



المكتب الوطني للهيدروكاربورات و المعادن
ΕΘΣΟ. Α.Ε.Ε.Ο | ΗΦΣΛΟ:Κ.ΟΘ:Ο.+ Λ ΣΧ:Υ.Χ
OFFICE NATIONAL DES HYDROCARBURES ET DES MINES



Moroccan Hydrocarbon Exploration Opportunities and Future Cooperation Prospects

1st ARAB-INDIAN COOPERATION FORUM IN ENERGY

June 8-9, 2021

SUMMARY

Energy & Hydrocarbon Exploration Outlook

Proven Petroleum Systems

Hydrocarbon Exploration Status

Legal Framework

Moroccan Indian Cooperation

Summary

A GROWING ENERGY DEMAND: A SIGNIFICANT ECONOMIC DEVELOPMENT

Morocco's primary energy demand

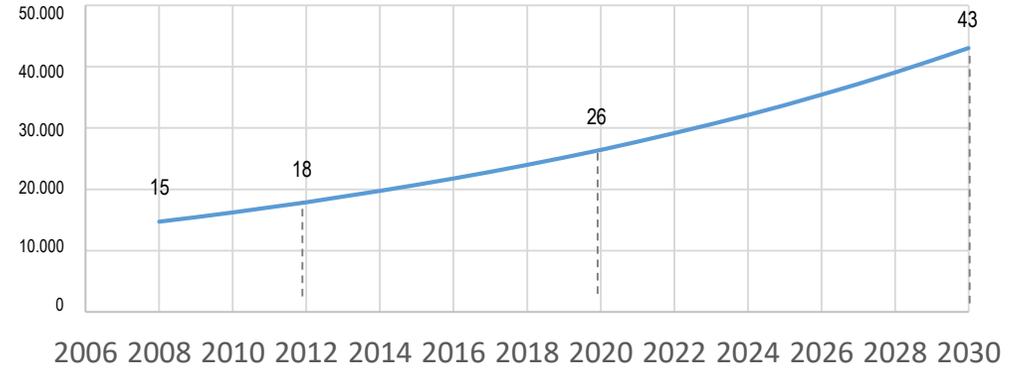
- x2 by 2020
- x3 by 2030

Morocco's electricity demand

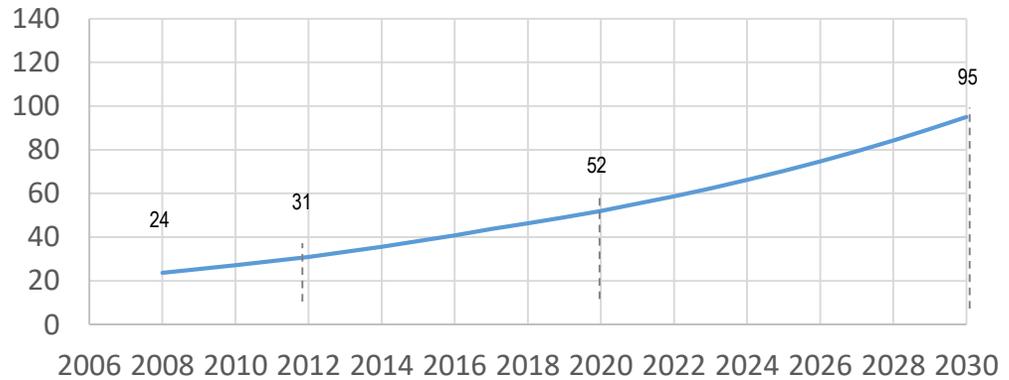
- x2 by 2020
- x4 by 2030

Morocco's dependency on imported fossil fuels around 93%

CONSUMPTION IN MILLIONS TEP

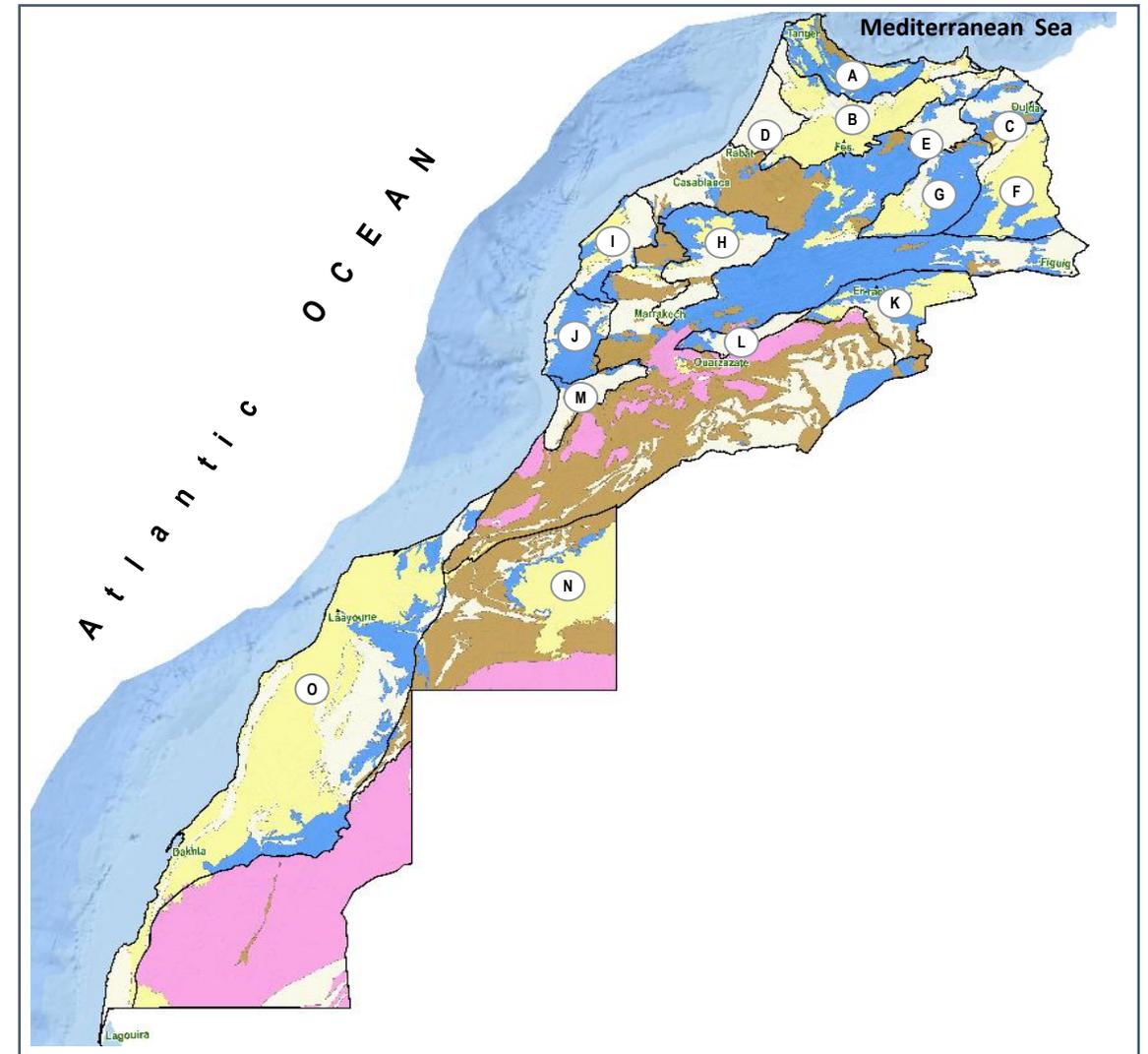


CONSUMPTION IN TWH



