

Facilitating a sustainable future

BENEFITS FOR LOCAL COMMUNITIES

IN THE CONTEXT OF

POWER-TO-X



Ensure that local value creation potentials of green hydrogen and Power-to-X (PtX) projects can be tapped and maintained in the long term



The EESG (economic, environmental, social, governance) framework forms the basis for the identification of local benefits of green hydrogen and PtX projects



Benefit sharing rewards both the local communities and the green hydrogen and PtX project

Developments and chances

The development of a renewable Power-to-X (PtX) economy can help to defossilise national industry and generate significant socio-economic benefits for the country. PtX can lead to the production of goods with low greenhouse gas emissions and with high export potential, such as ammonia, methanol and synthetic fuels. Scaling up the production of these goods would spur sustainable industrial growth, aid economic diversification and create new jobs (Agora Energiewende et al., 2023). This is certainly true at the national level.

In terms of a just transition, especially the impact on the local communities where the green hydrogen and PtX plants and infrastructures (e.g., renewable energy and desalination plants, grids and pipelines) are located should also be positive. While such large industrial development projects offer great opportunities, they do not automatically lead to the realisation of benefits for local communities.

The communities where PtX production development including power generation, hydrogen conversion, PtX synthesis, storage and logistics, and feedstocks and fuel use, takes place have an interest in ensuring that it (a) inflicts no harm and (b) ideally benefits their community and the local economy. In part, this is considered an adequate response to the changes that result from implementing the project (e.g., construction activities, inflow of workforce, general enlargement of the community). It is also seen as a fair share of the increased productivity (through the use of local land and resources) that benefits local people (Lane & Hicks, 2019).

The concept of benefit sharing is based on acknowledging that the siting of such industrial development projects – especially when it is large scale – results in changes in the local landscape and community. Sharing the financial and other benefits of a project improves the social and economic outcomes for the local community, thereby making the change worthwhile (Lane & Hicks, 2019).

There are many examples in the literature of what the benefits should be for local communities. The most common are the following ones:

- Access to long-term jobs
- Access to water and energy or access to discounted energy
- Capacity building/skills development
- Local sustainable development
- Financial participation of municipalities and local population

The benefits for local communities are an important issue along entire PtX value chains. A major issue comes right at the start with the production of green electricity. For large photovoltaic or wind projects large areas of land are needed. If the surrounding area is inhabited, this automatically leads to impacts for the local communities also depending on how the land was originally used or what services it provided. The actual production phase of hydrogen has similar effects to any other production facility. Depending on the location the necessary infrastructure can also lead to tremendous impacts on local communities. This includes especially the installation of pipelines or the building or enlargement of port facilities.

Benefits for local communities also have value for developers and investors

If the local communities benefit from the PtX development project, there are also benefits for the developers and investors. Developers have an interest in fast and smooth processes, and a trusting relationship with local communities can facilitate this (Lane & Hicks, 2019). Additionally, inadequate local project support can lead to more costly and lengthy procedures and a poor reputation, which in turn can have a negative impact on the decisions of financial institutions or investors (Bukowski, 2022; Lane & Hicks, 2019).

Trust in technology and governance as well as knowledge about PtX are imperative for public acceptance and therefore also for the creation of a 'social licence to operate' (SLO). Generally, an industry with a SLO benefits from the continued acceptance and approval of the affected stakeholders and those who can influence the implementation of the projects (Dumbrell et al., 2022). The pyramid model of the SLO proposed by (Boutilier & Thomson, 2011) shows four levels. At the lowest level, the project is at risk of restricting access to essential resources. The next and largest part of the pyramid is the area of acceptance. When the project has proven its credibility, the SLO rises to the level of acceptance. As trust is built over time, the highest level of psychological identification can be reached, reflecting a very low socio-political risk.

