

Stakeholder Survey

German Business Perspective on Hydrogen Projects in Ukraine

In the context of the German-Ukrainian Energy Partnership



Imprint

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1 Introduction

The hydrogen sector could become a new pillar for Ukraine's future energy development and has received increasing political attention. The year 2020 marked the start of the hydrogen policy development in Ukraine – green hydrogen has been taken into the focus, as it not only represents a building block for the decarbonisation of Ukraine's economy but also good export opportunities. At the same time, the introduction of a new technology is extremely demanding and needs a particularly high level of strategic planning and risk-awareness, to which this paper is a small contribution.

The large potential of renewable energy sources and opportunities for the production of green hydrogen have been recognized internationally: Ukraine is gaining attention as a potential hydrogen supplier for the EU. Cooperation in the field of green hydrogen is one of the central focal points of the **German-Ukrainian Energy Partnership**, which was established with the signing of a joint declaration in Berlin on 26 August 2020.

The cooperation in this field, as identified by the bilateral **working group**, focusses on two main issues: The analysis of key issues for the development of green hydrogen in Ukraine and the facilitation of joint pilot projects including German companies.

Over the course of 2020, a number of pilot projects initiatives for green hydrogen emerged in Ukraine and were compiled in a dossier by dena¹. The various initiators have expressed great interest in working with German companies. Within the framework of the Energy Partnership, a basis for matchmaking between German and Ukrainian companies and stakeholders is being established. Part of these matchmaking activities was a **round table "Hydrogen Projects in Ukraine"** with project developers, government representatives and companies from both countries, which took place in the context of the **1st German-Ukrainian Energy Day** on 9 December 2020. In the course of the discussion it became clear that there is a general interest from German companies in Ukrainian hydrogen projects, but

also a variety of uncertainties when it comes to the regulatory framework on hydrogen and business opportunities.

Following on from the discussions with representatives of the Ukrainian government, experts of dena carried out the short study **"Green Hydrogen Potential in Ukraine: Taking Stock and Outlining Development Pathways"** in the context of the German-Ukrainian Energy Partnership, which is expected to be published shortly.

The study is intended to ensure that the work that is done to date in projects, research, and industry is included in the further discussion and provides an overview of green hydrogen pilot projects that are currently being considered in Ukraine.

In addition to the short study, dena has conducted an **online survey** on the **"German Business Perspective on Hydrogen Projects in Ukraine"**. The survey aims at developing a better understanding of the possible contribution of German companies in the sector, but also of the obstacles they may face. **Representatives of 20 German companies**, including the participants of the round table and the leaders of the sector, were asked for their perspective and assessment regarding the possible participation in Ukrainian hydrogen projects. This paper is based on the results of the non-representative survey, in which 15 companies gave their perspective, but also incorporates aspects raised in individual discussions.

¹ Source: dena 2021, Dossier: Hydrogen Projects in Ukraine

2 Main Results

With its natural potential for renewable energy production and promising possibilities for low-cost transport of hydrogen to the EU using existing pipeline infrastructure, Ukraine possesses the prerequisites for large-scale and export-oriented green hydrogen production. As a result, national and international stakeholders from business, industry and politics take interest in the development and implementation of green hydrogen projects in Ukraine.

In order to understand which starting points German companies see for an engagement in Ukraine and which technical and administrative framework conditions are required for this, we have asked 10 questions to 20 **representatives of German companies**, among them electrical and energy engineering companies, developers and providers of renewable energy systems as well as project consulting companies. The first part of survey covered general multiple-choice questions, while the second part consisted of open questions, focusing on the main obstacles and recommendations for the further project engagement.

A high response rate (an average of 15 participants or 75% responded to each of the questions) reaffirms the interest of German business and industry representatives in hydrogen project development in Ukraine.