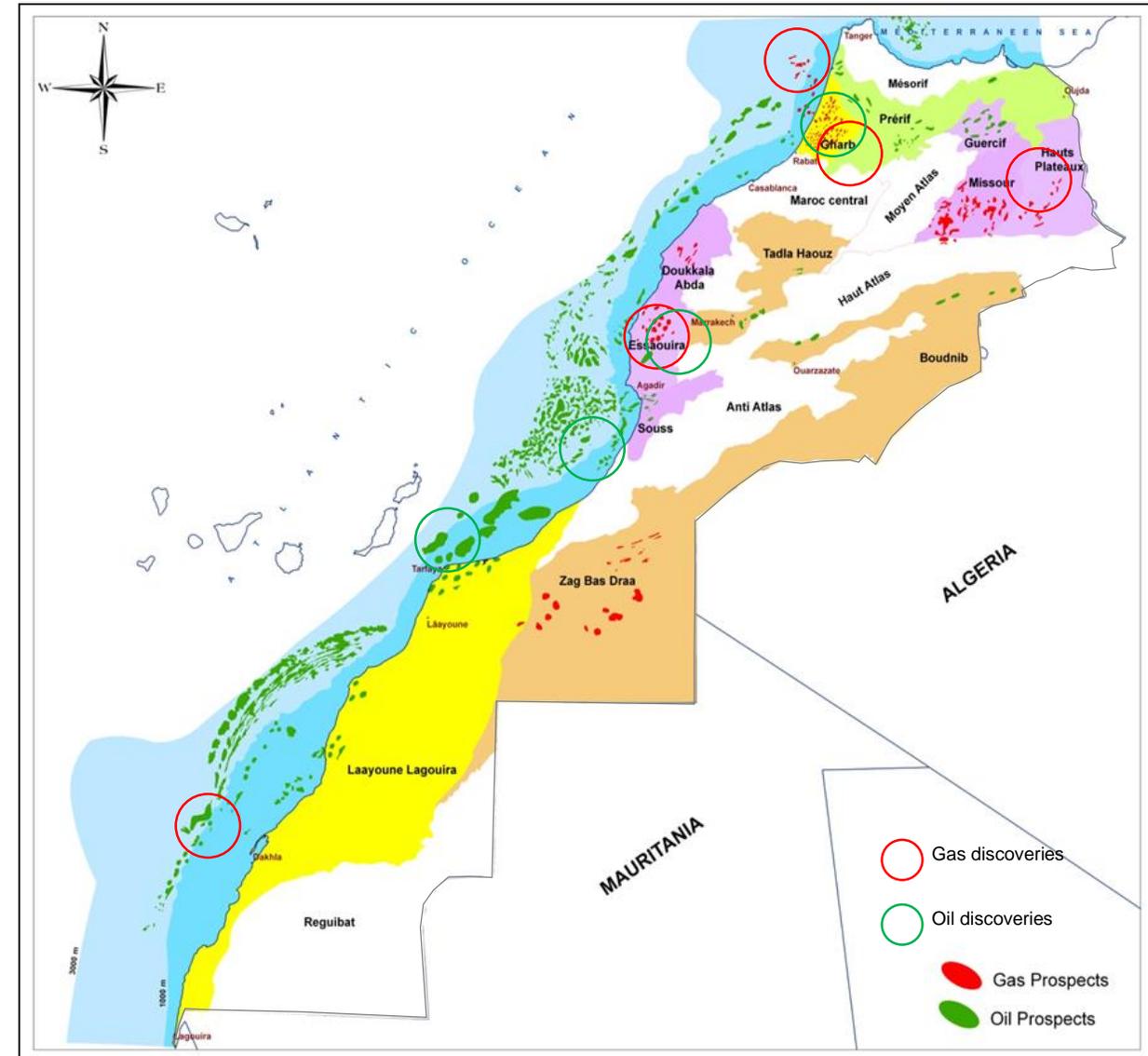
HYDROCARBON EXPLORATION : KEYS FACTS

- A very extended offshore domain:
 - **3 000 Km** of coast line on the Atlantic and **500 Km** on the Mediterranean sea.
- Large **sedimentary** basins of several geological and structural types:
 - Total surface area: **740 000 Km²** (Onshore & Offshore)
 - But underexplored: **360 wells** drilled - Many objectives have not yet been tested



