

# GEF-8 Program Framework Document (PFD)

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## General Program Information

Program Title	
Global Clean Hydrogen Programme	
GEF Agency(ies):	GEF Agency ID
UNIDO	230262
Other GEF Agency(ies):	Submission Date
	10/18/2023
Type of Trust Fund	
GET	
Anticipated Program Executing Entity(s):	Anticipated Program Executing Partner Type(s):
Algeria - Ministry of Environment and Renewable Energy (TBC)	Government
Egypt - Ministry of Electricity and Renewable Energy (TBC)	Government
Malaysia - Ministry of Science, Innovation, and Technology and NanoMalaysia (TBC)	Government
Namibia - Ministry of Environment, Forestry and Tourism (TBC)	Government
Nigeria - Energy Commission of Nigeria (ECN) (TBC)	Government
Philippines - The Department of Science and Technology (TBC)	Government
South Africa - The Department of Science and Innovation (TBC)	Private Sector
Ecuador - The Ecuadorian Center for Resource Efficiency and Cleaner Production of Ecuador (CEER) (TBC)	
Sector (Only for Programs on CC):	Project Duration (Months):
Technology Transfer/Innovative Low-Carbon Technologies	60
GEF Focal Area (s)	Program Commitment Deadline:
Climate Change	6/1/2025

### Taxonomy

Focal Areas, Climate Change, Climate Change Mitigation, Technology Transfer, Renewable Energy, Influencing models, Deploy innovative financial instruments, Transform policy and regulatory environments, Convene multi-stakeholder alliances, Demonstrate innovative approaches, Strengthen institutional capacity and decision-making, Stakeholders, Private Sector, Individuals/Entrepreneurs, Capital providers, Communications, Awareness Raising, Education, Local Communities, Civil Society, Academia, Non-Governmental Organization, Type of Engagement, Information Dissemination, Consultation, Participation, Beneficiaries, Gender Equality, Gender Mainstreaming, Sex-

disaggregated indicators, Gender results areas, Knowledge Generation and Exchange, Capacity, Knowledge and Research, Innovation, Knowledge Exchange, Conference, North-South, South-South, Knowledge Generation, Workshop, Training, Seminar

GEF Program Financing (a) 13,129,820.00	PPG Amount: (c) 600,000.00
Agency Fee(s): (b) 1,181,683.00	PPG Agency Fee(s): (d) 54,000.00
Total GEF Project Financing: (a+b+c+d) 14,965,503.00	Total Co-financing 141,196,891.00

Project Tags

CBIT: No SGP: No

Program:

Other Program

## Program Summary

Provide a brief summary description of the program, including: (i) what is the problem and issues to be addressed? (ii) what are the program objectives, and how will the program promote transformational change? (iii) how will this be achieved (approach to deliver on objectives), and (iv) what are the GEBs and other key expected results. The purpose of the summary is to provide a short, coherent summary for readers. The explanation and justification of the program should be in section B “program description”. (max. 250 words, approximately 1/2 page)

Climate change poses a real and urgent threat to the world. To keep global warming under an agreed 1.5°C threshold, as called for within the context of the 2015 Paris Agreement, emissions need to be reduced by 45% by 2030 and to reach net zero by 2050. The energy sector is key to reaching carbon neutrality and to helping countries to meet their NDCs and net zero strategies. Clean, or green, hydrogen has emerged as a viable solution to decarbonizing hard-to-abate industrial sectors and transport sectors and to achieving climate mitigation goals. According to the Hydrogen Council, using green hydrogen in current hard to-abate industries alone could support the reduction of 80 GT of cumulative CO<sub>2</sub> emissions up to 2050, which constitutes about 11% of the emissions reductions required to stay within the 1.5°C goal. The uptake of green hydrogen industries and transport in developing countries and transition economies can provide an opportunity to promote industrial growth and net-zero economic development while creating new jobs and skills.

The Global Clean Hydrogen Programme aims to enhance national institutional capacities, enable policy frameworks, improve technological readiness and financial mechanisms for the successful uptake of clean hydrogen in developing countries, to ensure their net zero development with social considerations and benefits. The programme targets the production and application of hydrogen, with a focus on the industrial and transport sectors. The programme's work will focus on green hydrogen and clean will be used as a synonym. The programme consists of a global component (through a global child project) and National Child Projects:

- The global component provides a foundation to promote innovation and will enhance the national projects by providing technical assistance, bringing all the knowledge together and sharing good practices regarding clean hydrogen production and application.
- National child projects will be implemented in Algeria, Egypt, Ecuador, Malaysia, Namibia, Nigeria, Philippines and South Africa. Each National Child Project will have activities tailored to the country context and in line with the programme's thematic areas of (i) policy, (ii) technical readiness, (iii) pilot projects, and (iv) financing.

This programmatic approach will enable long-term system transformation from robust public-private stakeholder engagement, by providing recommendations on standards, skills development, policy and environmental and social governance to transition industrial processes and transportation with clean hydrogen. The programmatic approach will also support the development green hydrogen pilots in developing countries and will develop global lessons targeted at developing countries and economies in transition.

The Global Clean Hydrogen Programme (GCHP) will support developing countries in achieving their NDCs and meeting their country-specific climate commitments in line with the Paris Agreement goals. The Programme will deliver impactful outcomes by recognizing country ownership as a core principle and ensuring activities are country-driven through maximizing the capacity of recipient countries. With GEF funds approaching \$ 14 million and close to \$ 131.5 million in co-financing, the Programme is expected to result in approximately 13.3 million tCO<sub>2</sub> reductions. GEF funding is sought for green hydrogen only.

## Indicative Program Overview

### Program Objective

To enhance national institutional capacities, enabling policy frameworks, improve technological readiness and financial mechanisms for the successful uptake of clean hydrogen in developing countries to ensure their net zero development with social considerations and benefits.

### Program Components

#### Component 1 - Policy

Component Type	Trust Fund
Technical Assistance	GET
GEF Program Financing (\$)	Co-financing (\$)
1,587,803.00	14,499,000.00

Program Outcome:

#### Outcome 1.1.

Enhanced clean hydrogen enabling environment of the participating countries for hydrogen production and local application

National child projects may include a selection of the following outputs:

Output 1.1.1 Institutional stakeholders mapped and convened

Output 1.1.2. Recommendations on policies and regulations for hydrogen production and application developed/adopted, including environmental and water related policies and taking into account gender responsiveness and market scale up

Output 1.1.3. Recommendations on clean hydrogen standards provided/adopted

Output 1.1.4. Government stakeholders' capacity and awareness increased

Output 1.1.5 Green hydrogen roadmap/strategy developed/adopted

## Component 2 – Technical readiness

Component Type	Trust Fund
Technical Assistance	GET
GEF Program Financing (\$)	Co-financing (\$)
1,992,803.00	18,150,000.00

Program Outcome:

Outcome 2.1. Technical readiness for the production and application (industrial or transport) of clean hydrogen improved

Output 2.1.1 Sectors with greater potential for the application of hydrogen identified (industrial and transport sectors)

Output 2.1.2. New industries that can be developed based on clean hydrogen and renewable energy identified and market opportunities assessed.

Output 2.1.3 The potential impact of clean hydrogen on water and energy access determined

Output 2.1.4. Industry and transport stakeholders' capacity and awareness increased

## Component 3 – GHIC and Pilot project(s)

Component Type	Trust Fund
Technical Assistance	GET
GEF Program Financing (\$)	Co-financing (\$)
2,375,475.00	21,769,980.00

Program Outcome:

Outcome 3.1

Industrial clusters and companies with great potential to transition to green hydrogen identified, assessed and support provided .

National child projects may include a selection of the following outputs

Output 3.1.1 Industrial cluster with greater potential to become a green hydrogen industrial cluster or industry or transport companies with great potential to apply green hydrogen identified and selected

Output 3.1.2 Selected cluster's or companies' readiness improved to become a green/renewable hydrogen industrial cluster/company

### Component 3

Component Type	Trust Fund
Investment	GET
GEF Program Financing (\$)	Co-financing (\$)
1,000,000.00	48,000,000.00

Program Outcome:

Outcome 3.2 Pilot project on green hydrogen developed.

Output 3.2.1 Green hydrogen pilot projects supported

### Component 4 - Financing

Component Type	Trust Fund
Technical Assistance	GET
GEF Program Financing (\$)	Co-financing (\$)
871,000.00	8,000,000.00

Program Outcome:

Outcome 4.1. Bankable project preparation initiated

National child projects may include a selection of the following outputs:

Output 4.1.1 Project pipelines reviewed

Output 4.1.2 Economic pre-feasibility of projects conducted

Outcome 4.2 Financial mechanisms for clean hydrogen designed

National child projects may include a selection of the following outputs

Output 4.2.1. Capacity on clean hydrogen financing of the government and financial sector increased

Output 4.2.2 Mitigations strategies for clean hydrogen projects' risks developed

Output 4.2.3 Innovative financing options for clean hydrogen identified

Output 4.2.4 Country assistance for improvement of financial mechanisms provided

## Component 5 – Knowledge Management and Sharing

Component Type	Trust Fund
Technical Assistance	GET
GEF Program Financing (\$)	Co-financing (\$)
3,381,490.00	21,653,111.00

Program Outcome:

Outcome 5.1 - Global stakeholders have improved understanding of the green hydrogen sector and south-south cooperation in developing the sector established

Output 5.1.1 Knowledge products and tools developed, shared and implemented

Output 5.1.2 Convening and dissemination conducted

## M&E

Component Type	Trust Fund
Technical Assistance	GET
GEF Program Financing (\$)	Co-financing (\$)
1,182,911.00	2,040,800.00

Program Outcome:

Outcome 6.1. Project monitored and evaluated

Output 6.1.1. Project monitoring and evaluation plan designed and implemented

Output 6.1.2 Mid-term evaluation completed

Output 6.1.3. Terminal project evaluation completed

## Component Balances

Project Components	GEF Project Financing (\$)	Co-financing (\$)
Component 1 - Policy	1,587,803.00	14,499,000.00



Component 2 – Technical readiness	1,992,803.00	18,150,000.00
Component 3 – GHIC and Pilot project(s)	2,375,475.00	21,769,980.00
Component 3	1,000,000.00	48,000,000.00
Component 4 - Financing	871,000.00	8,000,000.00
Component 5 – Knowledge Management and Sharing	3,381,490.00	21,653,111.00
M&E	1,182,911.00	2,040,800.00
<b>Subtotal</b>	<b>12,391,482.00</b>	<b>134,112,891.00</b>
Project Management Cost	738,338.00	7,084,000.00
<b>Total Project Cost (\$)</b>	<b>13,129,820.00</b>	<b>141,196,891.00</b>

Please provide Justification

The successful execution of the programme and its child projects will require a strong management units with enough resources and funding. PMCs are expected to cover costs related to preparation of procurement plans and packages, manage output deliverables and consultant activities. Moreover, it is foreseen that management units would carry out consultations with project stakeholders. Given the anticipated increase of recruitment and management costs globally,, project management costs would require sufficient resources and funding to carry out all planned objectives. The role of this units will be essential for ensuring the child projects toward their defined objectives while adhering to the guidelines and standards set forth by GEF and UNIDO. This not only outlines the principle of ownership at national level and ensures alignment with local policies and socio-economic contexts, but also further fosters a conducive environment for tailored interventions and strategic adaptations.

M&E

The Monitoring and Evaluation (M&E) of the programme plays a critical role in ensuring the effectiveness, efficiency, and impact of the global activities and the child project interventions. The project demands a higher budget exceeding due to its complexity and scale. This project spans multiple counties with diverse conditions, necessitating advanced data collection and analysis tools and comprehensive stakeholder engagement. Adhering to GEF and UNIDO standards, our M&E strategy requires innovative methodologies and tools for effective project tracking, risk management, and adaptive learning. The project demands appropriate resources to assure systematic and impartial assessment of planned, ongoing and completed activities in specific focal areas

## PROGRAM OUTLINE

### A. PROGRAM RATIONALE

Briefly describe the current situation: the global environmental problems that the program will address, the key elements and underlying drivers of environmental change to be targeted, and the urgency to transform associated systems in line with the GEF-8 Programming Directions document. Describe the overall objective of the program, and the justification for it. (Approximately 3-5 pages) see guidance here

### Clean hydrogen and climate change

Since the 2015 Paris Agreement on climate change, there has been an increased focus on reducing emissions to near zero by 2050. The hard-to-abate industrial sectors are responsible for approximately 20% of the world's annual CO<sub>2</sub> emissions, including chemicals (2%), iron and steel (10%) and heavy transport (8%). To keep global warming under the 1.5°C threshold, as called for within the context of the Paris Agreement, emissions need to be reduced by 45% by 2030. With growing energy demands, most clean technologies in hard-to-abate industries need to be at scale by 2030. Clean hydrogen has emerged as a viable solution for countries to fulfil their climate commitments with the potential to decarbonize the hard-to-abate industrial sectors. According to the International Renewable Energy Agency (IRENA), to achieve the 1.5°C scenario, we would need to reach 518Mt of clean hydrogen production and usage annually by 2050. Notably, 94% of hydrogen consumption is expected to come from renewables, indicating an increased reliance on clean energy sources. (IRENA, World Energy Transition Outlook 2023)

Continuing with business-as-usual keeps the goal of reaching net-zero emissions by 2050 out of reach. Especially in emerging markets and developing economies, CO<sub>2</sub> emissions are projected to grow by almost 20% by mid-2040, primarily due to growing energy demands. As a consequence, the global average surface temperature rise would be around 2.7°C in 2100 (with a 50% probability). If countries fulfill their announced pledges, global CO<sub>2</sub> emissions could decrease to around 30 Gt by 2030 and 22 Gt by 2050, which is 15% less than business-as-usual, while still leading to a 2.1°C rise in global average surface temperature by 2100 (IEA, Net Zero by 2050 – A roadmap for the Global Energy Sector).

Hydrogen has a long history of being utilised in a wide variety of industries. However, the majority of hydrogen is currently produced from fossil-fuel based sources such as natural gas and coal, also defined as “grey hydrogen”, accounting for more than 95% of the global hydrogen production (IRENA, Green hydrogen supply, a guide for policy making 2021). (IRENA\_Green\_Hydrogen\_Supply\_2021.pdf) The demand for industrial hydrogen has grown more than threefold since 1975, reaching 94 Mt in 2021, and hydrogen production is responsible for 830 million tonnes of CO<sub>2</sub> emissions annually. (The Future of Hydrogen – Analysis - IEA )The production of grey hydrogen further leads to other environmental and social issues, such as water consumption and local air pollution.

Transitioning industrial processes and some transport sectors to clean hydrogen is essential to decarbonizing the hard-to-abate industries and transport. Clean hydrogen consists of both green hydrogen and low carbon hydrogen. This GEF funded project focuses on green hydrogen only but the terminology green and clean is used interchangeably.

Clean Hydrogen can contribute 20% of global CO<sub>2</sub> emissions abatement needed in 2050 across hard-to-abate sectors. Up to 2050, clean hydrogen can avoid 80 GT of cumulative CO<sub>2</sub> emissions, which constitutes about 11% of the emissions reductions required to stay within the 1.5-1.8°C goal (Hydrogen Council, McKinsey & Company - Hydrogen for Net-Zero: A critical cost-competitive energy vector ).<sup>1</sup> The annual abatement potential of 7 GT in 2050 is equivalent to about 20% of emissions if the world remains of its current business-as-usual trajectory. By transitioning to clean hydrogen, hard-to-abate industries and transport can reduce their CO<sub>2</sub> emissions and remain competitive in the long-run. While the transition requires larger initial investments, the use of hydrogen represents a downward trend and the cost of financing is expected to decline as technology matures and GHG emissions are price appropriately. (IEA, Net Zero by 2050 – A roadmap for the Global Energy Sector)

The uptake of clean hydrogen industries in developing countries and transition economies can promote industrial growth and inclusive sustainable development. Cooperation amongst government, industry stakeholders, and international organizations is needed to stimulate the adoption of clean hydrogen technologies and to enable a just transition for developing countries. Some transport sectors and hard-to-abate industries can develop and flourish in emerging economies, promoting the region's competitive advantage, innovation and overall welfare. Growing industries create new jobs and new skills, increasing the population's

prosperity. As a result, the countries grow more independent and accelerate the transition into a developed country.

The pipeline of projects for clean hydrogen production is rapidly increasing as the annual production of clean hydrogen demonstrates a potential of 37 Mt in 2030. If all projects currently in the pipeline are recognized, by 2030 the production of clean hydrogen could reach 27 Mt based on electrolysis and 10Mt on fossil fuels with carbon capture, utilization and storage (Global Hydrogen Review 2023 – IEA). Around a quarter to half of the clean hydrogen will come from emerging markets and developing countries. Meeting governments’ climate pledges would require 34 Mt of clean hydrogen production per year by 2030, a net-zero pathway by 2050 globally would require around 100 Mt per year by 2030 (Global Hydrogen Review 2022 – IEA).

However, today’s clean hydrogen projects face a bankability gap as only 10% of projects under development have reached a final investment decision. Producing 1 Mt clean hydrogen per year requires 10 GW of electrolyzers, 20 GW of renewable power and \$30 billion in investment. Expanding electrolyser manufacturing capacity, establishing off-take and importing arrangements to address uncertainties about clean hydrogen demand, establishing regulatory frameworks and infrastructure are critical in the scale up of clean hydrogen. Further, addressing systemic barriers on policy and standards, technical assistance, knowledge and capacity building, innovation and global coordination is of particular significance to developing countries and transition economies to foster clean hydrogen developments.

#### Barriers for clean hydrogen in developing countries

Green hydrogen is key to decarbonizing hard-to-abate industries and transport and providing unique opportunities for net-zero industrial development in developing countries. However, the use of hydrogen, particularly in some industries, is in nascent stages and developing countries face various barriers to further integrating green hydrogen in their domestic industries. To overcome such barriers, developing countries require adequate policy and regulatory frameworks, training, and skills development to increase capacity to support their hydrogen industry. The various barriers in fostering green hydrogen development within developing countries are summarized in Table 1.

Table 1. Barriers in fostering green hydrogen development in developing countries.

Barriers	Description
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<p>Policy and standards</p>	<p>There is a lack of appropriate regulatory mechanisms and national enabling policies, including domestic and international standards to facilitate trade. There is a need to create an enabling environment for the expansion of local production and usage of clean hydrogen in developing countries through providing recommendations on policies, regulations, and involving national and international key stakeholders in extensive consultations.</p> <p>Countries such as Nigeria and the Philippines are in early stages of development for clean hydrogen policies, requiring support for establishing a roadmap or national strategy to outline strategic pathways and a clear vision in clean hydrogen. Participating countries such as Egypt and South Africa have developed a hydrogen strategy and roadmap respectively but need further support in implementing policies and regulatory frameworks for the production and application of clean hydrogen. The development of regulatory mechanisms in various country contexts, will enable countries to integrate clean hydrogen in alignment to national energy and climate plans and the Paris Agreement climate mitigation goals.</p>
<p>Technical assistance</p>	<p>Providing technical assistance will address barriers related to a lack of local readiness for the production and industrial application of clean hydrogen. There is a need to enhance the technical knowledge and capacity of private sector stakeholders and promote innovation in developing countries for the production, transport, and industrial usage of hydrogen.</p> <p>To develop new industries in developing countries, comprehensive studies, market assessments and assessments on the water and energy usages need to be conducted to identify the potential of green hydrogen application and enable an inclusive clean hydrogen transition. The technical assessments will consider geographic and environmentally dependent factors such as access to renewables, country grid parameters, presence of hard-to-abate industries, and availability of gas and water infrastructure for the production and application of green hydrogen.</p>
<p>Knowledge</p>	<p>Knowledge development and dissemination of policies and regulation, standards on clean hydrogen production and application are lacking. On a global scale, there is a need to address technical knowledge on the use of hydrogen which can be applicable in a variety of regulatory environments and promote innovation of hydrogen technologies to be utilized in multiple markets of developing countries.</p>
<p>Capacity building</p>	<p>There is a lack of capacity in developing countries for the production and industrial application of clean hydrogen. There is a need to identify areas that require knowledge and skills enhancement such as policies, standards, and financial mechanisms, and further promote innovation. Improving the understanding and competencies of industrial stakeholders in developing countries is essential to support the transitioning of industrial processes to clean hydrogen.</p>

Innovation	Clean hydrogen technologies are not yet commercial and are currently at demonstration phase. To deliver the scale and pace to meet global net-zero climate targets, there is a need to accelerate the cost reduction of clean hydrogen production with technology innovation. There is an identified need to improve the understanding of clean hydrogen technologies along the value chain by optimising production, compression, storage and application. Technological capacities and skills need to be strengthened particularly for domestic industries through scaling up clean hydrogen technologies and expanding their applications.
Global coordination	There is a critical need to strengthen global coordination by convening relevant public and private stakeholders for the production and use of clean hydrogen. Strategic coordination amongst various hydrogen stakeholders is required to ensure resources and programmes demonstrate the greatest impact and to reduce duplicated efforts. There is a need to share good practices and develop replicable plans for scaling up hydrogen investments in developing countries and transition economies.

In line with the recognized barriers hindering the development and uptake of clean hydrogen applications, such challenges necessitate global coordination and action. The global clean hydrogen programme (GCHP) acknowledges the need for collaboration and innovation in addressing entangled barriers, particularly in developing countries. Therefore, national child projects will address barriers locally, while contributing to solving the barriers on a global scale. One major obstacle in the uptake of clean hydrogen applications is the lack of consistency. Without aligned standards, it will be difficult for local clean hydrogen producers to operate and engage in international trade. The programme will foster collective learning and facilitate knowledge management, ensuring that child projects as well as the global hydrogen community remain interconnected and mutually supportive. By addressing the barriers collectively, bundling and leveraging diverse resources, innovation, expertise and best practices, the global programme can effect meaningful change in the adoption of clean hydrogen applications.

### Programme's complementarity to existing investments

There are a number of existing GEF and non-GEF-funded initiatives either promoting clean hydrogen or complementing the programme on a global level. Organizations such as UNIDO, UNEP, GIZ, Global Climate Fund and international financing institutions, including World Bank, KfW Banking Group and the European Investment Bank, maintain clean hydrogen initiatives which assist in capacity building, project financing and knowledge sharing in support of developing countries. The Global Clean Hydrogen Programme (GCHP) can build on and demonstrate strong linkages to ongoing initiatives and investment opportunities for clean hydrogen. The GCF and DFIs such as AfDB, ADB, EBRD, IDB, and World Bank can provide co-financing for implementing the pilot projects while the various initiatives also bring complementary strengths and competencies to GCHP. The PtX Platform and PtX Growth Fund supported by KfW may further accelerate the pilot projects. Alongside financial aid, technical assistance agencies such as GIZ, IEA, IRENA and UNECE can offer technical and operational assistance in support of scaling-up the pilot projects. The following provides an overview of the key initiatives and stakeholders and how GCHP is complementary. Further details of the envisaged working relationships will be defined during the PPG.

