in Bremen, are enabling technologies for this new type of liquid hydrogen powered aircrafts with supporting infrastructure technologies at airport and seaports. The delegation consisted of both companies and knowledge institutes from the aviation industry, and organizations representing Dutch airports. The visit is co-organized with HTSM partner NAG (who has an MoU partnership with Airbus and is active in NGF ‘Luchtvaart in Transitie (LiT)’. There was also close involvement from EZK I&K. Tjerk Opmeer (Director International Programmes RVO) was part of the delegation.



Quantum Technology

(Outbound, United Kingdom, 01-03 November)

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Background

The UK's quantum market has a longstanding reputation and is expected to grow as part of updated National Quantum Programme in which 2.5B will be invested in quantum for the next 10 years. QDNL has also defined the UK as one of the priority countries for the Netherlands because of its highly relevant knowledge clusters, abundant talent, and available capital for start-ups. To strengthen collaboration with the UK in a post-Brexit constellation, IA London together with QDNL have engaged in a number of strategic activities since 2021 such as the visit of Dutch Delegation during the Quantum Computing Summit in 2021 and 2022, attending high-level Quantum receptions and the National Quantum Showcase to broaden connections with the UK government, facilitation of in-person bilateral meetings with the UK government and QDNL as a first step towards drafting a bilateral agenda in June 2022, attending of the Quantum.Tech conference, organization of a NL-UK Quantum roundtable in October 2022 to build on the bilateral agenda, organization of a research visit from the UK to NL during the launch of House of Quantum in November 2022. An innovation mission is an excellent way to consolidate the investment and efforts made to strengthen bilateral collaboration.

