EGYPTIAN GAS ASSOCIATION
الجمعية المصرية للغاز

HARNESSING GREEN HYDROGEN

EGYPT BOLD MOVE

OCTOBER 2024

Research Partner

EGYPT OIL&GAS
RESEARCH & ANALYSIS

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Egypt is rapidly emerging as a frontrunner in the development of green hydrogen projects. This strategic move capitalizes on three key strengths: its geographical location, its abundant renewable resources as well as established infrastructure (power distribution and ports). Situated at the bustling intersection of Africa, Asia, and Europe, Egypt presents an ideal hub for the production and distribution of green hydrogen. This advantage is further amplified by the country's immense potential for solar and wind energy. With a current installed capacity of a significant 6.3 GW, this figure is projected to experience a staggering 65% increase by 2027, reaching an estimated 10.4 GW. This impressive growth, driven primarily by solar and wind power, positions Egypt as a major force in the Middle East and North Africa's renewable energy landscape.

Egypt's vision extends beyond securing its own clean energy future. The country aspires to become a leader in the burgeoning green hydrogen economy. By actively developing this innovative fuel source, Egypt aims for a double win: a significant reduction in its carbon footprint and a prominent position in this transformative clean energy sector. This strategic approach holds the potential to unlock substantial economic growth opportunities.

NATIONAL GREEN HYDROGEN STRATEGY

THE NATIONAL GREEN HYDROGEN COUNCIL APPROVED THE NATIONAL GREEN HYDROGEN STRATEGY IN NOVEMBER 2023. THIS STRATEGY AIMS TO MAKE EGYPT ONE OF THE LEADING COUNTRIES WORLDWIDE BY UTILIZING WORLD-LEADING EXPERTISE AND INNOVATIONS IN PRODUCING AND EXPORTING GREEN HYDROGEN.

STRATEGY'S MAIN OBJECTIVES

- Producing **5.8 mmt** of green hydrogen by 2040
- Achieving **5%-8%** of the global green hydrogen market
- Reducing Carbon emissions by **40 mmt/y by 2040**
- Providing **100,000** job opportunities by **2040**
- Having **$60 billion** as total investment to meet the hydrogen production target by **2040**
- Increasing Gross Domestic Product (GDP) by **$10-$18 billion** by **2040**

OTHER OBJECTIVES

The strategy outlines that up to 20% hydrogen can be blended into Egypt's existing natural gas grid with minimal infrastructure modifications. This blending would allow hydrogen to be integrated into industrial and energy sectors, contributing to the country's decarbonization efforts while maximizing the use of current gas pipelines. Such an approach offers a cost-effective way to introduce hydrogen into the energy mix, supporting the gradual transition to a cleaner energy system without the need for immediate large-scale infrastructure overhauls.

Decarbonization Goals

Egypt aims to use hydrogen to support global decarbonization efforts by replacing grey hydrogen in sectors like steel and refineries and exploring hydrogen use in transport and industrial fuels.

Electrolyser Capacity

By 2030, Egypt plans to install 27 GW of electrolyser capacity for green hydrogen production, supported by 41 GW of renewable energy.

Renewable Energy and Infrastructure

By 2040, Egypt plans to have 76 GW of electrolyser capacity, requiring 114 GW of renewable energy to produce green hydrogen, leveraging its strategic location and renewable resources.

GREEN HYDROGEN ENDEAVORS

HYDROGEN INCENTIVES

Egypt is implementing pioneering incentives for green hydrogen projects based on Investment Law No. 72 of 2017, Cabinet Decrees No. 981 of 2022, and No. 104 of 2022. These initiatives mark Egypt's leadership as the first country to introduce production cost-reducing incentives of this nature.

Listed below are the known incentives for green hydrogen projects in Egypt:

5 years exemption from stamp tax, some notarization and registration fees

2% fixed customs tax rate for imported equipment required for project's construction and operation

A corporate tax rebate of **30-50%** of the investment value is available for a duration of seven years from the project's start of operations

The Egyptian government may finance, partially or fully, utilities connection to the projects

The Egyptian government may partially finance technical staff training

VAT exemption on equipment and raw material and all transportation assets

Zero VAT on the project's exports of green hydrogen and its derivatives

HYDROGEN PROJECT ALLOCATION PROCEDURES

A streamlined procedure is in place for launching green hydrogen production projects, making it easier and more attractive for developers to invest in Egypt. This process aims to facilitate project development and includes the following steps.

