# Hydrogen vision and strategy

## The role of hydrogen in the energy transition and circular economy in Zuid-Holland 2030 (-2050)

provincie ZUID HOLLAND

# Contents

# Introduction

**As we approach 2050, countries and regions will be transforming their energy systems and their economies. This is part of the commitments that were made with the signing of the Paris Agreement. The Netherlands has committed to reducing its $CO_2$ emissions to effectively zero by 2050. This will be an enormous challenge, and one that has been made even more monumental by the cabinet's decision to discontinue natural gas extraction in the northern province of Groningen by 2022. The province of Zuid-Holland faces the same challenge. We are on our way towards a carbon-neutral, circular economy based on renewable energy: clean, available and affordable. In it, there is an important role set aside for green hydrogen.**

## Questions for the future

Can the province of Zuid-Holland really wean itself completely off fossil fuels and still support its industry, major world shipping port, mobility and greenhouse agriculture sector? What will be needed to balance the generation of green energy and the demand? How will we ensure that energy remains guaranteed every day of the year during this transition? It is clear from the Hydrogen Vision and Strategy document produced by the province of Zuid-Holland that these are major questions, and hydrogen can be part of the answer. This publication presents an abbreviated account of our strategy going forward towards a green hydrogen economy.

### WHY HYDROGEN?

Our energy demand is so great that in a future without natural gas, we will not be able to get by on electrification and heat alone. We will need more alternatives – energy carriers that also have other properties, and so create new possibilities. One such energy carrier is hydrogen (H2), which can be stored and used for applications that electricity cannot handle. As an added bonus, hydrogen can also be transported over great distances at relatively low costs.

Hydrogen can be generated from renewable energy sources like wind and solar power. These are energy sources that do not generate a consistent output, like on winter days when solar panels do not produce very much electricity. Storage of the energy produced in peak periods, like the summer months for solar power, in batteries has proven to be an extremely expensive proposition. Storage of hydrogen is much cheaper and means that there can always be a supply. This buffer function makes hydrogen very interesting as a potential replacement for natural gas.

## MISSION AND METHOD FOR THE PROVINCE OF ZUID-HOLLAND

The province of Zuid-Holland has set the goal of reducing its CO2 emissions, boosting the economy and creating jobs. It has chosen to do this in part by stimulating a green hydrogen economy. This will start with facilitating the initial stages of projects and research.
The province also wants to create a cohesive foundation by connecting parties with a regional hydrogen programme, as announced in the National Climate Agreement of the Netherlands.

### Five focus areas of the province of Zuid-Holland in the transition to a green hydrogen economy:

1. Providing good spatial planning for the required hydrogen infrastructure and facilities
2. Knowledge and policy development on environment and external safety
3. Supporting long-term research
4. Seeking and utilising national and international opportunities of cooperation
5. Investing in future jobs in the hydrogen economy

This publication is based on the report 'Hydrogen vision and strategy: the role of hydrogen in the energy and raw materials transition in Zuid-Holland 2030(-2050)' (*Waterstofvisie en strategie: de rol van waterstof in de energie- en grondstoffentransitie in Zuid-Holland 2030 (-2050)).*

# Potential of green hydrogen

**The international market for renewable energy is growing. Costs of wind and solar power are falling. In time countries with a great deal of solar and wind power will be exporting their renewable energy. Transporting this green energy will require a suitable energy carrier, a form of energy that is safe and easy to transport at a large scale by road, water and pipeline. Hydrogen is an interesting option. In Zuid-Holland, we see three crucial domains in which hydrogen plays a key role.**

### 1 System functions

Hydrogen can take on critical system functions in the energy and raw materials transition. Currently, we use natural gas for a number of purposes, including responding to peak demand in electricity and heat. Hydrogen can fulfil this buffer and balancing function sustainably, to keep our energy system robust, reliable and green.

### 2 Energy carrier

As an energy carrier, hydrogen can help decarbonise the industry, heavy transport and long-distance transport. These are energy intensive sectors. The province of Zuid-Holland is working on pilot studies using hydrogen-powered regional buses and for inland shipping.

### 3 Circular economy

Green hydrogen is also vital for the circular economy. Alongside green and circular carbon, green hydrogen is one of the building blocks of new production processes for synthetics, bio-synthetics and green fuels and biofuels such as synthetic methanol and kerosene.

*'Thanks to its location on the sea, good national and international infrastructure and excellent greenhouse agriculture sector, the economy of Zuid-Holland will be able to retain its economic structure and functions if we make a resolute switch to sustainable and $CO_2$-neutral energy flows for critical functions in the Port Industrial Complex and the energy needs in Zuid-Holland.'*

From: A. van Wijk et al., *Naar een groene waterstofeconomie in Zuid-Holland: Een visie voor 2030* ['Towards a green hydrogen economy in Zuid-Holland: A vision for 2030'] (2019).

## EXPLORATION IN OTHER DOMAINS

The province of Zuid-Holland is currently concentrating on the use of hydrogen for mobility and industry. In the urban environment and agriculture & land use (greenhouse agriculture) sectors, the role of hydrogen in the transition is not yet entirely clear. To move forward on this, the province is currently involved in studying the role of hydrogen in the urban environment in projects at several locations (Rozenburg, The Green Village Delft and Stad aan 't Haringvliet). Only after 2025 will we evaluate the role that hydrogen can play in places where sustainable alternatives are not feasible from a technical, societal and financial perspective. As a means of increasing the sustainability of the greenhouse agriculture sector, the use of hydrogen is still primarily theoretical. If initial trials produce positive results, these may be scaled up to pilot projects.

