REPORT

NEW CLIMATE INSTITUTE

ASSESSING SAFEGUARDS FOR HYDROGEN SUSTAINABILITY

In the H2Global Mechanism

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SUMMARY

H2Global is a trade-oriented mechanism designed to foster a global green hydrogen market. It pairs long-term supply contracts with short-term demand contracts and uses public and philanthropic funds to bridge the cost gap. So far, H2Global has undertaken one pilot tender funded by a single donor, the German Federal Ministry for Economic Affairs and Climate Action (BMWK), which funded renewable ammonia, renewable methanol, and electricity-based sustainable aviation fuel.

Hydrogen production poses several opportunities and risks for producing countries. Robust environmental and social safeguards and energy and resource efficiency guidelines are essential to mitigate harm and capture benefits. This study aims to assess the extent to which the design of the H2Global instrument and BMWK pilot tender address key risks and opportunities associated with hydrogen production. Key findings and recommendations are summarised below:

No minimum standards: The H2Global instrument does not set minimum standards for tenders; instead, it remains adaptable to the objectives of tender funders. Funders define tender parameters, including product type, criteria, geographical focus, and sustainability standards. While the BMWK pilot tender sets more ambitious product standards in some cases than required by European Union (EU) regulation, the level of ambition of future tenders will depend on funders. This introduces variability in the impact of the H2Global instrument on global climate and sustainable development goals, for example, by allowing support for "low-carbon" hydrogen produced from fossil gas with carbon capture and storage (CCS) or biomass or using inadequate environmental and social standards for imported hydrogen. Hintco should lead by example and develop more robust guidance on sustainability requirements so that impacts are not variable. In the absence of minimum standards from Hintco, net importing governments funding H2Global tenders must outline ambitious import sustainability requirements. The H2Global Foundation could also focus its engagement with stakeholders and knowledge generation on expanding the international standards discussion to include environmental and social dimensions.

Focuses on renewables' additionality and correlation but overlooks surplus sharing benefits: The BMWK pilot tender incorporates environmental and social sustainability through renewable electricity sourcing requirements outlined in the hydrogen purchase agreement (HPA). These align with EU regulations on additionality, temporal correlation, and geographical correlation, ensuring electricity used in hydrogen production is sourced from new renewable installations or meets strict grid-based criteria. While these measures avoid overburdening existing

renewable electricity infrastructure, there is a missed opportunity to incentivise projects to share surplus electricity to enhance local energy access or support domestic decarbonisation. Due to the lack of minimum standards, future tenders catering to non-EU buyers could adopt weaker standards for additionality. We call on future funders to go beyond the do-no-harm principle and focus on generating local benefits.

Water sustainability safeguards lack consideration of competing uses: The BMWK pilot tender includes sustainability requirements prohibiting the use of groundwater or water intended for human consumption in dry regions, with sellers required to provide detailed documentation and independent verification. However, safeguards do not fully address competing water demands, like water for industrial or agricultural use, potentially creating competition with local needs. There is no requirement to ensure the additionality of water treatment facilities or desalination plants, which further risks prioritising infrastructure for producing hydrogen over improving local water access. We urge future funders to integrate checks for competing resource use and surplus-sharing mechanisms into their tenders' sustainability requirements.

Land use safeguards leave loopholes on competing uses and responsible siting: The BMWK pilot tender includes land use safeguards requiring sellers to avoid high-biodiversity areas, endangered species habitats, carbon pools, and recognised cultural heritage sites. However, its focus on globally recognised classifications may overlook locally significant or sacred sites, highlighting the need for community engagement and stakeholder consultation. The tender also lacks measures addressing competing land uses, such as agricultural or pastoral activities, and preventing project siting at locations with ongoing land disputes. In addition to integrating checks for competing use, we call on future funders to develop a complaint mechanism and to consider access-sharing arrangements or compensation mechanisms to mitigate impacts on local communities.

Local value creation measures lack sustainable economic impact: The BMWK pilot tender incorporates provisions for local value creation measures, including skill development and community infrastructure investments. However, unclear job allocation guidelines and limited scope for required infrastructure investments reduce the potential for local sustainable economic benefits. The export-focused design of the H2Global instrument prioritises low-value-added commodities and inherently limits opportunities for downstream industrial value capture. We urge future funders to increase ambition to generate sustainable economic value addition, for example, by requiring local sourcing of a proportion of value chain components (where feasible), mandating investments in project-related infrastructure that supports surplus sharing (e.g., electricity grids or water distribution facilities), and allocating portions of contracts for domestic buyers to foster higher value-added industries.

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ABBREVIATIONS

BMWK	Federal Ministry of Economic Affairs and Climate Protection
CCS	Carbon capture and storage
CCUS	Carbon capture, utilisation, and storage
CO_2	Carbon dioxide
CAD	Canadian Dollar
eSAF	Electricity-based sustainable aviation fuel
EU	European Union
EUR	Euro
GHG	Greenhouse gas
HPA	Hydrogen purchase agreement
HSA	Hydrogen sales agreement
km	Kilometres
KSV	Klimaschutzverträge
MW	megawatt
PPA	Power purchase agreement
RED	Renewable Energy Directive
TWh	Terawatt hour
USD	United States Dollar

/∧ 01 INTRODUCTION AND BACKGROUND

Green hydrogen and its derivatives have emerged as key pathways for global decarbonisation and industrial transformation. Hydrogen today is largely produced with fossil fuels, with demand primarily met by domestic production in industrial hubs. In contrast, green hydrogen is produced through water electrolysis powered by renewable energy. To achieve decarbonisation goals, heavy industrial applications that cannot be electrified must transition to using green fuels like hydrogen and its derivatives (NewClimate Institute, 2023).

