Green Inland Ports

Good Practices

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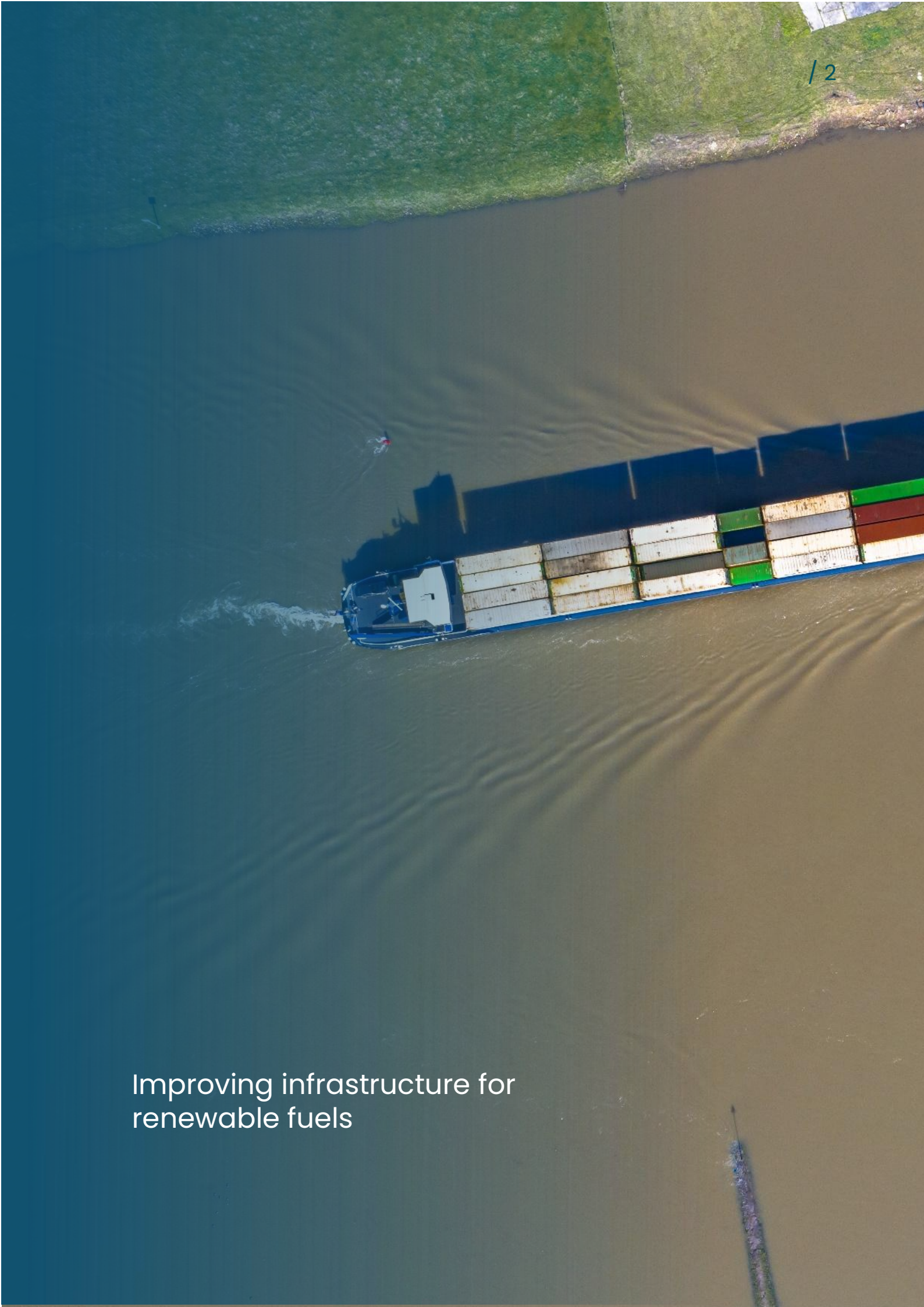

Improving infrastructure for renewable fuels

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1.1 Description

The EU's climate plans contain several direct measures for inland navigation. In the Netherlands, the sector has signed a Green Deal with the government to achieve a 35-50% reduction in CO_2 emissions by 2035. The goal is to achieve zero-emissions in water transport by 2050 (NPRC, n.d.).

The International Maritime Organisation (IMO) aims to reduce greenhouse gas emissions from international shipping to zero or near zero by 2050. It has set targets to cut emissions by at least 20%, aiming for a reduction of 30% by 2030 and 80% by 2040 (International Maritime Organization, n.d.).

Future greenhouse gas emission targets may result in inland navigation adopting alternative fuels such as hydrogen, electricity, ammonia, and methanol. For this shift, ports need the infrastructure to bunker renewable fuels. This requirement also applies to trucks and port vehicles, which are expected to increasingly use electricity and hydrogen.