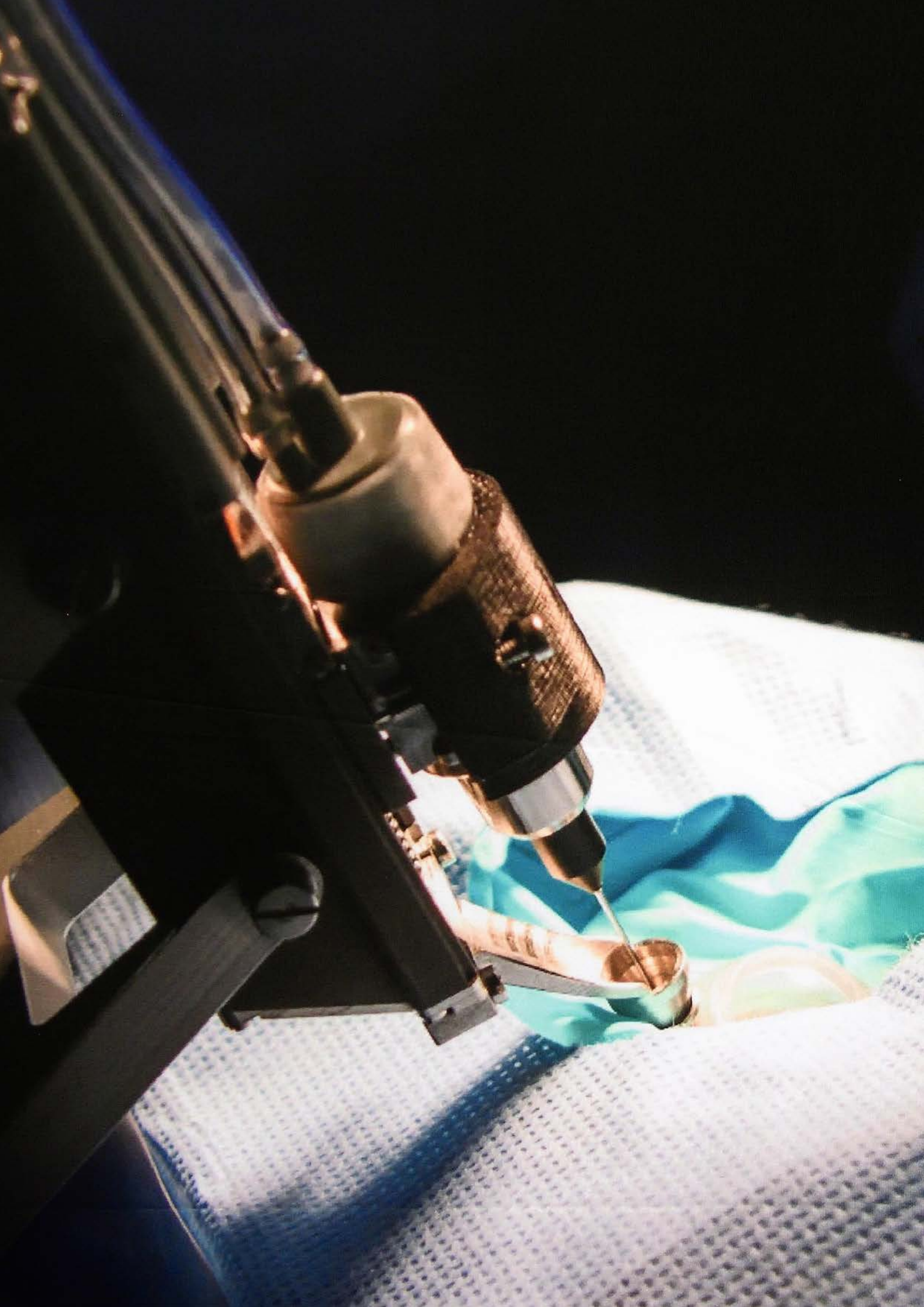
Summary

The delegation consisted of many players of the Dutch quantum ecosystem including TU Eindhoven, TU Delft, University of Amsterdam, University of Twente, TNO, Delft Circuits, Fermioniq, House of Quantum, MicroAlign, OostNL, Orange QuantumSystems, PhotonFirst, Quantum Gateway Foundation, Quix Quantum, Single Quantum. During Day 1, we visited the Harwell Science and Innovation Campus, the leading campus in the UK on science and innovation. We visited several of the facilities and there was opportunity for networking with administrators and inhabitants of the Campus such as UKRI, ISIS, Moderna, Oxford Sciences, Oxford Instruments, Element 6, Nanopore, and The National Quantum Computing Centre. After the visit, InnovateUK presented an overview of the UK Quantum Landscape, the strategic direction of the UK, and potential funding opportunities. On Day 2, the delegation participated in the UK National Quantum Technologies Showcase, the flagship event of the UK's quantum community that features several of the UK's most exciting projects across the quantum landscape and demonstrates advancements in the commercialization and industrialization of quantum in the UK. After the Showcase, there was ample opportunity to network with UK partners during the QDNL network event. During Day 2, a Memorandum of Understanding was signed between The Netherlands and the UK to further collaborate in the quantum domain. On Day 3, we visited the National Physical Laboratory, the UK's National Metrology Institute, providing the measurement capability that underpins the UK's prosperity and quality of life.



Table 3. Overview of Key Enabling Technologies Missions

Country	Objectives	Topics	Participants	Rating	Contacts
Brazil	<ul style="list-style-type: none"> • Further explore and develop concrete projects and research collaboration within the framework of the National Growth Fund project • Further explore and develop possible projects and collaboration that arise from the C-390 deal 	<ul style="list-style-type: none"> • Sustainable aviation (LiT) • Military aviation • Further collaborative relationships between Embraer and NL • New urban mobility concepts (e.g., autonomous/AI flying) 	20	8.4	15
Japan	<ul style="list-style-type: none"> • Stimulate bilateral NL-JP strategic partnerships and business/research collaboration in fields like advanced materials, analytical and production equipment, next-generation semiconductors, integrated photonics, and application • Contributes to the commercial and knowledge position of both countries in the sectors that are driven by digitalization (i.e., semiconductors) 	<ul style="list-style-type: none"> • Chip Design • Heterogeneous integration • Advanced packaging • Integrated photonics 	28	8.3	14
Taiwan	<ul style="list-style-type: none"> • Facilitate existing calls, including 2018 EUREKA GlobalStars Photonics, 2021 NWO-MoST Joint call and 2022 EUREKA GlobalStars collaboration projects. • Connect R&D strength of the NL to competitive manufacturing expertise in Taiwan and support demonstration projects • Explore collaboration opportunities on the next generation semiconductor (e.g., compound semiconductor, advanced packaging) • Address new opportunities for photonics in the areas of applications, manufacturing, advanced packaging, and semiconductor materials in Taiwan 	<ul style="list-style-type: none"> • Advanced Packaging • Integrated Circuits • Chip Design, Production & Assembly • R&D Collaboration 	10	8.7	29
Germany	<ul style="list-style-type: none"> • Strategically position Dutch know-how and the Dutch aviation ecosystem within the R&D activities of Airbus' ZEROe program for the development of future sustainable aircrafts, and at their suppliers and contributing knowledge institutions. • Explore and develop concrete projects and research collaboration with Airbus and other key players. 	<ul style="list-style-type: none"> • Hydrogen Aviation • Hydrogen Technology • Composites • Collaboration 	19	8.3	11
United Kingdom	<ul style="list-style-type: none"> • Improve insight in local ecosystem (e.g., Harwell Campus), innovative development and opportunities in quantum technology • Strengthen bilateral collaboration between policy, business, and knowledge institutes • Explore opportunities for public-private collaboration 	<ul style="list-style-type: none"> • Quantum Sensing • Quantum Communication • Quantum Computing • Funding • Bilateral Collaboration 	22	8.3	10



Life Sciences & Health

Life Sciences & Health Ecosystems (Outbound, Switzerland, 20-22 March)

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Background

Switzerland's industry and research community have a strong focus on themes in which NL has recently made big investments through the National Growth Fund (NGF): BiotechBooster (valorisation), Health-RI (health-data), RegMedXB (Regenerative Medicine) and Oncode-PACT (Oncology) and Pharma (PharmaNL). This offers opportunities for Dutch pharmaceutical innovation ecosystems. The top sector Life Sciences & Health has the ambition to connect the two LSH ecosystems in a more strategic approach, with the program of cooperation between the Netherlands and Massachusetts/Boston as leading example. Working towards a multiannual bilateral agenda. Switzerland is one of Netherlands' most relevant partners in (life sciences & health) research and innovation cooperation. This is illustrated by the extensive collaborations in Horizon2020 and Switzerland being #2 collaboration partner in Eurostars SME-programme. Strategic investment in the bilateral R&D relationship has recently become even more important, since Switzerland is not eligible for Horizon Europe, as it has not signed the agreement with the European Union to become a third country associated to Horizon Europe. Switzerland and the Netherlands have similar missions concerning the improvement of health in old age, the proximity of healthcare to people's homes and the life quality of people with chronic diseases. Both investing in relevant key enabling technologies contributing to societal health and care challenges. International cooperation may help in

achieving these missions. The relevance of Switzerland is recognized by the Dutch LSH community, which has identified Switzerland as a priority country for the Top Sector. Therefore, connecting ecosystems is ambitious by the Top Team LSH. The program aligns with the ambition to internationally position the initiatives funded by the National Growth Fund. These strategic public-private partnerships (Health-RI, Oncode/Oncode-PACT, BiotechBooster, PharmaNL, RegMedXB) will be involved in next steps. Also, a link could be made with the pilot 'internationalising topsectoren' Organ-on-Chip.