The pyramid model of the social license to operate

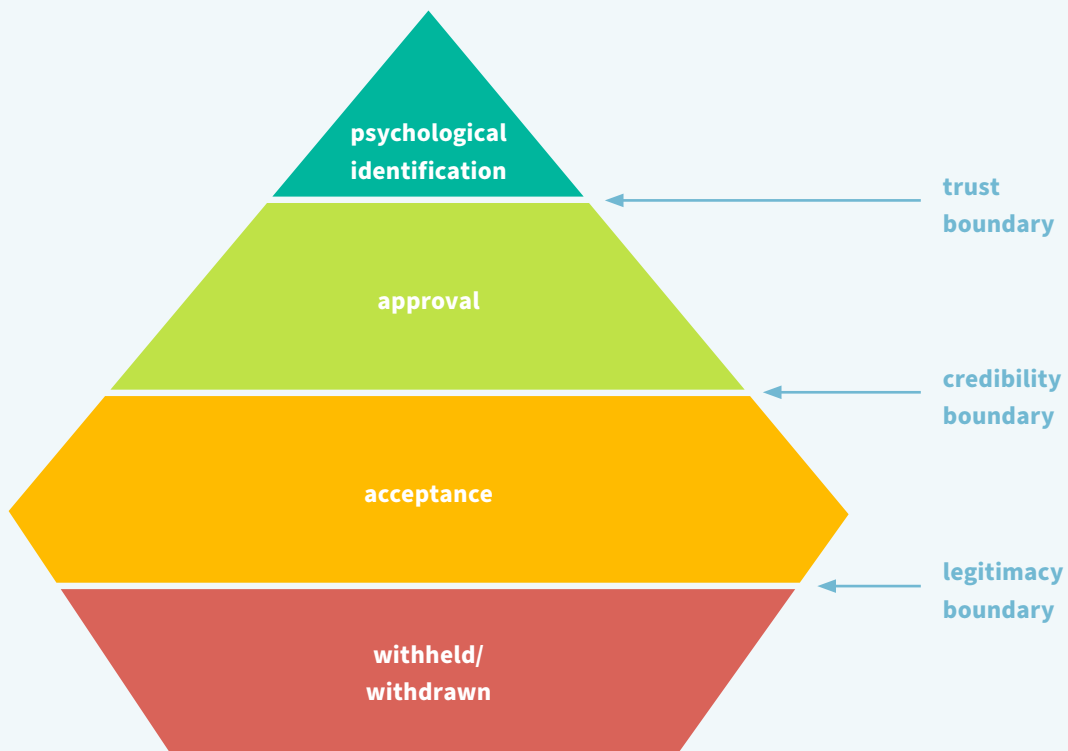


Figure 1: Based on Boutilier & Thomson (2011)

Overall, especially large-scale projects need wide social acceptance to be carried out. The lack of a SLO for energy developments (including solar, wind, gas and coal projects) has led to costly disputes, regulatory restrictions and difficulties in obtaining legal approvals in several countries. For investors, the SLO is therefore a serious matter. Even if it is not on a piece of paper, the SLO is a powerful force that can enhance or detract from the value of a project. Especially in countries with general high investment risks but promising conditions for PtX, the SLO is a crucial factor.

The SLO is primarily required by neighbouring communities, which are generally affected by the construction and operation of a PtX project. If stakeholders' interests and expectations are not aligned, formal procedures and issuance of permits can be delayed and take several years. A challenging task right at the outset of a PtX project is the definition of boundaries for the community to be benefited and to identify the respective contact persons.



Realising opportunities

How to realise local benefits

Several levers exist on how benefits for local communities can be facilitated:



Access to long-term jobs

- Guaranteeing a certain share of local workforce can be a first step for socio-economic participation in the project (Heinemann & Mendelevitch, 2021). Long-term, high quality jobs for community members are essential, even though training or capacity development of remote communities might need substantial efforts.
- These local jobs should be realised within safe working environments, probably agreed by a local employment plan (Green Hydrogen Organisation, 2023).
- Communities with traditional fossil fuel related jobs can supply skilled workers that, at least partly, can move to the new hydrogen / PtX field quite easily. These just transition possibilities should be actively pursued (Agora Energiewende et al., 2023).



Access to water and energy or access to discounted energy

- Surplus capacity can be used for other purposes. For example, a plant can also produce renewable electricity for the local community, parts of the electricity grids can remain free for domestic use, or additional water from desalination plants can be supplied to local communities (Heinemann & Mendelevitch, 2021).
- Such an additional access is especially relevant in countries where general access to energy, electricity and/or water is still low or unstable (Heinemann & Mendelevitch, 2021).
- As a rule, additional or improved access to clean energy and water should be permanent, or at least be maintained throughout project implementation (Green Hydrogen Organisation, 2023).



Capacity building

- Tailor made capacity building is necessary to enable the local population to enter the local job market. An employment plan for the community could bundle this.
- Capacity building may also be linked to other productive purposes including training for climate resilient farming.