# Demand • infrastructure • supply

**For the time being, in the testing and start-up phase of new hydrogen applications we rely primarily on grey hydrogen, generated from natural gas. In the foreseeable future, the Porthos project (CCUS) will be capturing the $CO_2$ released from the generation of grey hydrogen. This 'blue hydrogen' is an intermediate step on the way towards green hydrogen. The choice of starting with grey hydrogen might seem to be an impediment to our progress in achieving the climate objectives of 2030, but it is dictated by availability and affordability of blue and green hydrogen at the present time.**

### Sailing into uncharted territory…

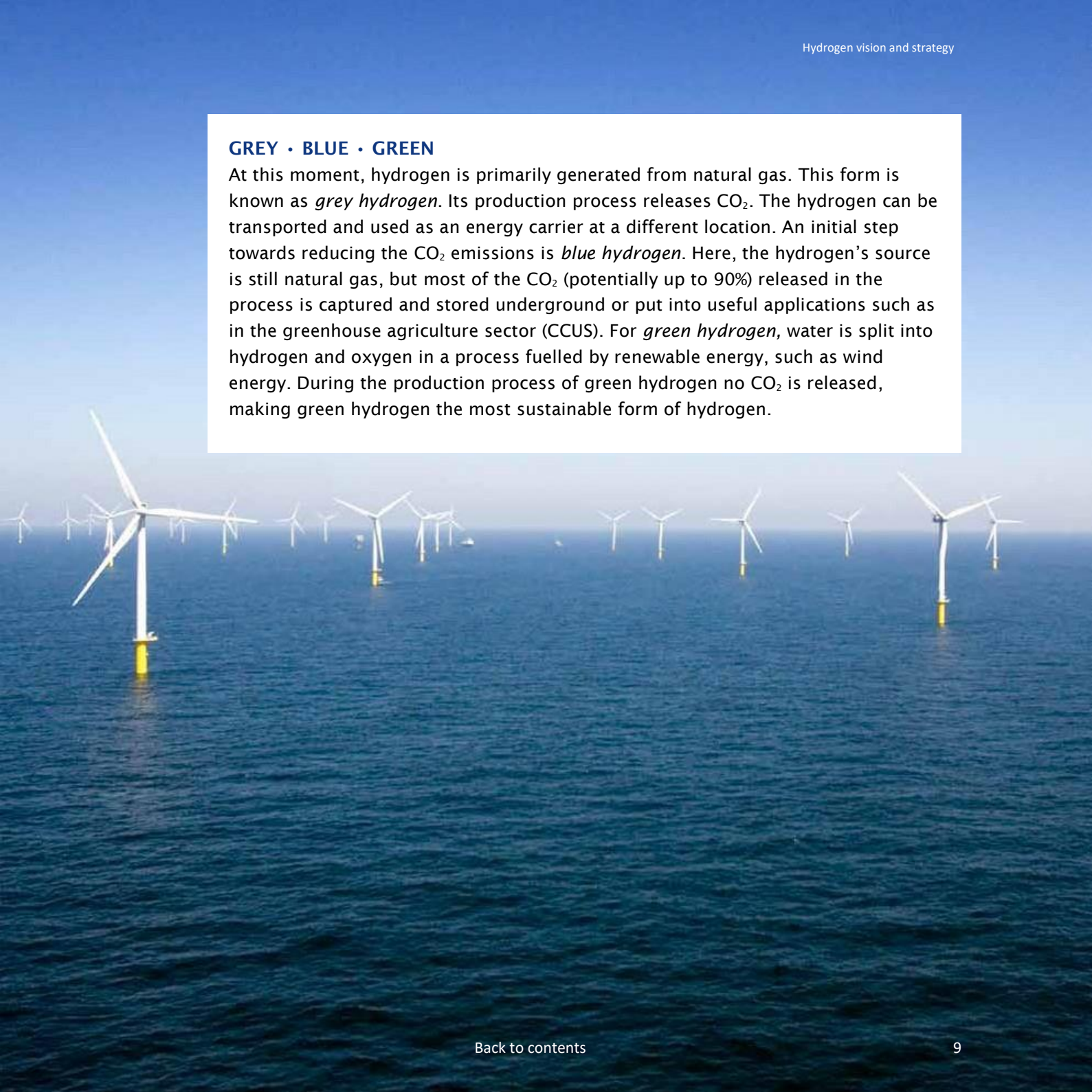
The hydrogen being produced at present is primarily grey hydrogen. It is an important raw material for industry and an energy carrier for mobility. There is currently no public hydrogen infrastructure and no energy legislation that governs hydrogen. This means companies and organisations face tremendous hurdles in independently developing a value chain for hydrogen production, infrastructure and applications in industry, mobility, electricity, the urban environment, and agriculture and land use. As long as this remains the case, there is no future for sustainably produced hydrogen. What will be needed to get a market for hydrogen as an energy carrier and raw material off the ground?

### …means using grey hydrogen to get the ship going

This market is not going to build itself. Starting with grey hydrogen applications will give the hydrogen market the chance to develop. For instance by creating infrastructure for supplying hydrogen to industry and mobility. With each step, an open and accessible infrastructure will gradually emerge. Only with sufficient applications (demand) and transportation options (exchange) will the production costs (supply) come down. A levy on $CO_2$ emissions can also improve the chances. And that will be the first step on the road to a green hydrogen economy.

## GREY • BLUE • GREEN

At this moment, hydrogen is primarily generated from natural gas. This form is known as *grey hydrogen*. Its production process releases $CO_2$. The hydrogen can be transported and used as an energy carrier at a different location. An initial step towards reducing the $CO_2$ emissions is *blue hydrogen*. Here, the hydrogen's source is still natural gas, but most of the $CO_2$ (potentially up to 90%) released in the process is captured and stored underground or put into useful applications such as in the greenhouse agriculture sector (CCUS). For *green hydrogen,* water is split into hydrogen and oxygen in a process fuelled by renewable energy, such as wind energy. During the production process of green hydrogen no $CO_2$ is released, making green hydrogen the most sustainable form of hydrogen.