Examples of renewable fuels infrastructure in ports

Initiatives in the Wadden Sea region

Several ports in the Wadden Sea region are already working toward decarbonising inland shipping. The "Green Shipping Wadden Sea Program" consists of 10 projects, many of which focus on bunkering infrastructure and the use of methanol and/or hydrogen on ships. The programme runs from 2020 to 2025. Some of these projects are explained below (Green Shipping Waddenzee, n.d.-a):

- Green hydrogen in the port of Den Helder: The aim is to validate and demonstrate innovative maritime hydrogen technology. This will encourage the use of green hydrogen in the maritime sector and the development of hydrogen infrastructure in the Wadden Sea region (Green Shipping Waddenzee, n.d.-b).
- Conversion Ecolution ship Lauwersoog: This project plays a pioneering role in the transition to hydrogen as a fuel. The project included several phases, such as a test rig, conversion of the ship and trial runs, which contributed greatly to gathering knowledge in this field (Green Shipping Waddenzee, n.d.-d).
- Development of maritime methanol systems: 'Electric Ship Facilities' is investigating green methanol as an energy carrier for a fuel cell. A fuel cell can convert chemical energy into electric energy without significant efficiency losses and without intermediate steps (Green Shipping Waddenzee, n.d.-e).
- Hydrogen for onshore power in the ports of Harlingen, Den Helder & Groningen Sea Ports: Ports in the Wadden Sea region are working to reduce CO2 emissions, air pollution, and noise. While onshore power supply (OPS) is a common solution, it is costly to implement. This project explores a mobile hydrogen generator as a flexible zero-emission alternative for shore power (Green Shipping Waddenzee, n.d.-f).

- Hydrogen service ship in the port of Den Helder: Shipping accounts for 2.5% of global CO_2 emissions annually. This project involves converting a conventional fossil-fuelled ship to run entirely on hydrogen, contributing to industry knowledge on hydrogen-powered vessels (Green Shipping Waddenzee, n.d.-c).

Renewable Energy Development and Intelligent Implementation in Ports Project (REDII Ports)

Beyond the Wadden Sea region, the **Port of Zwolle** is participating in the **Renewable Energy Development and Intelligent Implementation in Ports Project (REDII Ports)**. The aim of this project is to develop technically and economically feasible solutions for cleaner energy generation, storage, and consumption of cleaner energy and fuels. The project aligns with the REDII 2018/200 and AFID 2014/94 Directives and prioritises five alternative energy sources relevant to port community:

- Electricity (shore, hydro power, battery)
- Windlock, tide, solar
- Biodiesel, hydrogen, ammonia/methanol

For each port, the energy systems relevant to achieving a green transition of ports will be analysed locally. REDII Ports will define the conditions for establishing a blueprinting for a medium- and long-term strategy that will enable ports to become initiators of new green energy developments. Once the framework is defined, partners will test their effective capacity to convert resources into the selected energy/fuel options and/or facilitate other companies' renewable energy initiatives at their sites (Port of Zwolle, n.d.).

1.2 Aim

Adapting port infrastructure to accommodate alternative fuels serves as a prerequisite to initiate the transition to the use of alternative fuels and green energy. When infrastructure and bunker facilities are adequately arranged, the step for ships/shipowners or other parties to switch to cleaner fuels becomes smaller.

1.3 Ports and other organisations that have improved infrastructure for renewable fuels

- Wadden Sea Ports (Niedersachsen Ports, Port of Den Helder)
- Port of Zwolle
- Port of Brussels
- Port of Switzerland (Basel)
- Compagnie Nationale du Rhône (Port of Lyon)
- DeltaPort (Wessel)
- Bayernhafen
- Port of Aalborg
- HAROPA Port
- Port of Venlo
- ZULU Associates
- KOTUG

1.4 Stakeholders

- Port authority /terminal operator: The port authority is generally responsible for port infrastructure, including fuel infrastructure. When terminals within the port belong to different companies, the relevant terminal operator could be responsible for fuel infrastructure. However, this will always be in cooperation/consultation with the port authority.
- Shipowner/truck owner: These parties can be incentivised to switch to more sustainable fuels when the alternative fuel infrastructure is in place and when the supply of sufficient alternative fuels is guaranteed.
- European/national governmental body: The adoption of fuel infrastructure can be accelerated if rules and regulations can be established at European and/or national level.
- Fuel company: Depending on the fuel infrastructure adopted in a port area, relevant fuel companies may supply their fuel, which may require contracts.

1.5 Voluntary or mandatory

Whether this measure is voluntary, or mandatory depends on the country. The Central Commission for the Navigation of the Rhine, for example, has the target of reducing greenhouse gas emissions of inland navigation by 35% in 2035 and 90% in 2050 compared to the 2015 level (TNO & Planbureau voor de Leefomgeving, 2024). There is no direct obligation to base the infrastructure around alternative fuels in inland ports, but when the above-mentioned targets have to be met, action must be taken by ports covered by the aforementioned parties.

1.6 Realised/potential impact

As the use of clean alternative fuels are still in their infancy, it is difficult to quantify any realized or potential impact. This good practice can also be seen as a prerequisite for the fuel transition to succeed, as sufficient fuel must be available in ports and ships/trucks/cars must be able to bunker the fuel without any problems.

1.7 Possible obstacles

- There are many alternative fuels, such as LNG, biofuel, ammonia, hydrogen, methanol and ethanol. Every fuel has its benefits and its limitations. Ports wants clarity on what would be the most widely used ‘future’ fuel before investing in infrastructure.
- It often remains a chicken and egg story at the moment, since ports want clarity first on what fuel the ships need, while ships wait until the fuel is available.
- Results from the Green Inland Ports survey (2024) show that ports generally find this good practice very difficult to implement (score of 7.4 on a scale from 1 (very easy) to 10 (very difficult).

1.8 Key learnings

- Large-scale emission reduction of both greenhouse gases and air pollutants can be achieved through the use of renewable fuels.

- Renewable fuel infrastructure plays an enabling role in the large-scale transition to renewable fuels and clean energy.
- As the Green Deal calls for significant CO_2 emission reductions on both the short and long term, the application of clean fuels will be necessary.

1.9 Sources

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