Not all countries will be able to meet their current and future green hydrogen demand domestically and will rely on international trade. In 2023, the Federal Republic of Germany updated its National Hydrogen Strategy, setting out an anticipated demand for hydrogen and its derivatives of 95-130 terawatt hours (TWh) by 2030 (BMWK, 2023). 50 to 70% of this demand is projected to be fulfilled by imports. Demand is expected to scale to 560-700 TWh by 2045, with the proportion of imports also increasing (BMWK, 2023). There is disagreement about whether the expected volumes of demand will come to fruition (Wettengel, 2024).

International trade flows of green hydrogen are nascent and face significant challenges in scaling up. Only a fraction of projects in the pipeline have reached final investment decisions, as investors are hesitant to fund initiatives without adequate offtake guarantees, and companies are reluctant to commit to long-term contracts with high premiums. Currently, green hydrogen production is between 1.5 to 6 times more expensive than fossil-based hydrogen production (IEA, 2024). Substantial investment is needed across the entire hydrogen value chain, including electrolysers, transportation solutions, and storage. While green hydrogen costs are anticipated to decrease over time, economies of scale will only be realised once technologies are sufficiently developed and deployed at scale. A country's competitiveness in the global green hydrogen trade will largely depend on its comparative advantage in producing renewable energy and transportation costs to demand centres.

Hintco stands for the Hydrogen Intermediary Company (HINT.CO GmbH)

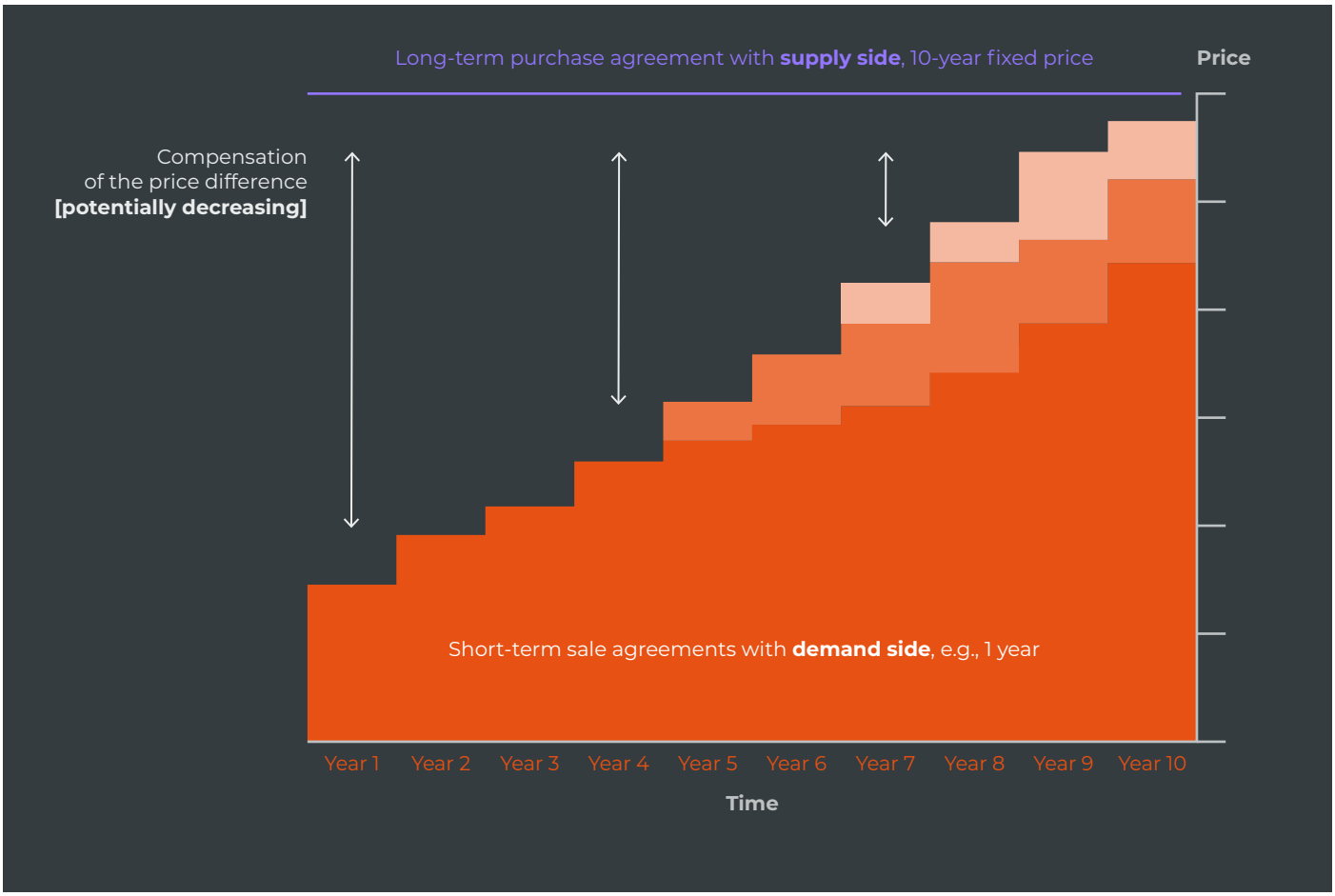
Innovative financial instruments are essential to mitigate risk, bridge the cost gap, mobilise private finance, and support the market ramp-up of green hydrogen and derivatives. **H2Global** is one such market-based instrument designed to bridge the gap between supply and demand, addressing economic and logistical challenges associated with scaling up hydrogen production and trade. It was developed by the H2Global Foundation in 2020 and is implemented by a subsidiary of the Foundation named Hintco (Bollerhey et al., 2023). H2Global employs a competitive double auction mechanism that targets both the supply (producers) and demand (buyers) sides. It incorporates a **Contract-for-Difference** mechanism to cover the green premium — the additional cost associated with producing or purchasing green products compared to the predominant alternative in the market. Public grants or philanthropic funds pay for the differential between production cost and market price.

