Sustainable Development Impact Matrix

Sustainable Development Impact Matrix defining the conditions for potential positive (+) or negative (–) impacts of green hydrogen on sustainable development in Global South producer countries.

Legend:

- SDG 3 - Good health and well-being
- SDG 6 - Clean water and sanitation
- SDG 7 - Affordable and clean energy
- SDG 8 - Decent work and economic growth
- SDG 9 - Industry, innovation and infrastructure
- SDG 13 - Climate Action
- SDG 14 - Life below water
- SDG 15 - Life on land

Electricity access

Desired impact: Green hydrogen development improves local access to reliable, affordable, and clean electricity.

+ Green hydrogen is produced with additional and grid-connected renewable power capacity and grid-connected electrolysers, with surplus electricity supplied to the power grid.
+ Green hydrogen is produced with existing renewable power capacity and grid-connected electrolysers, with production occurring only during surplus renewable generation hours.
– Green hydrogen is produced with additional and grid-connected renewable power capacity and grid-connected electrolysers, with surplus electricity being curtailed.
– Green hydrogen is produced with existing renewable power capacity and grid-connected electrolysers, with production occurring in all hours of renewable generation.
– Green hydrogen is produced with off-grid renewable power and off-grid electrolysers, where surplus electricity cannot be shared.

Land and water access

Desired impact: Green hydrogen development improves or does not restrict local access to land and water resources without free, prior, informed consent (FPIC) and fair compensation.

+ Project infrastructures are additional, oversized, and share planned surpluses with local networks.
+ Projects establish arrangements for sharing access to land and ocean resources (or the revenues generated from restricting use) with local communities.
– Projects compete for existing infrastructure or resources needed for critical alternative uses.
– Projects restrict access of local communities to local resources, potentially leading to forced resettlement.
– Projects diminish or degrade land and water resources (particularly in regions with high scarcity) without offering benefits or fair compensation to local communities.

Local value capture

Desired impact: Green hydrogen development spurs domestic upstream and/or downstream industrial growth and creates long-term, high-quality jobs and skills.

+ There is upstream and/or downstream industrial potential and policy support for their development.
+ There are policies to ensure local skills and capacity development.
– There is potential to develop upstream industries but equipment is to be primarily sourced from abroad.
– There is potential to develop downstream industries but green hydrogen is intended for commodity export only.
– Workforce is to be primarily sourced from abroad, with no policies for local capacity building.

Trade balance

Desired impact: Green hydrogen development creates more exports than imports.

+ There is potential for the country to reduce import dependence with domestic green hydrogen or upstream industrial products.
+ There is potential for the country to export green hydrogen or its upstream/ downstream products.
– There is risk of relying heavily on exports due to the potential being overestimated.
– There is risk of relying heavily on imported equipment and workforce.

Fiscal balance

Desired impact: Green hydrogen development creates substantial public revenues and does not lead to unsustainable debt.

+ There is potential for industry and jobs growth, as well as corresponding expansion of the tax base.
+ There are resource rents generated from leasing public land and ocean access.
– Fiscal incentives are provided mainly for export-oriented production and do not generate corresponding fiscal revenues.
– There is high sovereign risk exposure built into project finance terms .

Public infrastructure

Desired impact: Green hydrogen development leads to the development of publicly owned common user infrastructures.

+ It involves upgradation of common user infrastructure (e.g., grids, ports, roads).
– It competes for use of existing infrastructure needed for other development priorities.

Sectoral decarbonisation

Desired impact: Green hydrogen development contributes to the decarbonisation of economic sectors.

+ Green hydrogen is used in domestic applications that cannot be electrified (hard-to-abate sectors).
+ Green hydrogen is used for long-term or seasonal energy storage to provide flexibility to the power grid.
– Green hydrogen is used in domestic applications that can be electrified.
– Green hydrogen is used in domestic applications that support or prolong fossil fuel use.

Public health and safety

Desired impact: Green hydrogen development does not endanger worker or community safety.

+ Project locations are carefully chosen to minimise safety risks to local communities.
+ There are robust standards and safeguards to ensure worker and community safety at all stages of the value chain.
– Project locations are not chosen carefully enough to minimise safety risks to local communities.
– There are inadequate safeguards to ensure worker and community safety at all stages of the value chain.

Nature and biodiversity

Desired impact: Green hydrogen development does not lead to degradation of natural ecosystems.

+ Projects are located where impact on natural habitats, ecosystems and species can be minimised.
+ Water pollutants generated along the value chain are adequately treated before discharge.
– Projects are located in areas of high environmental or biodiversity value.
– Water pollutants generated along the value chain are not adequately treated before discharge.

Note: The matrix considers direct impacts arising from green hydrogen value chain development, including production, storage, transport, distribution, and end-use. It does not fully consider impacts of derivatives and downstream products. The impact areas listed here are not exhaustive, mutually exclusive, or presented in hierarchical order.