2.1 General interest in projects

Project Size

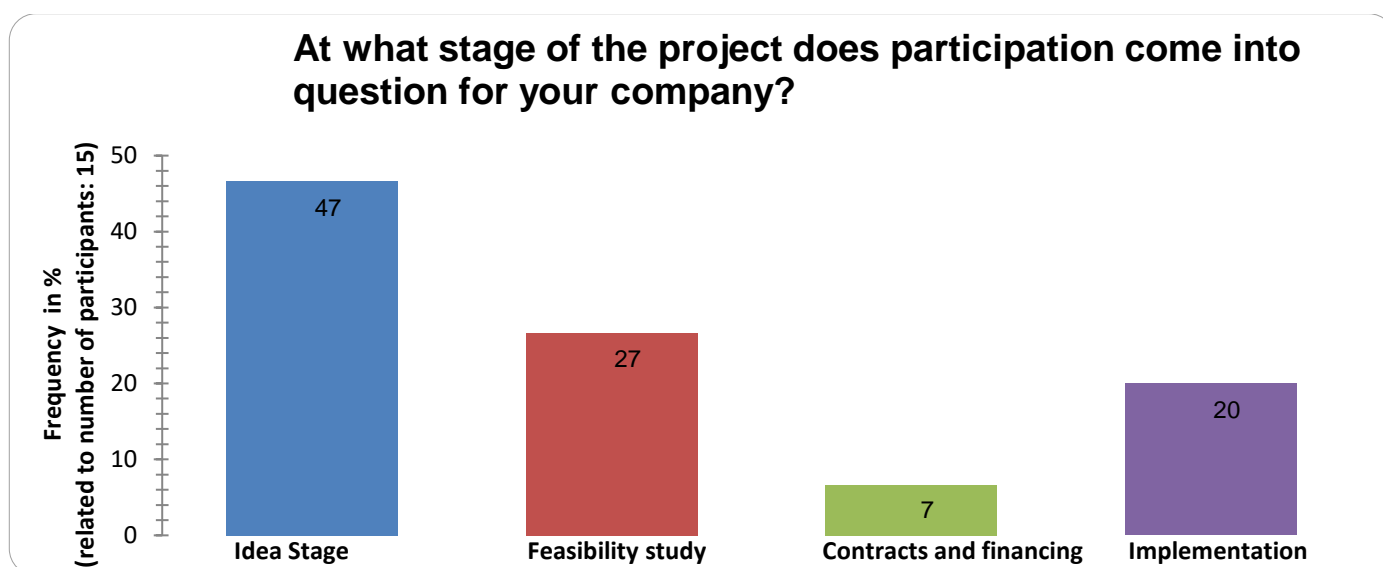
The majority of respondents indicated their equal interest in the implementation of **projects of different sizes** – here stated in electrolyzer nameplate capacity. Although, several answers were possible, the most common choice was a project size of 10 MW (53%), followed by 50 MW and 200 MW (both 47%) and 100 MW (40%).

Other answers (27%) included a project size of 5MW and a possible combination with biogas for the biological methanation of hydrogen. One participant pointed out that a high probability of realisation was crucial for their interest in projects. The lack of preference in project size means that other factors, such as project stages, or risks and obstacles, which we examine in turn, may be more decisive in the decision to develop hydrogen projects in Ukraine.

Project Stage

From dena's communications with Ukrainian project initiators, it became apparent that all pilot projects are currently in initial development stages, although some had already passed the idea stage and conducted feasibility studies and had started concluding contracts and searching for financing. In the survey, the German companies were asked about the **project stages** at which they would consider participation (Figure 1). Interestingly, most of respondents are ready to support projects in its early stages. Many are interested in contributing to the creation of a feasibility study; others would like to engage at the stage of implementation. Contracts and financing was identified as the least attractive option (5%).

Figure 1: Stages of participation



Investment Period

Another important part of the project planning is identification of an **investment period**. According to the survey outcomes, most of the German companies (50%) are interested in short investment periods of up to 5 years. However, the number of companies interested in investment periods of 10 years (29%) and 20 years (21%) is also substantial. This indicates a somewhat shorter investment horizon than usual for renewable energy projects. Although attractive for the German companies, the preferred short investment period of 5 years is especially challenging in the hydrogen sector, at least for investors and operators.

