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◆ POSITION PAPER

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Sustainability criteria for import projects for renewable hydrogen and PtX products

CONTEXT AND BACKGROUND

The development of a global, sustainable hydrogen economy is essential to meeting the goals of the Paris Agreement throughout the world. Since we are at the very beginning of one of the greatest transformational phases of the industrial age, time is more than pressing. If hydrogen is to make its necessary contribution to climate protection as early as the 2030s, great haste is required to drive its development forward. It is nevertheless necessary to formulate criteria for producing and using hydrogen sustainably in order to ensure that its contribution to a sustainable economy is not otherwise counteracted. This is also necessary for reasons of social acceptance and therefore ultimately important for companies and investors in terms of reliable frameworks.

Both the immense time pressure and the need for comprehensive sustainability – also in the sense of the sustainable development goals (SDGs) – create a state of tension. Integrating different policy objectives is essential to dealing with this tension. This paper identifies the opportunities and risks of the global hydrogen trade and discusses both the guidelines for Germany's international engagement and the project-specific sustainability criteria that should be proactively established by the German government.

THE IMPORTANCE OF SUSTAINABILITY CRITERIA FOR HYDROGEN IMPORTS AND ITS DERIVATIVES

INTERLINKING DEVELOPMENT GOALS AND HYDROGEN PRODUCTION

Particularly in countries in the Global South, in which Germany's cooperative development efforts plan to promote hydrogen and PtX projects and the partnerships they entail, the objective of the cooperation is to positively impact local development. Positive effects should be generated in particular for the following development goals (SDGs) from the United Nations' Agenda 2030:

- SDG 6 (clean water and sanitation)
- SDG 7 (affordable and clean energy)
- SDG 8 (decent work and economic growth; this also includes educational goals)
- SDG 9 (industry, innovation and infrastructure)
- SDG 12 (responsible consumption and production)
- SDG 13 (climate action)
- SDG 14 (life below water)

In addition, it is crucial to embed a hydrogen strategy in each of the respective countries' national energy strategies and establish nationally determined contributions (NDCs) in the producing countries in order to avoid conflicts concerning goals and resources. Exporting hydrogen products must not jeopardise the success of local paths for social, environmental and economic transformation.

ESTABLISHING INTERNATIONAL BEST PRACTICES AND STANDARDS – PARTNERSHIP ON AN EQUAL FOOTING

Transnational cooperation in hydrogen projects means a balanced partnership that benefits both the exporting country and Germany as the importing country.

As a major sales market for hydrogen and derived products, such as ammonia and synthetic fuels, Germany has the opportunity to play a formative role in international hydrogen projects[1]. The funding instruments that are already in place (H2Global, PtX-Hub, H2LAC, etc.) offer the possibility to implement criteria and best practices for the sustainability of the projects – including country selection – with great precision. In doing so, standards and best practices do not necessarily have to be redeveloped. Instead, resourcefully combining existing and, if necessary, supplementary regulations can facilitate both rapid and exemplary implementation.

At the same time, Germany can use its role in multilateral contexts to play a decisive role in shaping international sustainability standards in the coming years. This ensures that a consistently high level of acceptance for the use of hydrogen products is achieved on a global scale – and in particular for imports to Germany – and that people in exporting countries benefit from it. Ongoing processes in the field of environmental and social governance (ESG), such as the 'due diligence' process of the OECD, as well as the UN Global Compact, can be relied on in the process. Furthermore, the German and European Supply Chain Act, which provides a more exact definition of corporate due diligence obligations, will also be authoritative for hydrogen. The UN Guiding Principles, which form the basis on which other frameworks can be created, have been established at UN level since 2011. Specifically in the energy sector, for example, there is the World Bank's Environmental and Social Framework (ESF).[2] In the German context, the German Credit Institute for Reconstruction (Kreditanstalt für Wiederaufbau, KfW) has developed an SDG mapping methodology with corresponding criteria.[3]

Germany and the EU must assume a pioneering role in sustainability standards and initiate or interlink processes and initiatives in other international bodies such as G20, G7, IEA and IRENA. Germany's 2022 G7 Presidency provides a very good platform for doing so. The close involvement of development banks, which play a key role in financing large-scale projects in developing countries, is essential to ensuring uniform worldwide standards.