Summary

As a step in building a strategic relationship between both LSH ecosystems, together with Innosuisse and Basel Area Business & Innovation, a high level strategic round table is organized on March 20, 2023 in Basel, titled: The ingredients for successful Life Sciences collaboration in the development of cell & gene therapy. High-level representatives from Switzerland and the Netherlands shared their thoughts and discussed possibilities in the context of the proposed collaboration. With the goal to identify strengths and complementarity of the Swiss and Dutch advanced therapy ecosystems. During the program we identified and discussed the practical preconditions for successful ecosystems, such as optimal valorisation & scaling of start-ups, streamlining of regulations, swift market access, healthy investment conditions and a climate of cross border (R&D) collaboration, and to discuss next steps for a possible joint agenda on innovative therapies development.



Oncology & ICT

(Outbound, India, 20-24 November)

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Background

Healthcare is a priority sector for strategic investment in both the Netherlands and India. Growing market opportunities in India, combined with the Netherlands' strengths in areas such as Digital Health, Medical devices and Diagnostics create excellent opportunities for partnerships that address shared societal challenges with smart solutions. India's growing focus on technology and entrepreneurship combined with improvement in investment climate contributes to the factors that make India an attractive partner for the Netherlands. The field of oncology & digital technology has been a working theme for the last five years, in which it has become part of our Knowledge and Innovation Agenda, institutional connections have been made, research programs have been set up by institutional partners, and a track of our virtual Innovation Mission KETs (2021) was dedicated to it. The Netherlands and India share a Knowledge and Innovation Agenda (KIA), which is set up by EZK, NWO and RVO on the Dutch side, and DST, DBT and MeitY on the India side. The Agenda is called WAH! and has Healthcare and Key Enabling Technologies (besides Water and Agriculture) as key areas for cooperation. In roundtables with experts and academic from both India and Netherlands on the programming of this agenda, non-communicable diseases like cancer and cardiovascular diseases, and digital solutions in these fields, were agreed as priority areas in the health sector. The mission also strategically connects with the Mission-driven Top Sectors and Innovation Policy. The strategic PPPs are highlighted as national infrastructures of high importance for innovations contributing to the Health & Care missions stated in the KIA Health & Care of the top sector Life Sciences & Health. Strengthening international collaboration through disease-related and/cure related PPPs such like Oncode, Health-RI, NLAIC is one of the aspired deliverables in this Health and Care mission, and in particular for submission III. People with chronic diseases. India is a priority I country for the top sector Life Sciences & Health (Health~Holland). India's strategy perfectly aligns with KIA and the above mentioned WAH! ambitions.

Summary

The field of oncology & digital technology has been a working theme for the last five+ years, in which it has become part of the bilateral investments. Institutional connections have been made, research programs have been set up by institutional partners, and a track of our virtual Innovation Mission KETs (2021) was dedicated to it. This innovation mission focusses on the collaboration opportunities with India, matching the Dutch ambitions to build an integrated health data infrastructure for research and innovation (Health-RI), and with that translate data into valuable insights to improve oncological and palliative care (IKNL) and innovating and accelerating the development of new cancer diagnostics and therapies (Oncode Accelerator). One of the objectives was to increase collaboration opportunities around a large KIC research call to be launched by NWO and the ICMR on the addressed topic of data & oncology. The delegation consisted of approximately twenty experts from Dutch top universities, companies, and organizations such as KWF, IKNL, NKI, NWO, and ZonMw. On the Indian side, they visited leading entities such as the ICMR, the National Health Authority (NHA), IIIT Delhi, the Centre for Development of Advanced Computing (CDAC), and the Tata Memorial Centre. Symposia were organized in Delhi, Pune, and Mumbai in collaboration with the host parties, while the Dutch embassy and the CG in Mumbai hosted networking receptions. The delegation gained further insights into how AI and machine learning applications are developed at prestigious technical universities such as IIT Bombay and IIIT Delhi. This includes predictive models that assist doctors in making more informed decisions about the diagnosis, prognosis, and treatment of cancer, or applications that significantly accelerate diagnostics in laboratories.

