# MASEN'S PRESENTATION

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endless power for progress

# 1

# MOROCCO: AN AMBITIOUS ENERGY POLICY

# AN ENERGY CHALLENGE FOR MOROCCO

## IN A COUNTRY WHERE ELECTRIFICATION IS ALMOST COMPLETE...

ELECTRIFICATION RATE BY THE END OF 2019 : ≈ **100%**

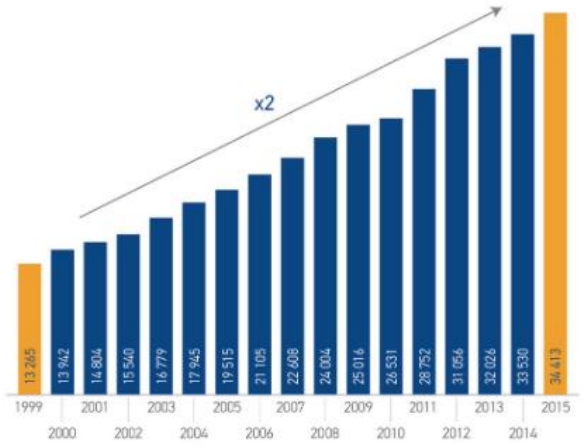
**PERG**

GLOBAL RURAL ELECTRIFICATION PROGRAM

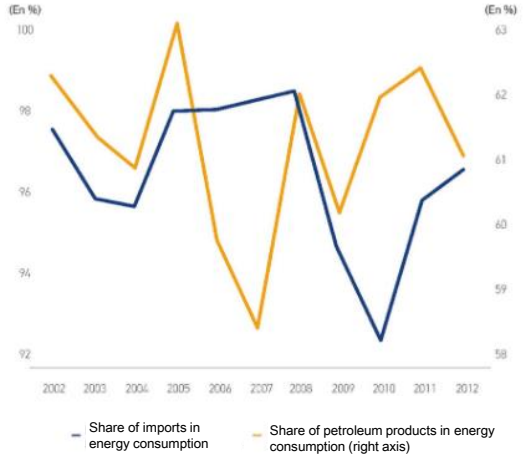
**99.72%** *IN 2019* Vs. **18%** *IN 1995*

**...IT IS NECESSARY TO MEET THE GROWING NATIONAL DEMAND FOR ELECTRICITY, WHILE REDUCING THE ENERGY DEPENDENCE OF THE COUNTRY IN A GLOBAL CONTEXT OF VOLATILE OIL PRICES.**

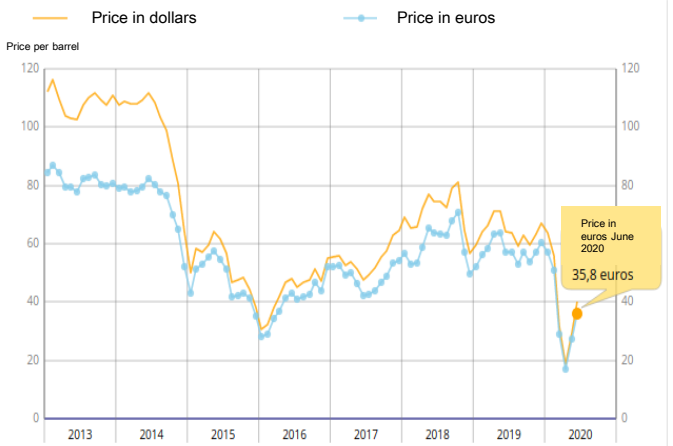
Doubling of electricity consumption per capita (2000-2015) (in GWH)