Hintco facilitates the H2Global auctions and acts as a contractual partner between sellers and buyers, implementing a double action model to identify the most competitive suppliers and buyers with the highest willingness to pay. On the supply side, Hintco conducts a competitive auction to conclude a long-term (i.e., ten-year) hydrogen purchase agreement (HPA) with the most competitive supplier, providing the long-term price and offtake security necessary for de-risking investments in large-scale infrastructure projects. On the demand side, it conducts annual auctions to conclude several one-year hydrogen sales agreements (HSAs) with various buyers, identifying those with the highest willingness to pay. The HSAs provide demand and price signals to the market (Bollerhey et al., 2023). Hintco covers the gap between production cost (HPA) and sales price (HSA) determined in the respective auctions through public grants. As market conditions improve over time and the gap between supply and demand prices narrows, the green premium and, in turn, the required grant funding are expected to decline **(→ Fig. 1)**.

H2Global highlights that it aims to conclude ten-year HPAs; however, the BMWK pilot ammonia auctions resulted in a seven-year HPA (Bollerhey et al., 2023; OECD and the World Bank, 2024).

Fig. 1

Overview of H2Global finance mechanism and decreasing cost differential



Note: The instrument anticipates that the price gap between production and demand will narrow over time due to technological advancements, economies of scale, and increased demand, depending on market developments.

Source: Reproduced by authors based on Hintco graphic (Bollerhey et al., 2023).

At the end of 2024, EUR 5.83 billion had been committed to H2Global tenders (H2Global Stiftung, 2024a). Germany contributed most of this funding, providing EUR 5.13 billion for five tenders. The German Federal Ministry for Economic Affairs and Climate Action (BMWK) is the sole provider of funds for the ongoing pilot tender. The pilot tender follows an import auction model, which funds hydrogen production abroad for import to the European Union (EU). Future tenders may have different models. Germany and the Netherlands have signed a joint import tender, with both countries providing funding for hydrogen production abroad to be imported into their respective countries (Hintco, no date c). Additionally, Germany has signed bilateral trade tender agreements with both Canada and Australia, to foster trade with Canada and Australia, net producers of hydrogen, to Germany, a net importer (H2Global Stiftung, 2024b, 2024a).

BMWK provided EUR 900 billion for the pilot auction and pledged an additional EUR 3.53 billion for the first official tender. It also committed to bilateral tenders with the Netherlands, Australia, and Canada. The Netherlands and Germany pledged EUR 300 million each for their joint tender. While the Netherlands and Australia, alongside Germany, pledged EUR 200 million each for the latter tenders (H2Global Stiftung, 2023, 2024b, 2024a).

H2Global is designed to adapt to the tender funder's specific objectives. These can include energy security, technology, industrial policy, or other development cooperation goals (Bollerhey et al., 2023). The funder of the tender defines the parameters, including the product (e.g., ammonia, methanol, eSAF, etc.), product criteria (e.g., emission intensity or additionality requirements, in the absence of international standards), geographical focus (e.g., open to all producers or targeting specific geographies), and sustainability criteria (e.g., water, land use, and other social factors). H2Global and Hintco do not set minimum standards for product specifications or sustainability criteria.

We use the term (BMWK) **pilot tender** throughout the study to refer to ongoing the EUR 900 million BMWK pilot auction in its entirety (i.e., all lots – renewable ammonia, methanol, and eSAF). As of publication, only one lot auction was completed (ammonia). The methanol lot auction is outstanding and the eSAF auction is cancelled.

The BMWK is funding the ongoing pilot tender through a EUR 900 million grant. The pilot tender is divided into three “lots” (sub-tenders) for renewable hydrogen derivatives: ammonia, methanol, and electricity-based sustainable aviation fuel (eSAF). Each lot is funded equally. The pilot tender sets out product specifications in the HPA and its annexes (Hintco, 2022e). Each lot has its own HPA and annexes. Apart from the technical product specifications for each lot, the HPA and annexes outline largely identical criteria, with additional product specifications where relevant. For example, the pilot tender for methanol and eSAF included requirements related to carbon sourcing. HPA Annex 6.1.a outlines technical product specifications (Hintco, 2022a). HPA Annex 6.1.b outlines criteria related to the production method, electricity and carbon sourcing, and required emission savings (Hintco, 2022b). HPA Annex 6.2 lays out sustainability requirements governing land and water use, biodiversity and cultural sites, local value creation, and gender (Hintco, 2022c). HPA Annex 6.4 outlines the verification requirements for sustainability and product specifications and the legal consequences for non-compliance (Hintco, 2022d).

Hintco defines **lots** as individual sub-tenders. One tender can have several lots each with their own rules and specifications to match the funders objectives (Hintco, no date c).

The pilot tender is open to producers outside the EU and buyers in the EU, with imports required to transit through deep-sea ports in Belgium, Germany, or the Netherlands. The first lot for ammonia production was completed in 2024 and awarded to Fertiglobe, a nitrogen fertiliser producer based in Egypt **(→ Box 1)**. The second lot for methanol is ongoing, while the third lot for eSAF was not awarded due to regulatory uncertainties and low interest.

Box 1

Results of H2Global pilot auction: Lot 1 ammonia

Lot 1 of the BMWK pilot tender was for green ammonia. Interest was high, with 22 consortia from five continents requesting to participate. The pilot auction for the ammonia HPA was two-phased. The first phase involved a preliminary qualification round, during which bidders were required to demonstrate that their financial and technical capacity met the specified minimum criteria. The pool was then narrowed to five bidders across Asia, North Africa, the Middle East, and South America. In the second phase, participants engaged in bidding and negotiation, culminating in the Egypt Green Hydrogen project, led by Fertiglobe, securing the tender (Hintco, 2024).