Table 4. Overview of Life Sciences & Health Innovation Missions

Country	Objectives	Topics	Participants	Rating	Contacts
Switzerland	<ul style="list-style-type: none"> Identify areas for R&D collaboration within oncology, organ-on-chip, regenerative medicine, dementia, and health data Learn from national ecosystems Identify partners for a joint EuroStars call and/or Health Holland PPS-allowance call. 	<ul style="list-style-type: none"> Challenges, trends and developments in cell- and gene therapies Investments, EU and international context New drug development- and manufacturing models New models for reimbursement and implementation Public Private Partnership, Entrepreneurship and Infrastructure Funding, business support and talent (Human Capital) EU pharma legislation 	15	8.3	7
India	<ul style="list-style-type: none"> Increase insight into local innovation and healthcare ecosystems Explore trends and opportunities for public-private collaboration Exchange knowledge and technology from NL with Indian partners on the topic of data and oncology 	<ul style="list-style-type: none"> Personal health data and Integrated health data infrastructure Cancer registries Federated data sharing models Translate data into valuable insights to improve oncological and palliative care Translate data to accelerate the development of new cancer diagnostics and therapies AI / ML models and applications 	15	8.7	11



Cyber, Defence & Water Security

European Defence Fund (Outbound, France, 14-15 March)

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Background

France has a large and innovative defence industry with many OEMs. Companies and research institutes from the country are well represented in European consortia that receive funds from the EDF. The French defence industry is active in every domain and EDF category of action. The EDF is a means to further shape and strengthen the cooperation between Dutch and French industry. In the short term, participation of Dutch organizations in the EDF will benefit from making connections with France due to its central role in industrial cooperation in Europe. In the medium to long term, joint participation in EDF consortia can advance the inclusion of Dutch companies in the supply chains of French companies. The EDF is also a framework to strengthen the cooperation particularly on capability development and eventually procurement of capabilities. Increasing defence expenditure in The Netherlands will give a new impetus to NL-FR cooperation, including on the EDF. The Dutch Ministry of Defence has reserved more money for co-financing the participation of Dutch companies and research institutions in the EDF. This should support their participation in EDF consortia. Increased co-financing will also make it easier to develop projects together for which consortia with Dutch and French entities will submit proposals. There is already industrial cooperation, but this cooperation, especially within the EDF, can be deepened. Dutch companies and research institutions see French entities as one of the most important EDF partners. Security is one of the themes of the mission driven innovation and top sector policy. EU collaboration reinforces multiple missions that are part of the KIA on Security, for instance on maritime security, space, and autonomous systems. Many of these capabilities are developed on a European level through the EDF. Regarding the top sectors, this mission is directly linked to HTSM and Maritime. Furthermore, key enabling technologies play a vital role in the defence domain and the mission will also take this into account.

Summary

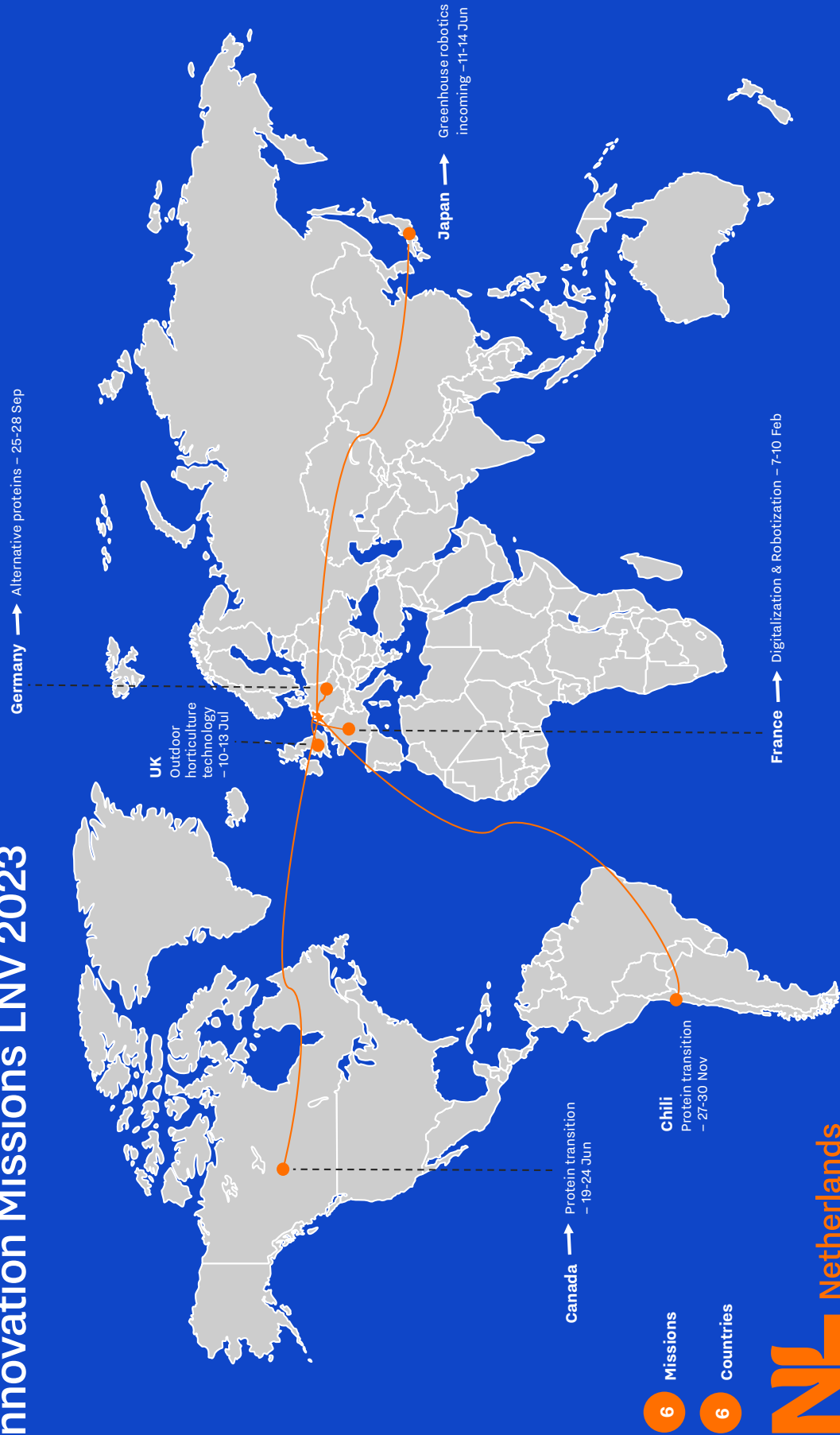
The Dutch delegation consisted of mostly of participants from the Ministry of Defence. The programme consisted of a welcome reception for all participants on the first evening, hosted in the residence of the Dutch Ambassador. On this evening there were speeches from high level individuals from both Ministries of Defence and the deputy ambassador. On Wednesday the day was opened by the Dutch delegation leader Tom Middendorp and his French counterpart Gaël Diaz De Tuesta. Both the Dutch and French Ministries of Defence presented their structure on how to stimulate innovation. The session in the morning was finished with 15 SME's giving a pitch about their company. After lunch, the day session continued with a panel discussion with representatives from the industry associations, followed with a short explanatory session about the role of a National Focal Point within the European Defence Fund and the deep-dive thematic sessions, chaired by the Subject Matter Experts from both Dutch and French Ministries of Defence. The rest of the afternoon was allocated for B2B matchmaking where sessions were planned by the participants themselves amongst each other. In the evening there was an informal dinner to motivate the participants to mingle with each other. On Thursday morning the Dutch delegation visited the OEM company Thales. After a series of presentations, the delegation was taken through the company on a lab tour.