Energy dependence on foreign countries and petroleum products




Brent Oil Price




**RENEWABLE ENERGIES HAVE MADE IT POSSIBLE TO REDUCE MOROCCO'S ENERGY DEPENDENCE FROM 98% IN 2008 TO 91.7% IN 2019.**

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*SOURCE : DEPARTMENT OF ENERGY AND MINES, MOROCCO*

*SOURCE : HTTPS://PRIXDUBARIL.COM/*

# A ROYAL VISION TO MEET THE ENERGY CHALLENGE

**INITIATED IN THE 1960S BY HM THE LATE KING HASSAN II, THE DAM POLICY WILL BE THE STARTING POINT FOR THE DEVELOPMENT OF RE PROJECTS IN THE KINGDOM...**

INAUGURATION, IN 1997 BY HM THE LATE KING HASSAN II, OF THE AL WAHDA DAM IN OUAZZANE

INAUGURATION BY HM THE KING MOHAMMED VI OF THE FIRST WIND FARM IN TANGER

INAUGURATION BY HM THE KING MOHAMMED VI, OF THE SOLAR POWER PLANT NOOR OUARZAZATE I

**... A VISION PURSUED AND ACCELERATED UNDER THE REIGN OF HM THE KING MOHAMMED VI,**
**BY THE ESTABLISHMENT OF AN ENERGY STRATEGY BASED ON THE DECARBONIZATION OF THE NATIONAL ELECTRICITY MIX**

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# A STRUCTURING NATIONAL ENERGY STRATEGY

**THE KINGDOM OF MOROCCO LAUNCHED IN 2009 A NATIONAL ENERGY STRATEGY WHOSE STAKES ARE:**

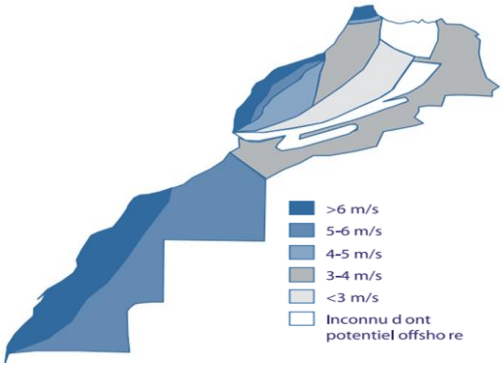
1. ENSURING THE ENERGY SECURITY OF THE COUNTRY
2. SECURING THE ENERGY SUPPLY
3. DIVERSIFYING THE NATIONAL ENERGY SOURCES BY USING ALTERNATIVE AND RENEWABLE ENERGIES
4. PRESERVING THE ENVIRONMENT
5. STRENGTHENING THE ENERGY PRODUCTION CAPACITY OF THE KINGDOM AND PAVING THE WAY FOR PROMISING INVESTMENTS IN ENERGY SUPPLY

**THIS NEW ENERGY STRATEGY IS SUPPORTED BY THE OFFICIAL LAUNCH BY HIS MAJESTY THE KING MOHAMMED VI OF THE MOROCCAN SOLAR PLAN, ON NOVEMBER 2, 2009 IN OUARZAZATE, AND THE MOROCCAN INTEGRATED WIND ENERGY PROGRAM ON JUNE 28, 2010 IN TANGIER.**