[1] Unless otherwise stated, the following references to hydrogen always include secondary products such as ammonia and synthetic hydrocarbons.
[2] https://www.worldbank.org/en/projects-operations/environmental-and-social-framework
[3] https://www.kfw.de/nachhaltigkeit/Dokumente/Sonstiges/SDG-Methodenpapier-DE-EN.pdf

MAINTAINING INTEGRITY

Addressing sustainability issues throughout the entire value chain, including social impacts in producing countries, is vital to guaranteeing the integrity and acceptance of hydrogen technologies and hydrogen imports. All partners should be on an equal footing when implementing projects in order to prevent repeating mistakes such as those made with biofuels (environmental damage, loss of biodiversity, indirect changes in land use) or DESERTEC (starting out from a purely import-oriented perspective, lack of involvement with local civil society).

OPPORTUNITIES AND RISKS FOR POTENTIAL EXPORT COUNTRIES (ESPECIALLY IN THE GLOBAL SOUTH)

OPPORTUNITIES

- **Local jobs and creating value at the local level**

By strengthening the processes for creating value at the local level, creating jobs, developing new skills and empowering existing local economic players, the hydrogen economy is able to contribute to economic development and prosperity in producing countries, balance interests and achieve win-win situations. The production of hydrogen and the services associated with it, upstream and downstream components of the value chain, locally required infrastructure and renewable energy technologies, are all potential drivers for creating value at the local level. From a geopolitical perspective, it is currently possible to secure new, potentially climate-neutral sources of income and establish corresponding business models designed for long-term sustainability, particularly in countries that currently export fossil fuels. Another result of this is the improvement of living conditions for local residents.

- **Putting new skills to work**

The experiences, skills and findings gained from export-related projects that involve generating renewable electricity and hydrogen can provide a good basis for initiating additional projects that focus on the national markets of countries in the Global South.

- **Foreign direct investments**

Foreign investments are flowing into countries through large, internationally financed hydrogen projects.

- **Accelerating the development of renewable energies (REs)**

More experience, improved regulation and sinking capital costs, among other things, offer attractive opportunities to phase out the use of fossil fuels – which are a limited resource in any case. In particular, developing RE potentials in the earth's solar and wind belts, which are far away from load centres and are impossible to exploit without transitioning to hydrogen due to transmission losses, offers enormous environmental and economic advantages for these countries in particular and for global climate protection in general. Development in these regions will also strengthen the required proficiencies and market for supplying power in the exporting countries.

- **Improved energy access**

Accelerating the development of renewable energies and disseminating the relevant expertise concerning their production and use makes it possible to improve energy access for local populations with little additional funding for projects.

- **Expanding and converting existing infrastructures**

Investments for expanding energy and hydrogen production infrastructures, as well as infrastructures for transport and storage, strengthen the exporting countries at the local level, regardless of what is being exported. This also serves to improve their global competitiveness within the industry.

- **Meeting local hydrogen demands**

Examples of these demands include using hydrogen as an alternative source of energy to help decarbonise local industry (for example, fertiliser production), using it in relevant mobility sectors or using it as a seasonal energy reserve option, which can lead to the further acceleration of local efforts to expand energy production using renewable resources.

- **Building long-term partnerships**

Considering the amount of interest there is in maintaining these long-term energy partnerships, the mutual development efforts they entail could not only gain environmental, economic and social significance, but could also partially contribute to regional stabilisation.

RISKS

- **Prolonging the use of fossil fuel-based infrastructures and power plants**

If renewable electricity is used to export hydrogen and subsequently reduces the amount of additional renewable capacities available for local use, it could lead to prolonging the use of fossil fuel-based power plants, especially in countries whose power supply is still largely dependent on fossil fuels. Similarly, overly generous regulations for using existing sources of CO_2 emissions can lead to these sources remaining in use for a longer period of time, as export projects that rely on such usage could create an additional source of revenue.