The Egypt Green Hydrogen project consortium includes Fertiglobe, Scatec ASA, Orascom Construction, the Egyptian Electricity Transmission Company, and the Sovereign Fund of Egypt (Hintco, 2024). Fertiglobe is the largest nitrogen fertiliser producer in the Middle East and North African region. Scatec ASA is a Norwegian renewable energy generation firm, while Orascom Construction is a global engineering and construction contractor. The state-owned electricity transmission company oversees the transportation of electricity from wind and solar farms to electrolysers via the national grid. Finally, the Sovereign Fund will provide additional financial support to the project for construction and operation (OECD and the World Bank, 2024).

The BMWK provided EUR 397 million for the ammonia lot, aiming to secure around 397,000 tonnes of green ammonia cumulatively by 2033 (Hintco, 2024). The pilot tender for ammonia resulted in a seven-year HPA, with production set to begin in 2027 and an initial supply of 19,500 tonnes per annum (Hintco, 2024). Hintco will sign an agreement for a guaranteed minimum offtake of 40,000 tonnes annually from 2028 through 2033. In addition to the guaranteed minimum offtake volumes, Hintco holds the option to procure additional volumes in a range between 17,500 to 33,000 tonnes per annum (Hintco, 2024).

Based on selected studies and forecasts, the auction set a maximum permissible net product price (excluding transport and import costs) of EUR 1,282 per tonne. The average net product price submitted by bidders was EUR 1,048 per tonne. Fertiglobe's volume-weighted net product price is 37% lower than the bid cap at EUR 811.30 per tonne (Hintco, 2024). For comparison, the global average net product price for ammonia was about USD 490 per tonne in November 2024 (S&P Global Commodity Insights, 2024). The total contract price, including transport, logistics, and customs, was EUR 1,000 per tonne. Transport charges make up 9% of the contract price, followed by logistics charges at 7% and import duties at 3% (Hintco, 2024).

The produced green ammonia will be sold to Hintco in batches of 500 tonnes for the HSA auctions. The price difference covered by the grant depends on the HSA contracts, which determine the product's sales prices. BMWK only transfers the difference between the purchase and sales prices to Hintco. Ammonia HSA auctions are scheduled to begin in 2025/26 (Hintco, 2024).

The H2Global Foundation aims to promote sustainability through innovative finance instruments like H2Global. It views H2Global as not only a tool to address climate goals but also as a means to contribute to the United Nations Sustainable Development Goals. The Foundation focuses its analytical work on the "rapid and sustainable integration of developing and emerging countries into the global hydrogen ramp-up and trade" (H2Global Stiftung, no date; Bollerhey et al., 2023). Hintco's website highlights H2Global's environmental and social approach, emphasising its support for market expansion while maintaining a commitment to sustainability (Hintco, no date a).

1.1 RATIONALE, SCOPE, AND METHOD OF THIS STUDY

Green hydrogen and its derivatives can play a dual role in enabling global decarbonisation while supporting resource-rich producers in emerging and developing economies to achieve sustainable development benefits. However, realising this potential requires conducive framework conditions (NewClimate Institute, 2024).

H2Global is an inherently trade-oriented instrument designed to secure hydrogen import contracts for net importers and export contracts for net exporters. This is a limitation of the instrument, as it aims to promote global trade and not necessarily sustainability or sustainable development for producing communities. While the H2Global instrument is not designed to influence environmental, social, or economic standards for hydrogen sustainability, its funders (i.e., net importing governments) should be cautious of the impact of resource extraction – particularly from emerging and developing economies – when it occurs without delivering proportionate benefits. Requisite support should be provided to enhance local value chain development, enable domestic decarbonisation, and expand access to renewable energy and water resources where access is limited.

This study aims to assess the extent to which the design of the H2Global instrument and BMWK pilot tender address key risks and opportunities associated with hydrogen production and use. These include energy and resource efficiency, environmental and social safeguards, sustainable development impacts, and equitable value creation for exporting countries. Since the H2Global instrument operates under criteria established by tender funders, the study specifically examines the parameters defined for the BMWK pilot tender for renewable ammonia, renewable methanol, and eSAF. The analysis and recommendations aim to contribute to discussions on the H2Global instrument and highlight lessons learned from the BMWK pilot tender to help shape the sustainability parameters of future tenders.

The assessment method followed in this study is based on the Sustainable Development Impact Matrix developed by NewClimate Institute as part of a report titled Green Hydrogen for Sustainable Development (NewClimate Institute, 2024). The Matrix defines the conditions under which green hydrogen value chain development could have desirable or undesirable impacts on several social, economic, and environmental aspects of sustainability. We adapted and built on this Matrix to develop a checklist of standards for assessing financial instruments like H2Global **(see → Annex)**.

The analysis is based on publicly available information on H2Global Foundation and Hintco's websites and the HPA and annexes for the BMWK pilot ammonia lot published in 2022. Where relevant, we cross-checked the ammonia HPA and annexes with those for the methanol and eSAF lots to ensure consistency. Some elements of the HPA are redacted in public versions. The exact details of the final agreements might also have changed during negotiations. This is noted where it might influence our interpretation. Secondary sources were consulted on an ad-hoc basis. As each tender is shaped by the funder, upcoming tenders and their product and sustainability criteria may differ from the BMWK pilot tender.

The analysis does not consider the HSA of the BMWK pilot tender or the intended use of the procured hydrogen, as no information on these aspects is publicly available. Hintco communications indicate that the HSA will be awarded to the bidder with the highest willingness to pay (Hintco, no date b). However, price signals must not be the sole drivers of the award of HSAs. Instead, a strategic approach that favours sectors that cannot be electrified and offer the highest potential for emission savings should be identified.

This study is part of a two-part series investigating auction mechanisms supporting hydrogen development. **The corresponding paper** in the series analyses the German Klimaschutzverträge (KSV) or carbon contracts for difference.