**UNIDO:** UNIDO aims to stimulate the accelerated uptake of green hydrogen and its application in hard-to-abate industries of developing countries and transition economies. UNIDO considers a wide array of key enablers to support developing countries in achieving a just hydrogen transition that puts social and environmental aspects in focus and has a number of on-going initiatives. As a result, UNIDO is in a good position to ensure the complementarity of all the initiatives it is involved with and to find synergies for a greater overall impact. The initiatives include:

- UNIDO's **Global Programme for Hydrogen in Industry (GPHI)** was launched in 2021 to support developing countries in the promotion of market policies, standards, skills and know-how, financial instruments, innovation and coordination amongst key stakeholders that play an essential role in the development of a hydrogen economy. Promoting tangible projects to accelerate the local uptake of green hydrogen in industries of developing countries and transition economies is a key element of the Programme. GPHI consists of two pillars of work:
  - i. The **Global Partnership for Hydrogen in Industry** coordinates with international partners to raise awareness and increase capacity of policy makers and industry representatives of developing countries for green hydrogen application in industry. The Partnership addresses countries' needs by developing knowledge products, innovative tools and conducts needs assessments to provide tailored guidance at policy, institutional and industrial level. *GPHI and GCHP will work together and share resources developed, building on each other's work. UNIDO will ensure that there is no replication between the programmes.*
  - ii. Through the **Technical Cooperation Programme**, UNIDO cooperates with governments in developing countries and transition economies to implement country-specific green hydrogen projects in industry. The TC Programme entails technical assistance in adapting and applying knowledge and tools, assessing local market needs and devising tailored strategies, tools and instruments. A key component of the TC Programme is the *green hydrogen industrial cluster model*, which aims to accelerate the application of locally produced green hydrogen in industrial zones, clusters and parks. *Where appropriate GCHP will complement the TCP by using the cluster model in identifying pilots.*
- The GPHI is supported by the '**International Hydrogen Energy Centre**' (IHEC) in Beijing which UNIDO launched together with the Chinese government. The centre operates as a knowledge partner, supporting technology research, development and application as well as by building-up green hydrogen economies and promoting international cooperation. The Centre functions as a global technology innovation hub for hydrogen energy, supporting the creation of hydrogen value chains and focusing on the R&D, application, and demonstration of key hydrogen technologies. The IHEC aims to enhance the global scale-up of hydrogen application in industry particularly in developing countries by attracting international R&D funding and promoting South-South and regional cooperation. *IHEC will act as a knowledge partner in this programme ensuring complementarity, providing expertise and sharing experience and knowledge products.*
- UNIDO is coordinating the **International Hydrogen Trade Forum**, which is an inter-governmental platform aiming to stimulate the nascent hydrogen market. The Forum is co-led by the Government of the Netherlands and the United Arab Emirates and member parties including Australia, Brazil, Canada, Chile, Germany, Japan, Saudi Arabia, South Korea, United Kingdom, United States, Uruguay and the European Commission on behalf of the European Union. In this capacity, UNIDO will facilitate the cooperation among the government members, industrial leaders and, *in line with GCHP, will bring in the perspective and considerations of developing countries and transition economies.*
- The Government of the UK through its Department for Energy Security and Net Zero, has launched the '**Accelerate-to-Demonstrate (A2D) Facility**' with an announced funding of 65.6 million GBP, which will be implemented in partnership with UNIDO. The A2D Facility will accelerate the commercialization of innovative clean energy technologies in low-and middle-income countries, with a focus on clean hydrogen, critical minerals and cross-cutting thematic areas (e.g., clean transport, smart energy, energy efficiency, energy storage, industrial decarbonization and sustainable cooling). The A2D Facility will provide grant funding to small and medium-sized enterprises and research institutions to undertake pilot demonstrations of innovative clean energy technologies, develop business models, trainings, skills development and knowledge products for its dissemination. *A2D and GCHP complement each other with A2D able to provide co-finance for pilot projects and in sharing knowledge products and training materials. GCHP will ensure that it does not duplicate A2D efforts.*
- UNIDO's **Industrial Deep Decarbonisation Initiative (IDDI)**, led by the UK and India, is a global coalition which aims to decarbonize heavy, hard-to-abate industries (e.g., steel, concrete, aluminium and refining) within participating countries. The initiative supports participating countries in the adoption of green public procurement policies, in reducing the carbon emissions associated with public construction projects, and in the development of standards and reporting mechanisms to encourage public sector carbon reductions. Like UNIDO's Global Partnership for Hydrogen in Industry, a central aim of the IDDI is the promotion of innovative technological solutions which will contribute to the decarbonization of industries,



especially those which are hard-to-abate. *IDDI is complementary to GCHP in that it is focusing on creating the demand for products rather than directly on the application and production of green hydrogen.*

**World Bank:** The World Bank brings financial expertise and a broad programmatic support to the sector. Specifically for hydrogen, the World Bank launched the Hydrogen for Development Partnership (H4D). H4D is a global initiative to boost the deployment of low-carbon hydrogen in developing countries. H4D fosters capacity building and regulatory solutions, business models, and technologies towards the roll out of low-carbon hydrogen. It has published a report on green hydrogen in developing countries and on the development of guarantees of origin. It is developing strategies and roadmaps for India, Morocco, Oman, Qatar, Saudi and UAE and supporting policies and standards in Brazil, Mauritania, Morocco, Tunisia and Uzbekistan and capacity building in Chile, Colombia, Costa Rica, India, Namibia. It is providing concessional financing in Barbados, South Africa, Mexico, Namibia, Chile and India. *As such it complements this programme with a focus on different countries. Work in Namibia will look to target gaps not targeted by H4D and there is a role for co-finance of pilot projects in both South Africa and Namibia. Further, H4D has a roster of hydrogen experts and conducts periodic study tours to successful green hydrogen projects. To ensure complementarity, the proposed GCHP programme shall coordinate with H4D to be able to offer services which are not already provided by H4D and be able to access H4D roster of experts and join studies tours as need be. H4D will also be represented on the Global Advisory Board.*

**IRENA:** A source of information and support for governments seeking to transition their energy infrastructures to greener alternatives, such as hydrogen. IRENA contributes to research on green hydrogen topics and provides a platform for dialogue and information sharing between stakeholders working within green hydrogen's political economy. Its Green Hydrogen Collaborative Framework serves as a platform for governments and private sector actors to work together to implement successful green hydrogen projects worldwide. The framework focuses on the development of a global knowledge database, the development of standards and regulations, transportation of hydrogen and financing for green hydrogen projects, among other topics. Meetings are open to all member states and to others by invitation only. IRENA also serves as a source of information and guidance for governments and policy makers on hydrogen policy. The agency has published a series of guides, reports and frameworks on policies for hydrogen (Creating a global h2 market – certification to enable trade (2023), Decarbonising end-use sectors: green h2 certification (2022), Green H2 for industry: a guide to policy making (2022), and Geopolitics of the energy transformation – the h2 factor (2022)). These sources of information address policy approaches to the sector at every stage of the hydrogen life cycle e.g., generalized hydrogen production, end uses, policies to support electrolyser production, and industrial uses of hydrogen specifically. *Although the scope is similar, GCHP's working groups will include governments, academia and the private sector and will make all their reports publicly available. Areas of focus and knowledge projects will be determined based on continued gaps in the market having consulted with IRENA and IRENA will be invited onto the Global Advisory Board.*

**International Energy Agency (IEA):** The IEA partners with governments to serve as a source of information and support in their transition to clean energy. The agency also conducts research to track the progress of the green energy transition, including hydrogen. The IEA developed the 2022 breakthrough agenda, which tracks global progress towards decarbonization in green energy sectors. This includes progress in the green hydrogen sector. The IEA also maintains a global hydrogen project database which tracks all hydrogen projects which have been developed since 2000 globally. The global hydrogen review is an annual publication by the IEA which tracks global hydrogen demand and production, as well as developments related to hydrogen infrastructure, trade, policy, regulation and investment.

The IEA established the Hydrogen Technology Collaboration Program (TCP) in 1977, which serves as a platform for government and private stakeholders to convene and share information and research on the development of hydrogen technologies and policies. *GCHP will ensure complementarity to the work of the TCP tasks by involving the TCP within the programme, particularly in the working groups and to advise on the development of policy and knowledge products. The hydrogen TCP will be represented on the Global Advisory Board.*

**Clean Energy Ministerial (CEM) Hydrogen Initiative:** The CEM Hydrogen Initiative aims to advance policies, programmes and projects that accelerate the commercialization and deployment of hydrogen fuels and technologies across all aspects of the economy. The initiative focuses on three key areas:

- Helping to ensure successful deployment of hydrogen within current industrial applications.

- Enabling deployment of hydrogen technologies in transport (e.g. freight, mass transit, and light-rail, marine).
- Exploring the role of hydrogen in meeting the energy needs of communities.

The Initiative includes activities such as the 'Global Ports Hydrogen Coalition', which is led by the European Commission and aims to enhance policy dialogue and project-oriented collaboration to scale up the production and use of low-carbon hydrogen and hydrogen-based fuels in industrial coastal areas; and the 'H2 Twin cities initiative' which is led by the U.S. with the objective to bring together cities and regions to increase awareness, best practices and information on the use of hydrogen and fuel cell technologies at scale. *The CEM's focus is primarily (but not exclusively) developed nations where the barriers are not the same as in economies in transition and developing nations. The work is therefore complementary and GCHP will ensure that all relevant work and case studies that come from CEM will be incorporated into its work.*

**UNECE:** The United Nations Economic Commission for Europe recognizes the role of hydrogen in decarbonization the industrial sector and integrating a higher share of renewable energy sources in line with the ambitious policy initiatives outlined in the European Green Deal. The Executive Committee of ECE approved a project in 2021 for “sustainable hydrogen production in the UNECE region and its role in the development of a hydrogen ecosystem and export potential” with the objective to enhance capacities of Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Republic of Moldova, Tajikistan, Turkmenistan, and Uzbekistan. The project will develop sustainable hydrogen production strategies with the aim to overcome economic, technical, policy and investment barriers. *The GCHP is focusing on a different set of countries but will look to build on any relevant capacity building material developed as part of the UNECE project.*

In 2022, the ECE Committee on Sustainable Energy discussed on a “comprehensive and science-based terminology, classification and taxonomy for hydrogen” to establish a working group to prepare the specifications for the application of hydrogen and coordinate with other relevant entities. *GCHP will establish working groups but they will focus on different technical areas.*

**GIZ:** GIZ combines global experience with local knowledge and brings first-hand experience promoting the uptake of green hydrogen. GIZ is actively supporting green hydrogen via *H2-Uppp* and *Global Hydrogen Diplomacy*.

- *H2-Uppp's* main objective is to further develop markets for green hydrogen technologies, especially in developing countries and emerging economies, through partnerships with business and public-private pilot projects.
- The *Global Hydrogen Diplomacy Initiative* promotes a political dialogue with fossil fuel exporting countries about switching to become a green hydrogen exporting country.
- *H2 Global* is a global initiative supported by GIZ and German companies and trade associations. Part of Germany's national hydrogen strategy, this initiative seeks to support the establishment of a global hydrogen market by ramping up global trade in hydrogen and power-to-X (PtX) technologies and products.
- *Promoting the energy transition in development cooperation* is a GIZ project in cooperation with the German Federal Ministry. It aims to strengthen capacities for international development organizations and their international partners for projects related to the clean energy transition, including green hydrogen projects.
- The *Global Energy Transformation Programme (GET.pro)* is a GIZ platform that connects funding from multiple European countries to developing economies and economies in transition, with the aim to support the clean energy transition on a global level. GET.pro has identified green hydrogen development as an essential goal within the larger global clean energy transition. For example, the Africa-EU Energy Partnership, which is hosted by the GET.pro platform, is working to develop unified policies and strategies for green hydrogen development in the African region.

*GCHP will work with GIZ, particularly in the countries where GIZ is active to ensure there is no duplication of effort and GCHP builds on work already done or underway.*

**KfW Banking Group:** The KfW Banking Group brings financial expertise and experience with concessional finance for hydrogen projects. It offers financing via their PtX Platform. The PtX platform provides funding for projects along the entire PtX value chain: from the generation of green electricity through renewable energies to the production and transport of green



hydrogen and derivatives. The platform has two different funding schemes, the PtX Development Fund and the PtX Growth Fund, to support PtX projects in developing countries and emerging economies. *GCHP is complementary since it will provide technical assistance in the development of projects and co-financing could be offered to pilot projects via the PtX platform.*

**Mission Innovation:** The goal of the mission is to reduce the costs of clean hydrogen to the end user to 2 USD/kg by 2030. The work includes three areas: Stimulating RDI - Tackle the top research and development priorities with the greatest potential to drive cost reductions across the areas of production, distribution, storage, and end-use applications; the integration of production, storage, distribution and end-use applications in hydrogen valleys with the delivery of 100 clean hydrogen valleys worldwide by 2030; and preparing the ground for the scale-up of the hydrogen economy by building a coalition of partners to provide a clear and coherent enabling environment. They want to create a global collaboration and go-to-platform for all information on large-scale hydrogen flagship projects (Hydrogen Valleys –H2V). *GCHP is complementary with its work on industrial clusters (similar in scope to H2V) with its focus on developing nations and all scale projects. Of the H2V identified so far, none are in Africa. GCHP can work with MI in assessing if any clusters identified could be classified as H2V and in sharing best practice and coordinating with the platform. It is anticipated that the target countries of the two initiatives are complementary to each other.*

**Green Climate Fund:** The GCF aims to ensure access to climate finance for developing countries and that investments drive a paradigm shift towards low emissions and climate resilience. GCF works directly with countries that are affected by climate change, through a country's National Designated Authority (NDA) or Focal Point (FP), government agencies tasked to liaise with GCF in delivering climate solutions. The IDB and GCF created the first regional fund to promote electric mobility and green hydrogen in Latin America and the Caribbean. The fund is expected to provide 450 million USD in concessional loans and grants to nine countries (Barbados, Chile, Colombia, Costa Rica, the Dominican Republic, Jamaica, Panama, Paraguay and Uruguay). *GCF support to date is targeted at Latin America and the Caribbean, so complementary to GCHP.*

**African Development Bank:** The AfDB Group has an overarching objective to spur sustainable economy development and social progress in its regional member countries, particularly the least developed African countries by providing concessional funding for project and programs, as well as technical assistance for studies and capacity-building activities. The AfDB developed a report on 'Africa's Extraordinary Green Hydrogen Potential' with an analysis of investment opportunities focusing on three hubs; Mauritania-Morocco, southern Africa and Egypt. The study addresses Africa's solar energy and the potential of transforming solar power into green hydrogen to strengthen energy security, cut emissions and decarbonize industry and transport.

The AfDB supports the Africa Green Hydrogen Alliance which consists of member countries such as Egypt, Kenya, Mauritania, Morocco, Namibia and South Africa to identify energy transition pathways and green hydrogen targets to decarbonize heavy industry and transport sectors through collaboration and development of green hydrogen projects. *GCHP will liaise with the Alliance in its work in Egypt, Namibia and South Africa to ensure there is no duplication and that they work together to identify projects.*

**Asian Development Bank:** The ADB is currently focusing on enabling works in the hydrogen economy including knowledge sharing, government policy development, enhancing hydrogen trading platforms, engaging with industry and associations and supporting pilot projects. Through the 'Energy Storage and Green Hydrogen Sector Development Programme', the ADB aims to create the conditions for green hydrogen to be generated from abundant renewable energy resources and allow sustainable battery energy storage systems to be installed. A number of studies are undertaken to identify the viability of hydrogen supply chains in Pakistan, Nepal, the Maldives, Indonesia and Palau. *Work carried out on supply chains will be reviewed for relevance and applicability for Malaysia and the Philippines and close liaison with the ADB will be maintained to avoid any duplication.*

**European Bank for Reconstruction and Development:** The EBRD focuses on projects across the hydrogen value chain in support of regulatory and policy angles for hydrogen certification, access to infrastructure, and providing concessional financing that will support early movers into the hydrogen economy. The EBRD is running a hydrogen acceleration programme for the Southern and Eastern Mediterranean region (SEMED), Turkey, Caucasus, Moldova, Western Balkans,

Uzbekistan, Kazakhstan, Ukraine, and Moldova. The programme addresses three work streams on country market assessment, investment case studies and development of a national hydrogen strategy for selected countries.

The EBRD is also supporting the European Clean Hydrogen Alliance, which aims to accelerate investment towards the deep decarbonization of economies and operations. Within the Alliance, the EBRD supports the early uptake of investment across the entire clean hydrogen value chain. *EBRD's work is complementary to GCHP with its focus on SEMED and Europe, rather than Africa and Asia, and there are potential lessons to be learned from the work and Europe is a potential market for global green hydrogen.*

**European Investment Bank:** The EIB brings financial expertise and experience with concessional finance for hydrogen projects. Finance is provided through the Green Hydrogen Fund. The Fund provides strategic advice and capacity building to developing countries to help them prepare for decarbonizing the industry sector through green hydrogen.

**Inter-American Development Bank:** The IDB has been supporting 14 countries within the Latin America and Caribbean region in building capacity and setting favourable conditions for successful green hydrogen investments since 2018. Specifically, the IDB supported several government agencies in Chile, Colombia, Uruguay and Costa Rica, amongst other countries, to build their national hydrogen promotion roadmaps and create favourable market conditions. The IDB approved a 400 million USD loan to develop Chile's green hydrogen industry to finance projects, develop domestic demand and training and research and IDB with IFC supported the Renewable Barbados project developed by Hydrogène de France (HDF) and Rubis, consisting of an installation of a 50MW photovoltaic farm with green hydrogen and lithium-ion battery storage that will provide reliable and clean electricity to the Barbados grid. *IDB's focus is complementary focusing on LAC but there is real scope to use the experiences in the hydrogen roadmaps developed in the work of GCHP.*

**Breakthrough Agenda:** The UK Breakthrough Agenda's goal is to accelerate clean technology transitions in each sector through strengthened international cooperation and coordination. Within the Breakthrough Agenda initiatives, the Hydrogen Glasgow Breakthrough Goal maintains an objective to make affordable renewable and low carbon hydrogen globally available by 2030. Five key enablers are identified as priorities for strengthened collaboration within the Breakthrough consisting of:

- Demand creation and management: to create targeted demand for low carbon and renewable hydrogen starting with existing industrial applications;
- Standards and certification: agreeing common standards for hydrogen emissions, safety and operations;
- Research and innovation: accelerating the research, development and demonstration of hydrogen technologies;
- Finance and Investment: Rapidly scale up investments in renewable and low-carbon hydrogen production, and support the development of the sector in emerging economies; and
- Landscape coordination: Establishing a clear architecture for international collaboration within each sector.

*GCHP is aligned with the Breakthrough Agenda and by working alongside the same coordinating organisations (The work is coordinated by a number of stakeholders including IRENA, the IEA's TCP and the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE), Mission Innovation and CEM and UNIDO) GCHP's outputs can add to the agenda at the same time as learn from its outputs, for example a proposed standard on emissions accounting.*

**EU Global Gateway:** The European Commission and the EU High representative have set out the Global Gateway, which is a European strategy to boost smart, clean and secure links in digital, energy and transport sectors and strengthen health, education and research systems across the world. Between 2021 and 2027, the EU institutions and EU Member States will jointly mobilise up to 300 billion EUR of investments for sustainable and high-quality projects, considering the needs of partner countries and ensuring benefits for local communities. Specifically, the Global Gateway will invest in green hydrogen production and open up competitive markets to enable hydrogen to be traded internationally and within the EU without export restrictions. To date much of the support has been to LAC with a 2 billion EUR investment pledged to support Brazil's production of green hydrogen and to promote energy efficiency. The EU-LAC Global Gateway Investment Agenda, presented in July 2023, highlights potential investment projects to address the region's infrastructure needs, whilst creating local added value and promoting growth, jobs and social cohesion by strengthening the LAC's unique potential on green hydrogen, renewable energy and strategic critical raw materials. Further, the EU, EIB and KfW, in partnership with Corporación de Fomento de la Producción (CORFO) and the Chilean Ministry of Finance, signed a statement of intent to finance green hydrogen projects with up to 216.5

million EUR to support Chile's renewable hydrogen industry and help meet the country's target of 100% clean energy by 2050. *GCIP is complementary in that it could identify green hydrogen production projects that could secure co-finance from the EU.*

Although there are numerous initiatives, there are limited lessons learned so far since most are relatively recent. However, within the framework of the GPFI, UNIDO, in cooperation with the World Bank, UK Breakthrough Agenda and IRENA, developed two questionnaires for mapping financial and technical assistance on clean hydrogen for developing countries and emerging economies. The questionnaire identified the strong need to coordinate both financial and technical assistance along the clean hydrogen value chain and further mitigate associated risks to create bankable projects in developing countries. The questionnaire was distributed to 38 stakeholders representing development finance institutions, government, international development assistance agencies and international organizations.

Responses have shown a strong focus is being placed on assessing policies and providing regulatory support for clean hydrogen in developing countries. However, further alignment is needed in financial and technical assistance towards creating enabling hydrogen infrastructure and providing R&I and skills development in developing countries. Further technical assistance is also required to enhance capacity and skills for clean hydrogen application at the domestic level.

The proposed Global Clean Hydrogen Program is designed to directly address these identified gaps, reflecting the valuable feedback received. The following additional dimensions and advantages further underscore the value of this initiative in the form of a global program (rather than several stand-alone national projects).

- **Economies of scale and shared resources:** By operating as a global program, GCHP can leverage economies of scale, ensuring more efficient use of resources. This approach allows for pooling of expertise, technology, and financial resources, which is particularly beneficial for developing countries that may have limited individual capacities.
- **Standardization and Best Practices:** A global program can facilitate the development and dissemination of standardized best practices and protocols for clean hydrogen projects. This standardization is crucial for ensuring safety, efficiency, and compatibility across different regions and projects.
- **Enhancing Policy Coherence and Cooperation:** A global program can play a pivotal role in ensuring policy coherence among different countries, which is vital for creating a supportive international regulatory environment for clean hydrogen.
- **Facilitating International Collaboration:** The global nature of GCHP enables and encourages international collaboration, fostering partnerships between developed and developing countries. This can lead to technology transfer, shared research and innovation (R&I) efforts, and a broader understanding of diverse energy contexts.
- **Building a Global Knowledge Base:** GCHP can act as a central repository for data, research findings, and lessons learned, making this information widely accessible to all participating countries, thereby accelerating the pace of innovation and implementation in the clean hydrogen sector.

## **B. PROGRAM DESCRIPTION**

This section asks for a theory of change as part of a joined-up description of the program as a whole. The program description is expected to cover the key elements of "good project design" in an integrated way. It is also expected to meet the GEF's policy requirements on gender, stakeholders, private sector, and knowledge management and learning (see section D). This section should be a narrative that reads like a joined-up story and not independent elements that answer the guiding questions contained in the PFD guidance document. (Approximately 10-15 pages) see guidance here

### **The Global Clean Hydrogen Programme**

The GEF-8 Global Clean Hydrogen Programme (the ‘programme’ or GCHP) – led by UNIDO– aims to enhance national institutional capacities, enable policy frameworks, improve technological readiness and financial mechanisms for the successful uptake of clean hydrogen in developing countries to ensure their net zero development with associated social considerations and benefits.

The programmatic approach aims to achieve greater impact by creating synergies with the participating countries, which, in aggregate, will create scale and momentum, attracting private sector interest and investment. The programmatic approach will also allow for a broader sharing of good practice and create economies of scale in providing programme services.

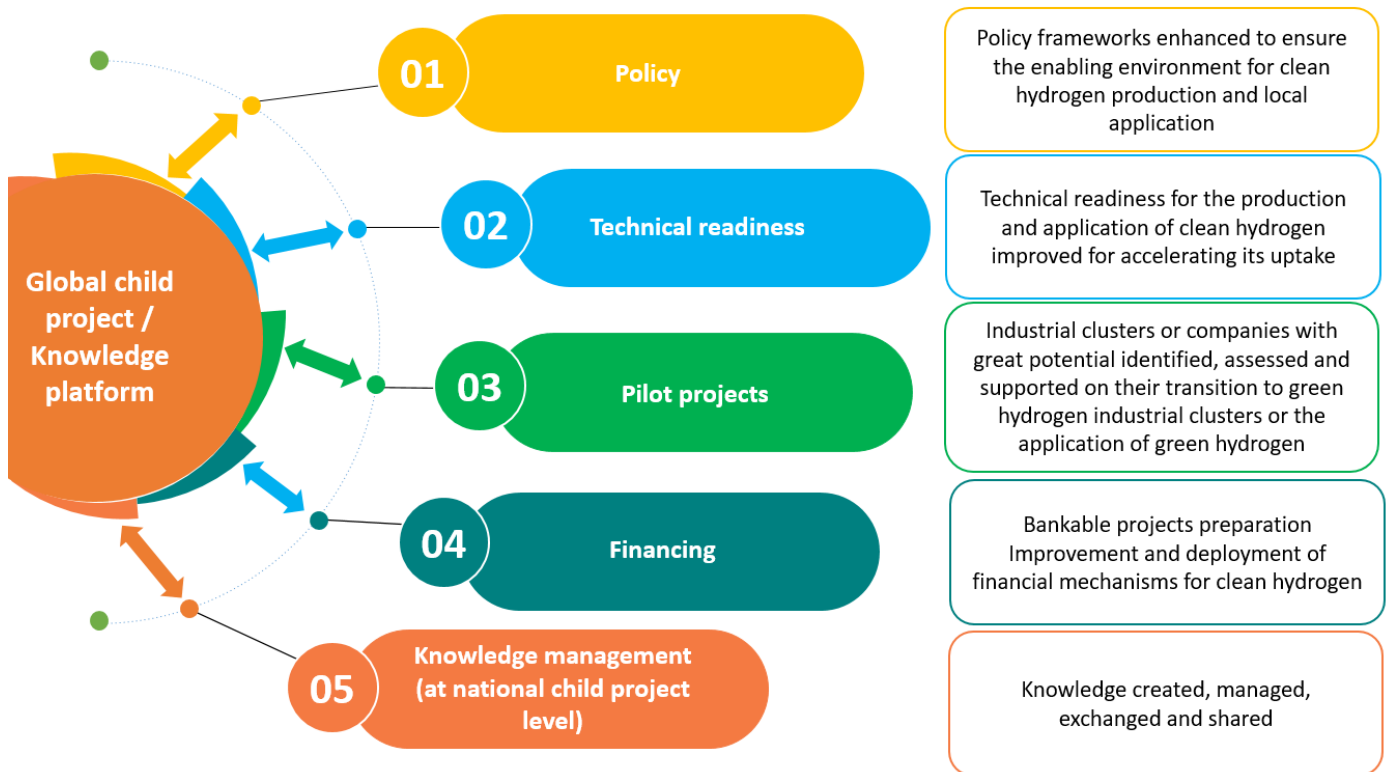
The programme has been designed to specifically address the barriers identified in developing countries and economies in transition and be complementary to existing baseline activities supporting clean hydrogen development. The programme will focus its work on green hydrogen and clean will be use as a synonym.