Country	Objectives	Topics	Participants	Rating	Contacts
France	<ul style="list-style-type: none"> Develop a common understanding between governments on which capabilities to develop jointly under the EDF programme (and available funding) Establish partnerships between companies and research for EDF calls Include NL companies and research in EDF consortia led by French companies. 	<ul style="list-style-type: none"> Digital transformation Force protection and Mobility Materials and components Underwater Warfare 	48	8.3	11



Ministry of Agriculture, Nature, and Food Quality

Innovation Missions LNV 2023



Contribution to SDG's



Digitalization & Robotization

(Outbound, France, 07-10 February)

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Background

France has an important ecosystem of start-ups, companies, technical centers, and research institutes active in the field of AgTech, and more specifically in the field of robotics. Those organizations are interested in international collaboration and business, and The Netherlands are seen as an important country for this. France also hosts a very important trade fair on AgTech and robotics, the 'World FIRA' in Toulouse (in February 2023). Like France, The Netherlands see digitalization and robotization as key for sustainable food production. As France does, The Netherlands have a lot of knowledge and technology in this field, and a lot of companies; the Dutch production of high-tech equipment is of world class and The Netherlands export a lot in this field. The 'Groefonds' is investing in robotization in agriculture (NXTGEN HIGHTECH, Photodelta), and the Topsectoren Agrifood en T&U as well. The French market is less well-known than the markets of other neighboring countries, and the Topsectoren have the wish to develop their activities on the French market.

Summary

The Netherlands and France are both investing heavily in digitalization and robotization for agriculture, including through NXTGEN Hightech (national growth fund) and the France2030 program. The focus is on reducing the use of crop protection products as well as the challenges surrounding labor shortages in agriculture. In this context, the AgTech innovation mission to Toulouse took place from February 7-10 with a focus on robotization in open cultivation. A group of 17 companies, knowledge institutions and government organizations visited, among others, the World FIRA. This small-scale, highly focused agro-robotics conference and trade fair is the event for European startups, technology developers and researchers in agriculture. It was therefore an excellent event to internationally benchmark where the Dutch sector stands in this area and to meet possible technology and implementation partners. In addition to the visit to WorldFIRA, visits were made to research institutes CNRS (robotics) and CNES (satellite applications). The innovative agro-robotics companies NAÏO and A Green Culture were also visited to learn from and explore collaborations. There have also been discussions with French farmer cooperatives on several occasions, including with a view to the robotization pilots that they proactively initiate together with their farmers. Throughout the entire mission, the mission participants have made many contacts with possible (technology) partners, resulting in several concrete follow-up actions and ideas for collaboration.



Greenhouse Robotics

(Inbound, Japan, 11-14 June)

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Background

Japan wants to transform its fragmented and aging agricultural sector into a modern, vital, and sustainable sector. To this end, the Japanese government is committed to the development of smart agriculture with the application of AI, IoT, automation and robotics. Through major R&D programs, universities and businesses are encouraged to come up with new technological solutions for both small and large-scale agricultural companies. At the same time, Japan's high-tech industry is showing increasing interest in the agricultural sector. The opportunities offered by digitalization and the need to adapt traditional revenue models in the face of shrinking growth have led to large utilities and multinationals becoming active in sectors that are new to them. For example, telecommunications giant NTT is concerned with possible applications of data technology in the agricultural sector and specialists in industrial robotics such as Denso, Yaskawa and Fanuc, as well as high-tech companies such as Panasonic, are investigating possible applications of robotics in agriculture. Like Japan, the Netherlands is faced with an increasing shortage of workers in the horticultural sector and has a general task to make food production increasingly sustainable. Robots and AI offer a solution for both the labor shortage and making cultivation more sustainable. The Dutch horticultural sector is extremely technologically developed and is already fully committed to digitalization and automation. But to achieve proper application of robotics and AI, it is appropriate to join forces with experts in the field of this technology. Since the Japanese high-tech industry is among the top, collaboration with Japanese high-tech companies is interesting. Conversely, Japanese companies are very interested in Dutch expertise due to the Netherlands' excellent reputation in the field of agro-technology. In 2021, LAN organized various successful activities in Japan around the theme of smart agriculture, which attracted a lot of interest from various Japanese parties (from industry, government, and knowledge institutions). This showed that there are opportunities for further bilateral cooperation with Japan. In July 2022 an innovation mission to Japan on greenhouse robotics was organized by RVO. A group of 10 organizations from the greenhouse sector participated in this mission and planted the seeds for collaboration and joint projects in this field.