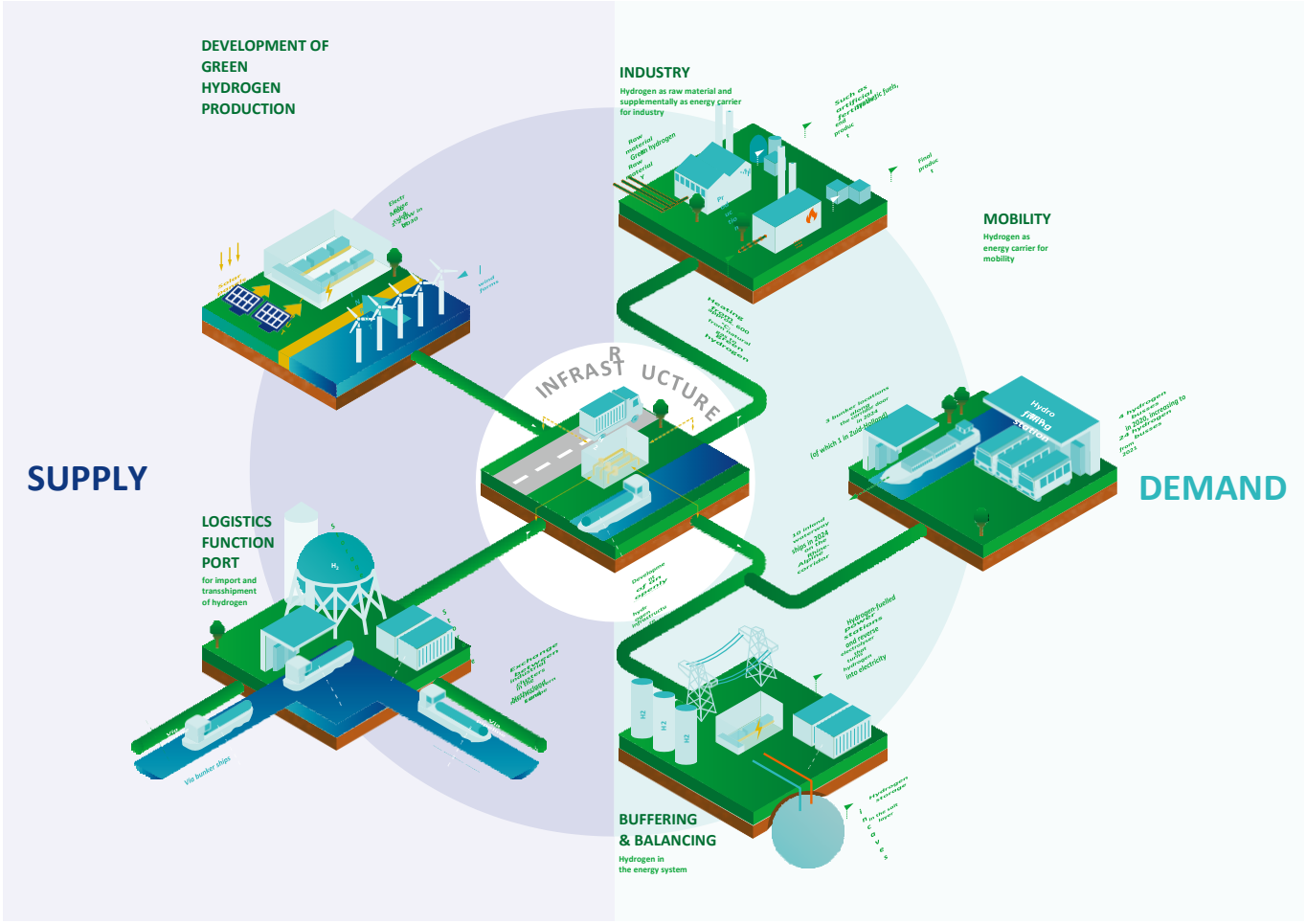
# Cooperating towards cohesion

**Energy generated from renewables and green hydrogen are still in short supply. Until that changes, we will have to make certain choices in the development of a hydrogen economy. Where can we best put sustainable hydrogen to use? The province has identified six priorities that are closely interrelated. Because the hydrogen economy is an interplay between three links: supply, infrastructure and demand. Together, these links make up the hydrogen value chain. This is why the province of Zuid-Holland is opting for a programmatic approach with partners in the region, in the Netherlands and in Europe. We focus on six priorities:**

1. Development of green hydrogen production
2. Logistic function of the port for import and transshipment of hydrogen
3. Development of openly accessible hydrogen infrastructure
4. Hydrogen as a raw material and supplementally as an energy carrier for the industry
5. Hydrogen as energy carrier for mobility: heavy transport, long-distance
6. Use of hydrogen for balancing the energy system

**Regional cooperation:** within the region, we have set a target for $CO_2$ reductions, and we are working towards future-proofing the economy and improving air quality. With companies, governments, civil society organisations and knowledge institutions we are debating the spatial planning implications and safety aspects of this new economy.

**National and international cooperation:** Because the province of Zuid-Holland does not stand on its own, we need to keep sight of a national and international perspective in our approach. The infrastructure is built around a whole system of connections, such as transport lines and traffic flows through corridors like the Rhine-Alpine: from Rotterdam in the Netherlands, through the Ruhr area in Germany, all the way to Genoa in Italy. Cooperation with other national and international regions also offers potential benefits, such as advantages of scale, cofinancing and knowledge sharing. Finally, it is worth noting that we are also dependent on material and energy flows from abroad.



