



Executive Summary **GROWTH FUND** APPLICATION

SUBMITTING PARTIES:

MINISTERIE VAN INFRASTRUCTUUR EN WATERSTAAT

MINISTERIE VAN ECONOMISCHE ZAKEN EN KLIMAAT

KONINKLIJKE NEDERLANDS LUCHT- EN
RUIMTEVAARTCENTRUM

LUCHT- EN RUIMTEVAART NEDERLAND

ROYAL SCHIPHOL GROUP

SKYNRG

TU DELFT

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Summary: Aviation in Transition

The aviation sector faces an enormous challenge to become climate neutral by 2050. To this end, Aviation in Transition develops technology, products and knowledge for which there is an upsurge in demand from the global market. Aviation in Transition thus increases the structural earning capacity of the Dutch economy and tackles the negative effects of aviation at an accelerated pace, in line with the recommendations of the United Nations Intergovernmental Panel on Climate Change (IPCC). The Dutch aviation sector has the opportunity to be a pioneer in Europe in the transition to sustainable aviation.

The potential in the Netherlands

The Dutch aviation sector represents a larger share of our total GDP compared to the rest of the EU¹. The Netherlands also has an excellent manufacturing and fuel industry, a strong national airline, a strong network of airports and one of the world's leading aerospace faculties and research centres. This creates a responsibility, but it also offers opportunities.

The aviation sector in the Netherlands currently has the opportunity to maintain its leading position in the areas in which we as a country are already thriving (such as the development of the sustainable fuels market) and to take the lead in other areas. The aviation ecosystem, through the Aviation in Transition programme, will address and deal with the opportunities earlier than other countries (such as the development of all the crucial elements of the future hydrogen-powered aircraft). The opportunity to embrace the transition to sustainable aviation is now presenting itself, and the 'Aviation in Transition' proposal helps us to seize this opportunity.

What does the Growth Fund invest in?

As a frontrunner, we create earning capacity by making aviation sustainable. The total financial volume of the Aviation in Transition programme amounts to EUR 1,019 million. The requested contribution from the National Growth Fund (EUR 504 million) will be recovered 4.5 times over the period 2020-2050. Thanks to the Aviation in Transition ecosystem proposal, the Dutch aviation sector will ensure it is ready for future national and international obligations, while also turning this obligation into an opportunity to make the most of this emerging market from an economic perspective.

In addition, innovations that make aviation more sustainable enable Dutch airports to further improve the quality of the working, living and everyday environment at and around airports, by increasing the benefits (employment, regional earning capacity) and reducing the burdens (noise, air quality). The Dutch aviation sector has an even stronger proposition to attract companies and capital, which in turn contribute to innovation and new business.

What does Aviation in Transition deliver?

Aviation in Transition is an integrated approach. The implementation of promising research and innovations is accelerated through the removal of bottlenecks and the creation of a new open innovation infrastructure by means of the:

- realisation of first-of-a-kind pilot facilities for synthetic aviation fuel;
- development of sustainable ultra-efficient demonstration aircraft with breakthrough technology for hydrogen propulsion, materials and systems;
- establishment of a testing ground with loading and refuelling infrastructure and field laboratories at Dutch airports for the entire aviation chain;
- new and promising research will continue to feed the innovation infrastructure.

¹ATAG. September 2020. *Aviation benefits beyond borders*.
https://aviationbenefits.org/media/167186/abbb2020_full.pdf

Programme lines

Aviation in Transition has five programme lines, each focusing on one domain within the aviation sector.

Energy supply

Replacing fossil kerosene with sustainable aviation fuels is a crucial step in making the Dutch and international aviation sector sustainable and an economic opportunity for the Netherlands. The Aviation in Transition programme brings three synthetic aviation fuel projects using different technology paths closer to the market.

In addition to scaling up these technology paths, the high demand for hydrogen is guaranteed by the innovative hydrogen import project. The realisation of this necessary step to the commercial scale is the direct result of the programme line.

The greater goal is fourfold:

1. demonstrating ground-breaking technologies and thus **enticing market parties to invest in large-scale production**. These projects will create the necessary infrastructure and provide a blueprint for further scaling up, both nationally and internationally;
2. building a **knowledge and expertise cluster** to safeguard infrastructure and a business climate for synthetic kerosene;
3. timely **realisation of the transition from a petrochemical hub to a sustainable fuels hub**. Timely transition is important to retain and strengthen the industry, with its jobs, turnover, profits and tax revenues for the Netherlands;
4. **expansion of our international market position** and maintenance of our leading position in sustainable fuel development and production.