Support local sustainable development

- Investment into local infrastructure (renewable electricity generation, energy grids, electricity storage, etc.) or leaving surplus infrastructure to local communities or sharing of infrastructure can support local sustainable development (Green Hydrogen Organisation, 2023; Heinemann & Mendelevitch, 2021).
- Technology transfer, commitments to local procurement and the diversification of local income-generating opportunities can support sustainable development on local level (Green Hydrogen Organisation, 2023).
- A good integration of PtX production into local productive networks would be a positive contribution to a just transition. Such up- and downstream multiplier effects for income and employment would benefit the local community (International PtX Hub, 2022).



Financial participation of municipalities and local population

- A simple and widely used method for project developers to contribute to local benefits is to finance a (trust or community development) fund for use by the community.
- Payments into such funds can be linked to certain developments within the project, e.g. a certain amount of money related to the revenues of the project (Green Hydrogen Organisation, 2023; Rudolph et al., 2015).
- The possibility of the local community itself becoming investors (as in the case of citizen energy in Germany or Chile, for example) is a good way of increasing the benefits for the local community and at the same time acceptance of the project
- Higher costs of living for community members (e.g., due to an influx of well-paid experts) must be avoided.



Realising local co-benefits

- A re-design of projects towards benefits for local communities can lead to additional local co-benefits. An example would be the use of Agri-PV systems that support the increase of local agriculture yields. In addition, it would foster local sustainable development and would guarantee local economic participation (Heinemann & Mendelevitch, 2021).
- Realising local co-benefits is a smart way to increase acceptance of the project. 'PtX.Ecosystems' tries to link hydrogen and PtX projects with local projects and thus generate co-benefits. In simple terms, for example, the government of a water-scarce country could combine a PtX project with an agricultural project that can only be realised because of the additional water from the desalination plant built as part of the PtX project.

How to secure benefits for local communities

Criteria for local benefits

ESG (environmental, social, governance) criteria are usually attached to large financing projects. The International PtX Hub has developed an extended EESG framework specifically for PtX projects, which takes also the economic dimension into account (International PtX Hub, 2022). A variety of sustainability

aspects are relevant for all four dimensions, which also forms a basis for the question on possible local benefits. The EESG framework shows all the main topics to be addressed. The importance of each topic however may vary, regarding the specific circumstances of a project.

EESG framework

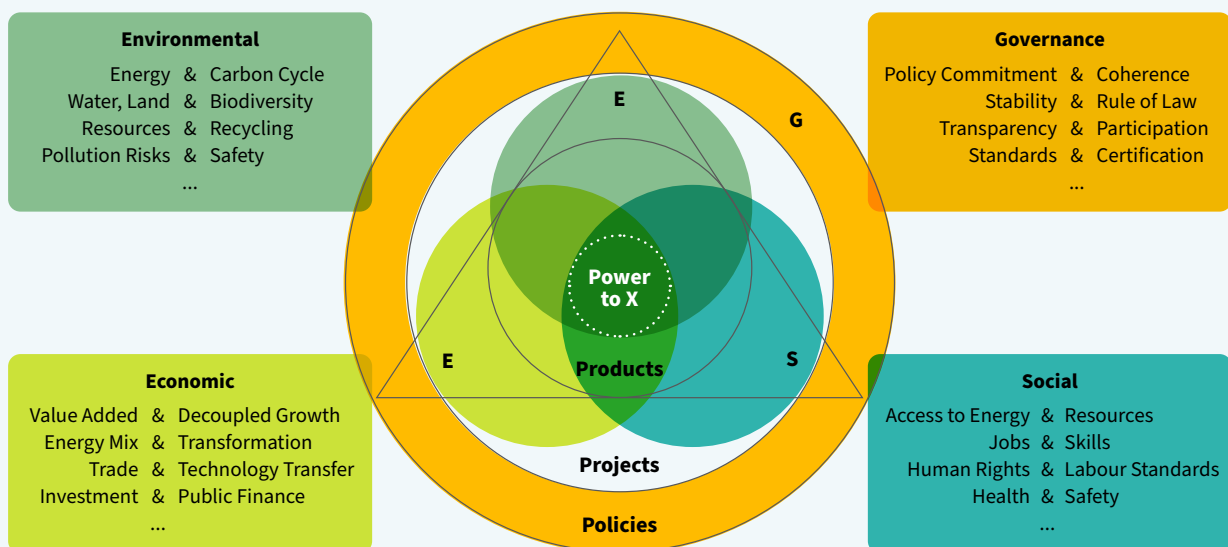


Figure 2: International PtX Hub (2022)