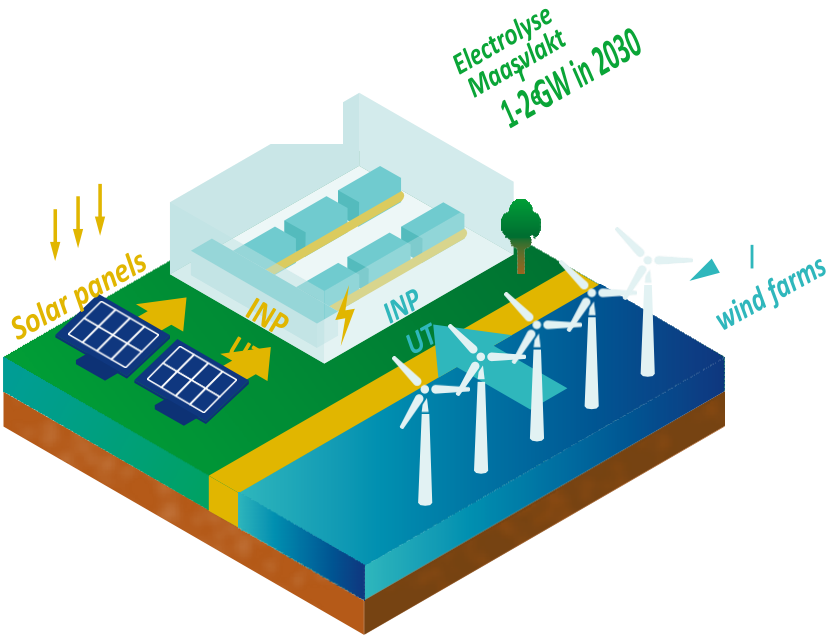

## POINT TO CONSIDER FOR HYDROGEN AS ENERGY CARRIER

Hydrogen is not a goal in itself. Together with other potential energy carriers, it can play an important role in the future sustainable energy system, which as a whole is intended to reduce $CO_2$ emissions. It should be kept in mind that the development of hydrogen is in no way intended to be detrimental to other sustainable options. It is important to consider the best solution for each individual situation.

# Supply

## 1. DEVELOPMENT OF GREEN HYDROGEN PRODUCTION

**At this time, massive amounts of research and development are going into electrolysis systems for large-scale production of green hydrogen. The goal is to ultimately construct hydrogen plants at the gigawatt scale, but at present, the largest systems are around 1 megawatt. 1 gigawatt (GW) is one thousand megawatts (MW). In short, we have a long way to go before we can scale up green hydrogen production to that level. Because of the limited production scale, green hydrogen cannot at present compete with grey hydrogen. This is why the province is aiming for upscaling to systems of 100-250 MW by 2025. That will be a necessary step on the way to producing 1 GW systems in 2030. As soon a production increases, the cost price of hydrogen will fall.**




### Upscaling and connection

Within the Port of Rotterdam, a number of large chemical conglomerates will be making decisions in 2022 about the construction of a green hydrogen facility .This will be a plant of 250 MW.

Hydrogen production at this scale releases a great deal of heat, and so the province wants to work with stakeholders to explore the possibilities for connecting this heat into the heat network currently being built at the regional scale. This will give the facility the ability to sell low-temperature heat, a win-win for the energy transition.

## Concept development

Initiatives from the industry itself are the first stepping stones on the way to a conversion farm of 1-2 GW in Zuid-Holland. In the early stages, a consortium led by the Institute for Sustainable Process Technology (ISPT) produced a conceptual design for a 1 GW electrolysis facility. This was a serious exercise that helped greatly in assessing how a production location of this scale can be successfully incorporated into the infrastructure for electricity, demineralised water, hydrogen, oxygen and heat in the Port Industrial Complex Rotterdam.

### WHAT EXACTLY WILL IT TAKE TO ACHIEVE LARGE-SCALE SUPPLY OF GREEN HYDROGEN?

Making this development a reality will require investments in the upscaling of renewable energy and water electrolysis. Producing green hydrogen takes energy, and that means there must be enough renewable energy available. This can be done with offshore wind farms and solar farms, but this solution will also involve increasing the capacity for electricity landfall and conversion to hydrogen in the Port Industrial Complex Rotterdam. Import of green hydrogen is also expected to play an important role in meeting the potential demand in Zuid-Holland, particularly in its hinterland.