1 Initial Proposal and Project Datasheet

Developer downloads the Project Datasheet from the website and fills it with the project's details. Subsequently, they will submit both the completed Project Datasheet and an Initial Proposal. This proposal introduces the consortium, outlines its capabilities, and provides information about the envisioned projects along with their respective phases

2 Sponsors Assessment and Feedback

Government Sponsors will assess the submitted Project Datasheet and Initial Proposal and will provide feedback through email or portal.Once agreed, the Developer receives the MoU template

3 MoU Signature

Government Sponsors sign a Memorandum of Understanding (MoU) with the Developer which is set to outline:

- The roles and responsibilities of each party
- The Project's capacities
- Any special arrangement relating to power or utilities for the project

4 Land Allocation

According to the MoU, NREA in coordination with EETC will allocate land coordinates for the developer matching the agreed form Project Data Sheet's targeted renewable energy capacity

5 Preliminary Studies

Developer conducts Preliminary Studies and submits them to Government Sponsors for review and acceptance via email or portal.These include; a preliminary feasibility study, preliminary business case/technical study,preliminary master schedule for the project execution, update and/or comfort letters on offtake and financing arrangements (if available)

6 Framework Agreement Signature

A Binding Framework Agreement is signed by the parties which outlines:

- The contractual relationship amongst all parties to the MoU
- A significant commitment from the government on the land allocation for the entire project to enable the Lead Developer to conduct their feasibility studies with certainty
- Commitment from the Lead Developer on a detailed project implementation schedule

7 Pre and Final Feasibility Studies

Feasibility Studies are carried out by the Developer and submitted to the Government Sponsors through email or portal, including:

- Technical Study
- Financial Model
- Master Schedule for the Project Execution
- Commitments on offtake and financing agreements

8 Government Sponsors and Developer FID

Government Sponsors and the Developer make their Financial Investment Decision (FID) after reviewing the Final Feasibility Studies

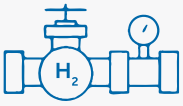
9 Project Documents Signature and Financial Close

All parties sign the binding project documents to reach financial close

CROSS-BORDER COLLABORATIONS

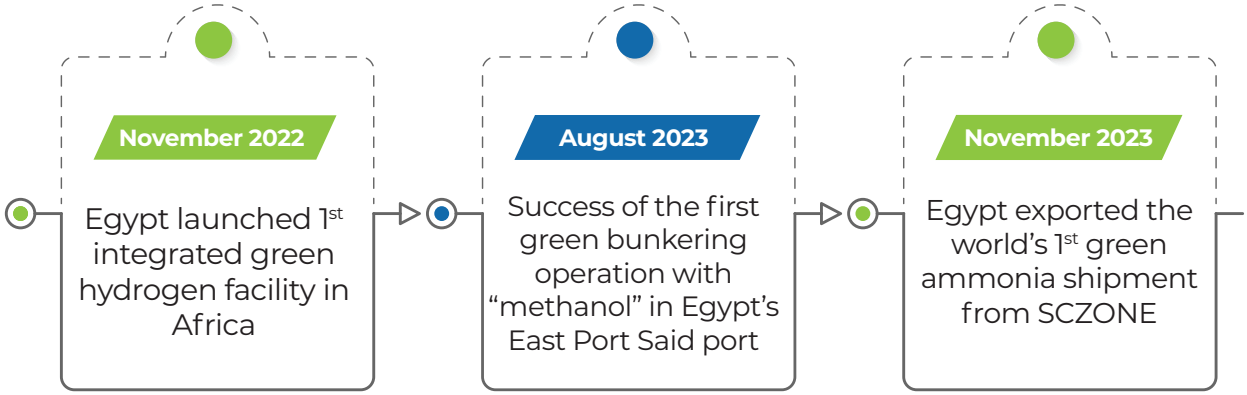
Egypt's cost-effective green hydrogen production, combined with a suite of incentives creates an enticing investment landscape. According to the 2023 report on global greenfield investment trends by fDi Intelligence, Egypt was the primary beneficiary of greenfield foreign direct investment (FDI) in the Middle East and Africa region in 2022. It attracted an estimated $107 billion, thanks to the presence of 17 green hydrogen projects.