/\ 02 KEY FINDINGS

2.1 NO MINIMUM STANDARDS FOR DEFINING "LOW EMISSION" HYDROGEN

H2Global Foundation and Hintco do not set standards for tenders. They use terms like "low emission" hydrogen and derivatives in their communications, which leaves the door open for hydrogen produced from fossil gas with carbon capture and storage (CCS) or biomass to be supported through future tenders. Their hands-off approach leaves the level of ambition of the tender up to the funder.

The ongoing BMWK pilot tender requires all hydrogen atoms in the final product to come from water electrolysis using renewable energy. The pilot tender only funds hydrogen and derivatives produced from admissible renewable sources, such as wind, solar, geothermal energy, ambient energy, tide, wave and other ocean energy, as well as hydropower (Hintco, 2022b, sec. 2). This definition differs from the definition of renewable energy sources applied in Article 2 of the EU's Renewable Energy Directive (RED) by explicitly excluding renewable energy sourced from biomass, landfill gas, sewage treatment plant gas, or biogas — sources which can have adverse environmental or biodiversity impacts (EU, 2018).

The Delegated Act on Article 28 of the EU's revised RED II mandates 70% minimum greenhouse gas (GHG) emission savings from renewable fuels relative to a fossil fuel comparator (EU, 2023). The pilot tender specifies a more ambitious requirement of at least a 73% reduction at the point of delivery (Hintco, 2022b, sec. 9.1). Under Lot 1 of the pilot tender, Fertiglobe will produce renewable ammonia with an emissions intensity reduction of approximately 75.5% relative to ammonia produced with fossil fuels (Hintco, 2024). The electricity used in production will be sourced from a newly built 203 megawatt (MW) onshore wind park and a 70 MW newly built solar photovoltaic plant. The Egyptian national power grid will be used for electricity transmission in compliance with European regulation on temporal correlation (Hintco, 2024).

While the BMWK pilot tender set more ambitious product standards than required under EU regulation, future tenders could adopt less stringent product requirements, given that there is no globally agreed standard for defining "low emission" hydrogen and derivatives. While the pilot tender excludes some renewable energy sources with potentially adverse effects even though they are allowed under EU law, other EU funders may still include those if the minimum emission savings requirement is met.

Funders outside the EU could have entirely different definitions for "low emission" hydrogen. Canada, for instance, has announced a CAD 300 million bilateral auction with Germany, but its definition of "clean" hydrogen includes hydrogen produced from fossil gas with carbon capture, utilisation, and storage (CCUS) (Canada, 2020; H2Global Stiftung, 2024b). This is different from Germany, which has committed to not financially supporting fossil-based hydrogen production with CCUS or CCS while retaining the option of importing it (BMWK, 2024). Thus, H2Global's impact on climate and sustainable development goals may vary depending on the funder's objectives and the corresponding tender design.

2.2 RENEWABLES MUST BE ADDITIONAL BUT NOT NECESSARILY CONTRIBUTING TO LOCAL ENERGY ACCESS

The Hintco website states that H2Global incorporates an environmental and social sustainability approach. The pilot tender outlines various requirements to safeguard electricity resource use in the form of additional product specifications. Annex 6.1.b of the HPA pilot tender outlines specifications related to renewable electricity sourcing requirements, including additionality, temporal correlation, and geographical correlation, in line with the Delegated Act on Article 27 (EU, 2023). It defines three scenarios: direct connection, grid connection without a renewable Power Purchase Agreement (PPA), and grid connection with a renewable PPA (Hintco, 2022b, secs 5, 6, and 7).

Electricity from an admissible renewable source directly connected to production must be additional, defined as in operation less than 36 months prior to the production installation (Hintco, 2022b, sec. 5). While this ensures that electricity used to produce hydrogen does not overburden existing renewable resources, the absence of a grid connection restricts opportunities to share surplus energy to enhance local energy access or contribute to domestic decarbonisation. Annex 6.1.b of the HPA pilot tender notes that if the electricity source is grid-connected, a smart metering system is required to measure electricity flows, ensuring that the project does not draw down on electricity from the grid for hydrogen production (Hintco, 2022b, sec. 5.1.3). However, it stops short of incentivising or requiring projects to share their surplus generation with the grid.

For electricity taken from the grid, requirements are set out for two scenarios. Electricity taken from the grid without a PPA is only considered renewable if the average share of the renewable electricity in the grid exceeded 90% in the past year (Hintco, 2022b, sec. 6). The electricity used in production must also not exceed a calculated maximum number of hours, which is set depending on the bidding zone. On the other hand, electricity taken from the grid with a renewable PPA must be additional (in operation for less than 36 months), consumed by the electrolyser in the same hour it was produced, and located in the same bidding zone as the electrolyser (Hintco, 2022b, sec. 7). The temporal correlation requirement aims to ensure renewable fuels are produced during surplus renewable generation hours, reducing the risk that production leads to additional fossil-based electricity generation. In jurisdictions without bidding zones, renewable electricity installations must be located within 500 kilometres (km), in the same country, and connected to the same grid as the electrolyser (Hintco, 2022b, sec. 7). The requirement for temporal correlation remains.

The winner of the pilot tender Lot 1, Fertiglobe, will use the national power grid to transmit electricity to the production site (Hintco, 2024). For the first three years of production, it will match its electricity consumption monthly, in compliance with EU law. At the start of 2030, hourly matching will begin as required. In 2022, only 12% of Egyptian electricity generation was with renewables (IEA, 2022).

The pilot tender follows EU standards on renewable electricity sourcing because buyers will be EU-based. However, as with other sustainability requirements, future tenders can use weaker standards, particularly if their HSA auctions include buyers outside the EU.