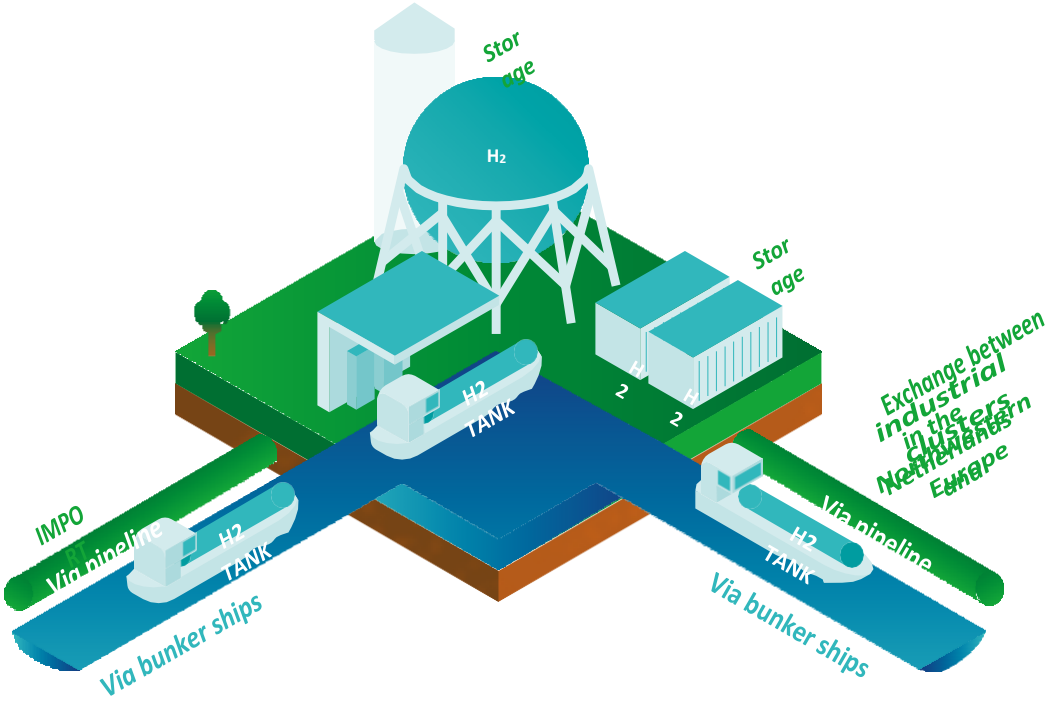
## Opportunity for the manufacturing industry

Currently, electrolysers are being built by large foreign companies, which makes them expensive. The production process is the subject of extensive research and development, with the goal of upscaling it to point that the costs can be reduced. Will these companies be able to limit or avoid the use of critical/expensive materials such as platinum and iridium? What is the reuse potential? Zuid-Holland is a hub of technological knowledge and expertise, which is why the province sees an opportunity for the manufacturing industry in Zuid-Holland to contribute to large-scale, circular and high-tech generation of green hydrogen.

# Supply

## 2. LOGISTIC FUNCTION OF THE PORT FOR IMPORT AND TRANSSHIPMENT OF HYDROGEN

**The Port of Rotterdam is one of the largest ports in the world. As a logistics hub for energy and goods, the Port Industrial Complex is a major nexus within the economy, not only of Zuid-Holland but the Dutch national economy as well. Imported energy and goods find their way through the port in Rotterdam to the province, the rest of the country, and the rest of Europe. In the future, these will be the same routes through which hydrogen is imported and transshipped.**



### Import of energy

One of the major functions of the Port of Rotterdam is the import, processing and transshipment of fossil fuel sources like coal, petroleum and natural gas. Hydrogen and its derivative products can serve as a sustainable alternative for these fossil fuels. This is important, because we will continue to have a need for imported energy in the future on top of the renewable energy produced in the energy, due to our large energy demand and export of energy. How great that need will be is something that the HyChain project is investigating.

### Study: Green Spider

One concrete initiative on the import and transshipment of renewable energy is Green Spider. This study is investigating the feasibility of hydrogen import by sea from Spain and Portugal, plus transshipment of hydrogen through the Netherlands to the hinterland in Germany. In order to make this transport possible with existing oil tankers, the gaseous hydrogen must first be bonded to a liquid organic hydrogen carrier (LOHC). This oil-like liquid can also be stored in existing oil terminals. The province of Zuid-Holland is working together with other stakeholders on how to facilitate this import study and how to connect the various links within it. It must also include a consideration of the health and safety aspects of these hydrogen carriers.

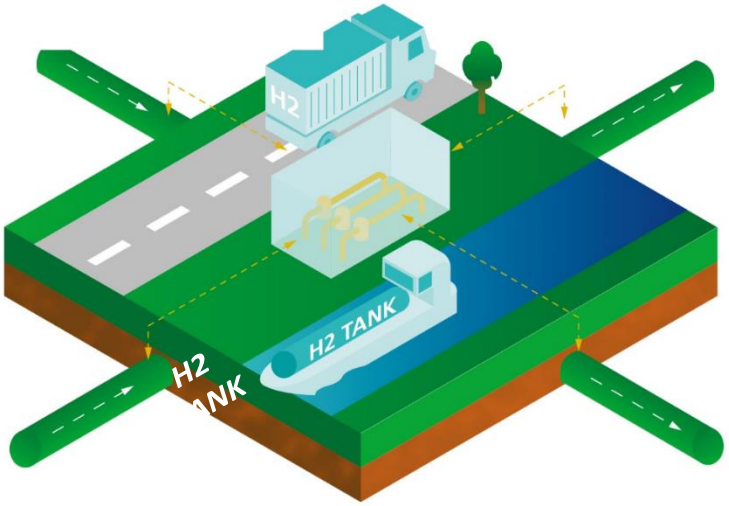
## ENERGY PORT OF THE FUTURE

In its vision for the future, the Port of Rotterdam Authority sees a crucial role for hydrogen in maintaining and expanding the position and importance of the Rotterdam energy port in a sustainable energy world market. The province shares this vision. Together, we underscore the strategic importance of developing the hydrogen infrastructure for import and transshipment in parallel with the infrastructure for regional production and use of hydrogen. We recognise the shared importance of the circular and sustainable transition of the port for the Dutch national economy, regional employment, the climate and the environment, and as a magnet for new industrial activity.

# Infrastructure

## 3. DEVELOPMENT OF AN OPENLY ACCESSIBLE HYDROGEN INFRASTRUCTURE

**The energy system of the future will be an interplay between green electrons and green molecules. It is an entirely new energy system, and one that will demand new structures and new implementations. This means not only a transformation of the current energy infrastructure, but also new infrastructure for the transport, distribution and storage of new energy carriers. The plan: start with a growth model with 'no regrets' infrastructure, and gradually upscale this to an infrastructure for transport, storage and distribution to end users with full coverage. The province has the ambition to be a facilitating link in this process.**




### Systemic function of hydrogen

By their nature, fossil fuel resources allow us to use energy at any time and at virtually any place in the world. Our current energy system is geared for the

large-scale storage and transport of fossil energy carriers. This allows them to fulfil an important buffer function. Hydrogen has the potential to take over all three of these systemic functions, but this will be contingent on the production of hydrogen both going fully green and efficient within the foreseeable future, and do so in enough quantities to meet the demand.