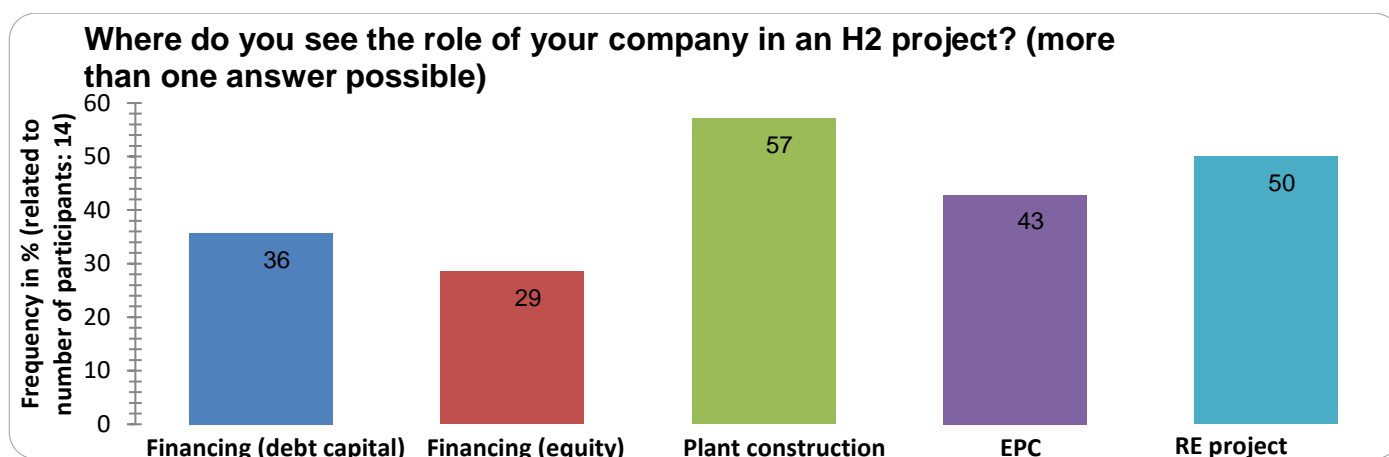
Role of German companies in Ukrainian hydrogen projects and established contacts

One of the key questions of the survey referred to specific roles of the companies in hydrogen projects (Figure 2). Plant construction, planning of renewable energy projects as well as engineering, procurement and construction (EPC) were selected as the most suitable competences among the respondents, followed by financing (debt capital and equity). The answers indicate that German

business is not limited to a single activity, but rather reflects the whole spectrum of potential in projects.

The willingness to engage in different project stages also reflects in the already established contacts between German and Ukrainian businesses. Although the pilot projects are in early development stages, about 33% of interviewees are already **in contact with Ukrainian stakeholders/partners** and have established a business relationship. Around 13% of the companies have initiated contact to representatives of the Ukrainian hydrogen sector but have not yet established any business relationship. Another 33% are willing to establish a contact in the future. 20% are not interested in such a cooperation for the time being. Focusing on the accumulated 53% that have not yet initiated contact, the question arises what may prevent these companies from engaging in the Ukrainian hydrogen sector. Besides individual company preferences, the survey finds that this reluctance is related to the risks inherent in the hydrogen sector in Ukraine, especially regarding profitability of projects and the unresolved transport question (see also dena's Short Study²)

Figure 2: Roles in the project



2.2 Risks and obstacles

Despite the huge natural and technical potential for the production of green hydrogen, the survey indicates that there is a number of key issues that are seen as obstacles for business activities in the sector. It is important to look for solutions to these technical, political, and economic uncertainties in order to make projects attractive to investors and assure security and feasibility to international project partners.

The survey results show that the main prerequisites for an involvement of German companies are reliability, predictability and security of project partners and business models. Concrete concerns that were uttered by

several participants will be addressed in more detail below.

Necessity for (long-term) purchasing agreements and/or guarantees

The most frequently named issue in the survey concerns the possibilities of marketing the respondents' final product, green hydrogen. More specifically, German companies see purchasing guarantees ("offtake agreements", preferably long-term) as a central prerequisite for implementing projects, as it allows them to make concrete assumptions about the required scope, financing and overall feasibility of a given project. In addition, tentative agreements on expected purchases