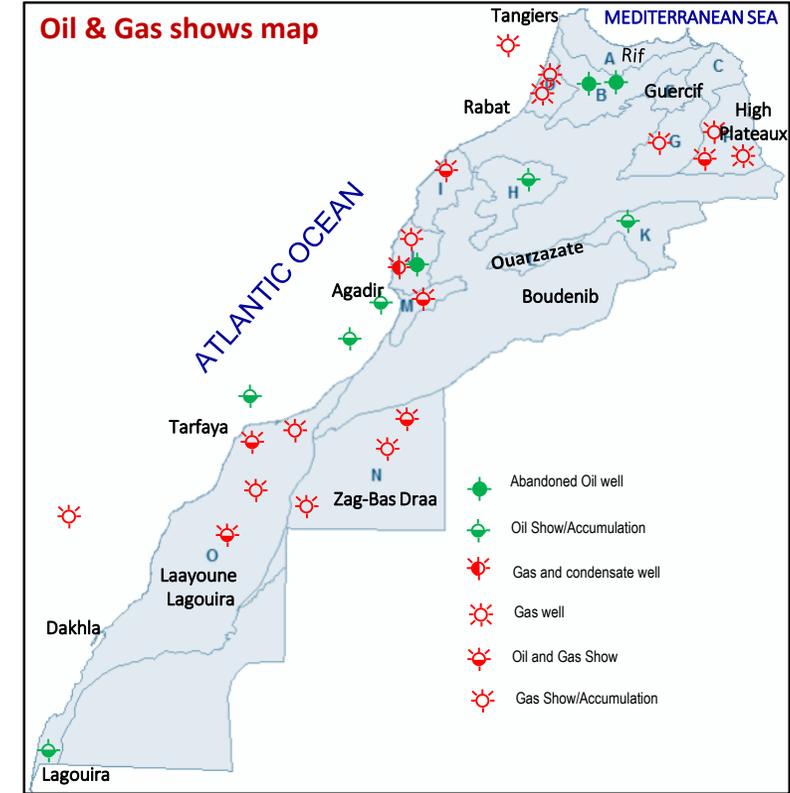
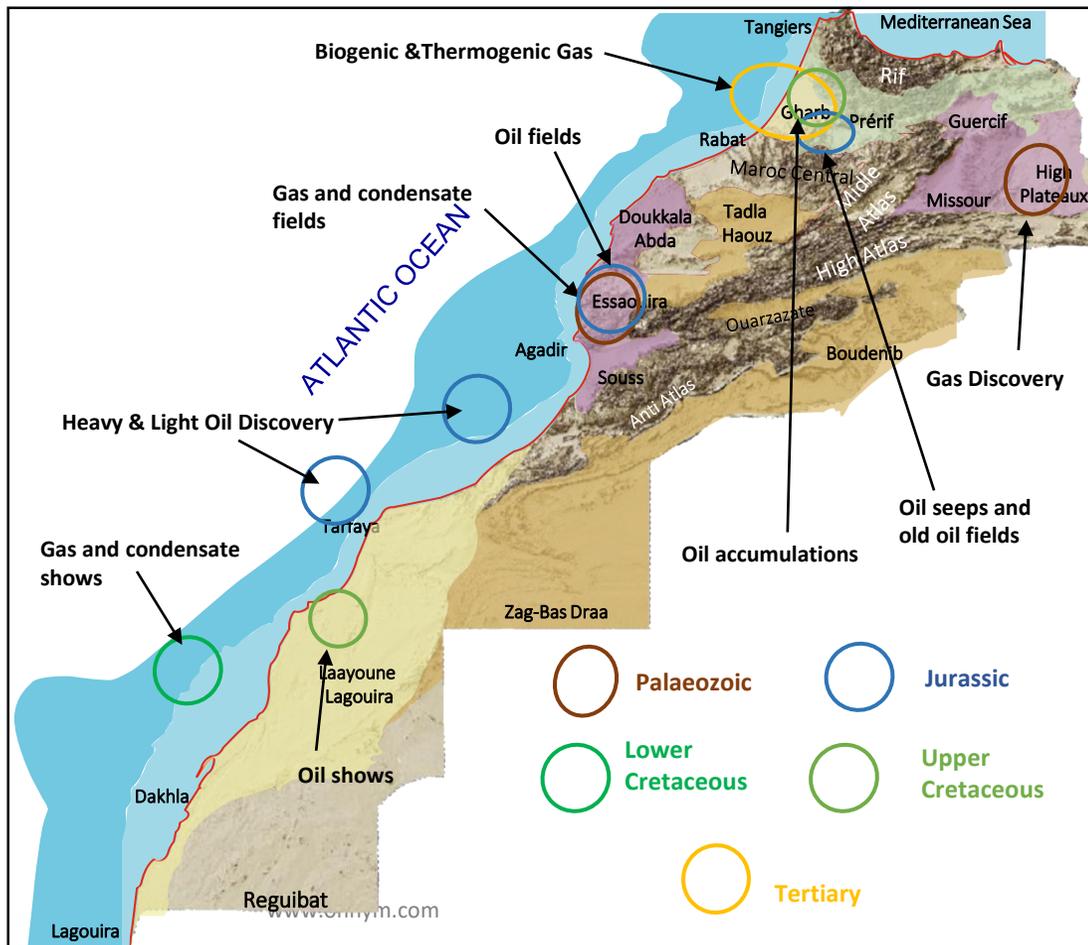
MULTIPLE PROVEN PETROLEUM SYSTEMS OFFSHORE AND ONSHORE

- ❑ 740 000 Km² of sedimentary basins with multiple identified petroleum systems ranging from Paleozoic to Cenozoic and proven source rocks.
- ❑ More than 850 identified prospects and leads offshore and onshore.
- ❑ Sedimentary basins in Morocco remain underexplored: Only 0.04 wells/100 km².
- ❑ The prospects drilled so far showed hydrocarbon accumulations and discoveries that have proven their potential.
- ❑ The identified prospects and leads range into Pre-Salt, Salt Related, Subsalt, Platform, Turbidite and Thrust Related Play categories.



MULTIPLE PROVEN PETROLEUM SYSTEMS OFFSHORE AND ONSHORE

- The petroleum systems are widely extended in stratigraphic time from Paleozoic into Tertiary. These are proven in the Onshore and Offshore Moroccan sedimentary basins through hydrocarbon occurrences (discoveries, shows, surface oil seeps).