### Storage of hydrogen: starting small

Right now, experts are already investigating the options for large-scale storage of hydrogen. As one example, experts are now studying the possibilities of storage in the salt caverns at Zuidwending in the province of Groningen. The North Sea Energy Program is investigating whether empty gas fields in the North Sea might be suitable for hydrogen storage. If so, these options could become available around 2030. This timing is good, because it is at that point that the volumes of hydrogen will be large enough to require storage capacity. For this reason, the province of Zuid-Holland is first focusing on local and regional storage of renewable energy and hydrogen in storage tanks and, potentially, a hydrogen terminal.

### Mapping the supply and demand

Zuid-Holland lacks a public hydrogen infrastructure; the development of such infrastructure on the scale required will be a process for the coming 5-10 years. This means that it is important to start mapping out the potential supply and demand for hydrogen now, to gain a view to the need for infrastructure for transport, distribution and storage.
For the exchange of hydrogen in the short term, we are looking at where the development of local and direct connections between supply and demand are necessary. At a later stage, the volumes of supply and demand at the regional level will be sufficient to exchange hydrogen through large transport pipelines between industrial clusters in the Netherlands and neighbouring countries.

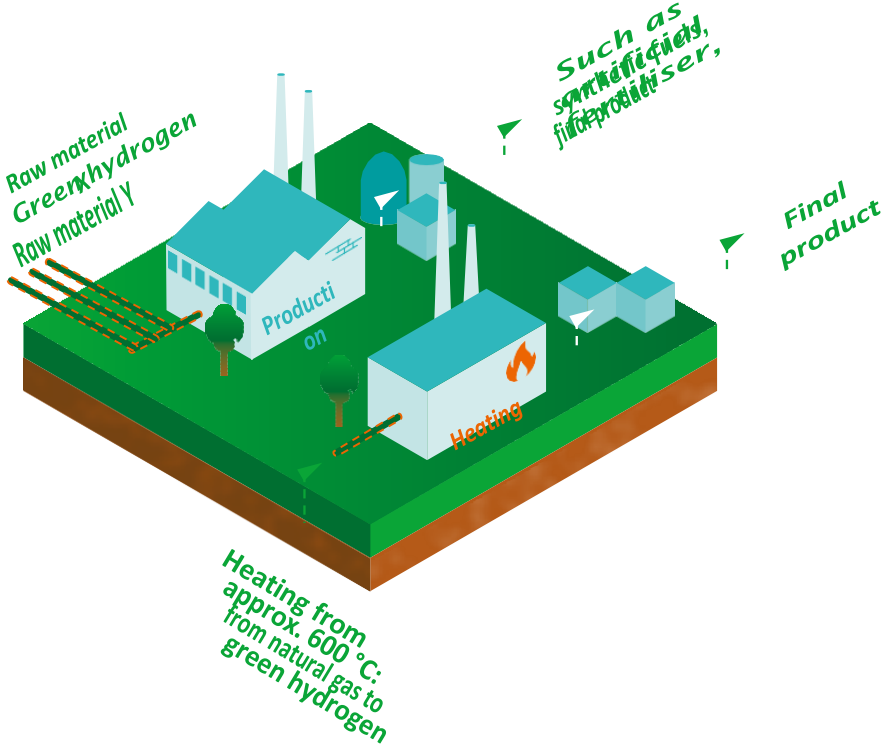
#### NEW AND EXISTING GAS LINES

Because hydrogen is a gas, it can be transported through a pipeline network. We can build new networks for this, but existing gas networks could also be used with some retrofitting of connectors and compressors. Experts have indicated that by 2030, existing natural gas lines could be made suitable for the transport of pure hydrogen. These pipeline networks are suitable for connecting the industrial clusters of the Netherlands. The Green Octopus initiative is investigating the potential for connecting five industrial clusters in the Netherlands with industrial clusters in Germany, Belgium and France.

# Demand

## 4. HYDROGEN AS RAW MATERIAL AND SUPPLEMENTALLY AS ENERGY CARRIER FOR INDUSTRY

**Up to now, hydrogen has been used primarily as a raw material for industry. The petrochemical industry and the food industry are the main users of hydrogen as a raw material, for example in the production of synthetic materials and fuels. Hydrogen also goes into artificial fertilisers. Besides these uses, hydrogen is also a powerful fuel for processes at high temperatures, starting at approximately 600 °C.**



## From grey to blue, and in parallel, to green too

At present, industry uses primarily grey hydrogen. The production of grey hydrogen comes with $CO_2$ emissions. In order to meet the emissions targets for 2030, hydrogen producers will need to capture and store or use the $CO_2$ released in this process. In parallel with this development, the production of green hydrogen is getting off the ground. Our desired end state is that by around 2050, all hydrogen will be green, both the hydrogen we produce ourselves and the hydrogen we import. This green hydrogen is intended for use in Zuid-Holland and the surrounding coverage area.

## Making high-temperature processes more sustainable

The energy for high-temperature processes is currently obtained from fossil energy carriers. With a view to the energy transition, the province of Zuid-Holland is stimulating industry to upgrade and modernise their processes. Are there ways to save energy? Perhaps some processes could be made to run at lower temperatures? Depending on the process and the temperature required, we can then look at possible alternative energy carriers. In some cases, electricity could replace natural gas. For processes with temperatures around 600 ˚C, hydrogen offers a lot of potential.