2.3 SAFEGUARDS FOR WATER SUSTAINABILITY DO NOT FULLY ACCOUNT FOR COMPETING USES

Approximately 40% of planned "low emission" hydrogen production projects are in water-scarce regions, making it essential to manage and use water resources sustainably (IEA, 2024). Annex 6.2 of the HPA pilot tender outlines sustainability requirements regarding water use in dry regions (Hintco, 2022c, sec. 3).

Defined as provinces with high or extremely high water stress according to the World Resource Institute's Aqueduct 3.0 Country Rankings.

The HPA prohibits sellers from using groundwater or water intended for human consumption in value chain activities in regions classified as "dry" at the time of contracting. It defines water intended for human consumption as that in its original state or after treatment and intended for drinking, cooking, and domestic purposes, as well as that used by businesses processing products for human consumption. The HPA also requires producers to provide Hintco with a list of all value chain activities involving water consumption, all water procurement contracts, and all water supply sources, including their geographical location (Hintco, 2022c, sec. 3). The seller must also provide a declaration on sustainable water supply, which outlines its aim to ensure that water use does not contribute to water scarcity or degradation. In addition, the seller must utilise an ISO-compliant environmental management system (Hintco, 2022c, sec. 7 and 10).

Sellers are mandated to provide documentation of compliance to a verified independent Conformity Assessment Body (Hintco, 2022d). While compliance is periodically verified throughout the contract, it is unclear what mitigation efforts are required if a region previously not considered water-stressed becomes so or if the level of stress increases. Further, the stipulation does not prohibit production in water-stressed regions; it only limits options for water procurement. Water intended for industrial or agricultural use is not prohibited, which could lead to competition with other industries that serve the domestic market.

In arid regions, desalination plants can be considered to meet water demand needs. Sellers are required to provide a declaration on sustainable water management specific to desalination, which details the responsible handling of by-products like saltwater brine (Hintco, 2022c, sec. 10). However, the pilot tender's sustainability

requirements do not mandate the additionality of water treatment facilities like desalination plants. This could result in competition between water demand for hydrogen production and other uses or allow for the prioritisation of desalinated water for hydrogen production over other needs such as agriculture. Further, there is a missed opportunity to promote surplus sharing for water treatment facilities, which could help improve access to water resources for local communities.

Lastly, the pilot tender's requirements do not consider measures to ensure local communities retain access to water resources, such as fishing areas around desalination plants or pipelines. Where access is restricted, revenue-sharing mechanisms could be explored to compensate for it fairly.

2.4 LAND USE PROTECTIONS LEAVE LOOPHOLES ON COMPETING USES AND RESPONSIBLE SITING

The BMWK pilot tender includes several safeguards on project siting and land use, requiring sellers to submit a list of value chain activities and their geographic location. It requires projects to avoid areas of high biodiversity value and cannot be conducted within one kilometre (km) of recognised biodiversity reserves, endangered species habitats (if the activities pose a risk to the species), or carbon pools (if the activities increase the risk of releasing carbon dioxide or other GHG emissions from the carbon pool) (Hintco, 2022c, sec. 6). Similarly, value chain activities cannot be carried out within 1 km of recognised heritage sites.

This includes sites recorded on the list of Ramsar Wetlands of International Importance; UNESCO listed Biosphere reserves; areas identified as AZE Sites (Alliance for Zero Extinction); areas listed on the IUCN (International Union for Conservation of Nature) Red list of Ecosystems; or Category I-IV protected areas.

This is defined as UNESCO World Heritage Sites.

The pilot tender's emphasis on globally recognised biodiversity or cultural hotspots may overlook locally valued or sacred sites. Stakeholder engagement with affected communities and local leaders is crucial to identify and avoid locating projects at sites of significance. Minimum standards could also be set to prevent siting projects close to residential neighbourhoods. Insufficient stakeholder engagement presents a reputational risk to the H2Global mechanism and its funders. Failure to involve communities may spark social conflict and hinder the expansion of future projects. Further, Annex 6.2 of the HPA pilot tender includes a caveat for biodiversity and land use: "Upon the Seller's request, Hintco may, at its sole discretion, approve the implementation of other measures instead of the obligations set out" (Hintco, 2022c, sec. 6.1). The conditions under which Hintco would approve value chain activities within 1 km of a biodiversity or cultural site are unclear. Without minimum standards set by H2Global, there is a risk that land use safeguards could be undermined.

The HPA also does not adequately consider competing land uses, such as local industrial, agricultural, or pastoral use. It is especially important to consider land use by pastoral communities that may not be formally recognised internationally or nationally and lack formal land titles. While sellers must provide evidence that no value chain activities are to be conducted on land that required forced resettlement in the last three years, it is equally important to consider ongoing

land disputes. Future tenders could require sellers to submit a land use plan that outlines considerations like access-sharing arrangements with local populations who depend on that land for their livelihoods (Waters-Bayer and Tadicha Wario, 2022). Where co-use arrangements are not feasible, revenue-sharing mechanisms could be explored to compensate fairly for restricting access to land. At a minimum, complaint mechanisms should be established to allow affected communities and individuals to file claims directly with Hintco.

2.5 "LOCAL VALUE CREATION" MEASURES DO NOT NECESSARILY CREATE SUSTAINABLE ECONOMIC VALUE ADDITION

Germany's Hydrogen Import Strategy notes that the global hydrogen market offers an opportunity to create new value chains and pragmatic partnerships that support socially just and sustainable energy transitions (BMWK, 2024). While considerations for local value creation are included in the pilot tender, important elements are missing. Annex 6.2 of the HPA pilot tender outlines criteria for local value creation but only includes two elements: training and skill development and investments in community infrastructure like schools, hospitals, and shelters (Hintco, 2022c, sec. 8.1).