- **Increasing CO_2 emissions**

With few exceptions, all power systems these days are still partly based on fossil fuels, including coal. This can result in risks when producing H_2 via electrolysis during the transition phase. When using coal-fired electricity for electrolysis, the direct emissions that result from H_2 production are about five times higher than the emissions that result from producing grey hydrogen via steam reforming of natural gas. The direct emissions created when generating electricity via electrolysis only equal that of those created when producing grey hydrogen if an energy mix of 50 per cent renewable energy and 50 per cent natural gas is used. This means that care must be taken to minimise the CO_2 content of the electricity being used. In doing so, it is also important to account for the possibility of indirect effects: even if the electrolysis process is carried out using purely renewable energy, additional emissions created via fossil fuel-based power plants may result indirectly (see first point).

- **Water shortage**

Electrolysis currently requires fresh water, which may prove to be an insufficiently available resource depending on the production location. Such water shortages may be exacerbated by the climate crisis and lead to conflicts over allocating the water supply. Desalinating seawater to provide the necessary supply results in considerable amounts of residues (brine). This makes it necessary to develop practical environmental concepts for utilising these residues at an early stage. In addition, measures to develop electrolysers that can handle seawater should also be promoted in German R&D roadmaps for hydrogen production.

- **Damage to ecosystems**
Large-scale renewable energy projects (such as large dams or wind farms) can also lead to subsequent harm to the environment and destroy local ecosystems.

- **Land use conflicts**
Producing renewable energy requires large tracts of land. Renewable energy projects have led to land use conflicts, for example, in coastal areas with local agriculture, fisheries and tourism, and even forced resettlement (such as in the case of large dams) and expropriation.

- **Corruption**
Large-scale projects in particular are often affected by corruption, which prevents projects from being implemented in a socially and environmentally sound manner that creates value at the local level.

- **Debt**
High initial investments are necessary for funding these projects, especially for renewable capacities. If the exporting countries take on new debts for these projects and they end up not being profitable, it results in the threat of a new debt trap or becoming dependent on international financiers and their own private interests.

- **Energy poverty**
Investing in export projects for producing renewable energy and hydrogen does not automatically improve the energy supply for the local population. Energy poverty threatens to be cemented if investments in decentralised renewable infrastructures are pushed back and newly built renewable capacities are not also used to supply energy to the local population.

- **Declining acceptance for renewable energies and exports**
If only few benefits for the local population are created, acceptance for further expansion in the exporting countries may decline and become politically and economically more difficult to attain as a result.

- **Lack of recycling concepts**
In order to avoid negative environmental consequences in the future, methods for assessing the life cycle of the implemented technology and corresponding recycling solutions should be developed at an early stage. This should be part of the process for developing a sustainable hydrogen economy, for example, for carbon fibres in wind turbines or precious metals in the electrolysers.

SUSTAINABILITY CRITERIA FOR IMPORT-RELATED PROJECTS

Sustainability standards must be established for hydrogen projects whose products are imported from countries outside the European Union, especially from the Global South. In this context, both measures at the intergovernmental level and standards for the development of individual projects are relevant. The best thing to do in both of these areas is formulate and implement uniform standards that are also universal – including internationally.

This requires a package of accompanying measures that are divided into the following two groups:

- an intergovernmental framework and
- project-specific measures and guidelines for companies investing in renewable energy projects outside the EU.

It is crucial that the criteria and frameworks for trade projects outside Europe are fully compatible with European-level requirements and mechanisms. A 1:1 transmission, however, is not possible. For example, the European Union Emissions Trading System (EU ETS) ensures that emissions from installations within the EU ETS are avoided in a way that complies with their goals. In principle, this makes it possible for a transitional phase to allow for sources of CO_2 emissions to remain in its member plants that produce sustainable synthetic fuel, as long as the emissions still continue to be accounted for by the plants themselves. This form of regulation is not possible outside the EU while there are no effective mechanisms for reducing CO_2 as outlined by the EU ETS.