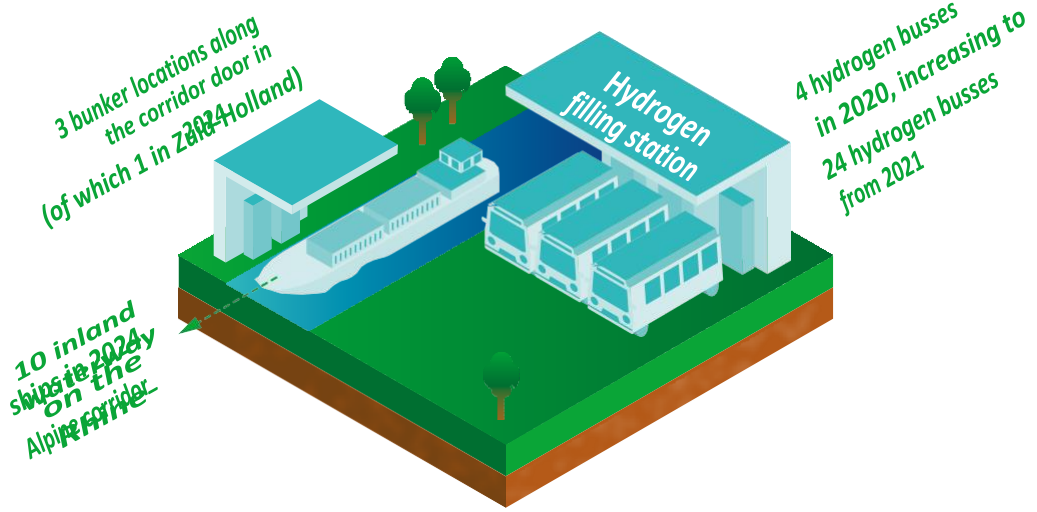
### FLYWHEEL

Right now, the use of green hydrogen as an energy carrier or raw material is a more expensive solution than existing fossil fuel applications, and that will remain so for the time being. This is one of the stubborn aspects of the energy transition that will not take care of itself. Early development and testing will help to scale up these applications safely and responsibly by around 2030. Increasing the demand for green hydrogen will have a flywheel effect that will drive a rapid upscaling of the supply. Financial incentives can help to discourage fossil fuel applications and encourage sustainable hydrogen alternatives.

# Demand

## 5. HYDROGEN AS ENERGY CARRIER FOR CLEAN MOBILITY

**The province of Zuid-Holland is a logistics hub. Every day, residents of Zuid-Holland travel by car or public transport to all kinds of destinations. A large portion of these vehicles burn fossil fuels. This is what makes mobility one of the major contributors to emissions of greenhouse gases ($CO_2$ in particular) and substances that are hazardous to health, such as fine particulates and nitrogen oxides. Clean mobility will make an important contribution to the health of our population. Here, there is a major opportunity for the sustainable hydrogen economy in Zuid-Holland.**




### Cracking the chicken-or-the-egg problem

Zero-emission vehicles – both battery-electric and hydrogen-electric – can be part of making transportation more sustainable and reducing emissions. But hydrogen in mobility struggles with a kind of chicken-or-the-egg problem: demand (vehicles and vessels) cannot really take off without supply (filling stations), and vice versa. That is why the province of Zuid-Holland is putting efforts into a chain-based approach on regional transport and inland waterway transportation, to crack this chicken-or-the-egg problem.

### BATTERY VS. HYDROGEN

The way to cleaner mobility is increased fuel efficiency in vehicles and water transportation, and going electric. The battery-electric solution is a good approach for short distances and lighter vehicles and transport. For heavy transport and longer distances, fuel cell technology in combination with hydrogen seems to be ideal.

## Power and long distances

### Regional buses on hydrogen

To give the transition to zero-emission public transport a boost, in February 2019, a pilot project was launched with twenty regional buses within one regional concession in Zuid-Holland, Hoeksche Waard Goeree-Overflakkee (HWGO). This comes on top of the four hydrogen buses that had already been contracted on this route, and which took to the road in 2020.

### Inland waterway vessels on hydrogen

Part of promoting accessibility within the province is to facilitate the transport of goods by water. One way that Zuid-Holland is doing that is opening up the international goods transport corridors for inland waterway vessels powered by hydrogen. In cooperation with the neighbouring German state of Nordrhein-Westfalen, the province has launched an initiative to promote hydrogen as a power carrier for inland shipping. This project, dubbed RH2INE, is focusing on both hydrogen-powered transport and the supporting bunker infrastructure.