Programme Design: The programme has two main elements:

- A cohort of National Child projects (Algeria, Ecuador, Egypt, Malaysia, Namibia, Nigeria, Philippines and South Africa), each with a set of activities tailored to the country context and in line with the programme’s thematic areas of (i) policy, (ii) technical readiness, (iii) pilot projects, and (iv) financing;
- A knowledge management and dissemination component, led by a global child project, and which supports the programme’s national child projects, and developing countries and economies in transition in general, offering two core sets of activities: (i) knowledge products and tools and (ii) convening and dissemination.

The programme is structured as five components across the national child projects, all supported and coordinated by one global child project, as set out in the figure below. This structure allows for a clear results framework for measuring impact across national child projects, with a commonality in outcomes, outputs and indicators in each component. The child projects and the overall programme also have monitoring and evaluation components. The programme is flexible and participating countries can decide the components that will be included in their child projects based on their current work on clean hydrogen.

Figure 1: Global Clean Hydrogen Programme components



## Theory of Change of the Global Clean Hydrogen Programme

The programme will contribute to enhance national institutional capacities, enable policy frameworks, and improve technological readiness and financial mechanisms for the successful uptake of clean hydrogen in developing countries to ensure their net zero development with social considerations and benefits. This will contribute to supporting participating countries to meet their decarbonisation targets and also provide valuable knowledge and expertise for the production and local uptake of clean hydrogen on their path towards equitable net zero development.

The enabling environment for the development and uptake of clean hydrogen application in developing countries and economies in transition faces several barriers, including lack of appropriate regulations, policies, and standards; limited local readiness, knowledge and capacity for hydrogen production and application; insufficient bankable projects and financing mechanisms for clean hydrogen; and limited global coordination and sharing of best practices. The programme will address these barriers through stakeholder identification and engagement activities; assessments and recommendations on policies, standards and financial mechanisms; technical assessments and studies for hydrogen production and application and for pilot projects in industrial clusters and in transport; awareness raising and capacity building for policy makers, financial institutions and private sector (industry and transport); conducting of pre-feasibility studies; development of knowledge products and tools; and the organization of dissemination and convening events.

For the successful execution of the activities, the programme assumes that regulatory bodies, private sector and other stakeholders are willing and able to participate in the transition to clean hydrogen. The global and local markets for hydrogen will continue to grow and will be receptive to new hydrogen-based solutions. There is sufficient infrastructure and technological capabilities to facilitate clean hydrogen production and application. Financial resources and investments will be available to fund clean hydrogen initiatives. Access

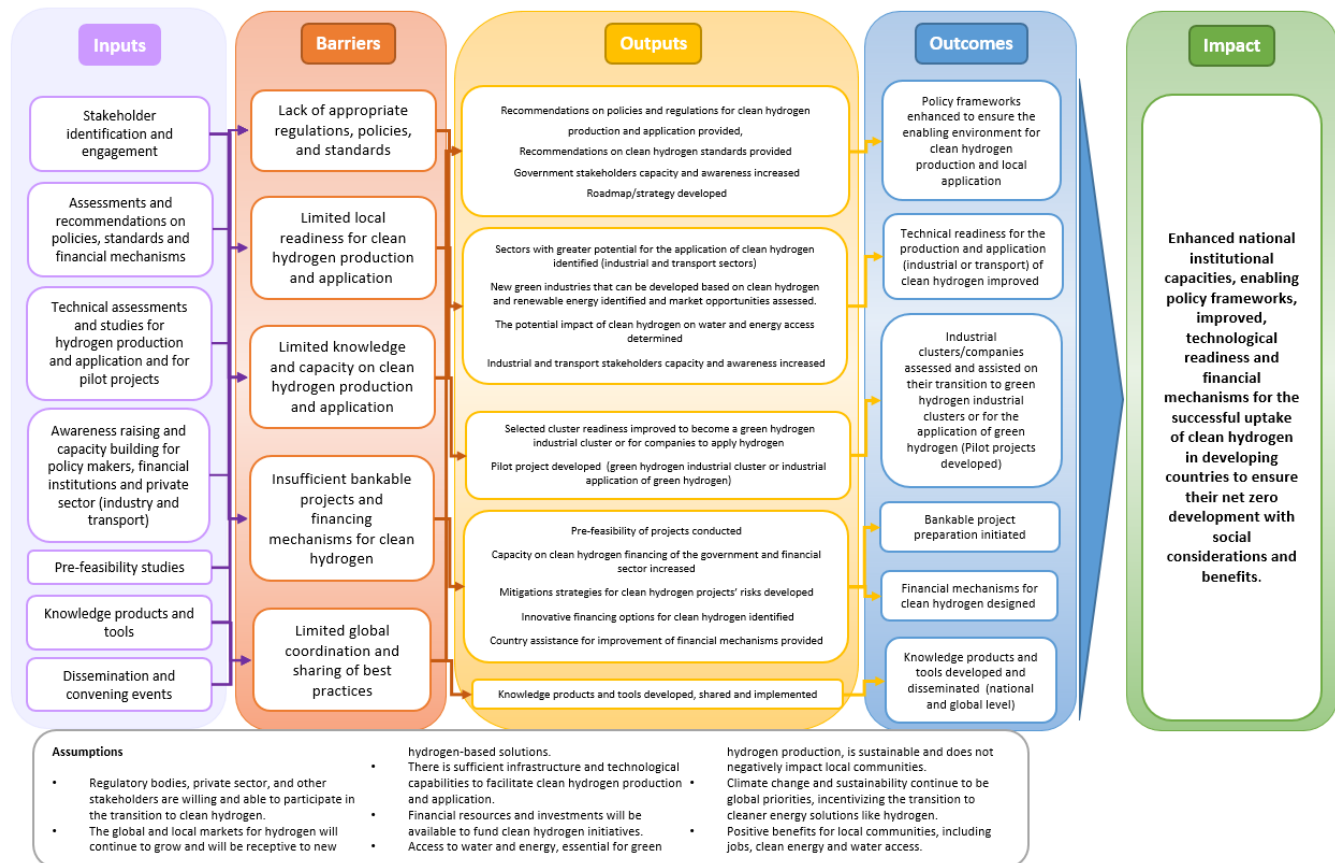


to water and energy, essential for green hydrogen production, is sustainable and does not negatively impact local communities. Climate change and sustainability continue to be global priorities, incentivizing the transition to cleaner energy solutions like hydrogen.

As a result, participating countries will have enhanced policy frameworks that ensure there exists an enabling environment as well as improved technical readiness for the production and application (in industry and transport) of clean hydrogen; Industrial clusters/companies are assessed and assisted on their transition to green hydrogen industrial clusters or for the application of green hydrogen in local companies as well as pilot projects developed. The programme outcomes will also include the initiation of bankable project preparation and the design of financial mechanisms for clean hydrogen in the participating countries. Finally, the programme will have knowledge products and tools developed and disseminated (at a national and global level).

The figure below presents the Theory of Change of the Global Clean Hydrogen Programme.

Figure 2: Theory of Change of GCHP



## Programme Design and Components

### Global Child Project: Knowledge management and dissemination / Knowledge platform

The global component of the programme will be delivered through a Global Child project, developing, sharing and disseminating knowledge products and tools to actively support and enhance all national child projects, as well as carrying out a coherence and M&E role for the overall programme.

Knowledge products and tools developed, shared and implemented

Global level knowledge products that provide guidance, promote innovation and share good practice regarding clean hydrogen production and application will be developed. Innovation is needed to reduce production costs, expand end-use applications and facilitate the sustainable transport and trade of clean hydrogen. A systemic approach to innovation will be integrated into the global component to ensure effective clean hydrogen technological development, and to provide knowledge of socio-environmental impacts and implications towards a growing clean hydrogen economy. The aim is to address the identified barriers and to support the national child projects through various knowledge products and tools.

**Incorporating existing best practices:**

- The Global Child project will incorporate a thorough analysis of existing lessons and best practices in the clean hydrogen sector. This will involve reviewing successful models, policies, and innovations from relevant global initiatives, ensuring that the program's approach is informed by proven strategies. Special attention will be paid to such strategies that have effectively addressed gender gaps in the sector.
- A dedicated section in the knowledge platform will showcase these existing best practices, providing a reference point for all national child projects.

**Learning from relevant projects and engaging to prevent overlaps:**

- The GCHP's approach will include a systematic review of ongoing and completed projects, programs, and initiatives in the clean hydrogen space. UNIDO will actively engage with entities like GHIC, H4D, IRENA, and IEA TCPs to learn from their experiences and evaluations.
- Regular stakeholder meetings will be organized to discuss ongoing projects and identify potential overlaps. This will ensure that the proposed program complements, rather than duplicates, existing efforts.

**Knowledge products and tools development:**

- In the course of the proposed program, a range of knowledge products will be developed, including policy guidelines, technical manuals, and innovation case studies, tailored to the needs of developing countries in the clean hydrogen sector. Dedicated case studies that highlight the role of women in clean hydrogen will be prepared.

- Tools for stakeholder engagement, policy, standards, environmental and social governance (ESG), skills development and innovation for clean hydrogen will be created. The development of such tools will be demand-driven, based on surveys of stakeholder needs from the participating countries and other relevant actors. These tools will be designed to be user-friendly, with a focus on promoting gender equality and women’s empowerment in the clean hydrogen sector, and adaptable to various contexts.
- A particular focus will be on creating materials that support capacity building in policy making, financial structuring, and technical implementation of clean hydrogen projects.

## **Convening and dissemination**

The programme will support and facilitate knowledge management and serve as a platform for information sharing amongst the national child projects within the programme’s community of practice as well as allowing for broader information sharing amongst the larger global hydrogen community. Several working groups organized around the programme’s thematic areas (policies, standards, innovation and skills development) will be established and will convene regularly online and three times in person throughout the duration of the programme. The working groups will place emphasis on south-south cooperation and local application of clean hydrogen and will be complementary to existing working groups. Experts working on other initiatives will be invited into the programme’s working groups to bring expertise and to ensure synergies. Particular attention will be given to private sector engagement, encouraging their active participation in working groups, in order to collect inputs for project implementation and to inform government action. Outputs from the working groups will directly support the work of the national child projects by providing advice on policy, standards, skills, finance and project development. The programme will also support national child projects in disseminating lessons learned and studies that will be used to develop replication plans for scaling up hydrogen investments in each participating country. Finally, two global conferences will be organized with the aim to discuss the development of clean hydrogen economies in developing countries and to serve as a platform for the participating countries to position themselves as global front runners and connect with investors to support their hydrogen plans.

## **National Child Projects**

The Child Projects will have the following five components and will collectively seek to achieve the objective of the programme. Components 1 to 4 will apply at the national child project level



and Component 5 will be implemented at both the global and national child project level. All projects will have an M&E component.

Participating countries can define and decide which components, outcomes and outputs will be implemented in each country based on their readiness for policies, standards, technical capacities, financing programmes and knowledge requirements. An overview of which outputs each national child project is participating in is shown in Figure 3 at the end of the project description.

## **Component 1 – Policy**

**Outcome 1.1** Enhanced clean hydrogen enabling environment of the participating countries for hydrogen production and local application

Several countries have developed their policies, strategies or roadmaps for hydrogen. Others are just starting their work on hydrogen policies and guidance is required. This component is designed to enhance the clean hydrogen policy frameworks within participating countries. This enhancement aims to establish a more accommodating environment for local hydrogen production and utilization, providing a basis for the large-scale adoption of hydrogen. Through the activities developed under this component, the programme will facilitate meaningful stakeholder dialogue, policy and regulation improvements, standardization, and increased capacity and awareness among government stakeholders. The global child project will support every output for the national child projects with guidelines, methodologies, case studies and capacity building material as well as through convening working groups, conferences and hosting the knowledge platform, The component has the following five outputs, with individual countries selecting the outputs most relevant for them.

### **Output 1.1.1: Institutional stakeholders mapped and convened**

The policy frameworks for a hydrogen economy are complex and several government institutions are involved in their development and implementation. Whether the policies for hydrogen are at national level or are for application in a specific sector, it is essential to understand who the institutional stakeholders are and ensure their interactions and engagement. This output aims to provide a strategic process of stakeholder identification and engagement. This critical initial stage will involve the mapping of country or sector-specific stakeholders integral to the successful implementation of hydrogen policies and practices (at national or a sector level). A thorough identification of the relevant stakeholders in each country will provide a comprehensive overview of the existing hydrogen landscape and identify the key players and potential barriers. Particular attention will be paid to ensuring organisations representing or led by women are included. Subsequent stakeholder engagement activities will focus on promoting cooperation and alignment amongst these identified entities, primarily through dialogue sessions and workshops. These interactions will ensure a more streamlined process for policy application and will help build consensus on strategic directions.

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**Output 1.1.2: Recommendations on policies and regulations for hydrogen production and application developed/adopted, including environmental and water related policies and taking into account gender responsiveness and market scale up**

As previously stated, several countries are at different stages of their hydrogen policy work. Some countries have developed their overall national policies for hydrogen, others are more advanced and developing policies for the local application and others are at very early stages and starting to draft their strategies or roadmaps. The activities within this output seek to address existing gaps in policies and regulations and identify market barriers preventing the large-scale implementation of clean hydrogen. This output will include a rigorous assessment of current policies and regulations related to hydrogen production and application, including environmental, social and energy policies and regulations. The goal is to discern areas requiring improvement or development and provide relevant recommendations for a more conducive policy environment. Moreover, a thorough examination of potential market barriers will be conducted to understand obstacles to clean hydrogen market scale-up. These findings and corresponding recommendations will be presented to government stakeholders during consultation workshops, fostering a collaborative effort toward enhancing the regulatory framework. Recommendations will include a focus on the inclusion of gender responsive policy elements and attention will be given towards a gender balance among the participants in the consultation workshops. The objective of the stakeholder participation is to bring together a diversity of expertise and experiences to ensure a holistic approach to the discussions. Where possible, support will be provided to ensure adoption of the recommendations.

**Output 1.1.3: Recommendations on clean hydrogen standards provided/adopted**

Work will be carried out on the standardization aspect of clean hydrogen and its derivative products. Activities here will involve a comprehensive examination of international hydrogen standards, with a focus on the technologies along the value chain, accurate measures and accounting (e.g., green hydrogen certification, H<sub>2</sub> purity, pressure, volume, temperature, weight, DC/AC current, CO<sub>2</sub> content; gas mixing, leakages, etc.); and the applications of hydrogen. This output will strive to establish a strong foundation for clean hydrogen quality infrastructure, taking cues from international practices and tailoring them to the specific context of each country. Subsequently, the most relevant standards will be prioritized, and customized recommendations will be developed, aiming to guide the respective countries' clean hydrogen sector toward globally accepted best practices.

**Output 1.1.4: Government stakeholders' capacity and awareness increased**

Capacity building and increased awareness among government stakeholders is extremely important for ensuring successful and sustainable policy frameworks. For this, capacity needs assessments will be conducted to identify areas that require knowledge and skills enhancement. Based on this assessment, capacity-building activities, such as training workshops, will be developed and implemented. These activities will cover essential topics related to clean hydrogen, such as policies, standards, financial mechanisms, and permitting procedures. These will also cover the different results of the studies conducted in the previous outputs. By empowering government stakeholders, particularly the ones identified in output 1.1.1 with the necessary knowledge and skills, this output aims to ensure the successful integration of clean hydrogen policies and practices into national systems.

All capacity-building activities and training workshops will be thoughtfully crafted to address and incorporate gender-specific considerations and challenges, fostering an environment where both men and women are equally equipped and encouraged to contribute to the integration of clean hydrogen policies and practices into national systems. This approach not only aligns with global sustainability and equality objectives but also enriches the project outcomes by leveraging diverse perspectives and expertise in policy formulation and execution.

All knowledge products as well as the results of the different assessments and studies will be included in the global component's platform. These will also be shared among the participating countries and also feed the global knowledge products.

### Output 1.1.5: Green hydrogen roadmap/strategy developed/adopted

Finally, for countries that are in the early stages, for example the Philippines and Nigeria, the programme will support the development of a clean hydrogen roadmap or strategy. The drafting of this document will involve extensive consultations with key stakeholders, ensuring a comprehensive and inclusive strategy which will include attention given towards a gender balance among the participants in the consultation workshops. This roadmap will outline specific goals, strategic pathways, and expected timelines, providing a clear vision for the integration of clean hydrogen into their energy and climate plans. At the centre of the roadmaps will be a focus on inclusiveness and ensuring the benefits are felt equally by women and men. The development of such a roadmap not only reinforces the commitment to clean hydrogen adoption but also serves as a guide for the countries' just hydrogen transition journey. Support will be provided, as appropriate, to adopt the hydrogen roadmaps/strategies.

Table 1: Summary of Component 1 expected outcome and outputs indicators\*

Output	Output and Outcome indicators
Outcome 1	# of green hydrogen policies/regulations/roadmaps, including environmental and water related policies and taking into account gender responsiveness and market scale up developed/adopted  # of government stakeholders with capacity and awareness increased (40% women))
Output 1.1.1	# of stakeholder mapping exercises
Output 1.1.2	# of green hydrogen production and application related polices and regulations reviewed  # of green hydrogen production and application related policies and regulations developed/adopted, including environmental and water related policies and taking into account gender responsiveness and market scale up
Output 1.1.3	# of standards for hydrogen production/application Provided/adopted  # of standards for hydrogen technologies provided/adopted

Output 1.1.4	# of government capacity needs assessment  # of government stakeholders trained (40% women)
Output 1.1.5	# of national green hydrogen roadmap/strategies developed/adopted

*\*Targets for the indicators will be elaborated during the PPG phase*

## **Component 2 – Technical Readiness**

### **Outcome 2.1 Technical readiness for the production and application of clean hydrogen improved**

Enhancing local technical readiness for the production and industrial application of clean hydrogen of the private sector is crucial for the development of clean hydrogen in the participating countries. Through fostering innovation, supporting the technical readiness in participating countries will help build local skills and capacities to develop local clean hydrogen industries. The objective of this component is to quicken the adoption of clean hydrogen by increasing the technical capacity through studies and capacity building while ensuring it is optimally utilized within local industries and other potential off-takers. In addition, it aims to estimate the reductions or prevention of CO<sub>2</sub> emissions due to the local application of clean hydrogen. The global child project will support this component with, inter alia, the development of methodologies for CO<sub>2</sub> emission calculations, guidelines for identifying and prioritizing applications and to carrying out value chain analyses plus capacity building material. This component will have the following outputs:

#### ***Output 2.1.1 Sectors with greater potential for the application of clean hydrogen identified (industrial and transport sectors)***

The first output entails identifying and prioritizing sectors with the highest potential for the application of hydrogen. In the preliminary phase, a comprehensive study of the country's industry and transport sector will be conducted. This process includes assessments of the existing local demand for hydrogen. Further analysis and prioritization of sectors will be undertaken based on the initial evaluation. In-depth research on industrial infrastructures, process conversion, and application of hydrogen within the chosen sectors will follow. Concurrently, a methodology for CO<sub>2</sub> emission estimation will be developed and an estimation for the prioritized sectors provided.

This systematic approach offers a strategic direction for the application of clean hydrogen in sectors where it can have the most substantial environmental and economic impact.

### **Output 2.1.2. New industries that can be developed based on clean hydrogen and renewable energy identified and market opportunities assessed.**

The second output focuses on identifying potential new industries that could be established based on clean hydrogen and renewable energy, coupled with an assessment of market opportunities. Initial activities will revolve around evaluating local and international market opportunities for clean hydrogen, considering both imports and exports. This research will be followed by a study aimed at identifying new industrial sectors that could benefit from the application of clean hydrogen and renewable energy as well as analyses of the hydrogen value chain. The most relevant new industrial sectors will be prioritized through a consultative process involving local stakeholders. The consultative process will ensure there is representation from women and disadvantaged groups. Lastly, business models and investment proposals for the prioritized sectors will be developed, setting the stage for potential economic growth and supporting the just hydrogen transition.

### **Output 2.1.3 The potential impact of green hydrogen industrial application on water and energy access determined**

Clean hydrogen production involves considerable renewable energy, land and water resources. Understanding its potential effects on local water supplies, land use and energy access ensures a balanced and sustainable approach to building-up a clean hydrogen economy. The third output will seek to determine the potential impact of the production and application of clean hydrogen on water and energy access as well as land use. This critical phase will involve an assessment of the water, land and energy uses and how these activities could affect access for local communities, particularly women in these communities.

### **Output 2.1.4. Industry and transport stakeholders' capacity and awareness increased**

The fourth output is aimed at increasing capacity and awareness on clean hydrogen production and application among stakeholders in the industry and transport sectors. Recognizing that stakeholders' understanding and buy-in are critical for the success of any initiative, this output will start by conducting stakeholder identification, prioritization and capacity needs assessments in the

selected sectors. These assessments will help determine focus areas for development, including hydrogen production, standards, infrastructure, innovation, and application. Based on the needs identified, training materials will be developed, and workshops will be conducted to improve understanding and competencies among these stakeholders. In acknowledging the imperative role of gender balance in driving sustainability and innovation in clean hydrogen initiatives, the work will explicitly incorporate gender considerations into every stage of stakeholder engagement and capacity-building. The approach ensures that women in the industry and transport sectors are not only identified and included as key stakeholders but also that the training materials and workshops are crafted to be gender-sensitive, acknowledging and addressing the unique challenges and perspectives they bring to the table. The training will also cover the results of the studies conducted in the previous outputs. This systematic approach will help ensure that industry and transport sector stakeholders are well-prepared to support the transition to green hydrogen.

Table 2: Summary of Component 2 expected outcome and outputs indicators

Output	Outcome and Output indicators*
Outcome 2	# of industry and transport stakeholders with capacity and awareness increased (40% women)
Output 2.1.1	# of Reports on the priority industry and transport sectors for green hydrogen application  # of Methodologies for CO2 emission estimations  # of national estimates for avoided CO2 emissions due to local application of green hydrogen
Output 2.1.2	# of hydrogen value chain analyses  # of studies identifying new industrial sectors that could benefit from green hydrogen and RE and market opportunities assessed
Output 2.1.3	# of assessments of impact of green hydrogen application on water and energy access, including any differentiated access between women and men
Output 2.1.4	# of industry and transport stakeholders trained (40% women)

*\*Targets for the indicators will be elaborated during the PPG phase*

All knowledge products as well as the results of the different assessments and studies will be included in the global component's platform. These will also be shared among the participating countries and also feed the global knowledge products.

### Component 3 – Green Hydrogen industrial clusters and pilot project (s)

The programme will focus on identifying, assessing, and transitioning industrial clusters or (industrial or transport) companies to leverage green hydrogen. The overarching outcomes of this component are two-fold. Outcome 3.1 aims to identify and support industrial clusters or companies with high potential for transitioning to green hydrogen utilization while Outcome 3.2 will support the development of some of these into pilot projects. The global child project will be supporting the national child projects with knowledge products and tools to assist in providing support and training to the companies and industrial clusters. This will build on the work developed under UNIDO’s Green Hydrogen Industrial Cluster programme.