Ways forward

Toolkits

In related sectors such as renewable energy production or mining, the question of local benefit is common practice and can also serve as an example for PtX projects (GIZ, 2023). A specific approach for PtX is discussed by Green Hydrogen South Africa (GHSA), Infrastructure South Africa (ISA), H2.SA and GIZ South Africa in a Green Hydrogen Community Development Toolkit for South Africa (GIZ, 2023). In their understanding, the lifecycle of an effective community development project generally goes through five phases:

- 1) Preparation
- 2) Assessment and planning
- 3) Relationship building
- 4) Programme implementation
- 5) Monitoring, evaluation and learning.

For each phase, the toolkit provides specific tools:

Table 2: List of tools for each phase of the Community Development Toolkit (GIZ, 2023)

Chapter	Name of community development tool
Preparation/getting companies ready	1. Competence assessment 2. Management systems
Relationships	3. Stakeholder identification 4. Stakeholder analysis 5. Consultation matrix 6. Partnership assessment
Planning	7. Community mapping 8. Institutional analysis 9. Development opportunity ranking 10. Social impact and opportunity assessment
Programme implementation	11. Community action plan 12. Conflict resolution and grievance mechanism 13. Local economic investment
Monitoring, evaluation and learning	14. Indicator development 15. Logframe

Agreements

A good way to ensure local benefits is to establish an agreement between the project developer and community representatives at the very beginning of the project. Through early and deep involvement of local communities, needs and concerns can be assessed, appropriate and desired benefit models can be discussed, and potentially benefiting communities can be identified (Rudolph et al., 2015).

Bilateral agreements between supplier and buyer countries as well as the private sector and local communities can play an important role in mitigating risks for setting up a PtX value chain: They can lead to long-term contracts that include price guarantees, investment promotion (and protection), technology transfer or direct financial support. They can ensure that the criteria for PtX production are consistent with the development priorities and capacities of producer countries and in line with their national energy transition strategies, as well as promoting social and environmental standards (Villagrasa, 2022).

If a strong intermediary such as the state or local government is involved, the promotion of public-private partnerships (PPP) would be a good way of concluding contracts on an equal footing. Formulating strategic goals and outlining roadmaps often is not enough to create a PtX market, and it needs investors.

Large PtX projects can improve their bankability by establishing PtX ecosystems. Such systems provide surplus water, renewable electricity or hydrogen to local partners, potentially bridged via PPPs. This socio-economic participation demonstrates to potential investors a reduction in country risk which, in turn, improves a project's bankability.



PtX.Ecosystem

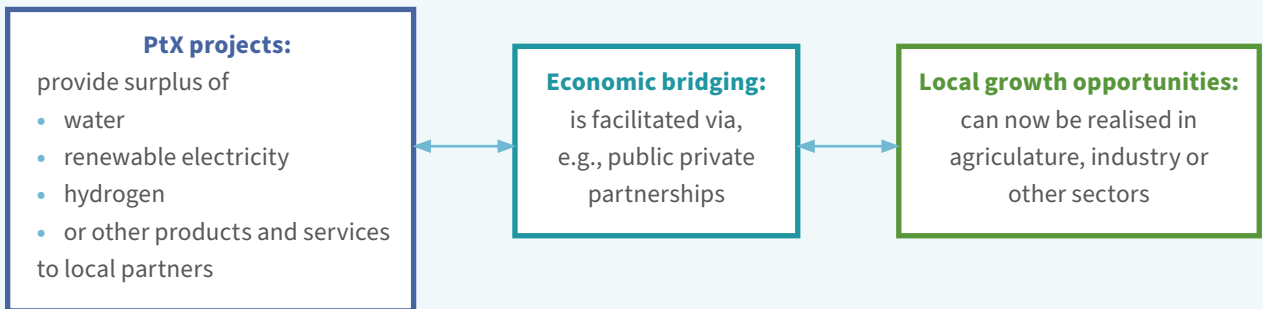


Figure 3: Own illustration

National law

A stricter way to ensure benefits for the local communities is to regulate certain aspects of a project that are of great importance to the country through national law. Namibia, for example, stipulates that all operations and maintenance work must be carried out by local labour (Ministry of Mines and Energy Namibia, 2022). As a result, the Hyphen project will employ an estimated 15,000 people during the four-year construction period, and about 3,000 people with permanent jobs. It is expected that over 90% of these jobs will be filled by Namibians (Hyphen Hydrogen Energy, 2022).

