AUSTRALIA – GERMANY
Energy Partnership

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FACT SHEET

HYDROGEN IN AUSTRALIA AND COOPERATION POTENTIAL WITH GERMANY

As of December 2023 I **Australia could become one of the most important producers and exporters of clean hydrogen in the future. As early as 2030, 6 million tonnes (Mt) of green hydrogen could be produced and, in the long term, up to 16 Mt could be exported (IEA 2023; Deloitte 2023). At the same time, there is already central technical know-how in Germany today and a great need for imports in the future. This results in diverse cooperation potentials along the hydrogen value chain, so that strengthening and deepening Germany's cooperation with Australia is in the interest of both countries.**

Potential for Hydrogen Production in Australia

Australia is widely seen as a future powerhouse in green hydrogen production. Above all, the first-class endowment with natural resources such as wind and sun, but also the high availability of space for the expansion of renewable energies as well as the experience with large-scale energy exports, existing export infrastructure, and the existing technical capabilities offer ideal conditions for the development of an export economy.

It is projected that Australia could produce 6 Mt of green hydrogen from 2030 (IEA 2023) and export significant quantities. With the introduction of favourable incentives, Deloitte expects that Australia's export capacity can increase to 16 Mt of green hydrogen per year in the long term, reaching a size comparable to the fossil fuel export industry (Deloitte 2023). While much of the existing energy transport infrastructure (rail, ports, roads, etc.) can also be used to transport green energy, including hydrogen, Australia is actively working to open up the sea route and enable global exports in a timely manner.

Already today, Australia is home to 33 major projects focused on the export of hydrogen and its derivatives (see Figure 1). In terms of trade volume, Australia thus records half of all trade projects planned worldwide until 2030. Australia's main trade routes are expected to be to Asia and Europe (IEA 2023). The Hydrogen Energy Supply Chain (HESC) project demonstrated the world's first transport of liquid hydrogen by ship from Australia to Japan in 2022 (IEA 2022). Although the hydrogen transported was brown hydrogen, the knowledge gained will also be relevant for the future transport of green hydrogen via ship. Information on all publicly known projects is compiled by the State Research Organisation (CSIRO) on the HyResource website (CSIRO 2023a).

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Political Situation and Funding Programmes in Australia

The Australian National Hydrogen Strategy was published in 2019 with a target of producing one kilogram of hydrogen for under 2 AUD (1.2 EUR). The strategy is currently being revised and adapted to the ever changing framework conditions. In addition, all six Australian states

and the Northern Territory have developed their own hydrogen strategies and roadmaps.

This year, the National Hydrogen Infrastructure Assessment (NHIA) and the State of Hydrogen Report 2022 were published. The latter provides an overview of the development of the Australian hydrogen economy since the publication of the National Hydrogen Strategy and shows that it is making rapid progress in many areas. In four areas (support for the electricity grid, heavy and light transport, and steel and iron production) the report identifies rather slow progress. Compared internationally, Australia ranks as a 'follower' when it comes to the actual implementation of hydrogen-related projects and initiatives (DCCEEW 2023). Industry players also repeatedly complain, and especially after the publication of the Inflation Reduction Act (IRA) in the USA, that hardly any binding investment decisions have been made so far and Australia is at risk of falling behind the USA and Europe. Particularly in the early phase of the market ramp-up, higher and binding investments are seen to be central to building momentum and consolidating Australia as an attractive industrial location (AHC 17.08.2023; The Guardian 16.02.2023). The NHIA models and evaluates industry needs and demand scenarios, aiming to ensure that relevant hydrogen infrastructure is built in the right place at the right time (Arup Australia 2023). Other ongoing activities include the development of a Guarantee of Origin Scheme for hydrogen, its derivatives, and renewable energy sources as well as the evaluation of existing regulations and national gas laws for their relevance to the hydrogen economy.

The Australian Government is funding projects along the value chain with a total of 3.64 billion AUD (2.2 billion EUR). The four largest funding programmes are the "Hydrogen Headstart Program", which provides 2 billion AUD (1.2 billion EUR) in the form of contracts for difference for two to three green hydrogen projects; the "Regional Hydrogen Hubs Program", which supports the expansion of hydrogen hubs with 513.7 million AUD (310.4 million EUR); the “Advancing Hydrogen Fund”, which is administered by the Clean Energy Finance Corporation (CEFC) and provides 300 million AUD (181.3 million EUR) for the development of the hydrogen industry; and the “Renewable Hydrogen Deployment Funding Round”, through which the Australian Renewable Energy Agency (ARENA) provides 108 million AUD (65.3 million EUR) to three commercial hydrogen projects. Additional state funding totals 4.7 billion AUD (2.8 billion EUR), with New South Wales leading with funding of 3.26 billion AUD (2 billion EUR), followed by South Australia with funding of 682 million AUD (412.1 million EUR) (CSIRO 2023b).