#### UNIDO’s Green Hydrogen Industrial Clusters

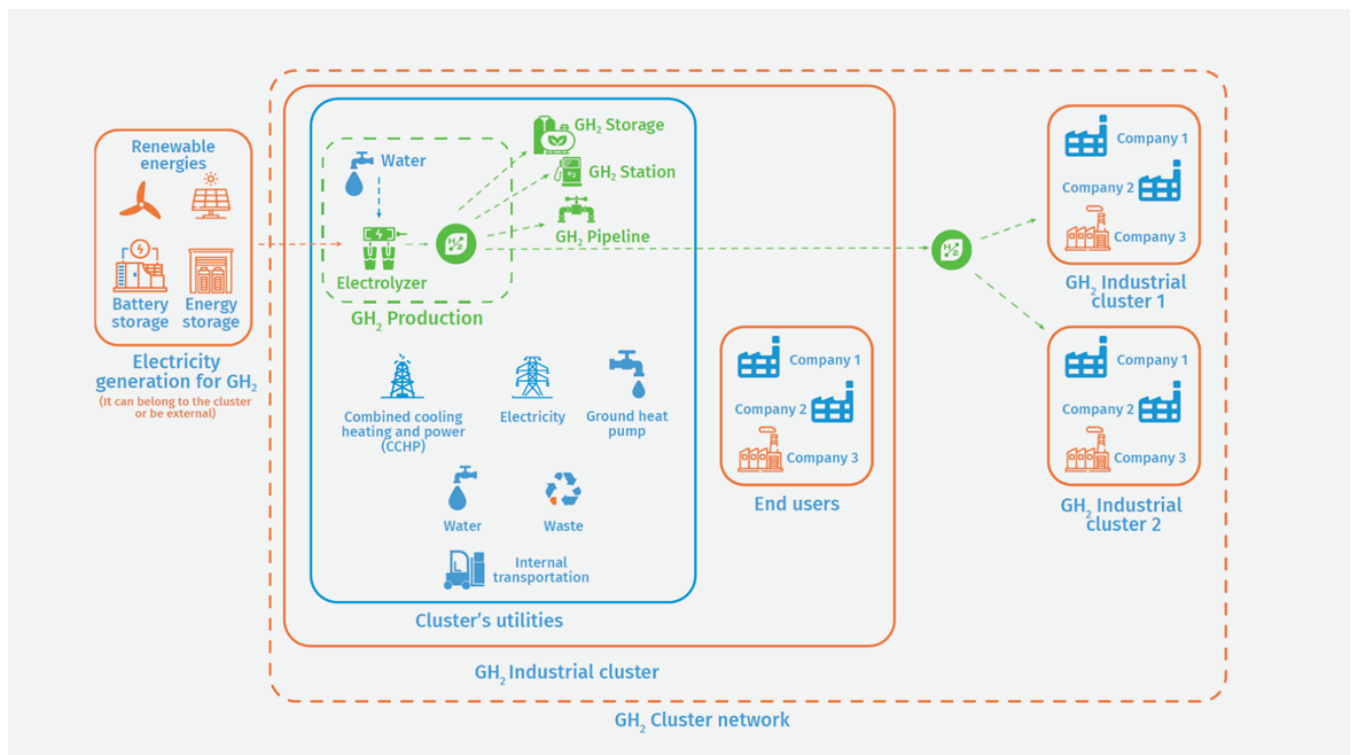


Figure 2: Green hydrogen industrial clusters

UNIDO defines green hydrogen industrial clusters (GHIC) as industrial regions or clusters that share green hydrogen (production, transport and use) and renewable energy electricity, in addition to other resources, for different purposes including material production, heating and cooling, local mobility and industrial feedstock. Such clusters are characterized by internal linkages enabling cooperation, specialized expertise, services, resources, suppliers and skills, and further generate various advantages among the participants, including the distribution of the investment and mitigation of risks. Green hydrogen industrial clusters can reduce greenhouse gas emissions, promote investment, create employment and foster economic growth that is environmentally sustainable and socially responsible.



As a key element of its GPHI, UNIDO developed a model for “green hydrogen industrial clusters”. This model aims to accelerate the application of locally produced green hydrogen in industrial zones, clusters and parks. Its aim is to serve as a replicable model through which countries can deploy green hydrogen technologies to achieve their emissions reductions and industrial production goals as well as to generate economic and social opportunities. This requires significant amounts of green hydrogen and coordination among the stakeholders within the clusters. The model provides guidance for governments and industries in the preparation, implementation and upscaling of green hydrogen industrial clusters.

The model has three stages that are summarized and are explained below. Throughout the phases, monitoring and evaluation exercises is carried out to track progress and update the model based on technological, cost and environmental developments.

Phase	Activities in the Phases
Phase 1	Preparation of green hydrogen clusters Awareness-raising Stakeholder engagement Preparation of the objective, strategy and work plan of a green hydrogen cluster Feasibility studies Financial mobilization
Phase 2	Deployment of technologies for green hydrogen, Commissioning of pilot projects Production, process adaptation and use of green hydrogen in industrial processes  Testing of pilot projects Commercial operation
Phase 3	Upscaling the use of green hydrogen in industry Programmes for uptake and challenges Development of green hydrogen networks

During Phase 1, industrial clusters are brought to a level of readiness wherein pilot green hydrogen projects can be developed during Phase 2. At this stage, initial pilot projects are supported as well as the adaptation of the cluster to ensure sector coupling and future upscaling. Phase 3 will lead to a successful implementation of green hydrogen strategies and a 100% provision of green hydrogen to meet the hydrogen demand of the production cluster. This will create success studies and examples of good practices for replicability.

### **Outcome 3.1 Industrial clusters and companies with great potential to transition to green hydrogen identified, assessed and support provided.**

Output 3.1.1: Industrial clusters with greater potential to become a green hydrogen industrial cluster or industry or transport companies with greatest potential identified and selected



The activities within this outcome comprise the identification of potential industrial clusters or companies (industry or transport) suitable for the application of green hydrogen. The prioritized sectors from the studies conducted in output 2.1.1 will be used. The activities under this output involve systematic identification and analysis of potential clusters or companies that could benefit from green hydrogen. This process involves assessing current industry/transport practices, potential for hydrogen application, and demand for hydrogen. In particular, the analysis would provide a comprehensive understanding of the quantity of hydrogen required, potential areas of application, necessary energy and water resources, and projected CO<sub>2</sub> reduction or prevention estimates. The result is a selection of clusters or companies, with potential for the transition to green hydrogen utilization, based on their potential impact and readiness for change.

The Global Clean Hydrogen Programme will use Phase 1 of the UNIDO's Green Hydrogen Industrial Cluster approach to identify industrial clusters, in addition to identifying individual companies (eg a mining or haulage company, or a cement factory) with the potential to transition to green hydrogen.

### **Output 3.1.2: Selected clusters' or companies' readiness improved to become a green hydrogen industrial cluster/company**

Once potential industrial clusters or companies have been identified, the second output of this component aims to enhance their readiness to become a green hydrogen industrial cluster. The preparatory phase involves conducting technical assessments focused on hydrogen production and application, energy efficiency, renewable energy potential and sector coupling within the cluster or near the company. Additionally, environmental and social impact assessments will also be carried out, specifically considering implications for water and energy access for local communities. Subsequently, pre-feasibility studies for the production and application of green hydrogen within the cluster will be conducted, ensuring a seamless transition. Lastly, stakeholders in the cluster will be engaged in training workshops, during which the results of the studies will be shared, and the next steps outlined. Stakeholder engagement and capacity-building will explicitly ensure women's participation and incorporate gender considerations into every stage. This holistic approach to readiness ensures that the cluster is not only prepared to transition, but that all stakeholders are actively engaged in the process.

### **Outcome 3.2 Pilot project developed**

**Outcome 3.2 focuses on the development of a pilot project within an industrial cluster and its transition to a Green Hydrogen Industrial Cluster or the application of green hydrogen within a company.**

#### **Output 3.2.1 Green hydrogen pilot project supported**

Building on the selected cluster or company, the programme will support the further development of the identified pilot project. This involves selecting an industrial cluster or company, prioritizing it based on a range of factors including potential for success and impact. Thereafter, a

comprehensive project document will be developed, ensuring compliance with environmental, social, and gender policies. This document will serve as the roadmap for the pilot project. Additionally, support will be provided in the preparation of an investment proposal, along with identification of potential investors, both domestic and international. In terms of financial backing, the project will be connected with financial mechanisms developed under Component 4 and identified co-financiers. Once the framework is in place, the programme will facilitate the transfer of knowledge and provide technical assistance for the implementation of hydrogen technologies, ensuring that the cluster or company has the necessary resources and expertise. The final stage involves the physical transfer of technologies, ranging from electrolyzers to solar panels to hydrogen lift trucks, amongst others. This comprehensive support system lays the groundwork for a successful pilot project and serves as a model for subsequent projects in the green hydrogen sector.

Table 3: Summary of Component 3 expected outcomes and outputs indicators

Output	Outcome and Output indicators*
Outcome 3.1	# of industrial clusters identified and supported in their transition to green hydrogen  # of companies identified and supported in their transition to green hydrogen (% with women in senior management roles)
Output 3.1.1	# of industrial clusters and companies assessed and identified to transition to green hydrogen (%with women in senior management roles)
Output 3.1.2	# of pre-feasibility studies conducted for industrial clusters and companies  # of stakeholders trained in the green hydrogen potential (40 % women)
Outcome 3.2	# of green hydrogen pilot projects started
Output 3.2.1	# of green hydrogen pilot projects supported

\*Targets for the indicators will be elaborated during the PPG phase

## Component 4 – Financing

### Outcome 4.1 Bankable project preparation initiated

#### Output 4.1.1 Project pipelines reviewed

Activities within this output will serve to improve clean hydrogen project proposals with respect to their eligibility for financing. The clean hydrogen projects will be identified and included in a country list. A list of

best practice project criteria will be developed by the global project and adapted for each country, and project proposals will be evaluated against this list and prioritized. A maximum of two of the prioritized proposals will be further revised and recommendations will be provided on how to enhance the viability and bankability as well as the quality of the proposals. The list of projects and the results of the revision will be shared with government stakeholders and other potential investors to promote projects and potential financing.

#### **Output 4.1.2: Economic pre-feasibility of projects conducted**

The economic feasibility of the prioritized projects will be evaluated. For this, an economic pre-feasibility study will be conducted focusing on key financial figures (CAPEX, OPEX), revenue streams and business cases. This will include economic attractiveness for the investor (NPV, IRR), robustness of the case (sensitivity analyses) and rough financial analysis. This output can be complementary to output 3.1.2 in case the prioritized project is the same as the pilot project of component 3. The global child project will assist in the feasibility by providing guidelines and sharing expertise between countries.

#### **Outcome 4.2 Financial mechanisms for clean hydrogen designed**

Financial mechanisms for green hydrogen will be designed or improved upon with support from the global child project and a specific working group focusing on finance for green hydrogen. Support will include advice, mitigation strategies and capacity building material.

#### **Output 4.2.1 Capacity on clean hydrogen financing of the government and financial sector increased**

This output is aimed at increasing capacity and awareness on financing and financial mechanisms for clean hydrogen projects among stakeholders in the public and financial sectors of the country. The activities within this output will start by conducting the identification, prioritization and capacity needs assessments of the stakeholders from the public and financial sectors. These assessments will help determine the level of knowledge and capacity the stakeholders have on the financing of clean hydrogen projects and the development of financial mechanisms. Based on the needs identified, training materials will be developed, and workshops will be conducted to improve understanding and competencies among these stakeholders.

The activities within this output will actively engage women in the public and financial sectors, ensuring that they are not only participants but also influencers in the development and implementation of financial mechanisms for clean hydrogen projects. The interventions and training materials will be tailored to be gender-sensitive, addressing the unique barriers women might face in this sector, thereby ensuring an equitable enhancement of capacities and crafting a pathway that supports and elevates diverse leadership and expertise in the financing of clean hydrogen endeavours.

All knowledge products as well as the results of the different activities for financing clean hydrogen will be included in the global component's platform. These will also be shared among the participating countries and also feed the global knowledge products.

### Output 4.2.2: Mitigations strategies for clean hydrogen projects' risks developed

This output will provide insights regarding the types of risks, their importance for capital cost, and strategies on how to mitigate these risks in a specific country context. The impact of risk mitigation on the hydrogen production and supply cost will be elaborated on as well as the cost and actions needed to implement these risk mitigation solutions. This will be done through a country report, that will be shared with relevant stakeholders for its validation and later promotion.

### Output 4.2.3 Innovative financing options for clean hydrogen identified

Through this output, a document on innovative financing options for clean hydrogen will be prepared. The document will aim to deepen understandings regarding concessional financing, blended financing, carbon financing and other innovative financing solutions in the hydrogen production, infrastructure and end-use context. The document will be developed according to the context of the country.

### Output 4.2.4 Country assistance for improvement of financial mechanisms provided

Countries interested in developing, or that already have, a financial mechanism for clean hydrogen projects will receive technical assistance for the revision and improvement of the mechanisms. The assistance will be provided on concessional financing, blended financing, carbon financing and other solutions in concrete terms in a specific country and project context, drawing on best practice in the hydrogen sector and other sectors. The results of the assessment will be included in the training materials of output 4.2.1. and it will be presented in the capacity building and awareness raising workshops of that output.

Table 4: Summary of Component 4 expected outcomes and outputs indicators

Output	Outcome and output indicators*
Outcome 4.1	# of bankable project preparation initiated
Output 4.1.1	# of project pipeline reviews  # of prioritized projects receive support on enhancing viability and bankability of projects
Output 4.1.2	# of economic pre-feasibility studies of green hydrogen projects conducted
Outcome 4.2	# of clean hydrogen financial mechanism designed or improved
Output 4.2.1	# of capacity needs assessment of stakeholders from the public and financial sectors  # of stakeholders trained in financing of clean hydrogen projects and the development of financial mechanisms (40% women)
Output 4.2.2	# of country reports on clean hydrogen risk mitigation strategies
Output 4.2.3	# of reports on innovative financing options for clean hydrogen

Output 4.2.4	# of sets of recommendation to design, revise and improve financial mechanisms for clean hydrogen projects
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*\*Targets for the indicators will be elaborated during the PPG phase*

## Component 5 – Knowledge Management and Dissemination

### Outcome 5.1 - Global stakeholders have improved understanding of the green hydrogen sector and south-south cooperation in developing the sector established

#### Output 5.1.1 Knowledge products and tools developed, shared and implemented

At national child project level, country activities will contribute to the development of global knowledge products and tools, by providing data, case studies, etc. At the country level, these products will be shared and disseminated through workshops or awareness raising events. Country stakeholders will participate in the surveys to define the topics and themes. However, focus on policy, standards, Environmental and Social Governance (ESG), innovation and skills development for clean hydrogen will be encouraged. Other activities may include collecting and analysing good practices around clean hydrogen production and application in a variety of regulatory environments, and the research and development of tools (e.g., policy packages, recommendations on standards for green hydrogen, and technical guidelines). All knowledge products and tools will be developed to be gender sensitive and to ensure equitable access and use. Similarly, all workshops or awareness raising events will ensure women’s participation and a role of influence.

From the start of the programme, an interoperable knowledge and collaboration platform will be developed by the global child project and made accessible to all programme beneficiaries and stakeholders, containing knowledge tools and products developed from the programme. It will serve throughout the programme’s lifetime to provide partners with access to centralized, accumulated programme knowledge on best practices and to facilitate knowledge-empowered partner collaboration.

#### Output 5.2 Convening and dissemination conducted

Through participation in the programme, counterparts will be part of its global knowledge and collaboration platform, which provides partners with access to knowledge products, tools and an open a space to collaborate and exchange experience and knowledge. In parallel with the programme's knowledge and collaboration platform, countries will participate in the working groups within their selected thematic area (policies, standards, innovation and skills development). Countries will convene regularly online and meet three times in person throughout the duration of the programme. Countries will conduct lessons learned studies that will be used to develop replication plans for scaling up hydrogen investments in each participating country. Finally, programme countries will attend and participate in the two global conferences that will be organized with the aim to discuss the development of clean hydrogen economies in developing countries and to serve as

a platform for the participating countries to position themselves as global front runners and to connect themselves with investors to support their hydrogen plans.

The knowledge products will be tracked and adapted into the knowledge and collaboration platform. This component will take a systems integration approach to knowledge management and learning. That is, through the platform, the component will facilitate the sharing, reuse and adaptation of all knowledge products among partners, thereby promoting knowledge durability throughout the programme. To facilitate a fair, collaborative environment for programme participants, the component will also ensure that those responsible for gathering knowledge and developing knowledge products are appropriately recognized and cited for their contributions. From a macro-perspective, the programmes' knowledge component aims to provide a space for vibrant south-south knowledge exchange and collaboration towards the project objective. Activities and all results from the component will be gender responsive and will ensure the active participation of women.

Table 5: Summary of Component 5 expected outcome and outputs indicators

Output	Outcome and output indicators*
Outcome 5.1	# of countries piloting/applying best practice guidelines/policy packages  # of users of the knowledge and collaboration platform (40% women)  % of stakeholders with improved understanding of the green hydrogen sector (% women)
Output 5.1.1	# of knowledge and collaboration platforms / websites  # of gender-sensitive global knowledge products (eg. case studies, best practice, policy packages, recommendations, technical/ESG guidelines, skills development material)
Output 5.1.2	# of global working groups established  # of working group meetings (% women participating/facilitating)  # of global conferences (% women participating/facilitating)

*\*Targets for the indicators will be elaborated during the PPG phase*

## Programme Coherence

The following figures indicate the target project outputs for each of the child projects and how the national child projects interact with the global child project. In particular, this shows how the Global Child project will be supporting each of the other component outputs and outcomes with knowledge products and tools and the facilitation of working groups and south-south cooperation. Likewise, each of the child projects contributes to the overall outcomes of the project by enhancing their respective enabling environments for green hydrogen production and application, by improving technical readiness for green hydrogen, supporting companies or industrial clusters to transition, supporting financing of green hydrogen and developing and sharing knowledge.

Under Component 1, the global project will provide the national child projects with guidelines for institutional stakeholder mapping, for development of policies and regulations and training and awareness raising material for capacity building. Further policy/standards working groups will feed into the national child programmes and the website and conferences will provide information and the opportunity to exchange/learn from other countries. Experiences, lessons learned



and case studies from the national child projects will be shared through the global project. Under Component 2, guidelines will be developed to support the national child projects as well as training and awareness raising material to be adapted to the national context for capacity building. Similarly in Component 3, the global platform will support the national child projects in their identification, selection and support for pilot projects. Knowledge products and tools will be developed to support financing of green hydrogen projects which will assist national child projects in creating pipelines of bankable projects and designing financing mechanisms. Even nations that do not participate in Component 4 can access this knowledge and participate in the working groups. Component 5 is common across all child projects with national child projects providing information to and using knowledge from the global child project.

Project output/component	Global	Algeria	Ecuador	Egypt	Malaysia	Namibia	Nigeria	Philippines	South Africa
Outcome 1: Clean hydrogen policy frameworks of the participating countries will be enhanced to ensure the enabling environment for hydrogen production and local application									
Output 1.1.1 Institutional stakeholders mapped and convened									
Output 1.1.2. Recommendations on policies and regulations for hydrogen production and application developed/adopted									
1.1.3 Recommendations on standards									
1.1.4 Government capacity and awareness									
1.15 Roadmap/strategy developed									
Outcome 2: Technical readiness: Local technical readiness for the production and application (industrial or transport) of clean hydrogen improved									
2.1 Sectors with potential identified									
2.2 New industry that can be developed and market opportunities assessed									
2.3 Impact on water and energy access determined									
2.4 Industry and transport capacity and awareness raised									
Outcome 3.1: Industrial clusters/companies with great potential will be identified, assessed and the support to their transition to green hydrogen industrial clusters or for the application of green hydrogen provided									
3.1.1 Selection of industrial clusters or companies									
3.1.1 Clusters/companies readiness improved to become a cluster									
Outcome 3.2: Pilot project on green hydrogen developed									
3.2.1 Pilot projects supported									
Outcome 4.1: Bankable project preparation initiated									
4.1.1 Project pipelines reviewed									
4.1.2 Economic pre-feasibility of projects conducted									
Outcome 4.2: Financial mechanisms for clean hydrogen designed									
4.2.1 Capacity on financing of the govt and financial sector increased									
4.2.2 Mitigation strategies developed									
4.2.3 Innovative financing options identified									
4.2.4 Country assistance for improvement of financial mechanisms provided									
Outcome 5.1: Knowledge products and tools developed and disseminated									
5.1.1. Knowledge products and tools developed, shared and implemented									
5.1.2 Convening and dissemination conducted									
M&E									

Figure 3: Child project focus

The GCHP programme will also work with other organizations and initiatives working in the green hydrogen space, at both the global level and at country level. These stakeholders will be involved as any of the following: knowledge partners, experts on working groups, on the Global Advisory Board, as co-financiers or/and as co-developers and partners. Further details of these initiatives and stakeholders and how the programme is working with them is included in the Baseline section and the Stakeholder section of the document. Figure 4 shows how the different components link to the global component and the interaction with other complementary initiatives.

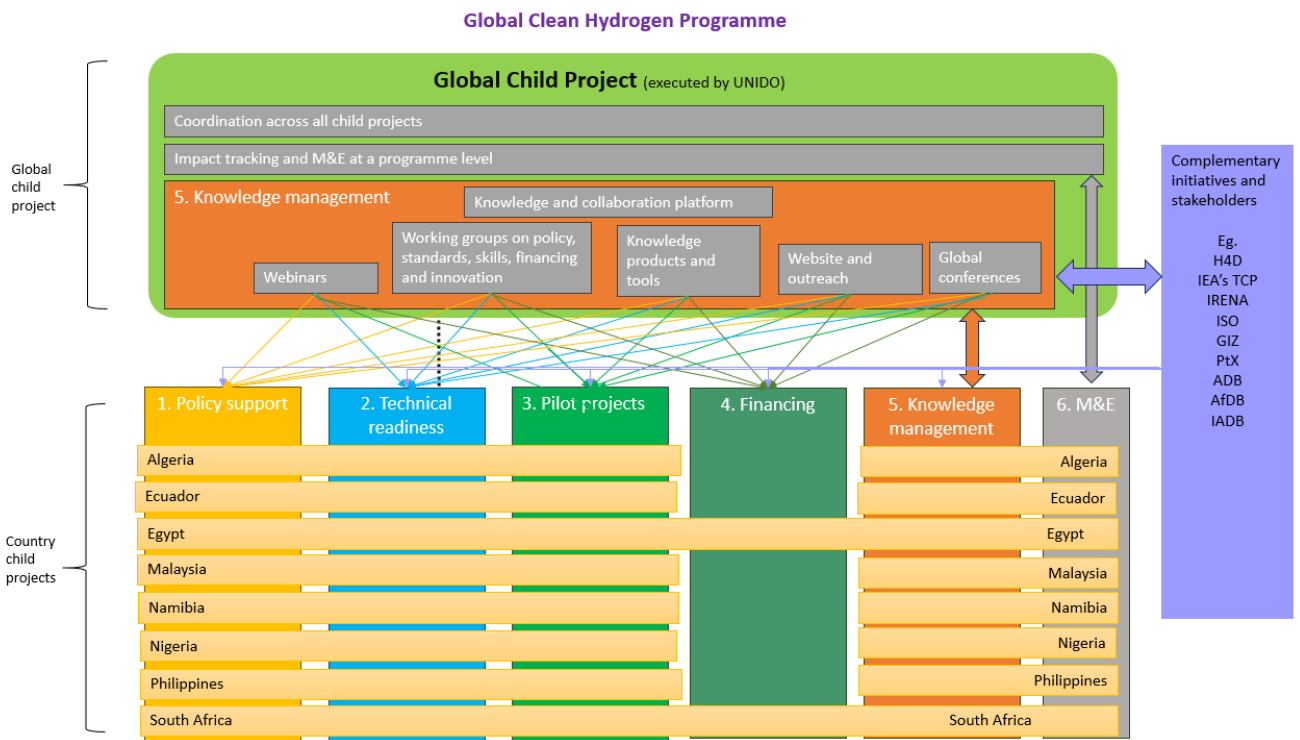


Figure 4: GCHP interaction between the global project and national child projects

## UNIDO GEF Project linked to the programme

The GEF project on “Green hydrogen energy integrated demonstration application project in China”, will be aligned with the Global Clean Hydrogen Programme. This project is led by UNIDO and executed by the International Hydrogen and Fuel Cell Association (IHFCA), and Ministry of Industry and Information Technology (MIIT) of China, with a total of 17,767,000 USD GEF Resources. The project aims to catalyze green hydrogen production and application in hard-to-abate industries, with the direct reduction of 17 million tCO<sub>2</sub> eq. through the commercialization of green hydrogen fuel cell vehicles and enhanced energy security. The project components will be linked to the Global Programme components forming a strong alignment demonstrated by the following:

- **Component 1:** Suggestions on policies, standards, and regulations will be provided and an information platform will be developed to scale applications in hard-to-abate industrial sectors and transportation. The programme’s knowledge platform will be linked to the China project’s platform providing information on scaling applications and relevant policies, standards and regulations can be used as a basis for recommendations where conditions are similar. (Component 1 and 2)
- **Component 2:** Multiple demonstrations will be conducted for integrating green hydrogen into the supply chain through identifying and assessing current industry practices, potential



for hydrogen applications and demand for hydrogen in an industrial cluster. The Chinese project will feed into the global programme's technical readiness assessments (Component 2) and pilot assessments (Component 3) with its experience, case studies and best practice.