Responsibility

PtX offers enormous opportunities for local development – far beyond pure export profits. Most countries do not only want to produce hydrogen, but also want to produce higher-value goods along the supply chain for local usage.

Clear sustainability criteria should be used and setting up agreements would certainly be helpful. Countries in the Global South can also make sure that hydrogen and PtX projects in their country lead to various benefits not only for the country as a whole but for local communities as well. Major issues to be considered are

- The size of the project (Can it be handled by the local community?)
- The existing regulation (Is it sufficient? Has it to be enhanced in order to benefit the local communities?)
- The empowerment of local communities (Are stakeholders aware of potential impacts and potential benefits?)

References

Agora Energiewende, Agora Industry & Fundación Torcuato Di Tella. (2023). 12 Insights on Hydrogen – Argentina Edition.

Boutillier R. & Thomson I. (2011). Modelling and Measuring the Social License to operate: Fruits of a dialogue between theory and practice. <https://sociallicense.com/publications.htm>

Bukowski M. (2022). Green hydrogen – Hype or beacon of hope? Opportunities, risks and strategies for green hydrogen production in the Global South. Brot für die Welt, Heinrich-Böll-Stiftung.

Dumbrell N. P., Wheeler S. A., Zuo A. & Adamson D. (2022). Public willingness to make trade-offs in the development of a hydrogen industry in Australia. Energy Policy, Volume 165. <https://www.sciencedirect.com/science/article/abs/pii/S0301421522002129>

GIZ. (2023). Green Hydrogen Community Development Toolkit.

Green Hydrogen Organisation. (2023). Community consultation and transparency. Green Hydrogen Contracting Guidance.

https://gh2.org/sites/default/files/2023-02/GH2_Contracting%20Guidance_Community%20consultation%20and%20transparency_february%202023.pdf

Heinemann C. & Mendelevitch R. (2021). Sustainability dimensions of imported hydrogen. <https://www.oeko.de/fileadmin/oekodoc/WP-imported-hydrogen.pdf>

Hyphen Hydrogen Energy. (2022). ENVIRONMENTAL AND SOCIAL SCREENING: <https://cdn.sanity.io/files/b0ecix6u/production/14dc9d1e5148577e53d83f53ac69b632cb0a60dc.pdf>

International PtX Hub. (2022). PtX.Sustainability – Dimensions and Concerns. <https://ptx-hub.org/wp-content/uploads/2022/05/PtX-Hub-PtX.Sustainability-Dimensions-and-Concerns-Scoping-Paper.pdf>

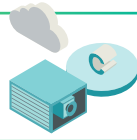
Lane T. & Hicks J. (2019). A guide to benefit sharing options for renewable energy projects. Clean Energy Council. Ministry of Mines and Energy Namibia. (2022). Namibia. Green Hydrogen and Derivatives Strategy. https://gh2namibia.com/gh2_file_uploads/2022/11/Namibia-GH2-Strategy-Rev2.pdf

Rudolph D., Haggett C. & Aitken M. (2015). Community Benefits from Offshore Renewables: Good Practice Review. The University of Edinburgh.

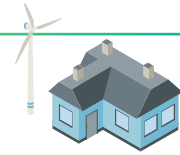
Villagrasa D. (2022). Green hydrogen: Key success criteria for sustainable trade & production. <https://www.boell.de/sites/default/files/2022-11/green-hydrogen.pdf>

This document is part of a series of six briefings which are intended to provide an initial overview of the relevant topics. To this end, expert interviews were conducted and a three-part discussion series was held in October and November 2023 to capture the key points of discussion within the various topics. We would like to thank all interviewees and participants in the online discussion for their time and effort.

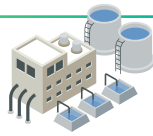
→ **Briefing #1: Carbon Sources**



→ **Briefing #4: Benefits for local communities**



→ **Briefing #2: Desalination**



→ **Briefing #5: Skills & Jobs**



→ **Briefing #3: Land use**



→ **Briefing #6: Stakeholder participation**



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