Summary

This incoming mission is a follow up from the innovation mission to Japan in July 2022. A group of 27 Japanese representatives from industry (mostly large corporations as well as a startup) and research (NARO plus 2 universities) visited The Netherlands for a 3-day program covering visits to the Westland area, the Greentech exhibition and Wageningen University & Research. On the first evening the Japanese ambassador hosted the delegation, and several Dutch stakeholders were involved in the visit. Visits in the Westland included: Lans, a large-scale commercial grower (part of the Harvest House cooperative), a research and demonstration greenhouse on data-driven growing and robotics (Tomato World), technology developer and greenhouse builder Certhon as well as the World Horti Center. At the Greentech exhibition a Dutch-Japanese seminar was organized to discuss development of greenhouse robotics. The Japanese delegation also had time to spend at the exhibition to connect to potential partners – a specific robotics route was prepared for them to meet various Dutch companies. On the third day, the delegation visited Wageningen to learn more about the data-driven and agro-food robotics research activities at NPEC (phenotyping center) and the Agro Food Robotics research group. During the 3 days program there were several 1-on-1 meetings organized with the Japanese delegation to discuss collaboration in a Public-Private Partnership (PPP).

Outdoor Horticulture Technology (Outbound, United Kingdom, 10-13 July)

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Background

Agriculture in the UK is changing. Entrepreneurs in agriculture and horticulture must respond to changes in agricultural policy after Brexit. They also play a crucial role in achieving objectives in the field of climate, environmental and nature policy. At the same time, companies are struggling with lagging productivity, rapidly rising input costs and workforce shortages. The value of fruit production in the United Kingdom in 2021 was approximately €1 billion, of which approximately 95% was in the open field. Important fruit crops in the United Kingdom are mainly apple, strawberry, blackcurrant, pear, and raspberry. The value of open field vegetable production in 2021 was approximately 1.5 billion euros. Important vegetable crops are mainly carrots, onions, green peas, cabbage, turnips, cauliflower, lettuce, and broccoli. The UK recognizes the crucial role and potential for technological innovation in this sector. The UK government provides support to farmers to invest in equipment, technology, and infrastructure to increase productivity growth, such as through a Farming Investment Fund and a Farming Innovation Programme. The country also invests in innovation cooperation and knowledge transfer between the business community, universities and research instruments and specifically looks to the Netherlands as a good example. The pursuit of companies and the British government to develop concrete, market-oriented R&D projects for open-field fruit and vegetable cultivation to address challenges such as personnel shortages, food safety, sustainability, and the environment, offers opportunities for collaboration with Dutch companies and knowledge institutions.

Summary

The delegation consisted of several key players in the industry including robotics, packaging, and imaging companies (6), education/research institutes (WUR, FruitTech Campus), and Topsectors (AF and TU). Day 1 started off with an overview of UK ecosystem by UK representative and a network reception at NIAB, Cambridge. Each delegate had the opportunity to pitch for 2 minutes, followed by 2-minute pitches of UK counterparts, and free networking. Afterwards, the delegation went for a visit at Gs in which they learned more about innovations in vegetable growing and the challenges that confront G's. On Day 2, we visited DogTooth, a company that develop a robot for strawberry picking. This was followed by a visit to the University of Essex (Life Sciences and AgriFood Lab), and a visit to Triptree, a grower of various fruits. On Day 3, we visited the FruitFocus 2023, a leading event for technology in the industry. In the morning there was opportunity for networking with UK counterparts. In the afternoon, the group was split up in two, with one group visiting The Lettuce Company and New Barn Farm (both vegetable growers), and another group visiting Adrian Scripps (a fruit grower). Both visits were highly informative as each company actively engaged in exploring opportunities for innovation (e.g., using drones, robotics, imaging for improving fruit growing). On Day 4, the final day, we had a morning session with the delegation and UK representatives in NL-UK teams would discuss how to overcome shared challenges and promote collaboration between NL-UK. Overall, the participants were very satisfied with the mission, the program, and the opportunities it offered them. Approximately, each participant has gained 15-20 new contacts by participating in the mission and have graded the overall mission with an 8.0.