The HPA annex lists **500 hours** and **250 hours** in brackets indicating this is a negotiable value (Hintco, 2022c, sec. 8.1.1). It is unclear what the final agreed figures were in the HPA agreement with Fertiglobe.

Producers are required to provide 500 hours of training per annum, 250 of which must be on topics related to the production of renewable electricity or the production and marketing of renewable hydrogen and derivatives (Hintco, 2022c, sec. 8.1.1). It is positive that this requirement is included in the HPA pilot tender, but there is ambiguity around its exact scope. The HPA pilot tender annex refers to "natural persons whose permanent residence on 1 January is located 50 km or less from value chain activities" However, it is unclear what percentage of workers will receive training. It also does not specify the proportion of total jobs that should be filled by the local workforce or the quality and longevity of those jobs (Hintco, 2022c, sec. 8.1.1). Unclear workforce requirements could result in a significant reliance on foreign workers, which would not add value to the local community. For example, Fertiglobe has announced that its project is expected to create between 1,000 and 1,250 jobs during construction and up to 80 jobs during operation and maintenance. However, there is no indication of how many of these jobs are expected to be filled locally (Hintco, 2024).

Annex 6.2 of the pilot tender also requires sellers to invest at least EUR 50,000 in schools, hospitals, or shelters in the vicinity of the production facility (Hintco, 2022c, sec. 8.1.2). If the area around the production facility is sparsely populated, they are directed to invest in the closest town with at least 20,000 inhabitants. A timeline is not provided for completing this during the seven-year HPA. Investments in local community infrastructure are important but unlikely to sustainably capture economic value for the local community. Investments in other project-related

Similarly, the HPA annex lists **EUR 50,000** and **20,000 inhabitants** in brackets (Hintco, 2022c, sec. 8.1.2). It is unclear what the final agreed figure were in the HPA agreement with Fertiglobe.

infrastructure could be more likely to add value to local populations, like in the local electricity grid and water distribution infrastructure. In areas with low population density, investments could be made in renewable electricity installations or water treatment facilities near population centres.

H2Global is an inherently export-oriented mechanism, with the pilot tender requiring purchasers to be based in the EU. The instrument's design is at odds with local industrial value capture, as it specifically sources commodities with lower economic value addition for exporting countries. However, future funders could explore carving out a portion of HSAs for national or regional buyers. This approach, along with support from donor governments via partnerships, could help foster the development of higher value-added downstream industries, such as green steel production, or support a country to position itself as a green ammonia marine refuelling hub.

Future tenders could also encourage sourcing a percentage of value chain components domestically. This approach would be aligned with the national priorities of producing countries and the development cooperation objectives of donors. However, this might conflict with funders' geopolitical priorities. The German National Hydrogen Strategy, for instance, highlights its goal to become a provider of hydrogen technologies, an ambition that would be at odds with a requirement to source value chain components locally (BMWK, 2023).

/∧ 03 RECOMMENDATIONS

H2Global is an innovative mechanism that addresses two important challenges of scaling green hydrogen production: cost disparity between supply and demand and offtake risk. As a contracting party, H2Global offers producers the long-term certainty needed for investments and buyers short-term flexibility. By providing security for investors and early price signals to the market, H2Global contributes to developing the global trade of hydrogen and derivatives.

While the BMWK-funded pilot auction set standards for sustainability, the absence of minimum standards set by Hintco risks undermining H2Global's effectiveness. Loopholes around what type of hydrogen can be supported, as well as social and environmental standards, could negatively impact producing countries.

Based on the above analysis, we formulated the following recommendations for H2Global Foundation and Hintco, as well as for future tender funders operating without minimum standards imposed by Hintco. The recommendations do not challenge the inherent design and purpose of the H2Global mechanism but instead aim to fix loopholes, prevent adverse impacts, and shore up positive outcomes.

→ **Outline minimum product standards and environmental and social sustainability requirements.** International standards on hydrogen should be expanded to consider a holistic understanding of sustainability, which includes environmental and social criteria. In the absence of such international standards, Hintco should lead by example and develop more robust guidance on sustainability requirements. If Hintco does not provide minimum standards, net importing governments should outline ambitious import sustainability requirements. H2Global Foundation could also focus its engagement with governments and private sector stakeholders on expanding the international standards discussion to include environmental and social dimensions. H2Global Foundation could also add a working group on sustainability to the H2Global Knowledge Hub.

→ **Integrate checks for competing resource use into additional sustainability requirements.** The pilot tender does not require sellers to consider competing resource use fully. It protects water intended for human consumption but overlooks water needed for agriculture or local industry. Similarly, it prohibits projects from locating at globally recognised biodiversity hotspots and cultural sites but does not consider locally significant sites without formal recognition. In the absence of minimum requirements set internationally or by Hintco, future funders should ensure tenders appropriately consider competing resource use. Including considerations of pastoral communities and ongoing land disputes, for example, through stakeholder consultations, is essential to avoid locating project sites near locally significant areas.

- → **Go beyond do-no-harm and focus on generating local benefits.** Hintco should consider providing clear guidance on how projects can generate local benefits. In the absence of guidance from Hintco or international standards, funders of future tenders should promote surplus-sharing initiatives where relevant to improve local community access to water and renewable electricity resources. Additionally, future HPA tenders could include mandates to ensure the additionality of water treatment facilities, such as desalination plants in water-stressed areas. HPA tenders could also support access-sharing arrangements to protect local resource use and consider revenue-sharing mechanisms to compensate for restricted access fairly. Lastly, government funders could establish qualifying criteria for producers to ensure that hydrogen is not sourced from other countries without contributing to their domestic decarbonisation efforts.