- **Component 3:** Capacity building, training workshops and awareness raising of national and local policy makers, industry and relevant stakeholders on green hydrogen will be conducted. Material from the China project can be used, where considered relevant, for capacity building and awareness raising under Components 1, 2, 3 and 4.
- **Component 4:** Knowledge dissemination, information exchange and international cooperation will be promoted with the aim to enhance industrial stakeholders' manufacturing quality and maintenance capabilities. Knowledge will be shared between the China project and this programme and international cooperation promoted between the national child projects and China. Experts from the China project may be invited to participate in the programme's Working Groups (Component 5) to share their expertise.

## **Beneficiaries**

*Government institutions:* Will receive support and capacity building on policies for clean hydrogen provided in component 1 of the programme. This strategic support will be addressed to different institutions, one relevant ministry would be the Ministries of Energy or similar which are often the primary responsibility for energy and hydrogen policies and regulations. They can lead or support convening institutional stakeholders, allowing the formulation and adoption of policy recommendations, develop clean hydrogen standards and participate in capacity building. These stakeholders include the Ministries of Industry, Ministries of Environment, Ministries of Finance, Ministries of Science and Innovation, Ministries of Transport, Ministries of Education and local governments. Additionally, they, in particular the Ministries of Finance, can utilize supportive financing mechanisms by providing fiscal incentives, subsidies, or seed funding for clean hydrogen projects.

*Private Sector – potential producers and off-takers:* These stakeholders, including producers and potential off-takers such as industrial clusters or hard to abate sectors, will benefit from the different assessments and capacity building activities from component 2. The policies and standards from component 1 will also benefit their activities and facilitate an environment for the hydrogen market to take off. One key element will be the identification of potential new industries that can be developed based on clean hydrogen and renewables. Finally, these stakeholders will understand the potential impact the production can have on the local environment and communities. These inputs will give tools and key information for the best

decision-making process. Further, any pilot projects developed (under Component 3) will also provide valuable experience/case studies for others interested in becoming involved in the green hydrogen sector.

*Technology Providers and Researchers:* These stakeholders can provide support in the development of the different assessments and knowledge products. Through the programme, the technologies can be promoted, and they can also learn what countries decide on their policies and standards.

*Financial Institutions:* Financial institutions will benefit from defined clean hydrogen projects that they can potentially support and promote their different financial products. They will also receive capacity building on the development of financial instruments for clean hydrogen projects and could benefit from future financial instruments designed for the growing hydrogen market

*Local Communities:* They will better understand the impact that clean hydrogen production and application can have within their communities, particularly regarding energy and water access. Additionally, they can also learn what kind of potential benefits clean hydrogen projects can bring including new jobs.

## **Gender and women's empowerment**

UNIDO recognizes that gender equality and the empowerment of women have a significant positive impact on sustained economic growth and inclusive industrial development, which are key drivers for poverty alleviation and social progress. Commitment of UNIDO towards gender equality and women's empowerment is demonstrated in its policy on Gender Equality and the Empowerment of Women (2015), which provides overall guidelines for establishing a gender mainstreaming strategy. UNIDO has also developed an operational energy-gender guide to support gender mainstreaming within its sustainable energy initiatives.

Women are under-represented in the green hydrogen sector. Green hydrogen has a key role in the transition of economies to net zero and since it is also a relatively new industry, it has a huge potential role in balancing the workforce. Hydrogen will replace historically male dominated industries and this provides an opportunity to change, to follow a different pathway; one that includes more women and other minorities. According to Women in Green Hydrogen, women constitute just 20 % of speakers at green hydrogen conferences. It is clear that much still needs to be done to boost women's participation at all levels of the sector, with actions needed to ease their entry into the industry and improve their career prospects and progression. Initiatives to build awareness of the complexity of the barriers that women face

are essential. This programme can not only support a clean hydrogen transition but also a transition to a balanced workforce.

Gender experts will be involved in the PPG phase to ensure that the final design of each child project takes into account gender aspects and that the design fully captures gender dimensions, and that gender is integrated well in the project components, outcomes, outputs and indicators.

A guiding principle of the programme will be to ensure that both women and men are provided equal opportunities to access, participate in and benefit from the project, particularly in the capacity building and participation in the global component activities. UNIDO's Guide on Gender Mainstreaming Energy and Climate Change Projects will be used as a framework and guide for the gender studies of the programme in order to ensure that the project is in line with both UNIDO and GEF requirements. Based on the guidelines, attention will be paid to:

- Gender-sensitive recruitment at all levels, where possible, will be conducted especially in selection of project staff. Gender responsive TORs will be used to mainstream gender in the activities of consultants and experts. In cases where the project does not have direct influence, gender-sensitive recruitment will be encouraged. Furthermore, whenever possible existing staff will be trained, and their awareness raised regarding gender issues.
- Considering gender dimensions in all decision-making processes (this will consider but will not be limited to efforts to achieve gender balance/ representation in such processes), including Project Steering Committee meetings.
- Collection of sex-disaggregated data.
- Consultations with and involvement of stakeholders focusing on gender equality and women's empowerment issues, such as gender experts and organizations, CSOs and NGOs promoting GEEW (providing them with equal voice), e.g. for outreach purposes.
- Gender Action Plans will be developed as part of each child project. The gender analysis during the child project design will identify the specific circumstances of women and youth, and will provide a basis on how the priorities and needs of these groups will be integrated in the implementation of the project. Child project log-frames will be developed to reflect key gender dimensions of the respective outputs, activities, indicators and targets.

## **Environmental and social safeguards**

UNIDO is promoting sustainable energy solutions to make industries more productive and climate resilient, which in turn includes creating shared prosperity and environmental safeguards. Environmental and social sustainability is integral to climate action and in the achievement of development outcomes. Therefore, the Programme will systematically integrate UNIDO’s Environmental and Social Safeguards Policy and Procedures (ESSPP) and have minimal or no adverse social and/or environmental impacts. The Programme fully supports a human rights-based approach and will not have any negative impact on environmental, social, or civil, political, economic, cultural key potential stakeholders, targeted communities or the population as a whole. A gender-transformative approach will be streamlined throughout the Programme (as described in the Section in Gender Mainstreaming). The Programme will take into account environmental and social risks related to the production and application of clean hydrogen such as water desalination, land use and its impact on flora, fauna, and heritage sites, and inclusion of local communities, indigenous peoples and other marginalized groups of people and individuals. Environmental and social issues will be integrated into institutional decision-making and in assessments, public consultations to effectively enhance an inclusive approach for climate mitigation and industrial decarbonization contextually within the national Child Projects.



Knowledge management is an essential objective of the programme, and as such is identified as the focus of the global child project and the programme’s fifth component, “Knowledge and Management Sharing”. The component identifies two outputs, associated with knowledge sharing and knowledge dissemination. A guiding principle of GCHP’s knowledge management will be to learn from other related projects and initiatives and programmes and to share knowledge, experience and best practice. This will be done through a number of different ways. Relevant stakeholders will be knowledge partners for the programme, relevant to their areas of work. UNIDO, the implementing agency, is actively involved in a number of initiatives and therefore the GCU will be responsible for liaising with the other initiatives and building on the results of the other initiatives. Experts working with H4D, IRENA, IEA’s TCP and ISO will be invited to participate in the themed working groups and H4D and IRENA will be on the Global Advisory Board. Experts on H4D’s roster will be used on this programme to ensure knowledge sharing and where relevant study tours and case studies will be shared. The global knowledge platform will house knowledge products and tools developed by the programme as well as those produced and published by others. The global conferences will also aim to bring all stakeholders together. At a country level, the

project will work with stakeholders working in the countries, for example GIZ, to build on their work and create synergies for greater impact.

Under the global child project and project component 5 and associated outputs, knowledge management will be addressed in the following ways:

- Several stakeholder working groups will be organized throughout the programme. They will convene regularly online and three times in person during the programme, and will place emphasis on south-south cooperation and local application of clean hydrogen. Particular attention will be paid to private sector engagement: private sector actors will be encouraged to actively participate in working groups, to collect inputs for project implementation and inform government action.
- A web platform will be developed to enhance the knowledge management capabilities of the programme. The platform will be used as a place to store relevant information on the project i.e., reports, updates and regulatory innovations related to the project. This platform will serve as a valuable source of information on the project for relevant stakeholders and other interested parties, as it provides a centralized place to find project knowledge and best practices.
- There will be an index of regular publications related to the project's developments and findings. Knowledge outputs will include project updates and reports, as well as information on policy best practices or recommendations for the successful implementation of green hydrogen projects, guidelines for support for green hydrogen projects, finance risk mitigation strategies, standards recommendations, methodologies and case studies. These will be elaborated further during the PPG. This information can be referenced by other green hydrogen development projects so that the process may be streamlined, thereby increasing the efficiency and effectiveness of similar projects in the future.
- Impact tracking will be administered to ensure knowledge related to child project outcomes is visible and placed in context. Indicators and a methodology will be developed to measure project outcomes and will then be used to carry out impact tracking during project implementation.
- Two conferences involving the participating countries will be organized to facilitate a global discussion about the development of green hydrogen economies in developing countries. The goal is to provide a platform for the participating countries to showcase their insights and experiences with green hydrogen development and to also provide an opportunity for investors and participating countries to connect and further develop on their green hydrogen goals.
- Standards will be developed, implemented and disseminated in the form of guidebooks and methodologies to ensure that knowledge management practices are transparent and uniform throughout the programme.

## Monitoring and Evaluation

Describe the approach to program-level Monitoring and Evaluation, including ways to ensure coherence across Child Projects and to allow for adapting to changing conditions, consistent with GEF policies. In addition, please list results indicators that will track the Program Objective, beyond Core Indicators. (Max 1-2 pages).

UNIDO will develop a measurement, reporting and verification (MRV) framework based on the SMART indicators used to assess project implementation and progress for the GEF. The MRV indicators will be developed by the Global PCU with guidance from the Global Advisory Board, and in consultation with the National PMUs. The National PMUs will be responsible for reporting annually and at the end of the project against these indicators, and the Global PCU will consolidate these reports, in conjunction with the executing agencies.

Monitoring and evaluation (M&E) will be conducted in accordance with established UNIDO and GEF procedures. The overall objective of the monitoring and evaluation process is to ensure successful and quality implementation of the project by:

- i) Tracking and reviewing project activities execution and actual accomplishments;
- ii) Providing visibility into progress as the project proceeds so that the implementation team can take early corrective action if performance deviates significantly from original plans; and
- iii) Adjusting and updating project strategy and implementation plan to reflect possible changes on the ground, results achieved, and corrective actions taken.

A detailed Result Framework (LogFrame) will be prepared for each child project, including the global child project, which will provide performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis on which the project's M&E Plan will be built. The evaluation team reports and verifies the actual progress against the work plan approved by the National PSCs.

The M&E procedures will consist of project inception, progress reporting and a project final report. A detailed monitoring plan for tracking and reporting on project time-bound milestones and accomplishments will be prepared by the implementing agency of each child project in collaboration with the National PMUs and respective project partners at the beginning of project implementation and then periodically updated. This includes monitoring and reporting on each child project Gender Action Plans and risks.

Investing significantly in the Monitoring and Evaluation (M&E) is key to ensuring robust and transparent project management, optimized to deliver high- quality, verifiable outcomes. The development of a comprehensive MRV framework, demands not only expertise but also thoroughness in its creation and subsequent implementation at both global and national levels. The coordinated efforts between the Global PCU, Global Advisory Board, and National PMUs in consolidating and scrutinizing reports pave the way for detailed, actionable insights that drive adaptive management throughout the project's lifespan. The allocated budget is crucial in enabling comprehensive tracking, review, and timely adjustment of project activities, strategies and Gender Action Plans, ensuring alignment with dynamic on-ground realities and fulfilment of project objectives. The M&E component, therefore, is not an expenditure but a strategic investment, ensuring the efficient use of resources, minimizing risks, and enhancing the project's impact, credibility, and sustainability, thereby justifying the allocated budget to safeguard the extensive and impactful results of the project.

Table 6: Summary of M&E expected outcomes and outputs indicators

Output	Output and Outcome indicators
Outcome 6	# of child projects achieving expect outcomes and outputs on time
Output 6.1.1	# of M&E plans including MRV framework

	# of PIRs
	# of inception reports
	# of annual monitoring reports
	# of project final reports
Output 6.1.2	# of mid-term evaluations
Output 6.1.3	# of terminal project evaluations

*\*Targets for the indicators will be elaborated during the PPG*

### Coordination and cooperation with Ongoing Initiatives and Programs.

Is the GEF Agency being asked to play an execution role on this program? Yes

If so, please describe that role here. Also, please add a short explanation to describe cooperation with ongoing initiatives and projects, including potential for co-location and/or sharing of expertise/staffing (max. 500 words, approximately 1 page)

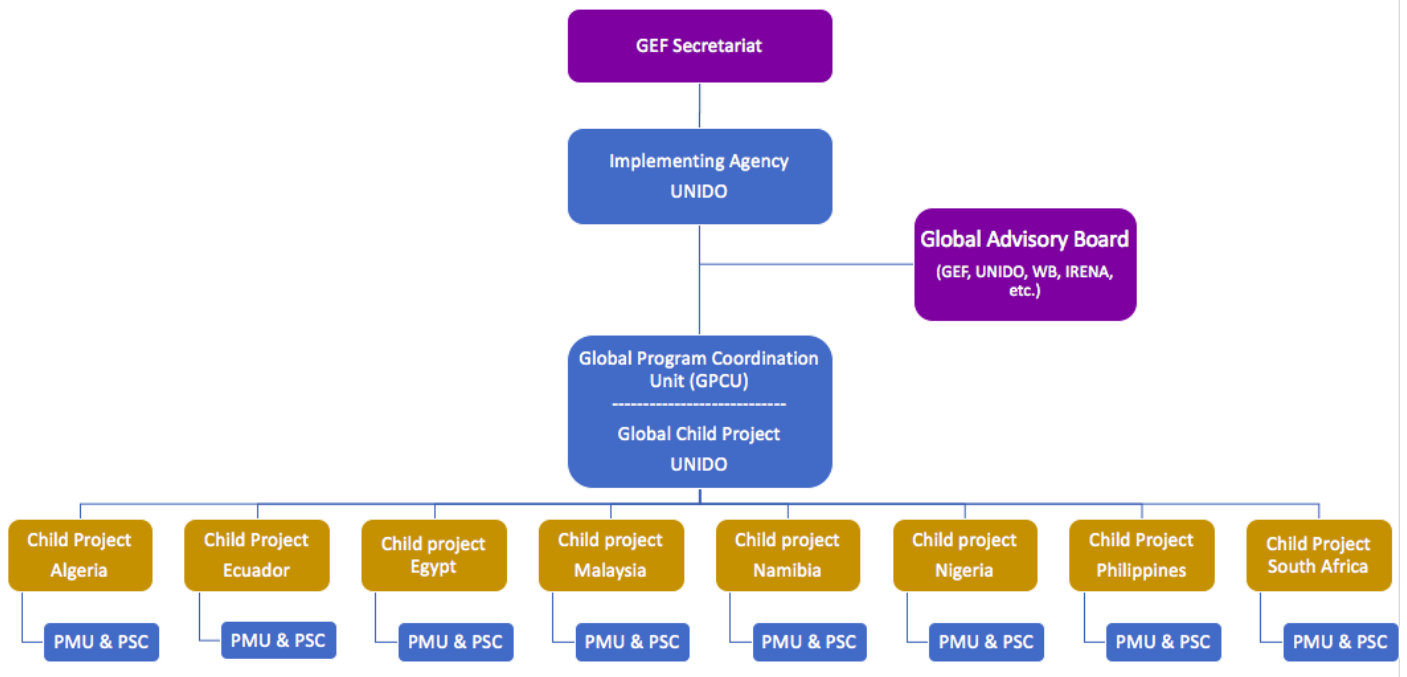


Figure 5: Organisational structure of the programme

UNIDO, as the lead GEF Implementing Agency for the programme, holds the ultimate responsibility for the implementation of the programme, the delivery of the planned outputs and the achievement of the expected outcomes. UNIDO will be responsible for monitoring and evaluation of the programme, and reporting on the programme performance to the GEF. UNIDO will also be responsible for coordinating monitoring and evaluation of child projects. GEF agencies will not execute the national child projects. National projects will be executed by the country executing entities defined by the implementing agency and the governments. UNIDO will execute the global child project of the programme and its global level activities as described in the global child project concept note.



### **Global Programme Coordination Unit**

The day-to-day execution of the whole programme and the global child project will be conducted by the Global Programme Coordination Unit (GPCU). The GPCU will be located in UNIDO. The PCU will be composed of a Global Coordinator, two technical experts on hydrogen that will also be responsible for communications and partnerships as well as impact monitoring and reporting, and one administration assistant. The main added value of the Global PCU will be to maintain the programmatic approach, to ensure the efficient use of funds across all child projects that benefit from the constant development and updating of the materials provided from the Global PCU to the national child projects. This will require robust communication channels between the Global PCU and the National Project Management Units as well as the national counterparts and executing entities.

### **Global Advisory Board**

The Advisory Board will comprise of the GEF, UNIDO, World Bank, IRENA plus government representatives of each participating country. Other key partners and stakeholders active in the clean hydrogen space may be invited to join the Advisory Board if deemed adequate by the Board. The Advisory Board will provide strategic guidance to the programme and will be the decision-making body for items of major impact on the programme. It will meet once a year to monitor progress against the objectives of the overall programme, address potential problems and address strategic and policy issues affecting the programme. It will review impact tracking and will be responsible for defining strategy and advocacy messages. While each county child project will have its own project steering committee, the Global Advisory Board will also actively discuss emerging issues across child projects and suggest solutions that contribute to the overall objectives of the Global Clean Hydrogen programme.

### **Child Projects**

The child projects will be implemented by UNIDO. In line with the GEF's emphasis on national ownership of projects, it will be the decision of the GEF Focal Point to designate a leading executing agency for the respective country child project, as well as a National Project Management Unit (PMU). Each national child project will also establish a National Project Steering Committee (PSC) that will provide strategic guidance to the respective child project. For the global component, the Global Advisory Board will also serve as the PSC.

During the PPG Phase, a meticulous evaluation and selection process will be undertaken to identify apt national executing entities, which will then assume a pivotal role in steering the child projects toward their defined objectives while adhering to the guidelines and standards set forth by GEF and UNIDO. This not

only outlines the principle of ownership at national level and ensures alignment with local policies and socio-economic contexts, but also further fosters a conducive environment for tailored interventions and strategic adaptations.

At the PFD stage, the following executing entities have been identified:

**Algeria:** The Ministry of Environment and Renewable Energy in Algeria plays a pivotal role in Algeria's renewable energy sector, overseeing the development and implementation of policies and programs aimed at promoting renewable energy and energy efficiency in the country.

**Ecuador:** The Ecuadorian Center for Resource Efficiency and Cleaner Production of Ecuador (CEER) is a private non-profit organization that provides innovative services to the industry and the financial sector, advising them on incorporating the concept of sustainability in their daily work. CEER has experienced technical professionals, which allows them to provide the industrial and financial sector with appropriate solutions on issues of Energy Efficiency, Circular Economy, Carbon Neutrality, Water and Carbon Footprint.

**Egypt:** The Ministry of Electricity and Renewable Energy of Egypt plays a crucial role in shaping the country's energy policies, particularly in the transition towards renewable energy sources. The ministry's activities are pivotal in ensuring the country's energy security and in supporting Egypt's commitments to sustainable energy development.

**Malaysia:** NanoMalaysia, established under the Malaysia's Ministry of Science, Technology and Innovation (MOSTI), acts as business and investment arm. The organization is designed to work with a range of stakeholders including government agencies, industries, and academia to promote and coordinate novel technologies development activities in Malaysia, including hydrogen.

**Namibia:** The Ministry of Environment, Forestry and Tourism (MEFT) in Namibia plays a vital role in environmental conservation, forestry management, and promoting tourism. It is actively engaged in projects and policies aimed at climate change mitigation and adaptation, including managing national parks and wildlife, overseeing sustainable forestry practices, and fostering environmentally responsible tourism.

**Nigeria:** Energy Commission of Nigeria (ECN) is the government body responsible for the strategic planning and coordination of national policies in the field of energy. The ECN is involved in various activities and initiatives related to the development of sustainable energy in Nigeria. This includes developing policies for exploring alternative energy resources and technologies. ECN is also involved in the execution of GEF projects in the country.

**Philippines:** The Department of Science and Technology is the executive department of the Philippine government responsible for the coordination of science and technology-related projects. Within the DOST, the Industrial Technology Development Institute (ITDI) acts as a national R&D agency which undertakes multidisciplinary industrial R&D, technical services for the commercialization of

technologies. The Climate Change Commission serves as the GEF focal agency for climate change and endorses all climate change projects for GEF funding to the DENR who serves as the GEF National Operational focal point. Both the DOST-ITDI, in cooperation with the Climate Change Commission will support the national child project in identifying barriers in scaling up the domestic market and provide necessary corresponding enabling policy measures for their removal.

South Africa: The Department of Science and Innovation is the custodian of national research, development and innovation focusing on developing new energy technologies such as hydrogen. The DSI has implemented the Hydrogen South Africa (HySA) strategy since 2008. Together with other government departments, the DSI has initiated the development of the Hydrogen Society Roadmap in March 2020. The Council for Scientific and Industrial Research (CSIR) is a scientific and technology research organization that researches, develops, localizes and diffuses technologies to accelerate the socioeconomic prosperity in South Africa. The CSIR is involved in the research and development of hydrogen storage technologies as part of the DSI HySA infrastructure project.

The capacity and institutional preparedness of these entities to act as project executing entities will be assessed and subsequently confirmed during the PPG phase.



#### UNIDO GEF Project linked to the programme

The GEF project on 'Green hydrogen energy integrated demonstration application project in China', will allocate funds and actively partake in *component 5 - Knowledge management and dissemination* of the Programme. Relevant stakeholders of the GEF project will be enabled access to the global platform of the Programme and participate in the working groups and global conferences, which are purposed to replicate plans for scaling up hydrogen investments through sharing knowledge amongst the participating countries. Activities contributing to the development of global knowledge products and tools, providing data, case studies and best practices will be jointly proceeded.

### Table On Core Indicators

#### Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
<b>Expected metric tons of CO<sub>2</sub>e (direct)</b>	23710	0	0	0

Expected metric tons of CO <sub>2</sub> e (indirect)	12330822	0	0	0
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**Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector**

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)				
Expected metric tons of CO <sub>2</sub> e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

**Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector**

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)	23,710			
Expected metric tons of CO <sub>2</sub> e (indirect)	12,330,822			
Anticipated start year of accounting	2030			
Duration of accounting	10			

**Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)**

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)				

**Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)**

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
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**Indicator 11 People benefiting from GEF-financed investments**

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	3,920			
Male	6,190			
<b>Total</b>	<b>10,110</b>	<b>0</b>	<b>0</b>	<b>0</b>

Explain the methodological approach and underlying logic to justify target levels for Core and Sub-Indicators (max. 250 words, approximately 1/2 page)

The reduction in GHG was determined with the use of GEF methodology and through a comparison of different scenarios. This comparison covers two time periods: the active project phase from 2025 to 2030 and the subsequent decade until 2040, with the presented number representing the 2040 result.

In accordance with their governmental hydrogen roadmap, they are expected to adhere to IRENA's target for hydrogen to supply 12% of the country's total energy demand by 2050. The total energy demand for the country is based on the current demand, and then projected using the annual energy growth rate for the world. In the baseline scenario, the assumption is that without a hydrogen strategy with set production goals, the 12% will come from grey hydrogen. The baseline is then compared to a scenario with 72% green hydrogen by 2050. The accumulated amount of emitted GHG from the baseline is therefore counted as the potential avoidances over the 10 years of the project.

With this, the CO<sub>2</sub>e associated with this hydrogen production using their respective emission factors is calculated. The emission reduction potential is calculated by comparing these scenarios with the baseline.

The calculations follow GEFs top-down approach and applying a 40% causality factor to the final amount in accordance with level 2 ( ). Included in the final number is the direct GHG emissions avoidances, obtained using the GEF methodology for calculating direct emission impact (1) using the set monetary target for the pilot project and the data specs for a state-of-the-art alkaline electrolyser, running over the 10 years.

## Risks to Achieving Program Outcomes

Summarize program-level risks that might emerge from preparation and implementation phases of child projects under the program, and what are the mitigation strategies the child project preparation process will undertake to address these (e.g. what alternatives may be considered during child project preparation-such as in terms of consultations, role and choice of counterparts, delivery mechanisms, locations in country, flexible design elements, etc.). Identify any of the risks listed below that would call in question the viability of the child project during its implementation. Please describe any possible mitigation measures needed.