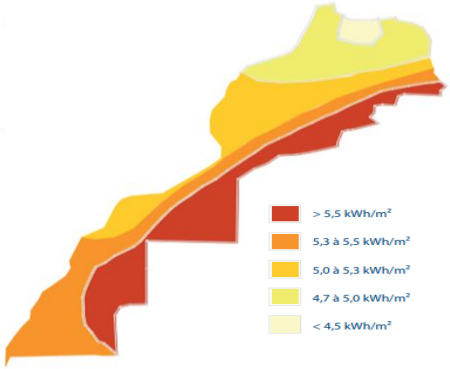
*SOURCE: NATIONAL ENERGY STRATEGY HORIZON 2030 (MEME)*

# A HUGE RENEWABLE ENERGY POTENTIAL

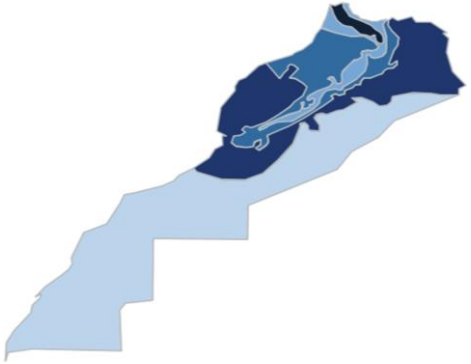
## WIND




## SOLAR




## HYDRAULIC



**AN ESTIMATED WIND POWER POTENTIAL OF NEARLY 25,000 MW**

**AN AVERAGE OF 3,000H/YEAR OF SUNSHINE AND AN IRRADIATION OF 5KWH/M²/YEAR**

**A HYDRAULIC POTENTIAL OF 3,800 MW***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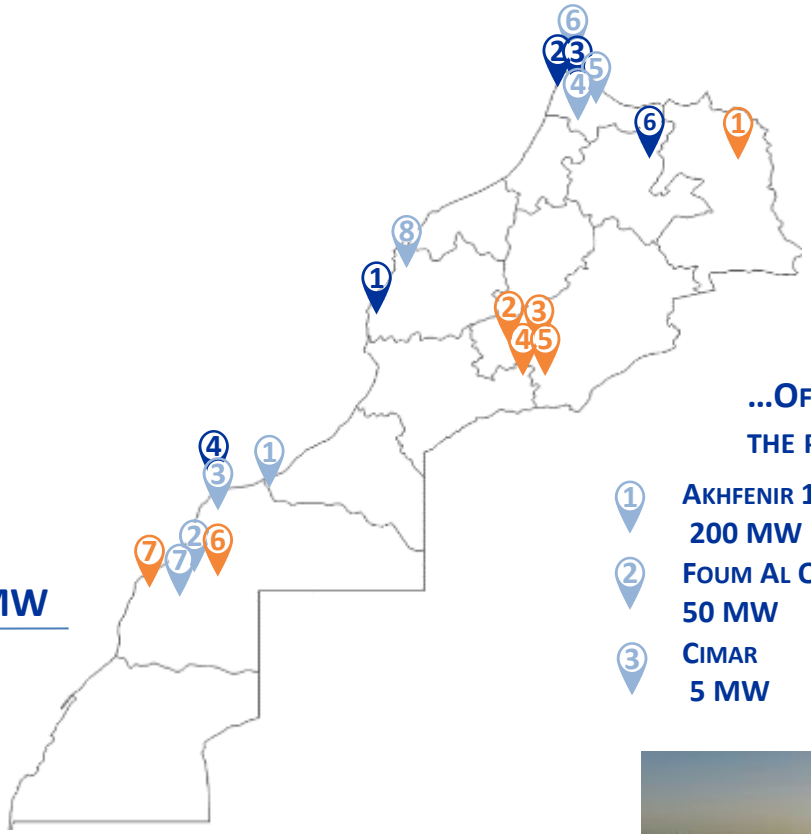
*Technical potential

# 4100 MW OF REN PROJECTS IN OPERATION AND 3 500 MW IN DEVELOPMENT

## Solar Projects – 827 MW

1. Ain Beni Mathar – 20 MW
2. NOOR Ouarzazate I – 160 MW
3. NOOR Ouarzazate II – 200 MW
4. NOOR Ouarzazate III – 150 MW
5. NOOR Ouarzazate IV – 72 MW
6. NOOR Laayoune I – 85 MW
7. NOOR Boujdour I – 20 MW
8. NOOR Tafilalet *(Zagora, Erfoud, Missour)* – 120 MW



## Wind Projects – 1 512 MW

1. Amougdoul – 60 MW
2. Tanger I – 140 MW
3. Torres / Koudia Al Baida – 50 MW
4. Tarfaya – 300 MW
5. PEI 850 Midelt – 180 MW
6. PEI Taza I – 87 MW

## …Of which 695 MW developped by the private sector (Law 13-09)

1. Akhfenir 1 & 2 – 200 MW
2. Foum Al Oued – 50 MW
3. Cimar – 5 MW
4. Haouma – 50 MW
5. Lafarge – 32 MW
6. Jbal Khalladi – 120 MW
7. 
8. 