The delegated legislative act currently under development in connection with recital (90) of the RED II is vital to the consistency of the regulations. This will define the criteria that must be met when procuring electricity for producing green hydrogen (additionality and temporal and spatial coupling). Therefore, developments at the European level should not be forestalled. At the same time, however, it is desirable to find corresponding criteria for projects outside Europe that should also be considered as green hydrogen projects independently of EU regulations (see the section 'Criteria for hydrogen projects').

The development of the first trade projects is in a state of tension. Overly strict specifications could delay projects or make them more expensive and hinder the market ramp-up, while overly lax criteria could call into question the sustainability of hydrogen in the long term and severely damage market development as a result. In this sense, the larger the corresponding projects are and the greater their potential impact (good or bad), the more binding the following criteria should become.

INTERGOVERNMENTAL FRAMEWORK

Establishing a suitable certification system for non-European contexts (applies to all export countries)

A suitable EU-coordinated certification system for importing hydrogen and its derivatives is urgently needed, and it is absolutely essential that it also functions at the transnational level. In order to be able to use it in a non-European context, it should be developed in coordination with selected potential export countries. When developing this system, current processes, such as developing criteria for renewable hydrogen in Europe within the framework of RED II or carbon border adjustment mechanisms, must be actively considered or suitable interfaces created. The following points are particularly relevant here:

- Additionality of generating electricity using renewable energies: only additional renewable electricity should be used for balanced electrolysis and desalination. This is so that the development of renewable electricity production for the purpose of exporting renewable hydrogen does not lead to prolonging the usage of climate-damaging fossil fuels, or to the exporting countries being unable to achieve their own energy and climate policy goals. Additionality in the context of non-European projects is also assigned if:
  - renewable energies are used to generate the electricity in regions where it is impractical to use the electricity elsewhere and where the electricity cannot be transported away via electricity grids;
  - power plants that use renewable energy exceed the limits of the country's binding target plan for the expansion of renewable energies, for example, in countries where development is regulated by state-owned electricity producers via integrated resources plans;

- Temporal and spatial comparison of renewable electricity generation and electricity demand: since renewable hydrogen will be produced predominantly on the basis of fluctuating renewable energies (wind and solar), a suitable location and mode of operation for the system must also be ensured. This is also the case in the context of non-European projects if
  - it is possible to directly couple renewable sources and electrolysis.

Systemic approach

Embedding the development of hydrogen production in a national or regional energy transition that is in line with the goals of the UN Agenda 2030 and aims at energy efficiency and energy access for all should be a prerequisite for sustainable development. Incentives for hydrogen production should be set as well (for example, regulatory frameworks, CO_2 prices and contracts for difference).

Energy poverty

Overcoming energy poverty must be actively promoted as a key goal of the SDGs regarding hydrogen exports. To this end, a list of countries affected by energy poverty is to be drawn up on the basis of established criteria. Projects in these countries must contribute to overcoming energy poverty in order to receive funding (see below).

Good governance and transparency (applicable to all export countries)

Working towards preserving human rights and observing anti-corruption standards should be a prerequisite of any commitment made by Germany and Europe. Good governance in general should be promoted as well. This may require institutions and facilities that support relevant government agencies. Hydrogen production requires large amounts of electricity, and large projects are often affected by corruption. It is therefore crucial that appropriate mechanisms for maintaining transparency be in place. In the meantime, there is a wide array of experiences and international mechanisms (such as the EITI) that can be implemented.

Participation

Local players in civil society and local residents affected by the projects should participate in planning, implementing and monitoring them and should also benefit financially if possible. Investing in the appropriate capacity building process for local players, creating transparent mechanisms for handling complaints and creating formats in which citizens can actively participate in decision-making will be the basic components of the various forms of participation. Doing so makes it possible to create confidence in how the necessary measures are implemented and to utilise comprehensive knowledge about geographical, climatological, sociocultural or technological factors.