The risk rating should reflect the overall risk to program outcomes considering the global context and ambition of the program. The rating scale is: High, Substantial, Moderate, Low.

Risk Categories	Rating	Comments
Climate	Moderate	Climate change risks are not foreseen to affect the programme activities and financial, environmental and social underperformance or failure is unlikely. The potential impact of extreme weather events in respective child project countries may occur but will be limited and the project will take into consideration of the country's resilience to energy and water security, and other public infrastructure which may be prone to damage from extreme weather events. Particularly within water-stressed countries such as Algeria, Namibia and South Africa, the projected climate change impacts on the water sector will be highlighted.

		<p>Each national child project will have to conduct a climate screening (following STAP guidelines for GEF projects) and adopt adequate risk management measures, including through adjustment in project design. Project activities will effectively integrate stakeholders from government, industries, civil societies and local communities in the decision-making process to ensure limited water resources for local consumption are not hindered through leveraging desalination from seawater, industrial or urban wastewater and other non-potable water resources.</p>
Environment and Social	Low	<p>The programme activities will mitigate potential environmental and social risks and ensure a balanced, sustainable approach to the green energy transition within the local communities of the countries. Local communities will be involved in land use decisions, permitting processes and environmental impact assessments and understand the impact hydrogen could have particularly in regard to water and energy access. Institutional stakeholders will be provided with recommendations on establishing policies and regulations for environmental and water related policies for clean hydrogen production and application.</p>
Political and Governance	Low	<p>Clean hydrogen is placed as a high priority area in international climate action dialogue and within governmental agendas of countries partaking in the Global Clean Hydrogen Programme. To maintain the momentum and political support, awareness raising activities, capacity building and training of institutional</p>

		stakeholders will be a key part of the global programme.
Macro-economic	Low	<p>Currency fluctuation can affect project costs and revenues. Uncertainty of market price can affect the production cost of the clean hydrogen produced and risk of economic losses due to high costs of electricity. To mitigate macro-economic risks, the global programme consists of activities in support of developing financial and investment risk mitigation strategies for clean hydrogen projects. In addition, programme activities include capacity training and assessments on clean hydrogen financing from government and financial sectors.</p>
Strategies and Policies	Low	<p>There is a growing interest in establishing strategies and policies on clean hydrogen, particularly within developing countries. However, the establishment of policy frameworks are complex and as it needs to consider priorities and targets, reference on hydrogen development for private investment and finance, identify incentives and subsidies which can contribute to creating an enabling environment for clean hydrogen developments. The programme aims to mitigate potential risks on strategy and policy development through facilitating stakeholder dialogue on policy and regulation, domestic and international hydrogen standards. Assessments on policies and regulations for hydrogen production and application and examination of potential market barriers will be conducted to identify existing gaps and enable large-scale implementation of clean hydrogen.</p>



Technical design of project or program	Low	To mitigate implementation risks of the project, the global programme activities will develop an annual workplan to ensure operational delays are minimized. In consideration to mobilizing co-financing from key partners, a proper follow-up will be made with the co-financing partners to ensure timely availability of co-financing options. During project implementation, co-finance received (cash or in-kind) will be closely monitored and documented.
Institutional capacity for implementation and sustainability	Low	Capacity building amongst government stakeholders is critical for ensuring successful and sustainable policy frameworks. The programme activities will consist of conducting capacity needs assessment to specifically identify areas that require knowledge and skills enhancement. Relevant training workshops will be developed and implemented covering topics on green hydrogen policies, standards, financial mechanisms and permitting procedures to sufficiently develop institutional capacity and mitigate relevant risks.
Fiduciary: Financial Management and Procurement	Low	UNIDO as the executing agency will ensure effective financial management and monitoring and take into consideration of anti-money laundering and counter-financing terrorism, opportunities for money laundering, terrorist financing or other prohibited practices
Stakeholder Engagement	Low	The Global Programme identifies a broad range of public and private actors, who are instrumental in creating an enabling environment for clean hydrogen. To ensure active stakeholder engagement, the programme will develop a

		stakeholder engagement plan and conduct stakeholder identification and mapping assessments in the initial stage of project implementation. Subsequent stakeholder engagement activities will be developed to promote cooperation and alignment amongst identified entities, primarily through dialogue sessions.
Other	Low	The global programme will pursue gender responsive integration and ensure stakeholder involvement at all levels, involving equal engagement of women and men streamlined throughout all activities. UNIDO's gender policy requirements will be implemented to mitigate potential lack of interest to actively promote gender equality in project activities.
Financial Risks for NGI projects		
Overall Risk Rating	Low	The overall rating is low

### C. ALIGNMENT WITH GEF-8 PROGRAMMING STRATEGIES AND COUNTRY/REGIONAL PRIORITIES

Describe how the proposed interventions are aligned with GEF- 8 programming strategies and country and regional priorities, including how these country strategies and plans relate to the multilateral environmental agreements.

Confirm that any country policies that might contradict with intended outcomes of the project have been identified. (approximately 2-3 pages)

Supporting countries in the aim to reduce emissions is integral in achieving the Paris Agreement climate goals. There is an identified need to scale up coherent implementation of climate mitigatory solutions particularly within the context of developing countries to translate such commitments into implementation. To support these objectives, the present Programme and its activities are developed and structured in strong alignment with the GEF-8 Climate Change Focal Areas to enable the transformational shift towards net-zero GHG emissions and climate-resilient development pathways in developing countries.

Corresponding to the GEF-8 Pillar I of the Climate Change Focal Area Strategy Pillar I. “Promote innovation, technology development and transfer, and enabling policies for mitigation options with systemic impacts”, the Programme focuses on enhancing national institutional capacities, promoting enabling policy frameworks, improving technological readiness and financial mechanisms for the successful uptake of clean hydrogen in developing countries. This aim will contribute to

assisting country-driven strategies towards rapid reductions in GHG emissions through the decarbonization of the hard-to-abate industries.

In particular, the present Programme shows strong linkages with the GEF-8 Pillar I. objective 1.2 “Enable the transition to decarbonized power systems”. The production of green hydrogen will contribute to increased expansion of renewable energy, complement end-use sectors that are difficult to electrify and replace fossil fuels as a zero-emission alternative. This approach will further demonstrate benefits clear potential for net zero development with the creation of jobs and take into account promoting women’s participation in the development of clean hydrogen and relevant decision-making processes.

At country level, the child projects are in alignment with the national priorities as set out below. No country policies that contradict the intended outcomes have been identified.

#### Algeria

The project’s objectives are aligned with national policies, strategies and plans related to GHG emission mitigation, renewable energy development and hydrogen. Under its *NDC*, Algeria aims to achieve a 7% reduction in its greenhouse gas emissions by 2030. In light of this, Algeria included clean hydrogen production as a priority in its governmental program announced in September 2021. The *National Renewable Energy Development Strategy 2015-2020* and the *National programme for renewable energy and energy efficiency development plan* aims to develop high solar and wind energy potential (with 22GW of renewables installed by 2030) and diversify the energy mix while attracting private investments. Further, Algeria’s *National Hydrogen Strategy* (March 2023) has a vision to produce and export between 30-40 TW-hours of hydrogen and derivatives by 2040. The strategy includes for a transition from the production of fossil-based hydrogen to clean hydrogen, as well as a transition from pilot projects to industrial-scale projects, particularly in industry such as in ammonia production for fertilizer.

#### Ecuador

The project’s objectives are aligned with national policies, strategies and plans related to GHG emission mitigation, renewable energy development and hydrogen. Under its *NDC*, Ecuador is committed to reduce 9% of its GHG emissions for the energy, industrial processes, agriculture and waste sectors. Furthermore, the commitment rises to 20.9%, conditioned to international support and cooperation. In addition, the goal of the National Government is to further promote renewable energies. For that, there is an updated Electricity Master Plan until 2031 that promotes the implementation of photovoltaic, wind, geothermal and biomass projects to cover the energy demand in the short, medium and long term. Further, the green hydrogen roadmap of Ecuador is aligned with the “fair energy transition” framework that allows a 20-25% reduction in greenhouse gas emissions by the year 2025, and thus contributes to limiting global warming to less than 1.5°C; turning green hydrogen into a competitive energy source.

#### Egypt

The project is aligned with Egypt’s national priorities and its *NDC* commitments (June 2023) to accelerate the transition towards a low-carbon development pathway and increased deployment of renewable energy with a target of 42% installed capacity by 2030. The Government aims to decommission 12 fossil-fuel power plants and overall dependence of

natural gas in the power sector. The NDC recognizes the importance of reducing GHG emissions in the industrial sector. For these reasons, hydrogen has become a priority for the country to achieve this ambition. The project aligns with the *National Climate Strategy 2050* and its aims to reduce carbon emissions and promote the use of renewable and alternative energy sources, including green hydrogen. Hydrogen is used extensively in Egypt's key industries. In this context, Egypt launched its national *Low Carbon Hydrogen Strategic Framework* in November 2022 at COP 27. This framework recognizes the importance of both securing market position through exports and decarbonizing local industries and transport. The project will look to strengthen the Egyptian Cabinet's approved *National Council for Green Hydrogen*, and the pending *National Hydrogen Strategy*. A key objective of the Council is to establish a streamlined mechanism for approving green hydrogen projects. Finally, the project aligns with Egypt's *Energy Strategy 2035* which includes a target of 54 GW of installed renewable energy by 2035 as well as improvements in energy efficiency.

### Malaysia

The project objectives are in line with and complement the national priorities of Malaysia including its *NDC* with an ambition to reduce its economy wide carbon intensity by 45% by 2030 and Malaysia's *National Energy Transition Roadmap* which aims to significantly reduce its reliance on fossil fuels. The plan sets a target of reducing fossil fuel consumption by 25% by 2030, with a corresponding 20% reduction in greenhouse gas emissions. To facilitate the transition to cleaner energy, Malaysia aims for renewable energy to contribute 40% of the country's total energy mix by 2030 and to contribute 70% by 2050. The project also supports the *National Energy Policy 2022-2034* which prioritizes sustainability by incorporating renewable energy sources and recognizing the potential of hydrogen as a versatile energy source for domestic use and export opportunities. The project also supports Malaysia's *Hydrogen Economy and Technology Roadmap* (October 2023) which aims to develop a hydrogen economy in the country. Malaysia seeks to become a competitive producer of clean hydrogen, emphasizing technology development, safety improvements, and cost reduction. Additionally, the project complements Malaysia Green Technology Corporation's *Low Carbon Mobility Blueprint 2021-2030* to reduce emissions in the transportation sector by promoting electrification and reducing reliance on internal combustion engine vehicles, aligning with Malaysia's greenhouse gas reduction targets under the Paris Agreement. Other plans that the project aligns with include *the New Industrial Mater Plan* and *Chemical Industry Roadmap*.

### Namibia

The project objectives are in line with Namibia's national priorities including its *NDC* and its commitment to reduce emissions by 2030. The '*National Sustainable Energy Strategy*' of Namibia looks to introducing new emissions-reduction technologies, whereby renewables will contribute to a 30% reduction equivalent in the quantity of electricity imported which would result in new RE generation of 330 MW of Solar PV per annum until 2030. Further measures, which the project is aligned with, include fuel switching to replace inefficient fuels with cleaner and economical alternatives, such as substituting hydrocarbon for hydrogen or electric energy. The Strategy highlights Namibia's decarbonization plan of the electricity matrix by 2030 to bring significant GHG emissions reduction through green hydrogen. The project is also aligned with the hydrogen roadmap for the strategic partnership on sustainable raw materials and green hydrogen with the European Commission.

## Nigeria

The project objectives are in line with and complement the national priorities of Nigeria. The project is in line with Nigeria's *NDC* and will also complement the already existing national programmes and objectives such as: The Nigerian *Renewable Energy Master Plan (REMP)* which seeks to increase the supply of renewable electricity from 13% of total electricity generation in 2015 to 23% in 2025 and 36% in 2030; the *National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN)*; specifically the strategies for energy and industry and commerce; the *National Energy Policy*, revised in 2022 which stresses the importance of green hydrogen and to ensure its use as a preferred energy source, wherever possible, due to its high environmental friendliness; and the *renewable energy roadmap (2022)* which analyses the additional renewable energy deployment potential up to the year 2050. The project also supports Nigeria's announced aim to reach net-zero emissions by 2060 and Nigeria's *Energy Transition Plan* which seeks to generate new funding and investment for the transition to net zero. Nigeria further declared that such a plan would create significant opportunities, such as the establishment and expansion of industries related to renewables and hydrogen.

## The Philippines

The project objectives are aligned with the Philippine's *NDC* which commits it to GHG emissions reduction and avoidance of 75%. Green hydrogen specifically demonstrates a high potential in contributing to its *NDC* and its stated priorities relating to sustainable industrial development, poverty eradication and inclusive growth, energy security, and transformation of its socio-economic sectors towards a climate and disaster-resilient and low carbon economy. The project is also complementary to the *Philippine Energy Plan 2018-2040*, the *National Renewable Energy Programme* and its implementing *Roadmap* to increase the installed RE capacity to at least 20 GW by 2040. Updates to the Energy Plan will consider the integration of green hydrogen into the country energy mix and the project can support this. The project also supports the medium-term *Philippines Development Plan 2017-2022* which seeks to adopt innovative technologies, which includes the use of green hydrogen as an energy source for electricity generation, utilities and transportation

## South Africa

The project's focus on green hydrogen is in line with, and supports, a number of the country's policy initiatives and strategies and its *NDC (2021)*; making a commitment to reduce GHG emissions by 30% by the year 2030. It is clearly in line and supports the country's *Hydrogen Society Roadmap (2022)* and progress towards a *Just Energy Transition*. Included in the HSR is the *Platinum Valley Initiative* which identifies hydrogen valleys or green hydrogen hubs. It also aligns with the *National Development Plan (2013)* which includes replacing 35 GW of coal fired power capacity with renewable and natural gas.

Child project selection criteria

The Programme takes into consideration of the specific country context and readiness with an overarching objective to support developing countries in achieving the *NDCs* and reducing the emissions gaps to meet climate commitments of the Paris Agreement goals. The Programme further recognizes that country ownership is a core principle of the GEF and ensures that activities are country-driven through maximizing the capacity of recipient countries. Strong alignment in

national-level interventions is shown throughout the activities of the Programme with consideration of the GEF-8 ‘Country Engagement Strategy’.

*Promoting South-South knowledge-sharing through tailored responsiveness:* The Programme consists of a global component which will enable countries to be part of a global platform and engage in knowledge sharing and thematic working groups. Developing countries can draw lessons and studies through analyzing good practices for clean hydrogen production and application. This will provide an opportunity for participating countries to exchange with investors and promote south-south knowledge to further support their hydrogen development plans.

Building on these considerations, the Programme incorporated the following selection criteria to engage with the countries:

- • Presence of hard to abate sector industries and/or energy related projects in particular, steel, chemical (ammonia/methanol) and other industries such as cement and glass, as well as potential for hydrogen use in the transport sector.
- • Availability of renewable energy and surplus.
- • Already existing green hydrogen production activities and baseline projects.
- • Presence of projects on natural gas, biogas, and biofuels; countries with availability of gas infrastructure.
- • Off-grid energy needs. Mini grids in rural areas where long term/seasonal storage is needed as well as for local grid stability/balancing.
- • Presence of industrial country roadmaps, projects or programmes, policies on green hydrogen (ongoing or to be developed with demonstrated interest shown from national government).

## D. POLICY REQUIREMENTS

### Gender Equality and Women’s Empowerment

We confirm that gender dimensions relevant to the program have been addressed as per GEF Policy and are clearly articulated in the Program Description (Section B).

Yes

### Stakeholder Engagement

We confirm that key stakeholders were consulted during PFD development as required per GEF policy, their relevant roles to program outcomes and plan to develop a Stakeholder Engagement Plan in the Coordination Child Project before CEO endorsement has been clearly articulated in the Program Description (Section B).

Yes

### Were the following stakeholders consulted during PFD preparation phase:

Indigenous Peoples and Local Communities:

Civil Society Organizations : Yes



Private Sector : Yes

Provide a brief summary and list of names and dates of consultations

UNIDO will be responsible for stakeholder engagement. In the project preparation UNIDO has reached out to consult with government agencies, international organizations and other hydrogen related initiatives, private sector, financial institutions and research academia to understand their concerns and their objectives, as well as their linkages to the Global Programme. A list of consultations to date is provided below/in annex z. Indigenous people will not be impacted nor specifically involved in this project, however, innovative solutions from such communities or those that benefit these communities will be supported.

#### Stakeholders

Private and public sector actors are essential in leveraging knowledge, expertise, resources, and capabilities. Collaboration can foster sustainable economic development, job creation, and technology transfer. All relevant stakeholders will be elaborated on more closely in each country's concept note and during the PPG. As detailed in the baseline section, there are a number of existing GEF and non-GEF-funded initiatives either promoting clean hydrogen or complementing the project on a global level. These initiatives and organizations can facilitate international cooperation, set standards, and share knowledge. They are particularly important for sharing knowledge, experiences, and best practices for clean hydrogen, including policy and finance. The key partner stakeholders are detailed in the table below along with the anticipated role of the stakeholders.

Table 6. Stakeholder roles and engagement

Stakeholder	Role	Engagement	Timing
Government institutions/agencies - Instrumental in creating an enabling environment for green hydrogen through policymaking and regulation.		The country government agencies are key stakeholders of GCHP. They will be beneficiaries of institutional capacity building and policy development. They can provide strategic directions and legal frameworks that promote the development and use of clean hydrogen. They can lead or support convening institutional stakeholders, allowing the formulation and adoption of policy recommendations, develop clean hydrogen standards, and participate in capacity building (all components)	Continuous
Algeria: GIZ, AFD, UNDP, Ministry of Environment			
Ecuador: Ministry of Energy and Mines, Ministry of Environment, GIZ Ecuador, Ecuadorian Hydrogen Association (H2 Ecuador), IDB Office in Ecuador			
Egypt: Department of Petroleum and Energy Engineering of the American University in Cairo, Nexus Analytica, GIZ		Consult, empower and inform	
Malaysia: Nanomalaysia			
Namibia: Environmental Investment Fund of Namibia, H4D, GIZ			



Nigeria: Energy Commission of Nigeria, Ministry of Environment, GIZ			
Philippines: Department of Science and Technology - Industrial Technology Development Institute, Climate Change Commission, GIZ			
South Africa: Department of Science and Innovation, Council for Scientific and Industrial Research, GIZ, Department of Forestry, Fisheries and the Environment, Department of Trade, Industry and Competition, H4D			
Private Sector – Energy producers	Energy companies are key players for successfully driving the clean hydrogen market. Energy companies will have a positive impact on the demand of renewable energy.	The producers will bring technical expertise and will invest in upscaling renewable energy production as well as capacity building. These companies will provide the energy for hydrogen production and for the decarbonization of industry. Involved in Components 2,3,4	Continuous
Private Sector – off-takers	Off-takers, such as hard-to-abate industry and transport, have great potential for hydrogen application, making a market case for clean hydrogen.	They can further contribute to the enabling environment for clean hydrogen by investing in hydrogen projects and participating in innovative financing mechanisms. Will be involved in technical readiness and industrial clusters and financing (Components 2,3,4)	Continuous
Researchers and Engineers	These stakeholders are responsible for developing and improving clean hydrogen technologies. Engineers provide expertise in designing and constructing production and infrastructure facilities. They ensure the technical feasibility and efficient execution.	They can assist in identifying off-takers for hydrogen application and determining potential impacts. They also contribute by improving the technical readiness of selected clusters for the production and application of hydrogen. Involved as consultants and consultees as well as technology providers in Components 2,3,4, as well as stakeholders in policy (Component 1)	Continuous
Technology Providers, including – Engie Intercontinental Energy SASOL Siemens Energy Thyssenkrupp Vietnam Petroleum Institute		Technical (and co-finance) partners relevant to Component 2 and 3, responsible for providing support in the development of the different assessments and knowledge products to enhance local technical readiness for the production and industrial application of clean hydrogen of private sector stakeholders in participating countries.	Continuous
Local communities	The engagement and acceptance of local communities are vital for successful project implementation. Local communities may be involved in land use decisions, permitting processes, and environmental impact assessment	Key stakeholders in the development of policy, and of projects. It is important to involve them to also understand the impact hydrogen can have on them, particularly in regard to water and energy access. (Components 1,2,3)	Continuous
National Financial institutions	These institutions are crucial for the financing and economic	Involved in financing projects as well as review project pipelines, conduct pre-	Continuous

	viability of clean hydrogen projects.	feasibility studies, increase capacity on clean hydrogen financing, develop risk mitigation strategies, and identify innovative financing options. (Components 3&4). Also receipt of capacity building.	
NGOs	NGOs can advocate for clean hydrogen, raise public awareness, and push for supportive policies. They can significantly encourage policy changes and advocate for environmental considerations in policy and finance.	Key stakeholders in policy development as well as in project development. They also play a key role in facilitating knowledge sharing and best practices for clean hydrogen (all components). Women's groups will be actively sought to engage in project design and implementation – e.g. Women in Green Hydrogen	Continuous
<b>International organisations and initiatives</b>			
UNIDO	UNIDO aims to stimulate the accelerated uptake of green hydrogen and its application in hard-to-abate industries of developing countries and transition economies. UNIDO considers a wide array of key enablers to support developing countries in achieving a just hydrogen transition that puts social and environmental aspects in focus. Runs a number of initiatives	Implementing agency and Executing Agency for the Global Child Project.  Responsible for the programme coordination and monitoring and for ensuring synergies with on-going UNIDO and others' initiatives	Continuous
World Bank/ESMAP – H4D	The World Bank brings financial expertise and a broad programmatic support to the sector. Specifically for Hydrogen, the World Bank launched the Hydrogen for Development Partnership.	Knowledge partner and Member of the Global Advisory Board responsible for providing strategic guidance to the global child project particularly within the working group for finance; Collaborate as invited member of Working Groups (Component 5); and member of knowledge platform. GCHP will build on H4D work.	Continuous
International Energy Agency (IEA)	IEA partners with governments to serve as a source of information and support in their transition to clean energy. The agency also conducts research to track the progress of the green energy transition, including hydrogen. The Hydrogen Technology Collaboration Program (TCP) serves as a platform for government and private stakeholders to convene and share information and research on the development of hydrogen technologies and policies	Knowledge partner relevant to Component 1 of the Programme, responsible for providing recommendations on policies and regulations for clean hydrogen production and application, and the development of strategies or roadmaps. Collaborate with TCP as invited member of Working Groups (Component 5)	Continuous
International Renewable Energy Agency (IRENA)	A source of information and support for governments seeking to transition their energy infrastructures to greener alternatives, such as hydrogen. Contributes to research on green hydrogen topics and provides a platform for dialogue and information sharing between stakeholders working within green hydrogen's political economy – hosts Green Hydrogen Collaborative framework	Knowledge partner relevant to Component 1 of the Programme, responsible for providing recommendations on policies and regulations for clean hydrogen production and application, and the development of strategies or roadmaps  Member of the Global Advisory Board; Collaborate as invited member of Working Groups (Component 5)	Continuous

International Organization for Standardization (ISO)	Responsible for development of international standards including along hydrogen value chain	Knowledge partner relevant to Component 1 of the Programme, responsible for providing recommendations on clean hydrogen standards with a focus on the technologies along the value chain, accurate measures and accounting and the applications of hydrogen. Collaborate as invited member of Working Groups (Component 5)	Continuous
Mission Innovation – Clean Hydrogen Mission	Its goal is to reduce the costs of clean hydrogen to the end user to 2 USD/kg by 2030, working in three areas: tackle top R&D priorities to drive cost reductions; deliver 100 clean hydrogen valleys by 2030; and preparing the ground for the scale-up of the hydrogen economy.	Knowledge partner relevant to Component 1 and 3 of the Programme, particularly looking at industrial clusters. Collaborate as invited member of Working Groups (Component 5)	Continuous
Clean Energy Ministerial (CEM) Hydrogen Initiative	Aims to advance policies, programmes and projects that accelerate the commercialization and deployment of hydrogen fuels and technologies across all aspects of the economy	Collaborate on knowledge products and advice – invited member to working groups (Component 5)	Continuous
United Nations Economic Commission for Europe (UNECE)	UNECE runs “sustainable hydrogen production in the UNECE region and its role in the development of a hydrogen ecosystem and export potential” project and a working group on classification and taxonomy for hydrogen	Collaborate as invited member of Working Groups (Component 5) Knowledge partner relevant to Component 1 of the Programme, responsible for providing recommendations on clean hydrogen standards with a focus on the technologies along the value chain, accurate measures and accounting and the applications of hydrogen.	Continuous
Breakthrough Agenda (FCDO/IRENA/UNIDO/)	Hydrogen Glasgow Breakthrough Goal maintains an objective to make affordable renewable and low carbon hydrogen globally available by 2030	Continuing interaction with the agenda through the implementing partners (included elsewhere in the table)	Continuous
GIZ	GIZ combines global experience with local knowledge and brings first-hand experience promoting the uptake of green hydrogen. GIZ is actively supporting green hydrogen via H2-Uppp and Global Hydrogen Diplomacy and H2 Global, promoting the energy transition in developing countries and GET.pro	Liaise with GIZ in each country in which they are active – particularly relating to Component 1 and policy, capacity building and roadmap/strategy development, but also related to all other components. Knowledge partner / potential co-finance.	Continuous
International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE)	IPHE informs broad stakeholder groups, including policymakers and the public, on the benefits and challenges to establishing widespread commercial hydrogen and fuel cell technologies in the economy.	Knowledge partner – GCHP will work with IPHE’s two working groups on outreach and standards as well as its task forces which focus on skills, production, trade and certification,	Continuous