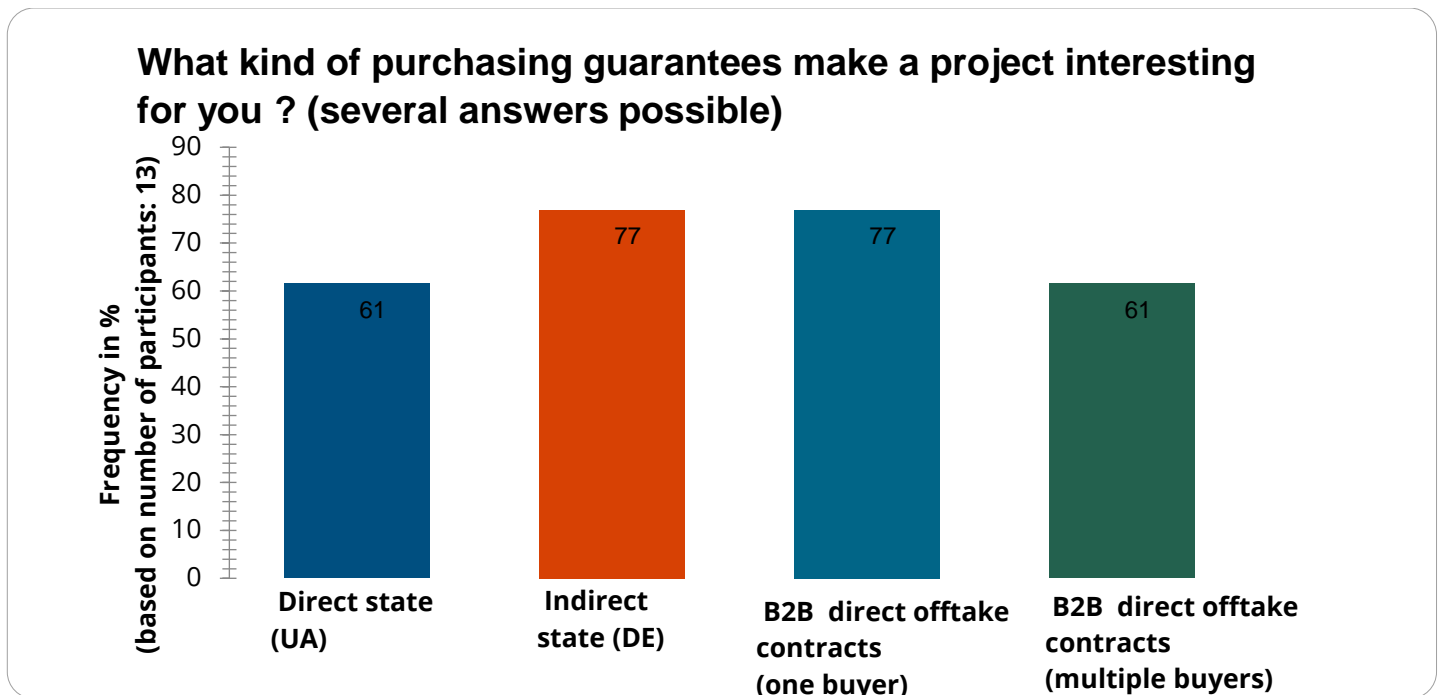
² dena 2021, Green Hydrogen Potential in Ukraine: Taking Stock and Outlining Development Pathways

are required for financing (see also “financing and support”).

As the survey shows, companies are open to the nature of the offtaker. All of the options included are welcome to the respondents, with a slight preference for German state guarantees and B2B marketing to a single partner (see Figure 3).

In addition to quantitative purchasing guarantees, some participants of the survey raised the issue of a price indication to guarantee cost and thus planning security. This applies to both the domestic market in Ukraine as well as to potential exports to the EU.

Figure 3: Purchasing guarantees



Financing and support

The second dominant obstacle identified in the survey is closely related to the previous one as well as to other aspects of **project financing**. In addition to the above-mentioned guarantees required by potential investors, the current rate of refinancing in Ukraine is of particular concern to some respondents, which is in line with the findings of the mentioned short study: under current conditions, hydrogen projects would have to be financed at high capital costs, which significantly hamper their profitability. The weighted average cost of capital (WACC) in Ukraine is around 15% for the oil and gas sector³, mainly driven by the cost of debt and the country risk premium, and may be considerably higher for hydrogen projects due to a variety of additional risks.

As a consequence of the insecure offtake market and high costs of capital, the economic feasibility of hydrogen production in Ukraine – and the competitiveness of green hydrogen in particular – is hard to assess for any investor at this point in time.

According to the survey participants' responses, efficient mechanisms are necessary to establish a **hydrogen market** in Ukraine. As a suggestion, the implementation of contracts for difference for hydrogen was repeatedly mentioned, which can hedge against uncertain price movements, reduce investment risks and make hydrogen technologies more competitive.⁴

Similarly, some respondents also stressed the necessity of direct financial project support to get the sector on its feet and alleviate potential risks.

General framework

Besides missing offtake guarantees and high capital costs, a number of respondents mentioned the general framework as a potential obstacle. This includes the absence of a “proven overall system” in Ukraine as well as a regulatory framework for hydrogen in Ukraine, but also on EU level (e.g. for compulsory hydrogen quotas and certificates of origin).