- Palaeozoic petroleum systems (Silurian/Triassic & Silurian/ Ordovician-Devonian):** e.g. Meskala gas & condensate field and High Plateaux gas discovery
- Jurassic petroleum systems (Toarcian-Callovian/ Jurassic):** e.g. oil fields in the rides prerifaines & Essaouira and oil discovery in the Offshore
- Lower cretaceous petroleum systems (Jurassic-Lw. Cretaceous/ Lw. Cretaceous):** e.g. oil and gas shows encountered in Offshore Atlantic
- Upper cretaceous petroleum systems (Cenomanian-Turonian/Upper Cretaceous-Tertiary):** e.g. Ain Hamra oil accumulation and oil shows in the Onshore
- Tertiary petroleum systems (Tertiary/Tertiary):** e.g. biogenic gas fields in Gharb basin

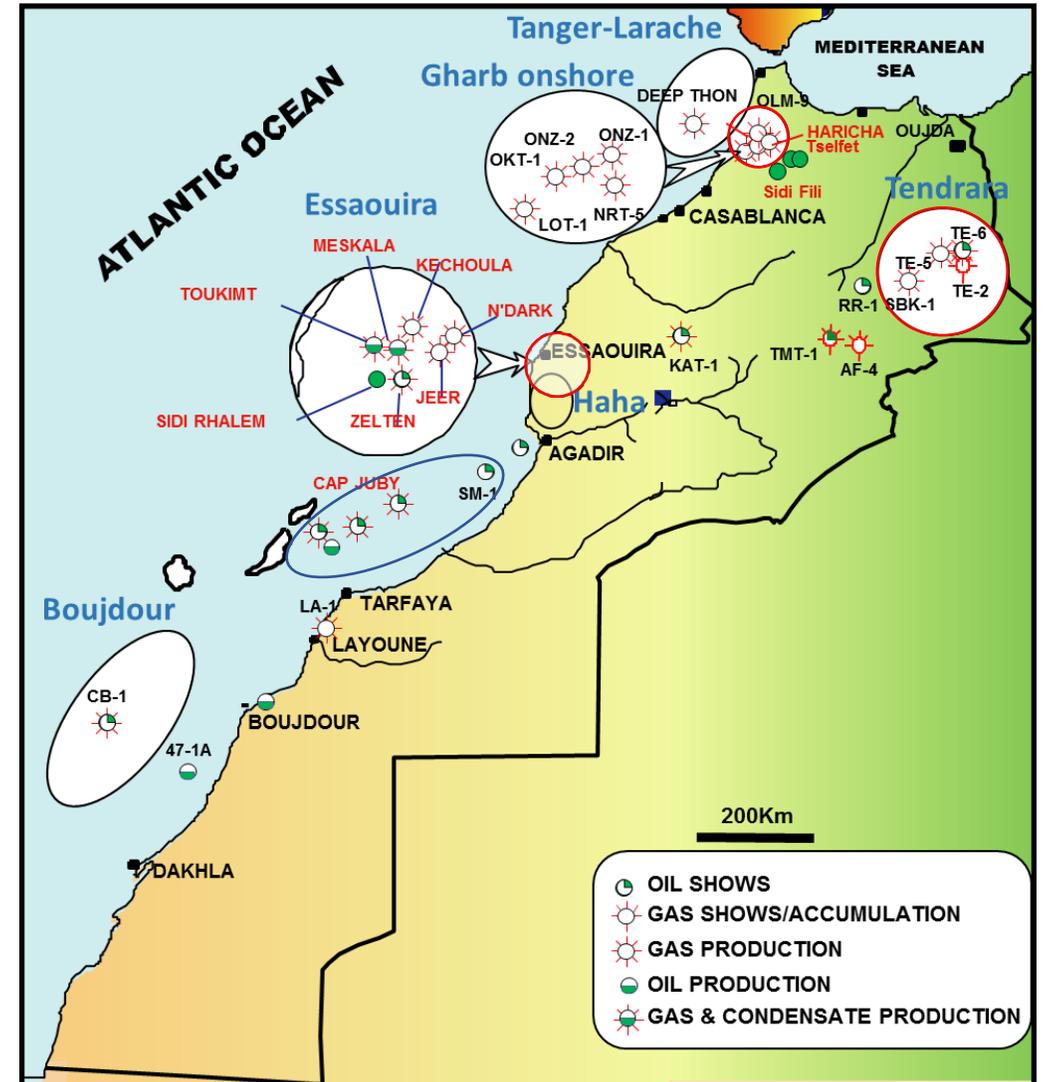
MULTIPLE PROVEN PETROLEUM SYSTEMS OFFSHORE AND ONSHORE

PRODUCING FIELDS AND DISCOVERIES

3 main producing or under development fields:

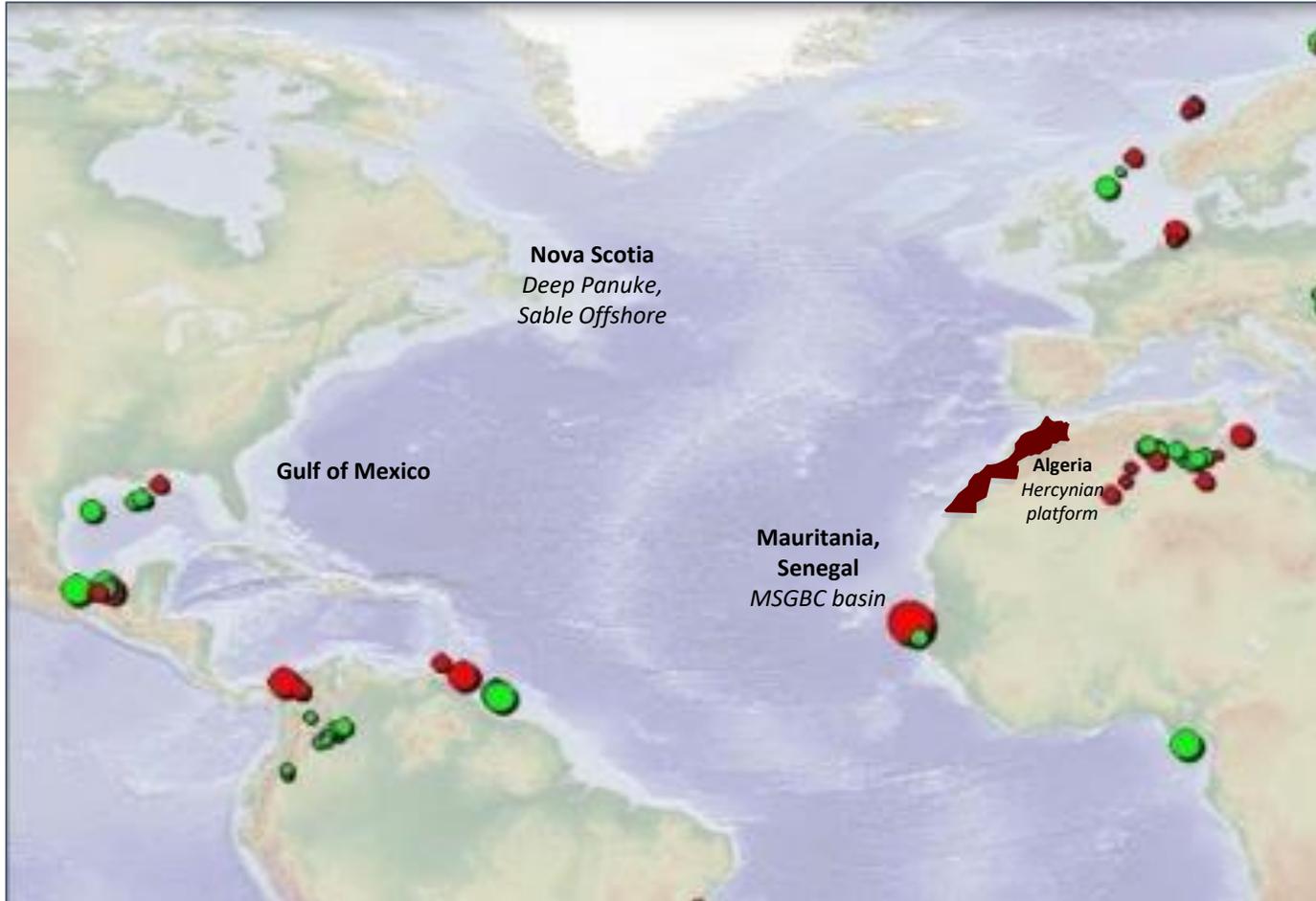
- **Essaouira Basin onshore** : Meskala Gas and condensate.
- **Gharb Basin onshore** : Biogenic and thermogenic gas.
- **Tendrara** : Natural gas in High Plateaus onshore.

Multiple heavy oil and gas shows offshore identified as a result of drilling.