Overall economic attractiveness for the exporting country

Should exporting countries directly invest in financing large-scale projects, it is critical, within the framework of intergovernmental agreements, to conduct a holistic assessment to determine whether the project is in the overall economic interest of the exporting country. Doing so can help avoid risks to social, economic and environmental development.

Creating value at the local level

In producing countries, creating jobs and developing possibilities for creating value at the local level should be promoted in a way that is both targeted and sustainable. Existing economic players should be strengthened (making targeted investments in and promoting local businesses) and new skills should be developed (promoting training programmes and innovation initiatives) in the process. A quota on the number of local companies allowed to participate can be set, provided it is reasonable, possible and economically feasible to do so. In addition, some of the hydrogen can be further processed into downstream products on site.

CRITERIA FOR HYDROGEN PROJECTS

Certified carbon footprint of hydrogen and its derivatives (applies to all export countries)

The carbon footprint of hydrogen must be certified throughout its entire value chain. Until internationally recognised mechanisms for doing so are available, certification must take place using criteria tailored to the individual project. In order to receive funding, a project must have already reliably demonstrated that its impact on the climate is positive, and it must be certified within 12–24 months after commissioning. The above-mentioned criteria for additionality and spatial and temporal coupling are to be applied in the process and, if necessary, adapted to the specific country.

Sources of CO_2 emissions for downstream products (applies to all exporting countries)

To achieve climate neutrality, CO_2 must be removed from the atmosphere at the system level. There are two long-term possibilities for doing so at the project level:

- Direct air capture (DAC)
  - increased electricity demand, increased need to develop processes for producing energy using renewable energies for which criteria described in this document are to be applied;
  - increased demand for land, for which criteria described in this document (in particular criteria for land use) are to be applied;
  - acquiring water in such a way that there is no water shortage or need for desalination or treatment plants.
- Bioenergy
  - In order to protect biodiversity and ensure priority is given to producing food, no additional areas should be designated for bioenergy use. Only residual materials are to be used.

It is disputed whether and for how long unavoidable industrial emissions from existing plants are acceptable as a source of CO_2 emissions for hydrogen derivatives.

Impact assessments

It is mandatory to conduct impact assessments before implementing individual projects. Investors in renewable energies in exporting countries should conduct the appropriate environmental impact assessments for production plants. When conducting impact assessments for projects in exporting countries, local players should also be consulted. Human rights as well as social and environmental issues should also be taken into account.

Energy poverty

Imports from countries experiencing energy poverty (see above for criteria) are only to be promoted if there is proof that the hydrogen projects contribute to overcoming energy poverty, for example, by making parts of the additional capacities used for renewable energy generation accessible to local populations as well.

Land use

Potential land use conflicts that arise due to competitive situations are to be solved together with the local population within the framework of effective and transparent participation processes. Forced resettlement and illegal land grabs must be ruled out. Setting minimum requirements for the preservation of biodiversity and carbon storage is necessary to avoid subsequent environmental damage.

Water demand

Conflicts over allocating the water supply must be avoided – the water supply must not be endangered. In the event of conflicting goals, priority is always given to developing sustainable desalination plants. Should such plants be developed, the water supply must also improve as a result, in that some of the desalinated water can be made available to the local population if needed. Investors must require proof of this before issuing funding. In addition, a sustainable solution must be found for dealing with the residues created as a result of the desalination process.

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THE GERMAN NATIONAL HYDROGEN COUNCIL

On 10 June 2020, the German Federal Government adopted the National Hydrogen Strategy and appointed the German National Hydrogen Council. The Council consists of 26 high-ranking experts in the fields of economy, science and civil society. These experts are not part of public administration. The members of the National Hydrogen Council are experts in the fields of production, research and innovation, industrial decarbonisation, transportation and buildings/heating, infrastructure, international partnerships as well as climate and sustainability. The National Hydrogen Council is chaired by former Parliamentary State Secretary Katherina Reiche.

The task of the National Hydrogen Council is to advise and support the State Secretary's Committee for Hydrogen with proposals and recommendations for action in the implementation and further development of Germany's National Hydrogen Strategy.

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