- → **Increase ambition to generate sustainable economic value addition.** Hintco should provide guidance on how projects can contribute to local economic value creation. In the absence of such guidance, the following measures should be taken up by future tender funders: HPA auction tenders should outline more specific workforce requirements, for example, the percentage of total workers that must be local. Additional requirements on the quality and longevity of employment should also be considered. In addition to requiring investments in schools and healthcare facilities, HPA auction tenders should prioritise investments in project-related infrastructure that sustainably capture economic benefits for local communities, such as investments in electricity grids or water distribution. Future funders could also consider initiatives that support the development of higher value-added downstream industries in producing countries, such as allocating a portion of HSAs to national or regional buyers.

- → **Make stakeholder consultation an explicit requirement and an iterative process throughout the project lifecycle.** Hintco should set minimum participation requirements and not leave this up to the discretion of the funders. Incomplete stakeholder engagement poses a reputational risk to the H2Global mechanism and funders. Failing to engage communities could also undermine investor confidence, leading to social conflict and hindering future project expansion. Producers could be required to formally develop an engagement plan for verification by the Conformity Assessment Body. In the absence of guidance from H2Global, tender funders should include this requirement in the HPA and annexes.

- → **Develop a grievance redressal mechanism.** Similar to other international funding mechanisms, the Hintco or H2Global website should include an independent grievance redressal mechanism that allows individuals and communities to submit complaints directly if a supported project has an adverse impact on environmental or social sustainability. Tender funders could also require this.

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ANNEX: ASSESSMENT CRITERIA

Tab. 1

Checklist of standards and rationale for inclusion in the assessment of H2Global

Category	#	Standard	Rationale	#	Questionnaire
Paris-alignment	**1**	Exclusively support green hydrogen	Green hydrogen is the only form of hydrogen produced and combusted with zero emissions	**1.1**	Is it explicitly stated that the instrument will exclusively support green hydrogen projects?
				1.2	Is the instrument designed to favour green hydrogen and/or avoid favouring other types of hydrogen?
	2	Prioritise application in no-regret sectors	Hydrogen should be reserved for hard to abate applications which cannot be electrified	**2.1**	Does the instrument explicitly rule out the use of hydrogen for end uses that can be electrified?
				2.2	Is the instrument designed to favour no-regret projects (i.e., using hydrogen in hard-to-abate sectors or long-term/seasonal energy storage for grid flexibility)?
	3	Promote production close to demand centres	Long-distance transport of hydrogen leads to significant energy losses	**3.1**	Are projects producing hydrogen explicitly required to be located close to planned demand centres?
				3.2	Is the instrument designed to reflect long-distance transport costs and efficiency losses?
	4	Ensure sustainable sourcing of carbon for downstream products	Carbon sourced unsustainably can lock-in demand and emissions	**4.1**	Are projects required to use only sustainable carbon sources to make downstream products?
				4.2	Are projects required to ensure that carbon capture processes (DAC or CCU) only use electricity and heat from additional renewable energy sources?
				4.3	Are projects required to ensure that carbon is sourced from unavoidable industrial process emissions (e.g., cement)?
				4.4	Are projects required to ensure that carbon is sourced from sustainable biogenic sources?
Local economic benefits	**5**	Ensure industrial value capture	Hydrogen development should support local economic development and value capture	**5.1**	Are supported projects encouraged to source industrial equipment domestically?
				5.2	Does the instrument encourage production of higher value added derivatives or downstream products of hydrogen?
	6	Promote local jobs and skills development	Hydrogen development should support high-quality and long-term employment and skill development	**6.1**	Does the instrument prioritise employment of domestic workforce in supported projects?
				6.2	Does the instrument require project developers to invest in local skills development and knowledge transfer?
	7	Contribute to domestic decarbonisation	Hydrogen should contribute to decarbonisation of domestic industries in addition to exports	**7.1**	Are supported projects required to prioritise application of green hydrogen for domestic decarbonisation?

Category	#	Standard	Rationale	#	Questionnaire
Sharing access to local resources	**8**	Improve access to renewable electricity	Hydrogen development should contribute to improved resource access in areas with scarcity	**8.1**	Are supported projects required to build additional renewable power capacity and share surplus electricity with the power grid or local network?
				8.2	Are supported projects that do not build additional renewable power capacity required to run electrolysers exclusively in surplus renewable generation hours?
	9	Safeguard local access to land resources	Land use for project siting should be based on social justice	**9.1**	Are supported projects required to ensure sustainable land use (consider competing uses, avoid encroachment, establish arrangements for sharing access, fair compensation for restricting use of local communities)?
	10	Safeguard local access to water resources	Water use for production should not increase scarcity or lead to pollution	**10.1**	Are supported projects required to ensure sustainable water use (e.g., prioritising recycled water, avoiding groundwater use, locating away from high water stress regions)?
				10.2	Are supported projects required to build additional water treatment capacity (e.g., desalination, wastewater recycling) and share surplus freshwater with the local distribution network?
				10.3	Are supported projects required to establish arrangements for sharing access to ocean resources (or the revenues generated from restricting use) with local communities?
Environmental and social safeguards	**11**	Protect nature and biodiversity	Project siting should not harm to biodiversity and natural ecosystems	**11.1**	Are supported projects required to avoid areas of high biodiversity value?
				11.2	Are supported projects required to comply with high standards for effluent treatment and pollution control?
	12	Protect workers and communities	Hydrogen value chains should not endanger workers or communities	**12.1**	Are supported projects required to locate away from residential or community hubs?
				12.2	Are supported projects required to comply with high standards for worker safety?
	13	Protect cultural heritage sites	Hydrogen value chains should not infringe upon cultural heritage sites	**13.1**	Are supported projects required to avoid areas of high cultural heritage value?
Governance	**14**	Ensure stakeholder participation	Project development must be based on stakeholder participation with free, prior, and informed consent	**14.1**	Are supported projects required to establish mechanisms for stakeholder consultations under free, prior, informed consent (FPIC) before and during project implementation?
				14.2	Are supported projects required to establish mechanisms for grievance redressal during project implementation?

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