## Hydro power plants – 1 770 MW

+ de 20 hydroplants across the country

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# FUTURE REN PROJECTS : OTHER PROJECTS PLANNED

## SOLAR PROJECTS

**827 MW OF SOLAR PROJECTS IN OPERATION**

## WIND PROJECTS

**1 425 MW OF WIND PROJECTS IN OPERATION**

## HYDRO PROJECTS

**1 770 MW OF HYDRO PROJECTS IN OPERATION**
**MORE THAN 29 DAMS IN OPERATION AND 1 STEP**

2030

## SOLAR PROJECTS ( ~2 500 MW )

NOOR MIDELT I
**800 MW**

NOOR MIDELT II
**400 TO 800 MW**

NOOR PV II
**710 MW (OUTISIDE 13-09)**

NOOR ATLAS
**200 MW**

## WIND PROJECTS (1120 MW)

PROGRAMME EOLIEN INTÉGRÉ
(JBEL HDID 270 MW; TISKRAD 100 MW, BOUJDOUR 300 MW)
**670 MW**

PROJET EOLIEN INTÉGRÉ – TAZA II
**83 MW**

KOUDIA AL BAIDA REPOWERING
**100 MW**
EXTENSION 150 TO 200 MW

AFTISSAT II
**200 MW**

## HYDRO-POWER PROJECTS (350 MW)

**DETAILED PROGRAMING ONGOING TO TAKE INTO ACCOUNT THE POSSIBLE SYNERGIES BETWEEN REN TECHNOLOGIES**

**+ 6000 MW in 2030**

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# 2

# MASEN: AN INNOVATIVE VISION FOR INTEGRATED RE PROJECTS

# AN INSTITUTIONAL FRAMEWORK

## SUPPORT AT THE HIGHEST LEVEL OF THE STATE

- **Law 57-09** on the creation of Masen completed by **Law 37-16** following the new prerogatives
- **State - Masen agreement:** conditions, technical requirements and guarantee of financial balance
- **State - ONEE - Masen agreement:** rules, conditions and guarantee for the procurement, sale, transmission and marketing of the electricity produced

## A SOLID INSTITUTIONAL LANDSCAPE, SUPPORTED BY THE MASEN-ONEE TANDEM

ROYAUME DU MAROC

Ministère de l'Energie, des Mines et du Développement Durable

***Government energy stakeholder***

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***Integrated development***

Production of electricity from renewable sources

المكتب الوطني للكهرباء و الماء الصالح للشرب

Office National de l'Electricité et de l'Eau Potable

Transmission and distribution of electricity from renewable and non-renewable sources*