Protein Transition

(Outbound, Canada, 19-24 June)

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Background

The Plant Protein Industry, once considered a niche market, is now becoming a mainstream market. The global plant-based protein market is expected to reach 36 billion by 2029. Consumer demand and the world's growing population are what drive industry innovation forward. Additional research on plant proteins is needed for scientific knowledge on health benefits, which is expected to further increase the demand. The demand for plant proteins has only accelerated due to the COVID-19 pandemic and presents opportunities for researchers, ingredient companies, and technology companies to further develop their product(s). Given the complementary strengths in Canada and the Netherlands, a strategic partnership is valuable to both countries. Both countries have robust R&D ecosystems and specialized expertise can be enhanced in both countries to reach value chain synergies. Both countries are focusing on becoming more self-sufficient in their respective food sectors. The Netherlands aims to work together with Canada to bridge the gap between demand and supply of plant protein and revalue the power of plant protein. The Dutch supply chain is strong but the small surface of land/acres in the Netherlands is a limiting factor. Collaboration between Canada and the Netherlands for the sourcing of proteins can accelerate the global market for plant-based proteins. Complementary strengths can lead to strategic partnerships such as Dutch expertise in high quality proteins and product development, and Canadian expertise in pulses and large volume protein processing.

Summary

The program in Canada was centered around the Calgary region and started off with a kick-off session with Protein Industries Canada (PIC). Several Canadian organizations attended and presented themselves providing an overview of the ecosystem of the Prairie provinces. PIC is one of the Canadian Innovation Superclusters Initiative and underlines the importance of the country's plant protein sector. Following a visit to Lovingly Made Ingredients, a seminar and networking event was held bringing together 35 stakeholders from the wider Calgary region. Additional company visit in the Calgary region included Botaneco, Stamp Seeds, and PIP International. Finally, Olds College of Agriculture & Technology was visited, a well-reputed institution which is running the "Smart Agriculture Initiative". Although not purely focused on protein-rich crops, it provided additional insights into the latest developments in smart farming. In Minnesota the visit started at the State Department of Agriculture. In addition to large agricultural production, it is also home to a large food industry including developing, processing and production of plant-based ingredient and food. The Plant Protein Innovation Center (PPIC) and the Forever Green Initiative were visited at the University of Minnesota. The Forever Green Initiative at the University of Minnesota is developing new crops for farmers with positive conservation outcomes. These new crops could reduce inputs and nitrogen loss while providing economically viable alternatives for the dairy and arable farming sectors in the Netherlands, all while bringing exciting new regenerative agriculture products to market. On the last day the delegation visited the Buhler Food Application Center, a unique facility where food (processing) companies can test new processes, and PURIS.

Alternative Proteins

(Outbound, Germany, 25-28 September)

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Background

The agrifood markets of Germany and the Netherlands are each other's most import export market, also for alternative proteins. The Dutch and German governments have national protein strategies in place, with the ambition to reduce dependence on foreign plant protein sources in the coming 5 to 10 years. At the same time, consumers in both countries increasingly choose for alternatives to animal protein products, such as plant-based milk, dairy, and meat. Experts expect this trend to lead to a fundamental change in protein consumption. With changing consumer behavior and limitations in protein supply, the markets in both countries face similar challenges. By connecting innovation clusters in Germany and the Netherlands, we assure that both markets remain well connected and maintain their world-leading position in the transition to healthy and sustainable proteins.

Summary

As a starting point, a series of webinars have been organized during May-June on themes like Precision Fermentation, Mild Processing, Nutritional Value and Sensory Aspects. These webinars were organized using the online B2Match platform and attracted around 100 Dutch and German participants. The webinars were used to exchange information, connect people, and prepare for the innovation mission. From 25-28 September the delegation visited the border region of North Rhein Westfalia and Lower Saxony for a series of interactions with German stakeholders in the protein shift. This included visits to major companies like Dr. Oetker and Apetito to understand how the large Germany food players are acting regarding the protein shift. Especially Dr. Oetker indicated that it is actively exploring "open innovation" cooperation on various applications. In addition, two universities of applied sciences (FH Münster and TH OWL Lemgo) were visited to gain insights into the practical research and interaction between knowledge institutes and industry. The delegation also visited Seedhouse, an accelerator for startups in food, to learn about the innovation ecosystem and the possibilities to join the program to enter the German market. The mission ended with a visit to DIL, the renowned German Institute of Food Technology. With a strong focus on meat analogues and an impressive infrastructure for research in food processing, many links and ideas were discussed. A networking event was organized in Münster to bring together a broader network of researchers, startups as well as more established food companies (including meat companies looking to enter plant-based alternatives). Many connections have been made during the mission, and several concrete ideas for follow up were generated. The mission delegates indicated they established a good number of interesting contacts, including with Dr. Oetker and DIL. Before returning to the Netherlands several follow up meetings were already planned.

Protein Transition

(Outbound, Chile, 27-30 November)

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Background

The protein transition is a hot topic for Chile. In many ways Chile is the regional hub for many sustainable agricultural practices. There are several producers, initiatives and events that promote the use and production of proteins such as insects and seaweed that are can be used as additive or ingredient for animal feed. Main drivers behind this sector is the private sector that is urged to make steps in sustainability. Besides this there are several research (public and private) that investigate the topic alternative proteins. First, the Chilean salmon sector that doesn't have sustainable image in Chile because of the environmental impact of the aquaculture practices. Several Chilean start up currently produce protein powder on the basis on the larvae of black soldier flies and are looking to scale-up their produce. Secondly the global dairy sector that is looking for ways to reduce the greenhouse emissions the sector produces. But overarching challenge is the increasing demand for animal proteins by the growing world population and the feed the livestock sector needs. *Another stakeholder that must be considered are the local indigenous communities already have large, protected concessions (>150.000 hectare) in the coastal areas of the Los Lagos region that are highly suitable for seaweed farming. Exploring the potential of sustainable large scale seaweed production and application offers opportunities for indigenous communities to further develop seaweed cultivation and setup new markets.* Chilean experiences and knowledge on local algae varieties and feed-additives for aquaculture could be relevant for Dutch experts and Dutch knowledge on industrialization and scaling up of production could be interesting for Chilean stakeholders.