<p>International/Regional Financial Institutions, including -</p> <p>African Development Bank</p> <p>Asian Development Bank</p> <p>Development Bank for Southern Africa</p> <p>European Bank for Reconstruction and Development</p> <p>European Investment Bank</p> <p>Inter-American Development Bank</p> <p>GCF</p> <p>KfW</p> <p>World Bank</p>	<p>Knowledge partners in Component 1&amp;2 building on previous work.</p> <p>Financing partner for pilot projects (component 3) – particularly Green Hydrogen Fund and PtX platform</p> <p>Technical and knowledge partner relevant to Component 4, responsible for enhancing the capacity on clean hydrogen financing of the government and financial sector, developing mitigation strategies for clean hydrogen projects, identifying innovative financing options and improving financial mechanisms of participating countries.</p>	<p>Continuous</p>
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Table 7. Consultations with national stakeholders

Country	Participants (Name, position)	Institution/organization	Date	Type of meeting (online or in person)	Summary of the consultation
Algeria	<p>Mr. Mourad Chikhi</p> <p>Mr. Karim Baba</p>	<p>Director of Cooperation at the Ministry of Environment and Renewable</p>	<p>16/02/2023</p> <p>21/02/2023</p> <p>09/05/2023</p>	<p>Online</p> <p>Online</p> <p>Online</p>	<p>The UNIDO Global Hydrogen for Industry programme was presented and a plan was defined to reach other relevant stakeholders to develop a GEF child project. A child concept note for GEF was shared and relevant comments were incorporated</p>
Algeria	<p>Mr. Berrah Sofiane</p>	<p>Ministry of Foreign Affairs, Director General of Multilateral Relations</p>	<p>02/03 2023</p>	<p>Note Verbale</p>	<p>Request to get the endorsement letter</p>
Algeria	<p>Ms. Rebecca Hilz</p>	<p>GIZ Algeria</p>	<p>09/05/2023</p> <p>19/05/2023</p>	<p>Online</p> <p>Online</p>	<p>The child project was presented to them in order to align with their activities in green hydrogen in the country, and avoid duplication of efforts. They were also</p>

					reached to be part of the co-financing
Egypt	Mr. Eng. Ahmed Hafez  Mr. Dr. Ahmed Mahrous	Section Head Green Hydrogen Projects, Minister's Technical Office, Ministry of Electricity and Renewable Energy	22/02/2023  14/06/2023  14/10/2023  Throughout 2022/23	Online  In person  In person  Online	The UNIDO Global Hydrogen for Industry programme was presented and a plan was defined to reach other relevant stakeholders to develop a GEF child project. A child concept note was shared and relevant comments were incorporated
Egypt	Ms. Moongyung Lee  Mr. Deger Saygin	OECD	11/05/2023  19/06/2023  01/11/2023  08/11/2023	Online  In person  In person  Online	The child project was presented to them in order to align with their activities in green hydrogen in the country, and avoid duplication of efforts. They were also reached to be part of the co-financing
Egypt	Mr. Ali Abo Sena	GEF OFF, Ministry of Environment	19/06/2023  14/10/2023	In person  In person	The child project preparation was done in coordination with the Ministry of Environment's team
Egypt	Ms. Maha Nabulsi  Ms. Elvira Kanichay	GIZ Egypt	20/06/2023  07/11/2023	In person  Online	The child project was presented to them in order to align with their activities in green hydrogen in the country, and avoid duplication of efforts. They were also reached to be part of the co-financing
Egypt	Mr. Amr Hazaa	MTI, Ministry of Industry	21/06/2023	In person	The GEF Global Clean Hydrogen programme was presented
Egypt	Mr. Karim Rawy	Siemens Egypt, Decarbonization Business Advisor &	09/10/2022	In person	The GEF Global Clean Hydrogen programme was presented. A visit to their facilities in the

		Head of Governmental Affairs	Throughout 2023		Siemens-GIZ academy took place
Egypt	Mr. Stefano Giera	ENI Egypt, head of Commercial and Negotiations	10/10/2022 Throughout 2023	Online In person	Close coordination to elaborate the technical assessments on green hydrogen in the country developed by UNIDO's Programme
Egypt	Mr. Ahmed Kamal A Mr. del Taha; Ms. Noha Elbalky	Federation of Egyptian Industries, Executive Director. FEI Technical advisor	22/06/2023 Throughout 2023	In person In person and online	Close coordination to elaborate the technical assessments on green hydrogen in the country developed by UNIDO's Programme
Egypt	Mr. Amir Refaat	Orascom, Hydrogen Projects Director	10/10/2022	Throughout 2023	The GEF Global Clean Hydrogen programme was presented
Egypt	Mr. Khaled Nageib Ms. Dalia Samir	Hydrogen Egypt, CEO	14/02/2023 24/05/2023	Online Online	The GEF Global Clean Hydrogen programme was presented, as well as the activities that UNIDO is carrying out in Egypt
Egypt	Mr. Nafal Hassani	Afreximbank	18/05/2023	Online	Exploration of funding opportunities
Egypt	Ms. Eirini Koutra Mr. Juan Audibert Ms. Isabelle Cabos	EIB	05/12/2023 22/05/2023 07/08/2023	Online	Presentation of the GEF Global Clean Hydrogen programme Exploration of funding opportunities
Egypt	Mr. Hamza Al-Assad Mr. Dimitri Koufos	EBRD, CFA Associate Director	16/09/2022 11/10/2022 29/11/2022 30/01/2023 06/03/2023	Online In person Online Online Online	Presentation of the GEF Global Clean Hydrogen programme The child project was presented to them in order to align with their activities in green hydrogen in the country, and avoid duplication of efforts Exploration of funding opportunities

Egypt	Mr. Martino Melli	Italian Agency for Cooperation and Development	12/09/2022	Online	Presentation of the GEF Global Clean Hydrogen programme
	Mr. Carmelo Armetta		22/06/2023	In person	
			23/10/2023	Online	
Egypt	Ms. Noha Khalil	Sovereign Fund of Egypt, Chief Investor Relations Officer	11/10/2023	In person	Presentation of UNIDO's work in Egypt in green hydrogen
			09/2023	Online	
					Exploration of funding opportunities
Egypt	Mr. Ahmed Elbeltaoui	Delegation Egypt Cooperation	25/10/2022	Online	Exploration of funding opportunities
Namibia	Mr. Nico Synders  Mr. John Titus	Renewable Energy Division, Ministry of Mines and Energy	31/08/2022	Online	The UNIDO Global Hydrogen for Industry programme was presented and a plan was defined to reach other relevant stakeholders to develop a GEF child project. A child concept note for GEF was shared and relevant comments were incorporated
			22/09/2022	Online	
			19/10/2022	Online	
			28/10/2023	Online	
			13/01/2023	Online	
			25/01/2023	Online	
			07/02/2023		
			16/05/2023		
26/05/2023					
Namibia	Mr. Abraham Hangula	National Designated Authority	19/10/2022	Online	The GEF Global Clean Hydrogen programme was presented for
				Online	



	Mr. James Mnyupe  Mr. Demetrius Jonas  Ms. Susan Tise		24/10/2022		Namibia and relevant comments were incorporated
Namibia	Mr. Grant Muller	Sacreee  Nampower	28/10/2023	Online	The GEF Global Clean Hydrogen programme was presented for Namibia and relevant comments were incorporated
Namibia	Mr. Kudakwashe Ndhlukula	Sacreee	10/08/2022  28/10/2023	Online  Online	The GEF Global Clean Hydrogen programme was presented for Namibia to align the strategies in the region
Namibia	Mr. Bertram Swartz  Ms. Ndina Nashipili  Ms. Paulina Mufeti	Geohydrology at Ministry of Agriculture, Water and Land Reform.  Chief Hydrologist with the Ministry of Agriculture, Water and Forestry	25/01/2023	Online	The GEF Global Clean Hydrogen programme was presented for Namibia and relevant comments were incorporated
Namibia	Mr. Simon Inauen	GIZ Namibia	16/10/2023	Online	Presentation of the GEF Global Clean Hydrogen programme for namibia  Meeting to discuss co-financing for the GEF programme
Namibia	Mr. Petrus Muteyauli	Ministry of Environment	16/05/2023	Online	The GEF Global Clean Hydrogen programme was presented for Namibia and relevant comments were incorporated
Nigeria	Dr. Iniobong Abioal-Awe	Federal Ministry of Environment - Director, Climate Change Department	14-May-23	In person	The Director was briefed on Green Hydrogen and UNIDO's plan to develop the project with the

					Ministry and other national organizations
Nigeria	Ms. Sharon Ikeazor	Federal Ministry of Environment - Former Minister of State for Environment	6-Feb-23	In person	Discussion on forming a Green Hydrogen National Steering Committee and government coordination between Ministries of Environment, Power and Petroleum
Nigeria	Dr. Aminu Mohammed	Federal Ministry of Environment - Technical Adviser to Minister of State for Environment	13-Dec-22	In person	Discussion on forming a Green Hydrogen National Steering Committee and government coordination between Ministries of Environment, Power and Petroleum. Organizing the meeting with UNIDO coordinating
Nigeria	Dr. Ibrahim Sulu	Energy Commission of Nigeria - Director	3-Oct-22	In person	Discussion on Green Hydrogen and the possible role of Energy Commission of Nigeria
Nigeria	Ms. Gina Lagunes	GIZ - Country Head, GIZ Hydrogen Office	17-May-23	Virtual	Discussion of coordination and possible collaboration between UNIDO and GIZ
Nigeria	Mr. Jonah Stanley	Federal Ministry of Environment - GEF OFP	29-Jan-23	In person	Discussion on Green Hydrogen and allocation of GEF STAR allocation
Nigeria	Mr. Abubakar	Federal Ministry of Power - Director Renewable Energy	1-Nov-23	In person	Discussion on putting a National Working Group and the role of Federal Ministry of Power
Nigeria	Prof. Bala	Energy Commission of Nigeria - Former Director General	25-May-23	In person	Introducing the proposed project and ECN's role
Nigeria	Dr. Mustapha Abdullahi	Energy Commission of Nigeria - Director General	14-Nov-23	In person	Introducing the proposed project and ECN's role

Malaysia	<p>Mr. Remy Ruat, GEF Secretariat HQ</p> <p>Mr. Ahmad Farid bin Mohammed, Deputy Undersecretary, NRECC (GEF OFP)</p>	Ministry of Natural Resources, Environment, and Climate Change (NRECC)	09/05/2023	In-Person at Sheraton Imperial Hotel, Kuala Lumpur	Proposal for GEF Global Clean Hydrogen programme was shortlisted for a selection meeting, in which it was presented and discussed. The next steps were to further develop the proposal documents (the Concept Note and the Presentation Slides) in preparation for a follow-up meeting to the GEF Steering Committee.
Malaysia	<p>Ms. Dr. Hartini binti Mohd Nasir, Secretary of the Climate Change Division, NRECC</p> <p>Ms. Marhaini binti Mat, Assistant Secretary of the Climate Change Program Unit, NRECC</p> <p>Ms. Suaibatul Aslamiah binti Abd Halim,</p>	Ministry of Natural Resources, Environment, and Climate Change (NRECC)	15/08/2023	In-person at NRECC Headquarters	The GEF Global Clean Hydrogen programme proposal was presented to the GEF Steering Committee. The Committee members were either neutral or in strong support of the proposal. The next steps were to address comments on Proposal Documents from the GEF Steering Committee before resubmission. This included developing a proposed project timeline, further detailing the costings of project components, and obtaining a letter of support from the Ministry of Science, Innovation, and Technology (MOSTI).

	Assistant Secretary,  Ministry of Science, Innovation, and Technology (MOSTI)				
Philippines	Mr. Jonas Leones, Undersecretary  Ms. Analiza Reuelta-The, Undersecretary, GEF OFP	Department of Environment and Natural Resources	13/06/2023	In person at UNIDO HQ	The GEF Global Clean Hydrogen program was presented. Representatives from the country showed interest. The next steps for the endorsement of the project were established, including the submission of the Child project concept note and the initiation of the consultation process with different departments.
Philippines	Dr. Annabelle V. Briones, Director IV	Department of Science and Technology	14 June 2023	Online and in-person	The Department of Science and Technology supported the proposal and led as the government's main proponent.  The department also endorsed the proposal to the GEF-OFP for the country's child project for the GEF-8 Global Programme.
Philippines	Mr. Rustico Noli Cruz, Vice President	Development Bank of the Philippines	14 Sept 2023	Online	As the country's development bank, The Development Bank of the Philippines is open to supporting the project by assisting the

					project stakeholders in accessing financing windows and in the delivery of capacity-building
Philippines	Mr. Rommel Antonio O Cuenca,  Deputy Executive Director	Climate Change Commission	06 November 2022	Online meetings and Document Correspondence	<p>The Climate Change Commission (CCC) notes that the support for developing the country's institutional capacity needs, alongside support for the actual technology transfer, would be beneficial and critical in implementing robust intellectual property protection and allowing the country to do its fair share in raising ambition and climate action. CCC further noted that the proposed innovation may be the first in the country.</p> <p>The commission also suggested to include the project's alignment or contribution to facilitating the implementation of the country's Nationally Determined Contribution (NDC) policies and measures be included.</p>
Philippines	Dr. Nicole Kranz  Cluster Coordinator Climate Change and	GIZ	September 29, 2023	Online Meeting	The proposal was presented to the local GIZ team in the Philippines. GIZ is eager to seek potential

	Disaster Risk Management				collaboration and partnership.
Philippines	Mr. Sagar Siva Shankar, operations Officer  CMA East Asia and Pacific	IFC	27 June 2023	Online meeting	The proposal was presented to the local GIZ team in the Philippines. GIZ is eager to further assess the proposal to seek potential collaboration and partnership.
Philippines	Mr. Octavio Peralta, Executive Director	UN-Global Compact Network Philippines	20 July 2023	Online meeting	The proposal was presented to the UN-Global Compact Network Philippines. It was agreed to engage in further discussions when the project is approved to seek synergies.
South Africa	Ms. Shahkira Parker, Operational Focal Point and Senior Policy Advisor	Department of Forestry, Fisheries and the Environment	02 March 2023	Online meeting	<ul style="list-style-type: none"> <li>The GEF-8 Global Clean Hydrogen program was presented. The GEF OFP from the country showed interest.</li> <li>The next steps for the endorsement of the project were established, including the submission of the Child project concept note and the</li> </ul>

					initiation of the consultation process with different stakeholders including the Department of Science Innovation and Department of Trade Industry and Competition.
South Africa	<p>Ms. Tanya van Zyl, Quality Manager, National Cleaner Production Centre</p> <p>Mr. Lee-Hendor Ruiters, Regional Manager, National Cleaner Production Centre</p>	Council for Scientific and Industrial Research (CSIR)	29 May 2023	Online meeting	<ul style="list-style-type: none"> <li>The child project concept was presented to the Council for Scientific and Industrial Research. It was agreed to engage in further discussions when the project is approved to seek synergies.</li> <li>The CSIR introduced ongoing green hydrogen pilot projects in South Africa which demonstrate strong relevance and complementarities to the child project.</li> </ul>
South Africa	Ms. Shahkira Parker, Operational Focal Point	Department of Forestry, Fisheries and the Environment	5 July 2023	Online meeting	<ul style="list-style-type: none"> <li>Consultation made with DSI and DTIC in receiving inputs</li> </ul>



	<p>and Senior Policy Advisor</p> <p>Mr. Gerhad Fourie, Chief Director Green Industries, Department of Trade Industry and Competition</p> <p>Ms. Mandy Mlilo, Deputy Director of Hydrogen and Energy, Department of Science and Innovation</p>	<p>Department of Science Innovation</p> <p>Department of Trade Industry and Competition</p>			<p>to the draft child project concept note.</p> <ul style="list-style-type: none"> <li>UNIDO elaborated on how the UNIDO projects on green hydrogen through the GCF and GEF will be complementary .</li> </ul>
South Africa	<p>Mr. Alexander Mahler, Green Hydrogen and Power to X Component Lead, GIZ</p> <p>Ms. Thobeka Mchunu, Programme Officer, GIZ</p> <p>Mr. Thabo Chauke, policy and regulatory framework advisor, GIZ</p>	GIZ South Africa	2 August 2023	Online meeting	<ul style="list-style-type: none"> <li>Consultation undertaken with GIZ South Africa to be a potential co-financier of the project.</li> <li>UNIDO presented and outlined hydrogen activities in South Africa through the GCF and GEF. The GEF-8 child project concept note for South Africa was shared as reference.</li> </ul>

<p>South Africa</p>	<p>Ms. Rakeshnie Ramoutar, Acting Deputy Director-General of Technology and Innovation, Department of Science and Innovation</p> <p>Ms. Rebecca Maserumule, Chief Director: Hydrogen and Energy, Department of Science and Innovation</p> <p>Ms. Mandy Mlilo, Deputy Director of Hydrogen and Energy, Department of Science and Innovation</p> <p>Mr. Cosmas Chiteme, Director of Alternative Energy, Department of Science</p>	<p>Department of Science Innovation</p>	<p>10 August 2023</p>	<p>Online meeting</p>	<ul style="list-style-type: none"> <li>• Consultation made with DSI in receiving inputs to the draft child project concept note.</li> <li>• UNIDO further elaborated on how the UNIDO projects on green hydrogen through the GCF and GEF will be complementary .</li> </ul>
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	and Innovation				
South Africa	Mr. Gerhad Fourie, Chief Director Green Industries, Department of Trade Industry and Competition	Department of Trade Industry and Competition	10 August 2023	Email Correspondence	DTIC provided endorsement and support to the child project proposal submission to GEF OFP.
South Africa	Mr. Cosmas Chiteme, Director of Alternative Energy, Department of Science and Innovation	Department of Science and Innovation	22 August 2023	Email and Document Correspondence	DSI provided inputs and endorsement to the child project proposal submission to GEF OFP.
South Africa	Ms. Shahkira Parker, Operational Focal Point and Senior Policy Advisor	Department of Forestry, Fisheries and the Environment	01 September 2023	Document Correspondence	Letter of Endorsement received from GEF OFP upon finalized inputs provided from the Department of Science Innovation and Department of Trade Industry and Competition of South Africa.
Ecuador	Ms. Isabel Albornoz, Undersecretary of International Cooperation, Ministry of Foreign Affairs (MOFA)	Ministry of Foreign Affairs of Ecuador (MOFA)	11/07/2023	In person UNIDO Representative and online HQ	The GEF Global Clean Hydrogen programme was presented. Representatives from MOFA showed interest. Next steps for coordinating meetings with Ministry of Energy and Mines delegates and Ministry of Environment GEF OFP were defined, as to advance a Green

	Other delegates from MOFA				Hydrogen project for Ecuador.
Ecuador	<p>Ms. Irene Schults, Director of International Cooperation, Ministry of Environment (MAATE) GEF OFP</p> <p>Ms. Brigitte Flores, Director of International Affairs, Ministry of Energy and Mines (MEM)</p> <p>Delegates from other Government institutions</p>	<p>Ministry of Environment, Directorate of International Cooperation</p> <p>Ministry of Energy and Mines, Directorate of International Cooperation</p> <p>Ministry of Foreign Affairs, Ministry of Production, Ecuador Permanent Mission in Vienna</p>	20/07/2023	In person UNIDO Representative and online HQ	The GEF Global Clean Hydrogen programme was presented. Representatives from the country showed interest. Next steps for the endorsement of the project were established, including conducting internal consulting processes in the Ministry of Environment and the Ministry of Energy and Mines, and defining if funds from the GEF STAR allocation for Ecuador are available and can be used for this project.
Ecuador	Ms. Irene Schults, Director of International Cooperation, Ministry of Environment (MAATE) GEF OFP, and her staff	Ministry of Environment, Directorate of International Cooperation	13/09/2023	In person UNIDO Representative Ecuador	The GEF Global Clean Hydrogen programme was presented and details of a possible project for Ecuador were discussed. Representatives from the Ministry of Environment showed interest, but most of Ecuador GEF STAR allocation has been already distributed, conversations will be conducted at the interior of the Ministry of Environment to

					reassign priorities and define if funding can be available for this project, as they believe this project is very important for Ecuador.
Ecuador	Ms. Irene Schults, Director of International Cooperation, Ministry of Environment (MAATE) GEF OFP, and her staff	Ministry of Environment, Directorate of International Cooperation	27/09/2023	Online UNIDO Representative Ecuador	<p>Further details of the Green Hydrogen project for Ecuador were discussed.</p> <p>Next steps for the endorsement of the project were established, including the submission of a concept note for presentation to the Minister of Environment, for advancing technical consultation process with different departments of the Ministry of Environment and the Ministry of Energy and Mines.</p>
Ecuador	Ms. Irene Schults, Director of International Cooperation, Ministry of Environment (MAATE) GEF OFP, and her staff	Ministry of Environment, Directorate of International Cooperation	07/11/2023	In person UNIDO Representative Ecuador	<p>Further details of the Green Hydrogen project for Ecuador were discussed. Ecuador can assign funds for the project from GEF BD allocation for this country.</p> <p>Next steps for the endorsement of the project were established, including the submission of a concept note in final GEF Child Project format for further consultation process with different departments and with</p>

					the Ministry of Energy and Mines.
Ecuador	Ms. Brigitte Flores, Director of International Affairs, Ministry of Energy and Mines (MEM) and her team	Ministry of Energy, Directorate of International Cooperation			Technical details of the Green Hydrogen project proposal for Ecuador were discussed. They are very interested and committed to the project. Next steps were agreed, including revising the final GEF Child Project proposal in consultation process with different departments of the Ministry of Energy and Mines.
	Mr. Luis Manzano, director of Projects of Energy Efficiency	Ministry of Energy, Undersecretariat of Electric Energy	10/11/2023	In person UNIDO Representative	
	Ms. María Sara Jijón, Senior Advisor of the Minister of Energy and Mines	Ministry of Energy, Office of the Minister			
Ecuador	Ms. Irene Schults, Director of International Cooperation, Ministry of Environment (MAATE) GEF OFP, and technical staff from the Ministry of Environment	Ministry of Environment, Directorate of International Cooperation	14/11/2023	In person UNIDO Representative Ecuador and online HQ	GEF Child Project final proposal was discussed in detail with technical staff from the Ministry of Environment, their inputs were included in the proposal and a final proposal review was planned with the participation of technical areas of the Ministry of Energy involved in the process.  Next steps for the endorsement of the project were

					established, including the submission of the Endorsement Letter.
Ecuador	Mr. Luis Manzano, director of Projects of Energy Efficiency and his team	Ministry of Energy, Undersecretariat of Electric Energy			<p>GEF Child Project final proposal was discussed in detail with technical staff from the Ministry of Energy and Mines, their inputs were included in the proposal and validated by Ministry of Environment representatives.</p> <p>All parts agreed with the final GEF Child Project proposal, and the GEF OFP agreed to submit the Ecuador Endorsement Letter to continue the process</p>
	Ms. Brigitte Flores, Director of International Affairs, Ministry of Energy and Mines (MEM) and her team	Ministry of Energy, Directorate of International Cooperation			
	Ms. Irene Schults, Director of International Cooperation, Ministry of Environment (MAATE) GEF OFP and her team	Ministry of Environment, Directorate of International Cooperation			
			16/11/2023	In person UNIDO Representative and online HQ	

(Please upload to the portal documents tab any stakeholder engagement plan or assessments that have been done during the PFD preparation phase)

#### Private Sector

Will there be private sector engagement in the program?



Yes

And if so, has its role been described and justified in section B program description?

Yes

### Environmental and Social Safeguards

We confirm that we have provided indicative information regarding Environmental and Social risks associated with the proposed program and any measures to address such risks and impacts (this information should be presented in Annex D).