Furthermore, the general country risk is of concern to some of the respondents. The ongoing discussion around

³ Source: waccexpert.com

⁴ <https://www.bmw-energiawende.de/EWD/Redaktion/EN/Newsletter/2020/11/Meldung/direkt-account.html>

the incurring debt of the Guaranteed Buyer to RE producers is one aspect that was mentioned, lengthy decision-making procedures are another.

Transport

Besides the uptake of green hydrogen production, enabling **hydrogen transport** to Ukrainian and EU customers is crucial for establishing a hydrogen economy in Ukraine. The existing gas infrastructure in Ukraine might be used for this purpose and could be the cheapest transport option for Ukraine, especially for long

distances⁵. However, to what extent, how, and when the existing pipeline system can transport Ukrainian green hydrogen is yet uncertain. This unresolved question represents a major obstacle for the participants of the survey. To make green hydrogen production in Ukraine a profitable business case and attract investment, low cost hydrogen transport to domestic and EU customers has to be secured. Especially the international transport via Ukrainian gas infrastructure will be of importance, as the EU market for hydrogen is on the rise and willingness to pay for the “green” product high.

⁵ dena 2021, Green Hydrogen Potential in Ukraine: Taking Stock and Outlining Development Pathways

3 Summary & Recommendations

The findings of this survey illustrate that Ukraine undoubtedly offers interesting business opportunities in the field of green hydrogen and awakes interest among representatives of German hydrogen business. However, it becomes clear that unresolved barriers and questions regarding hydrogen transport, offtake, and project financing represent barriers for German companies to engage in the Ukrainian hydrogen sector. Consequently, the development of pilot projects in collaborating with German businesses is hampered. Following, possible pathways that may contribute to overcome the presented obstacles are outlined. Based on proposals made by the survey participants, the suggestions include aspects related to:

- strategic policy framework, as well as
- concrete action points to be taken in the near future.

Strategic policy framework

For the Ukrainian government, the future strategy to promote the hydrogen sector should consider dependable state support of RE deployment, mitigation of general country risks, creation of an appropriate legal framework and addressing the open questions concerning hydrogen transport.

In addition, both Ukrainian and German/EU policymakers are required to insure the offtake of green hydrogen produced in Ukraine, thus enabling economic feasibility of hydrogen projects. Thereby, demand could initially come from Germany, due to the high willingness to pay for the “green” product and the offtake in Euro, which in turn enables financing in Euro, thereby lowering capital costs.

In the short- and medium-term, the German green hydrogen demand, which will require the physical flow of hydrogen or hydrogen based products to German customers, can be met in three ways:

1. Hydrogen pipeline transport as admixture (“blending”) to natural gas or as a dedicated pipeline
2. Ship transport (via the Danube) as hydrogen or derivatives
3. Export of green hydrogen based products (which might benefit from the planned EU-CBAM⁶)

At best, all three options are made available to ensure the offtake of green hydrogen, possibly already in the short term. It is paramount to further develop a roadmap addressing the need for infrastructure, so that project developers are able to anticipate which infrastructure they can rely on in the future.

Action Points

As concrete action points that can be taken in the context of the proposed strategic framework, the following measures appear most promising to kick-start the green hydrogen sector in Ukraine including German business participation.

1. Direct and/or indirect government co-funding of first pilot project(s)
2. Creation of strong demand mechanisms
3. Measures aimed at reducing the cost of capital or mitigating country risk

A successful implementation of first pilot project(s) can increase the level of security and trust, as upcoming challenges could be identified and resolved in practice. It can also foster the international cooperation and development in the hydrogen sector in Ukraine. However, as also outlined in the short study, the first project(s) will require direct government co-funding (by Ukrainian government) and/or indirect support by German government for German companies participating in Ukrainian hydrogen projects, as (economic) insecurities are high, hence full private sector financing at this stage is unlikely.

Besides project support through government funding, strong project-independent demand mechanisms can be created, possibly in the form of long-term offtake guarantees and price assurances. Thereby, the economic feasibility of pilot projects can be facilitated, as a dominating insecurity factor – the insecure green hydrogen offtake – would be eliminated.

Finally, the established bilateral mechanisms to improve access to capital and lower country risk, such as export credit guarantees (ECG)⁷, offer a route to further improve the economics of hydrogen projects in Ukraine and make them competitive in the medium term with production elsewhere in Europe.

⁶ Carbon border adjustment mechanism

⁷ In the specific German case, those are known as “Hermes cover”

List of figures

Figure 1: Stages of participation5
Figure 2: Roles in the project.....6
Figure 3: Purchasing guarantees7