Summary

Following a market report from a Topsector SMP (Seed Money Project) in 2022, this mission was organized to explore the seaweed sector in Chile and explore opportunities for collaboration with local partners. The benefits of seaweed, rich in fibers, proteins, and other nutrients, growing fast, without the need for irrigation nor land use, make it a very interesting crop. Applications range from food, feed, bio stimulants, pharmaceuticals, and many others. Chile shares some of the challenges with The Netherlands when it comes to cultivated production, while at the same time it has a long history of wild harvesting of seaweed. The mission started in Santiago de Chile with an informative seminar providing an overview of the seaweed sectors in the Netherlands and Chile, covering aspects from cultivation, processing, financing, and regulatory aspects. It was followed by thematic roundtable discussions with the Dutch delegates and Chilean representatives from government, research, and industry. The delegation visited the Latin-American R&D center of Nestlé which has a specific focus on the use of seaweed in food. Nestlé is closely cooperating with the Catholic University of Chile and several researchers presented an overview of their research activities. The mission then moved further south to the Puerto Montt region, which is the heart of the aquaculture industry of Chile, including salmon and seaweed. Visits were made to regional government officials to learn about the local ecosystem, ambitions, and challenges. Also, the Maripark concept (multi-use of the North Sea, initiated by LNV) was discussed and sparked interest. In the evening a lively networking reception was held at the hotel, the regional governor also joined to meet the delegation. Leading researchers were visited at INIA Remehue (seaweed as feed additives for dairy cows, seaweed as ingredients for food snacks) and Centro I-Mar, University of Los Lagos (breeding and cultivation of seaweed). Both research institutes provided interesting insights and generated plenty of ideas for possible collaboration. The Thursday was spent in the Maullin region where a cultivated seaweed farm was visited. Following various presentations by different stakeholders and local entrepreneurs, a small boat took the delegates to see the actual cultivated seaweed production. Following long and vibrant discussions the delegation left with several concrete follow up ideas to pursue with the local stakeholders. The last day a meeting with the Seaweed Place was organized, to learn about their efforts to develop food applications in Chile. The meeting also included a tasting of va

Table 6. Overview of Agriculture, Nature, and Food Quality Mission

Country	Objectives	Topics	Participants	Rating	Contacts
France	<ul style="list-style-type: none"> • Increase insight into the French market and its players • Developing collaboration and business and potential follow-up in the framework of the 'Innovatiepact' between NL and France • Stimulate formation of European projects (Horizon Europe) and business 	<ul style="list-style-type: none"> • Auto Field Robotics • Sensor technologies • Artificial Intelligence 	17	8.8	20
Japan	<ul style="list-style-type: none"> • Further exploration of which applications could be fit for joint R&D project(s) • Increase insight into the strategy and ambitions of Japanese high-tech companies • Facilitate collaboration by contributing to building relationships between potential collaboration partners 	<ul style="list-style-type: none"> • Greenhouse robotics • Data-driven growing • Artificial Intelligence • Sensor technologies 	27	N.A.	N.A.
United Kingdom	<ul style="list-style-type: none"> • Increase insight into the ecosystem, the innovative developments, and opportunities in the open cultivation of fruit and vegetables in the UK • Exploring trends and opportunities for (public-private) collaboration • Linking innovative knowledge and technology from the Netherlands to market opportunities in the UK 	<ul style="list-style-type: none"> • Robotics • Imaging • Packaging • Growing Innovations • Funding 	12	8.0	11
Canada	<ul style="list-style-type: none"> • Seek out opportunities/leads wherein Dutch innovation and knowledge are needed in Canada • Identify opportunities/leads for Dutch innovation and expertise to expand beyond the borders of the Canadian Prairies and into the United States market 	<ul style="list-style-type: none"> • Plant-based ingredients and food • Food processing • Meat analogues and animal-free dairy 	13	7.9	18
Germany	<ul style="list-style-type: none"> • Increase insight into the protein transition In Germany • Increase insight into innovation and innovation challenges • Improve insight into collaboration amongst organizations 	<ul style="list-style-type: none"> • Plant-based food • Meat analogues and animal-free dairy • Upcycling of side-streams • Food processing 	14	7.4	9
Chile	<ul style="list-style-type: none"> • Identify potential areas for collaboration in the cultivated production of seaweed as well as the processing of seaweed into various ingredients and applications. • Build on the local Chilean knowledge of seaweed cultivation and the large scale production (incl. wild harvesting) and processing. • Build on the Dutch knowledge in biomass processing and development into high value applications needed by feed/food -industry. 	<ul style="list-style-type: none"> • Breeding and cultivation of seaweed • Ecology and biodiversity • Biorefinery and processing of seaweed • Applications in food, feed, biofuels and biostimulants 	12	8.5	10

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For an overview of the Innovation Attaché network go to:
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For an overview of the Agriculture Attaché network go to:
<https://www.rvo.nl/onderwerpen/buitenlandnetwerk/landbouw-attache-netwerk-lan>