amee

Agence Marocaine pour l'Efficacité Energétique

***Focus of activities***

On the Energy Efficiency

anre

الهيئة الوطنية لضبط الكهرباء

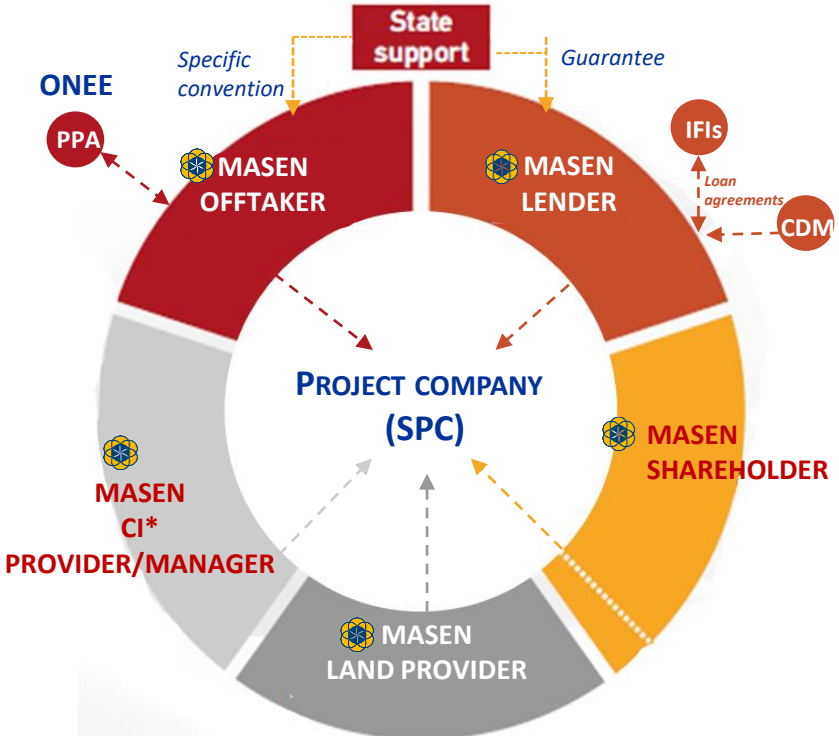
NATIONAL ELECTRICITY REGULATORY AUTHORITY

***Electricity regulator***

** IN ADDITION TO THE PRODUCTION OF RENEWABLE ELECTRICITY THROUGH THE STEP AND MEANS FOR THE STABILITY OF THE ELECTRICAL SYSTEM*

# MASEN: A MOROCCAN PPP INNOVATION

## 5 ROLES, A PLUG AND PLAY APPROACH




## + CONCESSIONAL AND DIVERSIFIED FINANCING

### Concessional financing

KFW · Banque européenne d'investissement · AFD · THE WORLD BANK IBRD • IDA · CTF CLEAN TECHNOLOGY FUND

### Issuance of the first green bond in Morocco and Africa

*Subscribers:*

AL BARID BANK · Société Centrale de Réassurance GROUPE CDG · Caisse Marocaine des Retraites · Attijariwafa bank

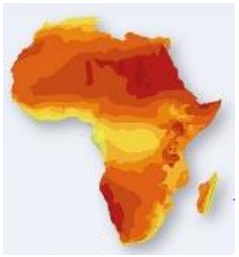
### Commercial financing through the use of banks

**THE INNOVATIVE USE OF PUBLIC-PRIVATE PARTNERSHIPS (PPP) ALLOWS MASEN TO ACT ACCORDING TO 5 ROLES TO OPTIMIZE THE ALLOCATION OF RISKS INHERENT TO RE PROJECTS. THIS APPROACH ULTIMATELY RESULTS IN A SIGNIFICANT REDUCTION IN THE KWH TARIFF.**

# 3 MASEN: A MODEL THAT IS BEING EXPORTED

# CATALYZING THE CONTINENTAL ENERGY TRANSITION

## A UNIQUE RE POTENTIAL



SOLAR

HYDRO

WIND

## A PROMISING SUB-SAHARAN MARKET

**65%** OF THE POPULATION WITHOUT ACCESS TO ELECTRICITY

**+632.5 M** INHABITANTS WITHOUT ACCESS TO ELECTRICITY

**4%** ANNUAL GROWTH IN ENERGY DEMAND

## 4 IDENTIFIED NEEDS

- **STRENGTHENING** OF THE INSTITUTIONAL FRAMEWORK FOR THE DEVELOPMENT OF RENEWABLE ENERGIES.
- **SUPPORTING** THE DEVELOPMENT OF RE STRATEGIES.
- **ASSESSING** THE NEEDS AND POTENTIAL OF RE RESOURCES.
- **DEVELOPING** COMPETITIVE RE PROJECTS AT THE BEST INTERNATIONAL STANDARDS.