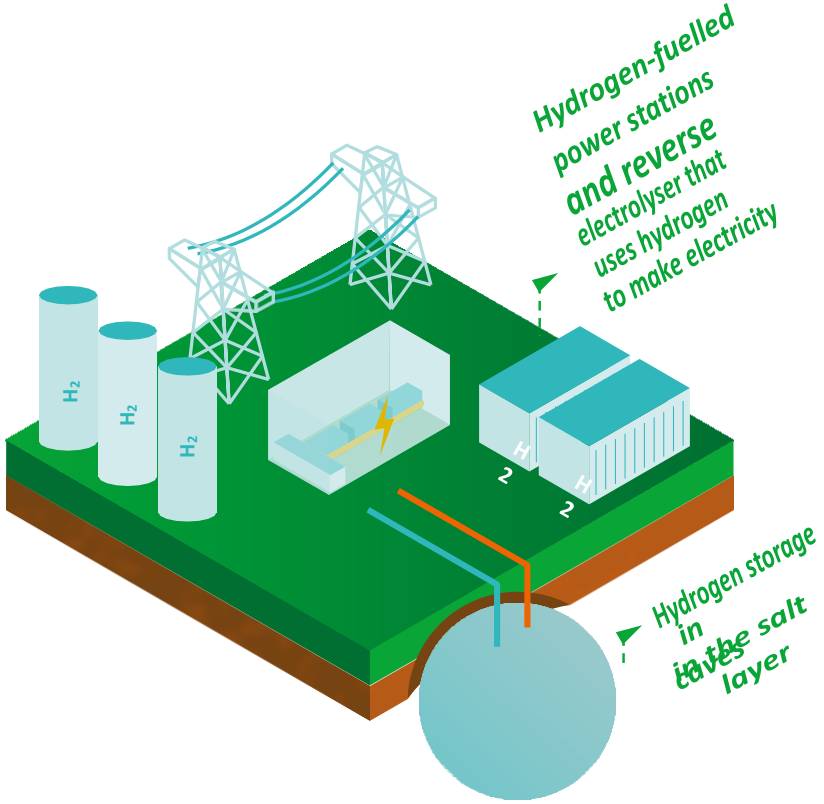
### MOBILITY PILOTS AS DRIVERS

With the pilot projects, the province is stimulating the development of hydrogen infrastructure with province-wide coverage. The initial focus is on goods transport corridors, infrastructure for regional public transport and, where possible, opportunities for connecting with multimodal fuelling infrastructure for freight trucks and inland waterway vessels (for example, energy hubs along corridors).

# Demand

## 6. THE ROLE OF HYDROGEN IN THE ENERGY SYSTEM: BUFFERING AND BALANCING

**Natural gas fulfils two important functions in our energy system: buffering of energy and balancing the energy system (electricity and heat). Replacing natural gas in order to achieve $CO_2$ emissions reduction targets will have consequences for the certainty of supply in the energy system and the affordability of the energy system as a whole. One of the main issues here is that renewable energy generation from sources like solar and wind is unpredictable. Hydrogen is a good candidate for taking over the balancing and buffering function of natural gas.**



One advantage of hydrogen is that it is suited for large-scale storage. If this hydrogen is produced with renewable energy, then it also allows buffering. Also, large-scale underground transport of hydrogen is possible using both existing natural gas infrastructure and new (future) construction of hydrogen infrastructure. Using existing gas networks will minimise cost increases for the construction of hydrogen infrastructure, and with conversion of electricity into hydrogen, expansion of the electricity net can be kept to a minimum. One important requirement here is, however, that the production (and thus the use) of green hydrogen in the energy system remains affordable.

## The system functions of hydrogen

What we need to do now is gain a full understanding of the roles that green hydrogen can play in the total energy system. Because there are, of course, other sustainable energy carriers. It is important to look not just at the situation in Zuid-Holland. What is the context of our regional energy system – not only within the Netherlands, but within Europe? Because the province and the region import some of the energy we need from other regions in Europe, from offshore energy farms, and from other parts of the world. Also, some renewable energy storage will be in other parts of the Netherlands, for example, in the salt caverns in the north of the country (Zuidwending in Groningen). Fully mapping out all the possibilities will require a system study of Zuid-Holland by individual hydrogen function in the future energy system.

# H2GO – real-world example of integral approach

**For many stakeholders, the hydrogen economy is still uncharted territory. The integration of renewable electricity and renewable gas in the future energy system presents major challenges. Not least of which in that the entire value chain, from production of new energy carriers to the necessary infrastructure to new applications, still need to be developed. This is why it is important to make sure that the supply, demand, distribution, storage and transport of hydrogen are parallelly developed. On the island Goeree-Overflakkee, the H2GO programme is studying this combination at a local scale. The projects in this local demonstration incubator are producing valuable insights and lessons for the province and the regional level.**

### H2GO programme

In 2017, thirty partners and project participants came together to join forces in the H2GO programme. H2GO hopes to show that green hydrogen will also fuel important developments for the energy transition beyond the realm of industry. Various projects are exploring the prospects of elimination of 100% of $CO_2$ emissions within the energy supply by using electricity and hydrogen. Each project is both an independent building block and a part of the whole of the programme. The goal is to have each project gradually grow from showcase to viable business case.

### Supply: Oude-Tonge energy farm

The goal of this project is to transform the Oostflakkee industrial park into a new energy farm, where green energy carriers (green gas, hydrogen and ammonia) will be produced. At the same time, this local production offers immediate opportunities to increase the sustainability of energy consumption in the area around the energy farm.

### Transport, distribution and storage: regional hydrogen roundabout

After hydrogen is produced, transport, distribution and storage become crucial. Storing hydrogen creates a buffer for the moments at which there is not enough wind or solar energy being generated to meet demand. The 'hydrogen roundabout' is a pilot project for a regional exchange system for the island of Goeree-Overflakkee. It is a hub for transport, distribution and storage of green hydrogen. Part of this project is exploring connecting the local hydrogen network to the network in the Port Industrial Complex Rotterdam as a backup for the security of supply.

### Demand: hydrogen for four different domains

Where can green hydrogen be a part of increasing sustainability? In what domains do we see opportunities?

In four separate projects, the H2GO programme is exploring the areas where hydrogen can be used in mobility, shipping, the urban environment and agriculture.

## Call to action

**Together with our partners, the province of Zuid-Holland is working towards a green hydrogen economy. On the way towards a sustainable energy system, we are keeping sight of spatial planning aspects, environmental issues and public safety. And we also consider it important that in the future, everyone will be able to take part. Do you have any ideas or plans for the production, demand, distribution, storage or transport of green hydrogen? If so, please contact one of the advisors on the province's Hydrogen Core Team.**

## Publication information

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