Many international companies have signed agreements and memorandum of understanding (MoUs), increasing their investments toward ammonia and green hydrogen production, particularly for export purposes. The Suez Canal Economic Zone (SCZONE) serves as a hub for green hydrogen projects, with more than 80% of these projects being implemented within. SCZONE has secured about 19 active MoUs, aiming at achieving an annual production volume of 17 million tons (mmt), according to the New and Renewable Energy Authority (NREA).



Egypt has an **$83 billion** pipeline of green hydrogen projects that could produce millions of tons of green hydrogen and ammonia

GREEN FUEL MILESTONES



KEY PLAYERS AND PARTNERS

Ministry of Electricity and Renewable Energy, Ministry of Petroleum, New and Renewable Energy Authority (NREA), Suez Canal Authority & SCZone, Egyptian Electricity Holding Company (EEHC), Sovereign Fund of Egypt, Egyptian Fertilizer Company, European Bank for Reconstruction & Development

Fertiglobe, AMEA power, Siemens, Eni, Ocior Energy, Scatec, DEME, ACWA Power, Globeleq, Actis, TAQA Arabia, Voltalia, Infinity, Masdar.

SIGNED MOUS AND FRAMEWORK AGREEMENTS

Framework Agreements

15

Valid MoUs

23

Estimated Production **18** MMT/Y | Estimated Investments **$64** BILLION

MAJOR SIGNED MOUS WITH SCZONE, TSFE, EETC, NREA

■ COMPANY ■ PRODUCTION

Fortescue Future Industries

330,000 tons of Hydrogen

China Energy

140,000 tons of Hydrogen

OCIOR Energy

1.1 mmt of Ammonia

Alfanar

500,000 tons of ammonia, 100,000 tons of Hydrogen

Abu Dhabi Future Energy Company, Hassan Allam Utilities Company

Two Hydrogen plants of total: 4GW electrolyser, 480,000 tons of Hydrogen, 2.3 mmt of Ammonia

THE MOUS AND AGREEMENTS SIGNED

by Egypt in the green fuel sector are crucial for its goal to become a global green hydrogen leader by 2030. These international partnerships would enable technological exchange, attract investments, and provide the resources needed for large-scale projects. They enhance Egypt's credibility and foster regional and global cooperation, driving sustainable energy development and economic growth.