## 4 AXES OF COOPERATION TO ADDRESS

- KNOW-HOW EXCHANGE
- CAPACITY REINFORCEMENT
- TECHNICAL ASSISTANCE
- CO-DEVELOPMENT

## 2 LEVERS

- BILATERAL AGREEMENTS
- MULTILATERAL AGREEMENTS

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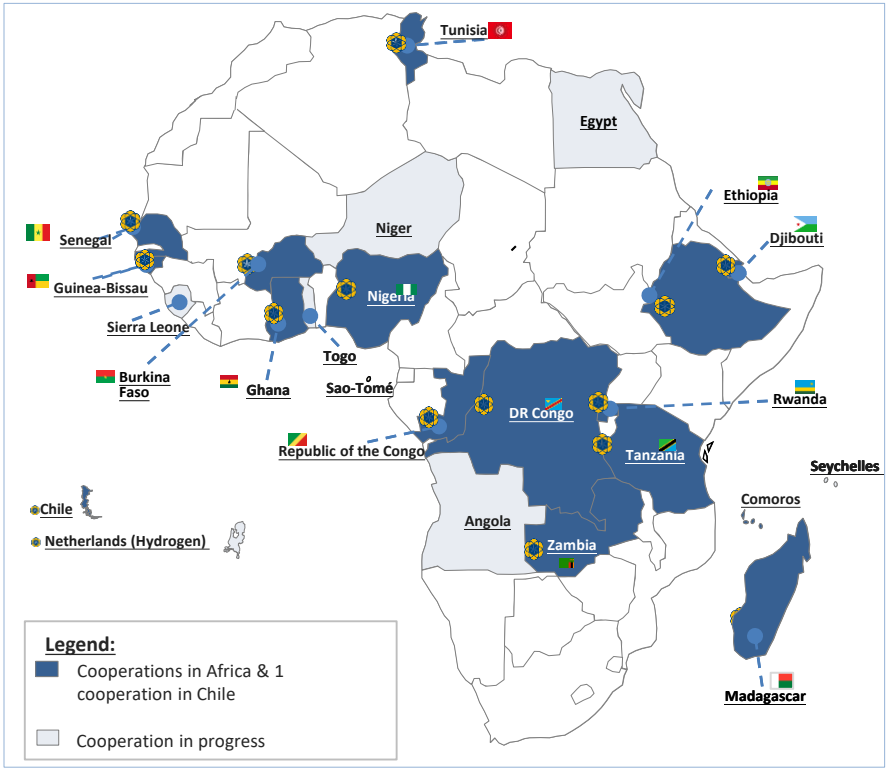
# TWO LEVERS OF COMMITMENT BEYOND BORDERS

## BILATERAL AGREEMENTS




**14** ONGOING COOPERATIONS IN AFRICA, 1 COOPERATION IN CHILI, 1 COOPERATION WITH MASDAR

**150** MW BEING COMMITTED

**450** MW COMMITTED

**+500** MW UNDER DISCUSSION

## MULTILATERAL AGREEMENTS

- ENERGY ACCESS COALITION

CLIMATE ACTION SUMMIT 2019 — A RACE WE CAN WIN

- DESERT TO POWER INITIATIVE

*CHAIR* masen *OWNER*

- MASEN-ISDB AGREEMENTS

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IsDB البنك الإسلامي للتنمية Islamic Development Bank

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# SET ROADMAP: A COMMITMENT TO EUROPE

**SIGNATURE AT THE COP22 OF THE JOINT DECLARATION FOR THE DEVELOPMENT OF A ROADMAP FOR THE EXCHANGE OF GREEN ELECTRICITY BETWEEN MOROCCO AND EUROPE**

MARRAKECH COP22|2016|CMP12 UN CLIMATE CHANGE CONFERENCE

**5 SIGNATORY COUNTRIES**

**STEERING COMMITTEE**

**STEERING COMMITTEE SECRETARIAT BY MASEN**

**COP22 NOVEMBER 2016 IN MARRAKECH: SIGNING OF THE JOINT DECLARATION**

**DECEMBER 2018 IN BRUSSELS: AGREEMENT ON THE OPENING OF THE CBGCPPAS* MARKET**

**MARCH 2019: LAUNCH OF NEGOTIATIONS FOR THE DEVELOPMENT OF A MoU**

**COP27 NOVEMBER 2022 IN SHARM EL SHEIKH: SIGNING OF THE MOU**

**PHASE I**

**PROJECT SCOPE AND SYNTHESIS OF VARIOUS STUDIES**

**PHASE II**

**STUDIES IMPLEMENTATION AND IDENTIFICATION OF TARGET MARKETS FOR THE EXCHANGE OF ELECTRICITY BETWEEN THE FIVE COUNTRIES**