Import Demand in Germany

In July 2023, Germany published its revised National Hydrogen Strategy. According to the updated strategy, Germany will have a demand of 95 to 130 TWh (2.85 to 3.9 Mt) in 2030, of which 50% to 70% (45 to 90 TWh/ 1.4 to 2.7 Mt) will have to be imported (BMWK 2023). However, there are significant differences between existing demand forecasts due to many uncertainties. For instance, a meta-study by the Fraunhofer Institutes IEG, ISE, and ISI estimates Germany's demand in 2030 at only up to 2.4 Mt (80 TWh), mainly for the industry and transport sectors, and in 2050 at 12.7 to 24.7 Mt (400 to 800 TWh) (Wietschel et al. 2021). However, the predictions for import demand are similar. The study predicts this to be between 43% and 70% for 2030, and between 53% and 80% for 2050 (Wietschel et al. 2021). The ports of Rotterdam and Antwerp, but also Hamburg, Brunsbüttel, and Wilhemshaven are correspondingly already preparing for the import of hydrogen and its derivatives. In Brunsbüttel, for example, RWE is considering importing liquid hydrogen and ammonia via the existing LNG terminal. Additionally, several research networks are discussing different hydrogen import routes (IEA 2022) within the framework of research projects such as TransHyDE while projects involving "H2-ready"

gas pipelines - e.g. the EU Hydrogen Backbone - and the conversion of salt caverns for hydrogen storage are being actively pursued. A comprehensive import strategy and a hydrogen transport network are currently being developed (BMWK 2023).

German Technologies

German technologies and German know-how can make a significant contribution to the development and market ramp-up of green hydrogen in Australia. German companies are represented along the entire hydrogen value chain and deliver essential innovations. According to a long-term study by the European Patent Office (EPO) and the IEA, German companies such as Linde, BASF, Siemens, and Bosch were leaders in Europe in filing patents on hydrogen technologies between 2011 and 2020; in fact, one in ten hydrogen patents worldwide was filed by German companies during that time period (EPO & IEA 2023).

Especially in the fields of electrolysis, liquid organic hydrogen carriers (LOHC), ammonia, and methanol production, German companies are industry leaders. In alkaline hydrogen electrolysis (AWE) and proton exchange electrolysis (PEM), producers such as thyssenkrupp nucera, Siemens Energy and Sunfire are already working on the commercialisation of modules with a capacity of 10 to 20 MW. Capacities in this order of magnitude will be decisive for the realisation of export projects (acatech/BDI 2022).

When it comes to the market ramp-up of hydrogen in Australia, German technology providers can play a significant role, especially since German products enjoy an excellent reputation. But not only electrolysers are needed, there is also demand for pumps, compressors, pressure tank vessels, polymers, and many other components and services. Further opportunities are arising in the field of applications, too. The VDMA PtX Manufacturers Directory provides a good reference point to get an overview of German companies along the hydrogen value chain.

Bilateral Hydrogen Cooperation

Since March 2017, Australia and Germany have been cooperating in the Energy and Resources Working Group, which was formalised as an official energy partnership at COP26 in 2019 and is currently being expanded to climate. In addition to energy efficiency, hydrogen is a key priority of the partnership. In 2021, Australia and Germany also signed the Australia-Germany Hydrogen Accord. Within the Accord, three initiatives deepen the close cooperation between Australia and Germany in the field of hydrogen: (1) Within the framework of the Innovation and Technology Incubator for H2 (HyGATE), the BMBF and Australia provide 40 million EUR and 50 million AUD (30.2 Mio. EUR) respectively for the funding of four cooperation projects along the hydrogen value chain. The four successful projects were announced in February 2023. (2) Support will also be provided to strengthen industrial cooperation for bilateral demonstration projects in Australia, for example through cooperation in hydrogen hubs where green hydrogen and derivatives can be produced using German technology. (3) The concrete initiation of bilateral hydrogen trade is also to be supported, among other measures, through the German import platform H2Global.

Between 2020 and 2023, the feasibility study on the establishment of a German-Australian supply chain (HySupply) funded by the BMBF and the Australian Government was able to create valuable insights and initiate connections (GlobH2E/UNSW/BDI/acatech 2023). Following the completion of HySupply, the BMBF is now funding a feasibility study together with the Governments of Western Australia and the Netherlands to establish a trilateral hub in the Oakajee industrial area. Cooperation with Germany is also being promoted in CSIRO's international RD&D collaboration programme on hydrogen. Stakeholders are further networked through the German-Australian Hydrogen Alliance founded by the AHK and the Australian Trade and Investment Commission (Austrade). adelphi is taking the lead in supporting the implementation of the bilateral energy partnership.