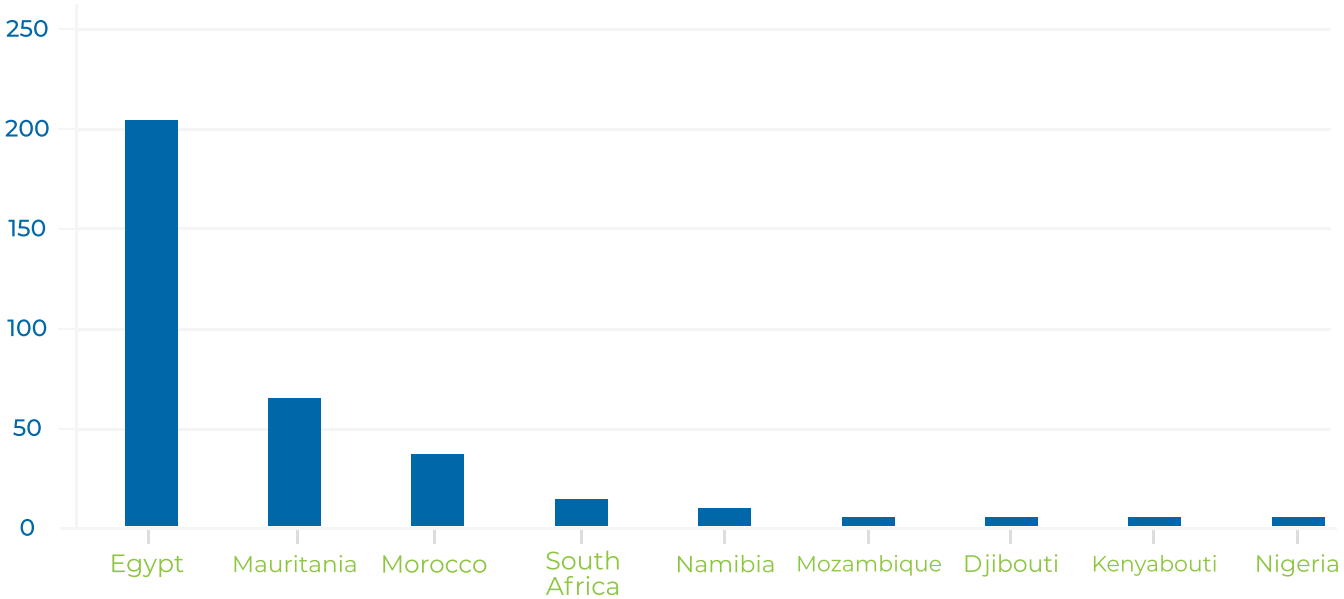
HYDROGEN PRODUCTION CAPACITY (MMT/Y)

14.9	33	47.9
Pilot Phase	Phase 1	Total

FDI IN GREEN HYDROGEN

Egypt leads African nations in green hydrogen development, attracting over $215 billion in Foreign Direct Investment (FDI) between 2021 and 2023. Several projects are centered in the Suez Canal Economic Zone (SCZone), created in 2015 as part of Egypt Vision 2030. Spanning 460.6 km2, the SCZone is positioned to become a global hub for green energy and hydrogen production, leveraging its strategic location near key international shipping routes. This influx of investment underscores Egypt's commitment to sustainable energy and its growing role in the green hydrogen sector.

GREEN HYDROGEN FDI INTO AFRICA (2021-2023):



EGYPT-EU INVESTMENT CONFERENCE GREEN FUEL PARTNERSHIPS

The Egypt-EU Investment Conference took place in June 2024, in Cairo, Egypt. The meeting focused on strengthening bilateral relations, boosting economic cooperation, and addressing shared challenges. Key discussions included investment, trade, green energy, migration, and security. Several Memoranda of Understanding (MoUs) were signed, covering areas such as renewable energy, vaccine manufacturing, food security, and migration management. The summit marked a significant milestone in the relationship between Egypt and the European Union..

4 Signed Agreements
by TSFE , SCZONE and NREA

Value **$33** billion

■ Investments ■ Aim

DAI Infrastruktur GmbH (DAI)	OCIOR Energy	TAQA Arabia and Voltalia	bp, MASDAR, Hassan Allam Utilities, and Infinity Power Holding
$11 billion	**$4.25** billion	**$3.46** billion	**$14** billion
Developing a green ammonia project in East Port Said to produce 2 mmt/y	Building a green ammonia project at Sokhna Port, targeting the European market	To produce 350,000 tons/y of green ammonia for each phase.	Construct a green hydrogen project at Sokhna Port

Exceptional Green Hydrogen and Green Ammonia Project Agreements

100 MW Green Hydrogen in Sokhna Port

TSFE, Orascom Construction ,Scatec, and Fertiglobe

13,000 tons/y

70,000 tons/y

Partners	Green Hydrogen	Green Ammonia

Two Solar and Wind Power Plants with a Capacity of 270 MW

Green Ammonia Project in Damietta

Partners	Investments	Renewable Ammonia
The Egyptian Petrochemicals Holding Company, (MOPCO), and Scatec	**$890** million	**150,000** tons/y

Developing and Building up Solar and Wind Energy with a Capacity of 480 MW

>> **Scatec signed a contract with Yara Clean Ammonia Company to purchase green ammonia from the «Damietta Green Ammonia» project for 20 years**