ANALOGIES WITH MAJOR RECENT DISCOVERIES

Circum Atlantic Margins



- Morocco basins have **analogies with many recent discoveries** and some of the biggest producing fields in the world.
- Continuity of the **Algerian Triassic Province** and the **Saharan Hercynian platform** in Eastern Morocco.
- Morocco is part of the **Atlantic Mesozoic - Cenozoic Passive Margin** where recent big discoveries have been made (MSGBC Basin).
- **Nova Scotia analogies** : Sable basin and Deep Panuke field.
- **Gulf of Mexico** in terms of salt tectonics.

HYDROCARBON EXPLORATION STATUS OFFSHORE & ONSHORE

FREE OF CHARGE AND EXTENSIVE G&G DATABASE

Offshore Atlantic

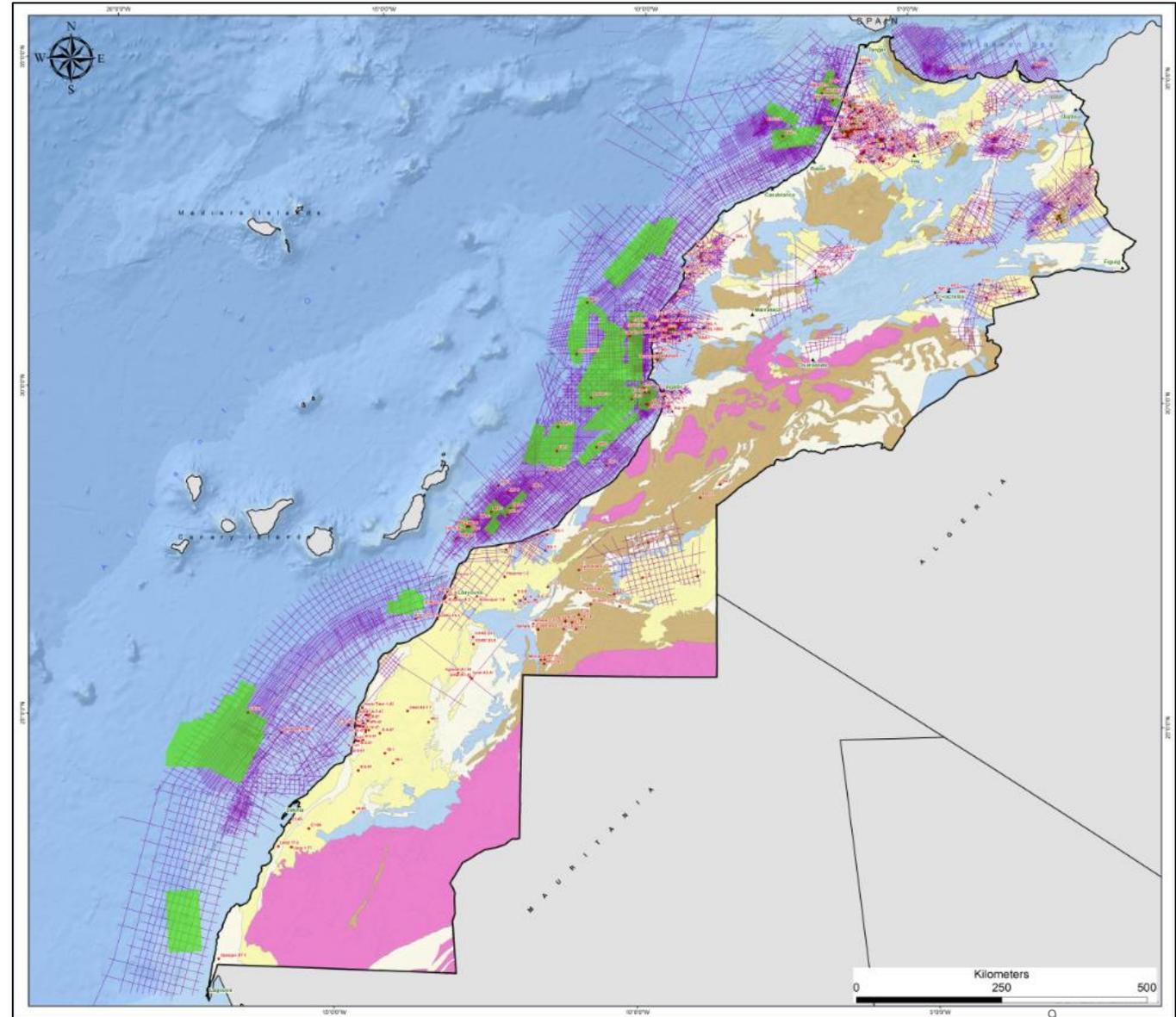
- 2D Seismic: 164 808 Km
- 3D Seismic: 70 242 Km²
- 2D Multi-clients: 13 195.9 Km
- 42 exploration wells