Existing Industry Cooperation

Active cooperation to initiate business relationships can also be found at industry level. In mid-January 2022, the first agreement was concluded between the Australian company Fortescue Future Industries (FFI) and the German company Covestro/Bayer for hydrogen deliveries amounting to 100,000 tonnes (3.3 TWh) per year from 2024. This was followed up by a second agreement between E.ON and FFI in March 2022 for supply volumes of up to 5 Mt (166.9 TWh) from 2030. In addition, German technology suppliers are involved in a number of Australian demonstration projects and are engaged in ongoing dialogues with Australian companies. For example, Australia's largest commissioned electrolyser to date at Hydrogen Park South Australia is from Siemens Energy.

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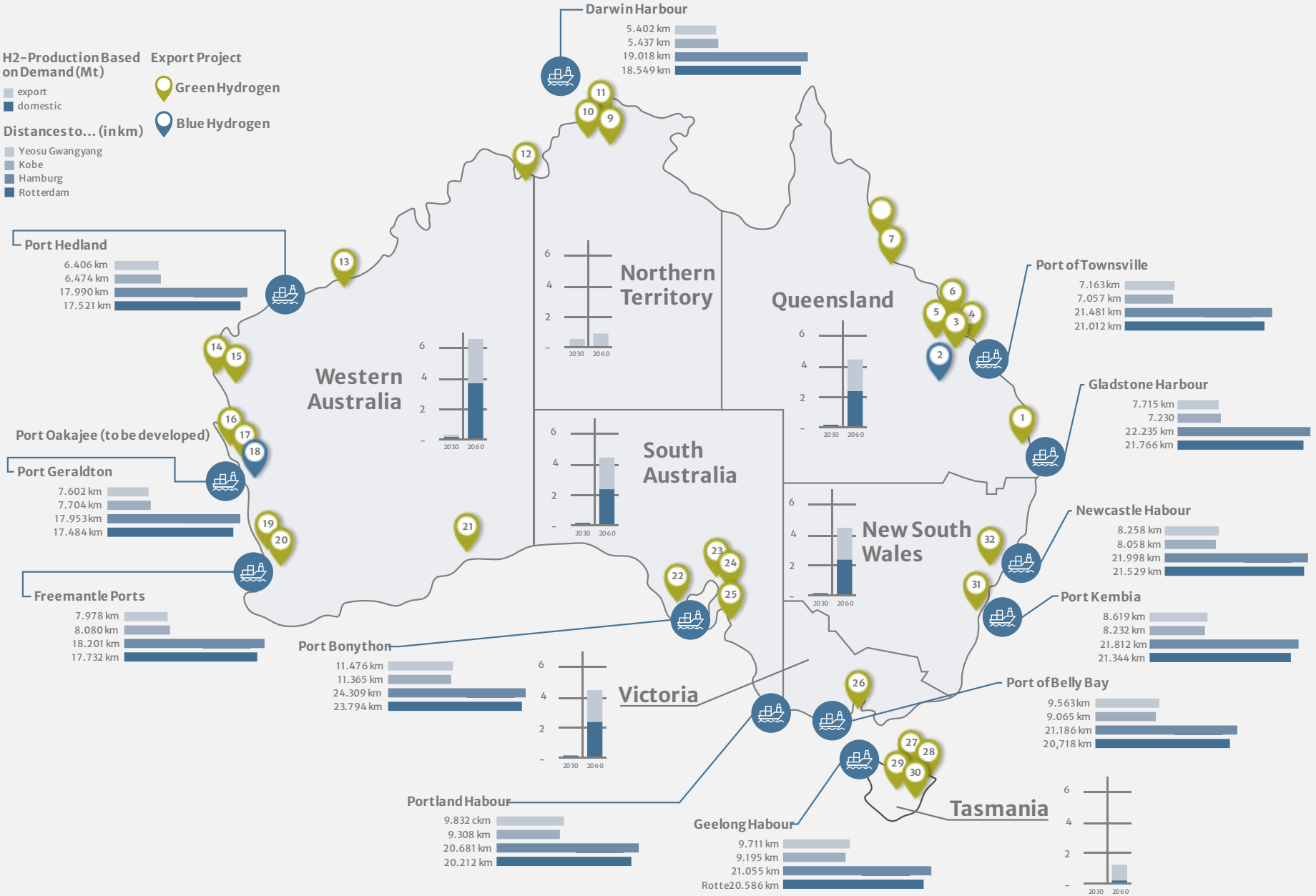
Figure 1: Large, Export-Oriented Projects in Australia



Source: Own representation based on data from CSIRO 2023a