Mega Green Hydrogen and Green Ammonia Projects

Garboub, West of Matrouh

Partners
The NREA, APA and an international consortium led by Belgium's DEME HYPORT Energy

Investments
€24 billion
€3 billion for the first phase

Project's Area
1,180 km^2

Aim
Supply up to 2 mmt/y of green fuel to meet the EU's energy needs

Ras Shukeir, Western Shore of the Gulf of Suez

Partners
The NREA, RSPA and consortium comprising French EDF Renewable & Egyptian-Emirati Zero Waste company

Investments
€7 billion
€2 billion for the first phase

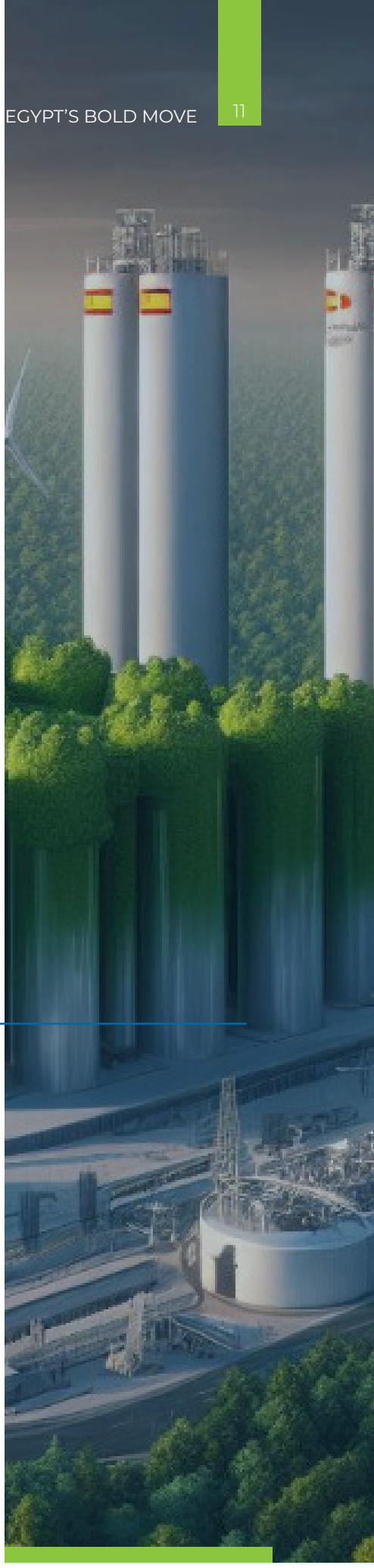
Production
1 mmt/y of green ammonia

At the Egypt-EU Investment Conference in Cairo, the Green Hydrogen Organisation (GH2) and Nile University launched the GH2 International Green Hydrogen Centre of Excellence "GH2 Cairo Centre." This center aims to provide global leadership and develop talent for sustainable large-scale green hydrogen projects, especially in developing economies. Approved by Egypt's National Green Hydrogen Council in February 2024, the GH2 Cairo Centre is based at Nile University and focuses on capacity building and technical assistance in green hydrogen within Egypt, across Africa, and globally.

The GH2 Cairo Centre aims to accelerate the financing of large-scale renewable energy and green hydrogen projects by mobilizing and derisking investments from both public and private sectors. It will facilitate regional collaboration through the Africa Green Hydrogen Alliance (AGHA), serving as the AGHA Secretariat, and promote cooperation with key export markets, including the European Union and Asia.

WAY FORWARD

Despite Egypt's immense potential in the green hydrogen industry, strategic solutions are needed to overcome certain challenges. The main obstacles include securing long-term competitive offtake agreements that meet lender requirements, limited technological development, and an evolving legal framework. Additionally, issues related to storage, transportation, and production necessitate enhanced infrastructure and increased incentives. Egypt's venture into green hydrogen is marked by numerous advantages, supported by strong national strategies and incentives. Ongoing projects and partnerships demonstrate proactive progress, though addressing challenges in infrastructure, technology, regulations, and investment will be essential. Successfully navigating these barriers will enable Egypt to fully realize its potential as a global energy hub.



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