**PHASE III**

**ROADMAP ELABORATION AND PREPARATION OF THE IMPLEMENTATION**

**IMPLEMENTATION OF THE SET ROADMAP BEGINNING WITH THE CBGCPPA MARKET**

**PARTNERS INVOLVED IN THE PROJECT**

Union for the Mediterranean
Union pour la Méditerranée
الإتحاد من أجل المتوسط

Commission européenne

THE WORLD BANK IBRD • IDA

**ELECTRICITY TRANSMISSION SYSTEM OPERATORS TSO**

**CROSS-BORDER GREEN CORPORATE POWER PURCHASE AGREEMENTS*

# 4 AND TOMORROW...

# ANTICIPATE THE FUTURE OF RE

**A VALORIZATION OF RENEWABLE ENERGIES THROUGH THE DEVELOPMENT OF APPLICATIONS TO MEET VARIOUS NEEDS**

### DESALINATION

### PRODUCTION OF HEAT AND COOLING

### OFF-GRID ELECTRICITY

### PUBLIC LIGHTING

### ELECTRIC MOBILITY

### WASTE RECYCLING

**AS WELL AS NEW PERSPECTIVES FOR THE PRODUCTION OF GREEN HYDROGEN AND ITS DERIVATIVES FROM RENEWABLE SOURCES**

# MOROCCO'S STRONG POTENTIAL FOR THE PRODUCTION AND EXPORT OF GREEN MOLECULES (1/2)

## MOROCCO HAS SET IN MOTION A REGIONAL DYNAMIC THROUGH THE CREATION OF AN ECONOMIC AND INDUSTRIAL SECTOR AROUND GREEN MOLECULES (HYDROGEN, AMMONIA AND METHANOL)

Morocco has been identified by several international energy agencies as **one of the 6 countries** with a **strong potential** for the production and export of **hydrogen and green derivatives**

THE KINGDOM COULD CAPTURE **4%** TO **8%** OF THE GLOBAL POWER-TO-X MARKET.

## MOROCCO HAS SEVERAL ASSETS AND POTENTIALITIES

### GEOGRAPHIC POSITIONING

- PROXIMITY TO EUROPE
- GAS AND PORT INFRASTRUCTURES CONNECTED TO THE ATLANTIC AND THE MEDITERRANEAN

### RENEWABLE ENERGIES

TARGET: AT LEAST 52% OF THE RENEWABLE ENERGY MIX BY 2030

### NATURAL HYDROGEN

- ACCORDING TO ONHYM: POSSIBILITY OF EXPLOITATION OF NATURAL SOURCES OF HYDROGEN IN THE MOROCCAN UNDERGROUND

## >> A committed dynamic thanks to the implementation of instruments aiming at providing Morocco with a national strategy around green hydrogen

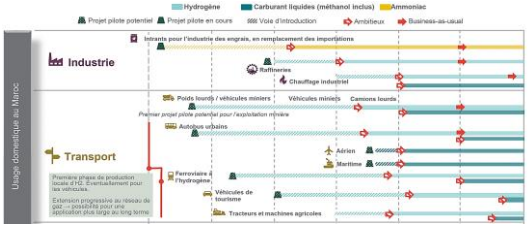
<<

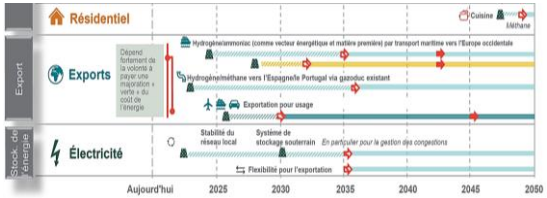
COMMISSION NATIONALE HYDROGENE

**2019 :** CREATION OF A NATIONAL HYDROGEN COMMISSION WHOSE MISSION IS TO GUIDE AND MONITOR STUDIES IN THE FIELD OF HYDROGEN, AS WELL AS TO EXAMINE THE IMPLEMENTATION OF THE NATIONAL ROADMAP FOR GREEN HYDROGEN