Yes

### Overall Project/Program Risk Classification

PIF	CEO Endorsement/Approval	MTR	TE
Low			

## E. OTHER REQUIREMENTS

### Knowledge management

We confirm that an approach to Knowledge Management and Learning has been clearly described in the Program Description (Section B)

Yes

## ANNEX A: FINANCING TABLES

### GEF Financing Table

#### Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	GEF Program Financing (\$)	Agency Fee(\$)	Total GEF Financing (\$)
UNIDO	GET	Algeria	Climate Change	CC STAR Allocation: CCM-1-2	634,932.00	57,143.00	692,075.00
UNIDO	GET	Nigeria	Climate Change	CC STAR Allocation: CCM-1-2	1,784,862.00	160,638.00	1,945,500.00
UNIDO	GET	Philippines	Climate Change	CC STAR Allocation: CCM-1-2	1,000,000.00	90,000.00	1,090,000.00
UNIDO	GET	South Africa	Climate Change	CC STAR Allocation: CCM-1-2	863,242.00	77,692.00	940,934.00
UNIDO	GET	Namibia	Climate Change	CC STAR Allocation: CCM-1-2	497,945.00	44,815.00	542,760.00

UNIDO	GET	Malaysia	Climate Change	CC STAR Allocation: CCM-1-2	1,326,146.00	119,353.00	1,445,499.00
UNIDO	GET	Egypt	Climate Change	CC STAR Allocation: CCM-1-2	3,502,968.00	315,267.00	3,818,235.00
UNIDO	GET	Global	Climate Change	CC Global/Regional Set-Aside	2,652,294.00	238,706.00	2,891,000.00
UNIDO	GET	Ecuador	Climate Change	CC STAR Allocation: CCM-1-2	867,431.00	78,069.00	945,500.00
<b>Total GEF Resources (\$)</b>						<b>1,181,683.00</b>	<b>14,311,503.00</b>

### Project Preparation Grant (PPG)

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	PPG(\$)	Agency Fee(\$)	Total PPG Funding(\$)
UNIDO	GET	Algeria	Climate Change	CC STAR Allocation: CCM-1-2	50,000.00	4,500.00	54,500.00
UNIDO	GET	Nigeria	Climate Change	CC STAR Allocation: CCM-1-2	50,000.00	4,500.00	54,500.00
UNIDO	GET	Philippines	Climate Change	CC STAR Allocation: CCM-1-2	50,000.00	4,500.00	54,500.00
UNIDO	GET	South Africa	Climate Change	CC STAR Allocation: CCM-1-2	50,000.00	4,500.00	54,500.00
UNIDO	GET	Namibia	Climate Change	CC STAR Allocation: CCM-1-2	50,000.00	4,500.00	54,500.00
UNIDO	GET	Malaysia	Climate Change	CC STAR Allocation: CCM-1-2	50,000.00	4,500.00	54,500.00
UNIDO	GET	Egypt	Climate Change	CC STAR Allocation: CCM-1-2	150,000.00	13,500.00	163,500.00
UNIDO	GET	Global	Climate Change	CC Global/Regional Set-Aside	100,000.00	9,000.00	109,000.00
UNIDO	GET	Ecuador	Climate Change	CC STAR Allocation: CCM-1-2	50,000.00	4,500.00	54,500.00

<b>Total PPG Amount (\$)</b>	<b>600,000.00</b>	<b>54,000.00</b>	<b>654,000.00</b>
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### Sources of Funds for Country Star Allocation

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Sources of Funds	Total(\$)
UNIDO	GET	Algeria	Climate Change	CC STAR Allocation	746,575.00
UNIDO	GET	Nigeria	Climate Change	CC STAR Allocation	1,000,000.00
UNIDO	GET	Nigeria	Biodiversity	BD STAR Allocation	1,000,000.00
UNIDO	GET	Philippines	Climate Change	CC STAR Allocation	572,250.00
UNIDO	GET	Philippines	Biodiversity	BD STAR Allocation	572,250.00
UNIDO	GET	South Africa	Climate Change	CC STAR Allocation	995,434.00
UNIDO	GET	Namibia	Climate Change	CC STAR Allocation	597,260.00
UNIDO	GET	Malaysia	Climate Change	CC STAR Allocation	1,499,999.00
UNIDO	GET	Egypt	Climate Change	CC STAR Allocation	2,500,000.00
UNIDO	GET	Egypt	Land Degradation	LD STAR Allocation	1,481,735.00
UNIDO	GET	Ecuador	Biodiversity	BD STAR Allocation	1,000,000.00
<b>Total GEF Resources</b>					<b>11,965,503.00</b>

### Indicative Focal Area Elements

Programming Directions	Trust Fund	GEF Project Financing(\$)	Co-financing(\$)
CCM-1-2	GET	634,932.00	22,000,000.00
CCM-1-2	GET	1,784,862.00	5,784,300.00
CCM-1-2	GET	1,000,000.00	8,300,000.00
CCM-1-2	GET	863,242.00	15,800,000.00
CCM-1-2	GET	497,945.00	5,680,000.00
CCM-1-2	GET	1,326,146.00	7,080,480.00

CCM-1-2	GET	3,502,968.00	42,363,111.00
CCM-1-2	GET	2,652,294.00	24,490,000.00
CCM-1-2	GET	867,431.00	9,699,000.00
<b>Total Project Cost</b>		<b>13,129,820.00</b>	<b>141,196,891.00</b>

### Indicative Co-financing

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Donor Agency	UNDP	In-kind	Recurrent expenditures	3,700,000.00
Donor Agency	AFD	In-kind	Recurrent expenditures	12,300,000.00
Donor Agency	GIZ	In-kind	Recurrent expenditures	6,000,000.00
Donor Agency	GIZ	In-kind	Recurrent expenditures	3,784,300.00
Recipient Country Government	Energy Commission of Nigeria	In-kind	Recurrent expenditures	2,000,000.00
Recipient Country Government	Department of Energy	In-kind	Recurrent expenditures	150,000.00
Recipient Country Government	DOST-Industrial Technology Development Institute (ITDI)	In-kind	Recurrent expenditures	150,000.00
Donor Agency	GIZ	In-kind	Recurrent expenditures	8,000,000.00
Recipient Country Government	Department of Science and Innovation	In-kind	Recurrent expenditures	150,000.00
Recipient Country Government	Industrial Development Corporation	In-kind	Recurrent expenditures	150,000.00
Donor Agency	GIZ	In-kind	Recurrent expenditures	15,500,000.00
Recipient Country Government	EIF	In-kind	Recurrent expenditures	5,680,000.00

Recipient Country Government	Ministry of Science, Technology & Innovation (MOSTI)	In-kind	Recurrent expenditures	7,080,480.00
GEF Agency	UNIDO	In-kind	Recurrent expenditures	1,163,111.00
Private Sector	Renew Power	Equity	Recurrent expenditures	10,000,000.00
Private Sector	AMEA Power	Equity	Recurrent expenditures	10,000,000.00
Private Sector	EDF renewable	Equity	Recurrent expenditures	10,000,000.00
Private Sector	MASDAR consortium	Equity	Recurrent expenditures	10,000,000.00
Donor Agency	OECD	In-kind	Recurrent expenditures	1,200,000.00
GEF Agency	UNIDO	In-kind	Recurrent expenditures	24,490,000.00
Private Sector	AMBI SOLAR S.A.	Equity	Recurrent expenditures	3,000,000.00
Private Sector	IMBABURA SOLAR S.A.	Equity	Recurrent expenditures	3,000,000.00
Private Sector	INTIYANA SOLAR S.A.	Equity	Recurrent expenditures	3,000,000.00
GEF Agency	World Bank	In-kind	Recurrent expenditures	600,000.00
GEF Agency	IDB	In-kind	Recurrent expenditures	99,000.00
<b>Total Co-financing</b>				<b>141,196,891.00</b>

## ANNEX B: ENDORSEMENTS

### GEF Agency(ies) Certification

GEF Agency Type	Name	Date	Project Contact Person	phone	Email
GEF Agency Coordinator	UNIDO	10/18/2023	Ganna ONYSKO	+43 1 26026 3647	G.ONYSKO@unido.org
Project Coordinator	UNIDO	10/18/2023	Juan Pablo DAVILA	+43 1 26026 3167	J.DAVILA@unido.org

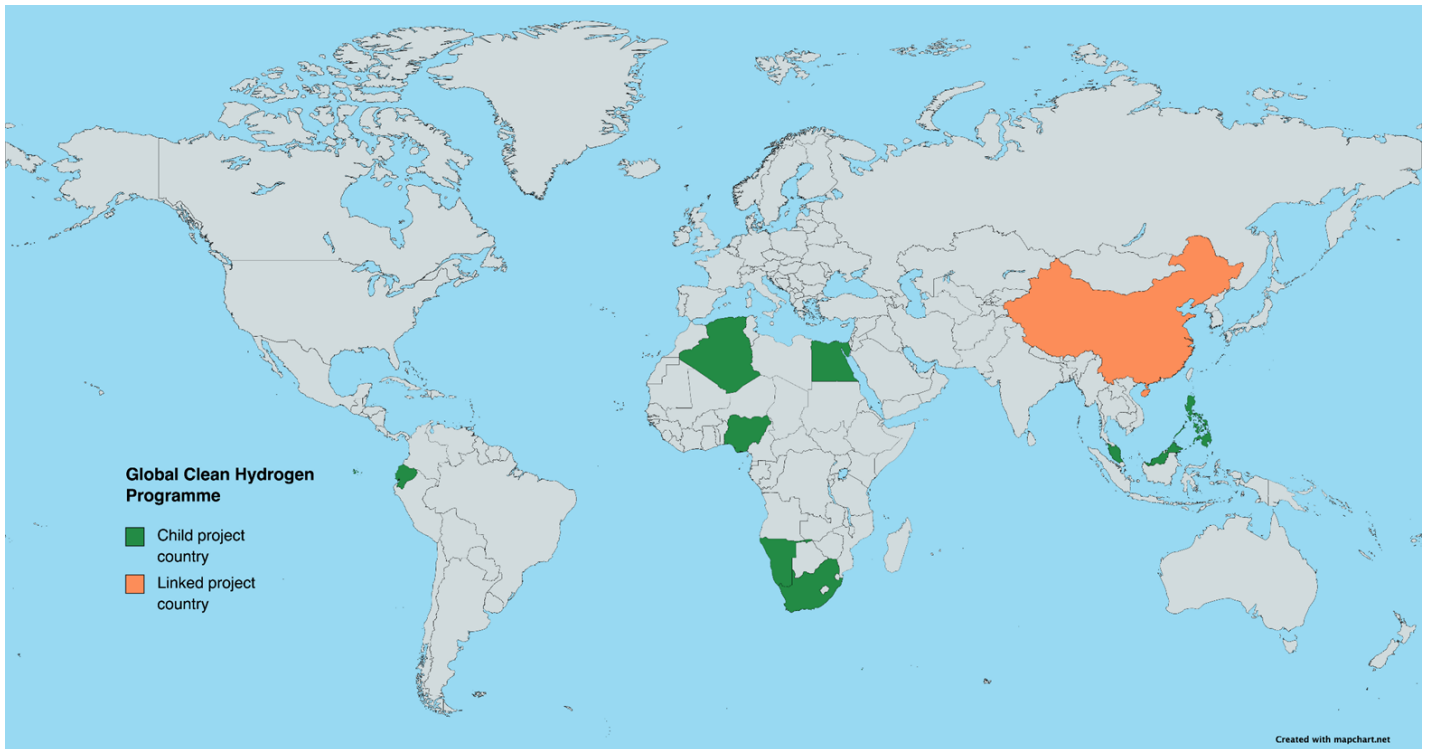
Record of Endorsement of GEF Operational Focal Point (s) on Behalf of the Government(s):

Name	Position	Ministry	Date (MM/DD/YYYY)
Karim Baba	Director of Urban Environmental Policy	Ministry of Environment of Algeria	5/22/2023
Analiza Rebuelta - Teh	Undersecretary	Department of Environment and Natural Resources of Philippines	10/17/2023
Shahkira Parker	Senior Policy Advisor: International governance Management	Department of Forestry, Fisheries and the Environment of South Africa	9/1/2023
Toefilus Nghitila	Executive Director	Ministry of Environment, Forestry and Tourism of Namibia	10/12/2023
Ali Bo Sena	Chief Executive Officer	Egyptian Environmental Affairs Agenc	11/29/2023
Dato Mohamed Razif Bin Haji Abd Mubin	Deputy Secretary General (Energy & Environment)	Ministry of Natural Resources, Environment & Climate Change	10/19/2023
Maria Schuldt	Director of International Cooperation	Ministry of Environment, Water and Ecological Transition	11/21/2023
Jonah Stanley	Director	Federal Ministry of Environment of Nigeria	11/24/2023

**ANNEX C: PROGRAM LOCATION**

Please provide geo-referenced information and map where the project interventions will take place

Please provide geo-referenced information and map where the program interventions will take place



Algeria	Northern Africa	N 28°00'00" E 3°00'00"	2589581
China	Eastern Asia	N 35°00'00" E 105°00'00"	1814991
Ecuador	South America	S 1°15'00" W 78°15'00"	3658394
Egypt	Northern Africa	N 27°00'00" E 30°00'00"	357994
Malaysia	Southeastern Asia	N 2°30'00" E 112°30'00"	1733045
Namibia	Southern Africa	S 22°00'00" E 17°00'00"	3355338
Nigeria	Southern Africa	N 10°00'00" E 8°00'00"	2328926
Philippines	Southeastern Asia	N 13°24'32" E 122°33'42"	1694008
South Africa	Southern Africa	S 29°00'00" E 24°00'00"	953987

Algeria	Northern Africa	N 28°00'00" E 3°00'00"	2589581
China	Eastern Asia	N 35°00'00" E 105°00'00"	1814991
Ecuador	South America	S 1°15'00" W 78°15'00"	3658394
Egypt	Northern Africa	N 27°00'00" E 30°00'00"	357994
Malaysia	Southeastern Asia	N 2°30'00" E 112°30'00"	1733045
Namibia	Southern Africa	S 22°00'00" E 17°00'00"	3355338
Nigeria	Southern Africa	N 10°00'00" E 8°00'00"	2328926
Philippines	Southeastern Asia	N 13°24'32" E 122°33'42"	1694008
South Africa	Southern Africa	S 29°00'00" E 24°00'00"	953987



## ANNEX D: ENVIRONMENTAL AND SOCIAL SAFEGUARDS SCREEN AND RATING

(Program level) Attach agency safeguard screen form including rating of risk types and overall risk rating.

Title

ES\_Screening\_SAP\_ID\_230362\_Green\_Hydrogen\_PFD\_GEF

## ANNEX E: RIO MARKERS

Climate Change Mitigation	Climate Change Adaptation	Biodiversity	Decertification
Principal Objective 2	No Contribution 0	No Contribution 0	No Contribution 0

## ANNEX F: TAXONOMY WORKSHEET

Level 1	Level 2	Level 3	Level 4
<b>Influencing models</b>			
	Transform policy and regulatory environments		
	Strengthen institutional capacity and decision-making		
	Convene multi-stakeholder alliances		
	Demonstrate innovative approaches		
	Deploy innovative financial instruments		
<b>Stakeholders</b>			
	Indigenous Peoples		
	Private Sector		
		Capital providers	
		Financial intermediaries and market facilitators	
		Large corporations	
		SMEs	
		Individuals/Entrepreneurs	
		Non-Grant Pilot	
		Project Reflow	
	<b>Beneficiaries</b>		
	Local Communities		
	Civil Society		
		Community Based Organization	
		Non-Governmental Organization	
		Academia	
		Trade Unions and Workers Unions	
	<b>Type of Engagement</b>		
		Information Dissemination	
		Partnership	
		Consultation	
		Participation	
	<b>Communications</b>		
		Awareness Raising	
		Education	
		Public Campaigns	
		Behavior Change	
<b>Capacity, Knowledge and Research</b>			
	Enabling Activities		

	<b>Capacity Development</b>		
	<b>Knowledge Generation and Exchange</b>		
	<b>Targeted Research Learning</b>		
		Theory of Change	
		Adaptive Management	
		Indicators to Measure Change	
	<b>Innovation</b>		
	<b>Knowledge and Learning</b>		
		Knowledge Management	
		Innovation	
		Capacity Development	
		Learning	
	<b>Stakeholder Engagement Plan</b>		
<b>Gender Equality</b>			
	<b>Gender Mainstreaming</b>		
		Beneficiaries	
		Women groups	
		Sex-disaggregated indicators	
		Gender-sensitive indicators	
	<b>Gender results areas</b>		
		Access and control over natural resources	
		Participation and leadership	
		Access to benefits and services	
		Capacity development	
		Awareness raising	
		Knowledge generation	
<b>Focal Areas/Theme</b>			
	<b>Integrated Programs</b>		
		Commodity Supply Chains ([1]Good Growth Partnership)	
			Sustainable Commodities Production
			Deforestation-free Sourcing
			Financial Screening Tools
			High Conservation Value Forests
			High Carbon Stocks Forests
			Soybean Supply Chain
			Oil Palm Supply Chain
			Beef Supply Chain
			Smallholder Farmers
			Adaptive Management
		Food Security in Sub-Saharan Africa	
			Resilience (climate and shocks)
			Sustainable Production Systems
			Agroecosystems
			Land and Soil Health
			Diversified Farming
			Integrated Land and Water Management
			Smallholder Farming
			Small and Medium Enterprises
			Crop Genetic Diversity
			Food Value Chains
			Gender Dimensions
			Multi-stakeholder Platforms
		Food Systems, Land Use and Restoration	
			Sustainable Food Systems
			Landscape Restoration
			Sustainable Commodity Production
			Comprehensive Land Use Planning
			Integrated Landscapes
			Food Value Chains

			Deforestation-free Sourcing
			Smallholder Farmers
		Sustainable Cities	
			Integrated urban planning
			Urban sustainability framework
			Transport and Mobility
			Buildings
			Municipal waste management
			Green space
			Urban Biodiversity
			Urban Food Systems
			Energy efficiency
			Municipal Financing
			Global Platform for Sustainable Cities
			Urban Resilience
	Biodiversity		
		Protected Areas and Landscapes	
			Terrestrial Protected Areas
			Coastal and Marine Protected Areas
			Productive Landscapes
			Productive Seascapes
			Community Based Natural Resource Management
		Mainstreaming	
			Extractive Industries (oil, gas, mining)
			Forestry (Including HCVF and REDD+)
			Tourism
			Agriculture & agrobiodiversity
			Fisheries
			Infrastructure
			Certification (National Standards)
			Certification (International Standards)
		Species	
			Illegal Wildlife Trade
			Threatened Species
			Wildlife for Sustainable Development
			Crop Wild Relatives
			Plant Genetic Resources
			Animal Genetic Resources
			Livestock Wild Relatives
			Invasive Alien Species (IAS)
		Biomes	
			Mangroves
			Coral Reefs
			Sea Grasses
			Wetlands
			Rivers
			Lakes
			Tropical Rain Forests
			Tropical Dry Forests
			Temperate Forests
			Grasslands
			Paramo
			Desert
		Financial and Accounting	
			Payment for Ecosystem Services
			Natural Capital Assessment and Accounting
			Conservation Trust Funds
			Conservation Finance
		Supplementary Protocol to the CBD	
			Biosafety
			Access to Genetic Resources Benefit Sharing

	<b>Forests</b>		
		Forest and Landscape Restoration	
			REDD/REDD+
		Forest	
			Amazon
			Congo
			Drylands
	<b>Land Degradation</b>		
		Sustainable Land Management	
			Restoration and Rehabilitation of Degraded Lands
			Ecosystem Approach
			Integrated and Cross-sectoral approach
			Community-Based NRM
			Sustainable Livelihoods
			Income Generating Activities
			Sustainable Agriculture
			Sustainable Pasture Management
			Sustainable Forest/Woodland Management
			Improved Soil and Water Management Techniques
			Sustainable Fire Management
			Drought Mitigation/Early Warning
		Land Degradation Neutrality	
			Land Productivity
			Land Cover and Land cover change
			Carbon stocks above or below ground
		Food Security	
	<b>International Waters</b>		
		Ship	
		Coastal	
		Freshwater	
			Aquifer
			River Basin
			Lake Basin
		Learning	
		Fisheries	
		Persistent toxic substances	
		SIDS : Small Island Dev States	
		Targeted Research	
		Pollution	
			Persistent toxic substances
			Plastics
			Nutrient pollution from all sectors except wastewater
			Nutrient pollution from Wastewater
		Transboundary Diagnostic Analysis and Strategic Action Plan preparation	
		Strategic Action Plan Implementation	
		Areas Beyond National Jurisdiction	
		Large Marine Ecosystems	
		Private Sector	
		Aquaculture	
		Marine Protected Area	
		Biomes	
			Mangrove
			Coral Reefs
			Seagrasses
			Polar Ecosystems
			Constructed Wetlands
	<b>Chemicals and Waste</b>		
		Mercury	
		Artisanal and Scale Gold Mining	
		Coal Fired Power Plants	
		Coal Fired Industrial Boilers	
		Cement	

		Non-Ferrous Metals Production	
		Ozone	
		Persistent Organic Pollutants	
		Unintentional Persistent Organic Pollutants	
		Sound Management of chemicals and Waste	
		Waste Management	
			Hazardous Waste Management
			Industrial Waste
			e-Waste
		Emissions	
		Disposal	
		New Persistent Organic Pollutants	
		Polychlorinated Biphenyls	
		Plastics	
		Eco-Efficiency	
		Pesticides	
		DDT - Vector Management	
		DDT - Other	
		Industrial Emissions	
		Open Burning	
		Best Available Technology / Best Environmental Practices	
		Green Chemistry	
	<b>Climate Change</b>		
		<b>Climate Change Adaptation</b>	
			Climate Finance
			Least Developed Countries
			Small Island Developing States
			Disaster Risk Management
			Sea-level rise
			Climate Resilience
			Climate information
			Ecosystem-based Adaptation
			Adaptation Tech Transfer
			National Adaptation Programme of Action
			National Adaptation Plan
			Mainstreaming Adaptation
			Private Sector
			Innovation
			Complementarity
			Community-based Adaptation
			Livelihoods
		<b>Climate Change Mitigation</b>	
			Agriculture, Forestry, and other Land Use
			Energy Efficiency
			Sustainable Urban Systems and Transport
			Technology Transfer
			Renewable Energy
			Financing
			Enabling Activities
		<b>Technology Transfer</b>	
			Poznan Strategic Programme on Technology Transfer
			Climate Technology Centre & Network (CTCN)
			Endogenous technology
			Technology Needs Assessment
			Adaptation Tech Transfer
		<b>United Nations Framework on Climate Change</b>	
			Nationally Determined Contribution

## ANNEX H : CHILD PROJECT INFORMATION

Title

Co2 avoidance calculation methodology

CO2 avoidance calculations updated 112423

Child Project Concept Notes Updated 112423

Child project Concept notes revised

CO2 calculations spreadsheet

Child project concept notes

### Child Projects under the Program

Country	Project Title	GEF Agency	GEF Amount (\$) PROJECT FINANCING	Agency Fees(\$)	Total(\$)
	<b>FSPs</b>				
Egypt	Child project of the Global Clean Hydrogen Programme of Egypt	UNIDO	3,502,968.00	315,267.00	3,818,235.00
Global	Global Child Project of the Global Clean Hydrogen Programme	UNIDO	2,652,294.00	238,706.00	2,891,000.00
	<b>Subtotal (\$)</b>		6,155,262.00	553,973.00	6,709,235.00
	<b>MSPs</b>				
Algeria	Child Project of the Global Clean Hydrogen Programme of Algeria	UNIDO	634,932.00	57,143.00	692,075.00
Nigeria	Child project of the Global clean hydrogen programme for Nigeria	UNIDO	1,784,862.00	160,638.00	1,945,500.00
Philippines	Child project of the Global clean hydrogen programme of Philippines	UNIDO	1,000,000.00	90,000.00	1,090,000.00
South Africa	Child Project of the Global Clean Hydrogen Program of South Africa	UNIDO	863,242.00	77,692.00	940,934.00

Namibia	Child Project of the Global Clean Hydrogen Programme of Namibia	UNIDO	497,945.00	44,815.00	542,760.00
Malaysia	Child Project of the Global Clean Hydrogen Program of Malaysia	UNIDO	1,326,146.00	119,353.00	1,445,499.00
Ecuador	Child Project of the Global Clean Hydrogen Programme of Ecuador	UNIDO	867,431.00	78,069.00	945,500.00
	<b>Subtotal (\$)</b>		<b>6,974,558.00</b>	<b>627,710.00</b>	<b>7,602,268.00</b>
	<b>Grant Total (\$)</b>		<b>13,129,820.00</b>	<b>1,181,683.00</b>	<b>14,311,503.00</b>