Aircraft development

The Dutch aircraft and aircraft systems industry has an excellent opportunity to earn money from sustainability, provided it produces sustainable solutions sooner and can position and demonstrate innovations at the right level. The Aviation in Transition programme quickly brings sustainable aircraft system innovations closer to the market. The parties will focus on developing sustainable ultra-efficient hydrogen propulsion technology, materials and systems that will be tested on demonstration aircraft. The consortium will do this in cooperation with Original Equipment Manufacturers (OEMs) such as Airbus, Boeing and Embraer.

The greater goal is threefold:

1. realising an **innovation infrastructure** for ground and airborne testing of aircraft innovations;
2. **uniting the fragmented aircraft and aircraft systems industry** in four partnerships;
3. **translating** developed knowledge, skills and technology into propositions that can be exported around the world by existing and new companies.

Testing ground at the airports

Within Aviation in Transition, the Dutch airports are the testing ground for the testing, development and further development of innovative technology, from an open environment, in cooperation with end users and close to the complex airport operation. The Aviation in Transition programme aims to accelerate innovation within the aviation ecosystem, and the testing ground helps with this.

The greater goal is twofold:

1. creating **loading and refuelling infrastructure** that facilitates test flights with new types of aircraft and that allows airports to investigate the implications of new infrastructure for operations;
2. **creating field laboratories at airports** as an open innovation environment that provides innovation infrastructure where manufacturing industry, knowledge institutions and end users can work together. The presence of the aforementioned loading and refuelling infrastructure is of vital importance in this respect.

In order to achieve this, cooperation is being sought with companies, knowledge institutes and start-ups with the operational practice of complex airport operations, and a wide range of Dutch and international parties are being attracted to facilitate the growth of the ecosystem's innovative strength. We thus maintain and expand the international market position and reinforce the 'license to operate' of the Dutch aviation sector by making a tangible contribution to the increased sustainability of global aviation with the testing ground.

Knowledge development

New and promising research will continue to feed the innovation infrastructure. Within the knowledge development programme line, the Aviation in Transition programme is establishing an open innovation think tank (Flying Vision), from which an ecosystem-wide vision and roadmap will be developed for the research and development of innovations for climate-neutral aviation. The first supporting research programmes set up by Flying Vision will result in technology and knowledge for future developments, with which the Dutch aviation sector will position itself firmly in the international playing field.

In addition, the Dutch Aviation Systems Analysis Lab (DASAL) will provide an open virtual infrastructure for monitoring and analysing the impact of research and innovations. DASAL will contain a 'digital twin' of the aviation ecosystem (aircraft, airports, airlines and Air Traffic Management) that acts as a virtual platform where research and innovations can be tested for their impact on the categories of economy and logistics, emissions and climate, noise and quality of life, safety, and policy and regulation.

The greater goal is twofold:

1. together with an OEM, drawing up an **overarching and guiding vision**, which will allow research to be focused and will thus enable the Dutch aviation sector to make a better connection with international developments and with the end users of the technology;
2. developing and demonstrating breakthrough innovations/technologies and thereby **enticing market parties to invest** in the further development of these new sustainable solutions.

Prerequisites

In addition to the technological topics, work will be carried out on a number of topics that are necessary to realise the ambitions. This includes activities to increase the supply of skilled labour, to strengthen the ecosystem, with a special focus on SMEs, and to consolidate international relations.

The Dutch aviation sector has the opportunity to be a pioneer in Europe in the transition to sustainable aviation. As a frontrunner, we create earning capacity by making aviation sustainable.

Aviation in Transition serves social and economic interests. We are committed to facilitating the transition to sustainable aviation. Will you help us?

Project leaders

This project is led by a consortium of Royal Schiphol Group, Lucht- en Ruimtevaart Nederland (LRN), SkyNRG, Royal NLR, TU Delft and their partners.

The proposal is supported and facilitated by the Ministry of Infrastructure and Water Management as the proposing ministry and the Ministry of Economic Affairs and Climate Policy.

Schiphol
Group



TU Delft



Ministerie van Infrastructuur
en Waterstaat



Ministerie van Economische Zaken
en Klimaat