Royaume du Maroc – Ministère de l'Energie, des Mines et de l'Environnement | Royaume du Maroc – Ministère de l'Economie, des Finances et de la Réforme de l'Administration | Royaume du Maroc – Ministère de l'Industrie, du Commerce, de l'Economie Verte et Numérique | Royaume du Maroc – Ministère de l'Education Nationale, de la Formation Professionnelle, de l'Enseignement Supérieur & de la Recherche Scientifique | masen endless power for progress | CGEM | ONHYM | MOHAMMED VI POLYTECHNIC UNIVERSITY | IRESEN | Office National de l'Electricité


**2021:** PUBLICATION OF THE MOROCCAN ROADMAP "GREEN HYDROGEN AS A VECTOR OF ENERGY TRANSITION AND SUSTAINABLE GROWTH" HIGHLIGHTING MOROCCO'S POTENTIAL, THE APPLICATIONS OF GREEN HYDROGEN, FUTURE PROJECTIONS AND PROSPECTS, THE ACTION PLAN AND THE FIRST INITIATIVES UNDERTAKEN BY MOROCCO




CLUSTER GREEN H2

**2021 :** LAUNCH OF THE 1ST GREEN HYDROGEN CLUSTER IN AFRICA DEDICATED TO THE PROMOTION OF THE HYDROGEN SECTOR IN MOROCCO THROUGH THE INITIATION, SUPPORT AND COORDINATION OF INNOVATIVE COLLABORATIVE PROJECTS IN THE FIELD OF GREEN HYDROGEN IN MOROCCO AND ABROAD, IN ORDER TO ENCOURAGE INNOVATION AND CONTRIBUTE TO THE EMERGENCE OF A COMPETITIVE HYDROGEN SECTOR

Ministère de l'Energie, des Mines et de l'Environnement | Ministère de l'Industrie, du Commerce et de l'Economie Verte et Numérique | Ministère de l'Equipement, du Transport | Ministère de l'Education Nationale, de la Formation Professionnelle, de l'Enseignement Supérieur et de la Recherche Scientifique

ONHYM | amee | AFRIQUIA | AKWA | Air Liquide | MAGHREB STEEL | OCP | Vestas | enel | SIEMENS energy | IRESEN | masen | MASEN | Fédération de l'Energie | NAREVA | UEMF | SNEP | EDF | John Cockerill | Sumitomo Corporation | BASF The Chemical Company | ACWA POWER | AAQIUS

# MOROCCO'S STRONG POTENTIAL FOR THE PRODUCTION AND EXPORT OF GREEN MOLECULES (2/2)

## International collaboration in accordance with the Moroccan green Hydrogen roadmap's objectives

**Morocco-Germany Partnership**
10 June 2020 in Berlin
Green Hydrogen Cooperation Agreement

The agreement was part of the long-standing energy cooperation between Germany and Morocco. It is planned to build an initial project with a 100 MW electrolysis capacity to transform electric energy into hydrogen..

## Studies and projets / Masen

KFW
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Integrated reference project for green hydrogen production from dedicated Renewable Energy plants

Development of a reference project, preceded by the realization of various technical and economic feasibility studies

ESMAP
Energy Sector Management Assistance Program
WORLD BANK GROUP
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Study on green hydrogen opportunities in Morocco

Analysis and recommendations of different options and scenarios for the development of green H2 and derivatives, based on a modeling tool

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