Offshore Mediterranean

- 2D Seismic: 10 745 Km
- 2 Exploration wells

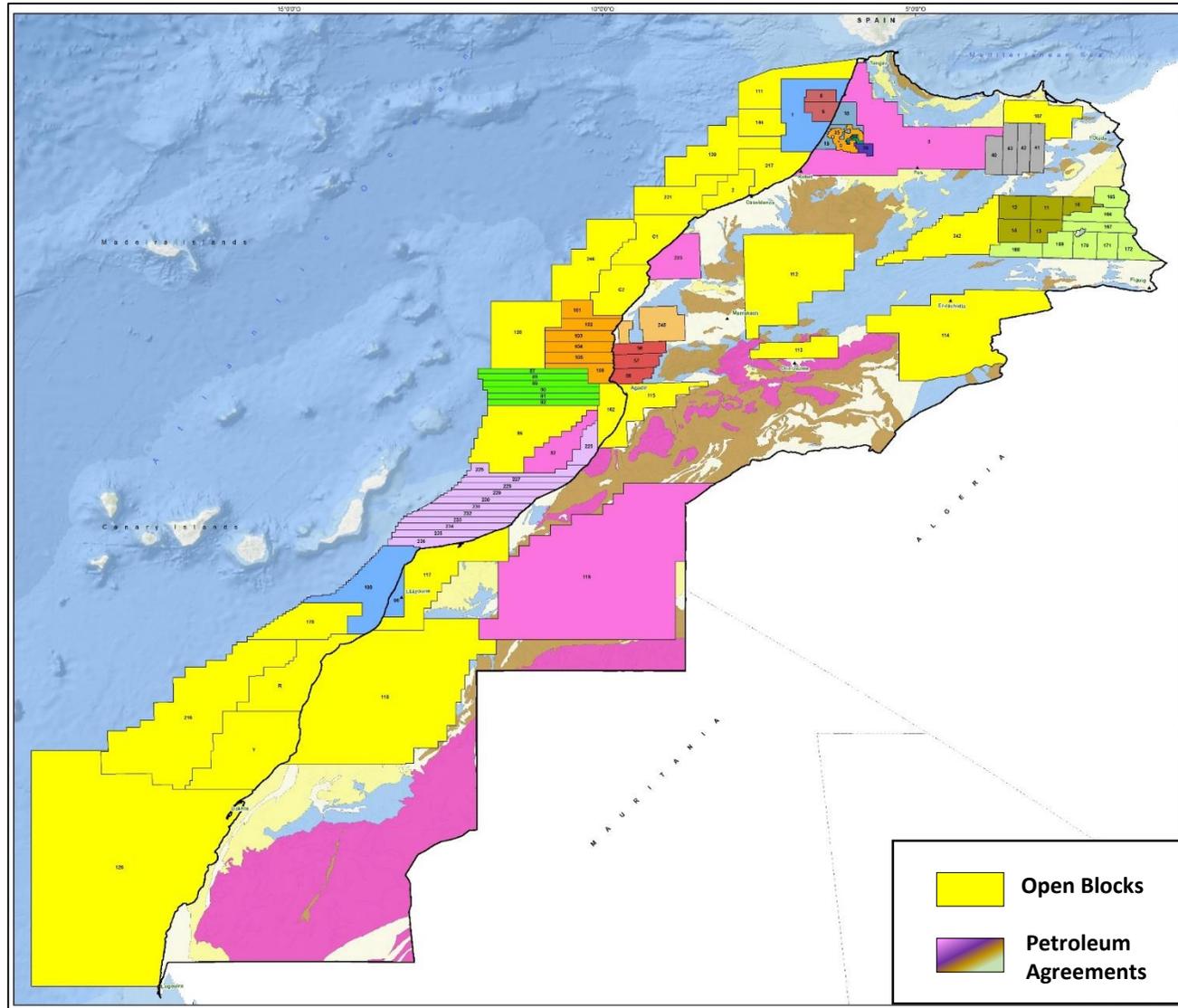
Onshore

- 2D Seismic: 56 808 Km
- 3D Seismic: 2 192 Km²
- 317 Exploration wells



HYDROCARBON EXPLORATION STATUS OFFSHORE & ONSHORE

E&P ACTIVITIES



www.onhym.com

Licensing status

- 54** Exploration Permits: **26** Offshore & **28** Onshore
- 4** Reconnaissance Licenses: **1** Offshore & **3** Onshore
- 9** Exploitation concessions (including **1** ONHYM)
- 24** Open Blocks: **16** Offshore & **08** Onshore
- 3** Blocks under negotiation

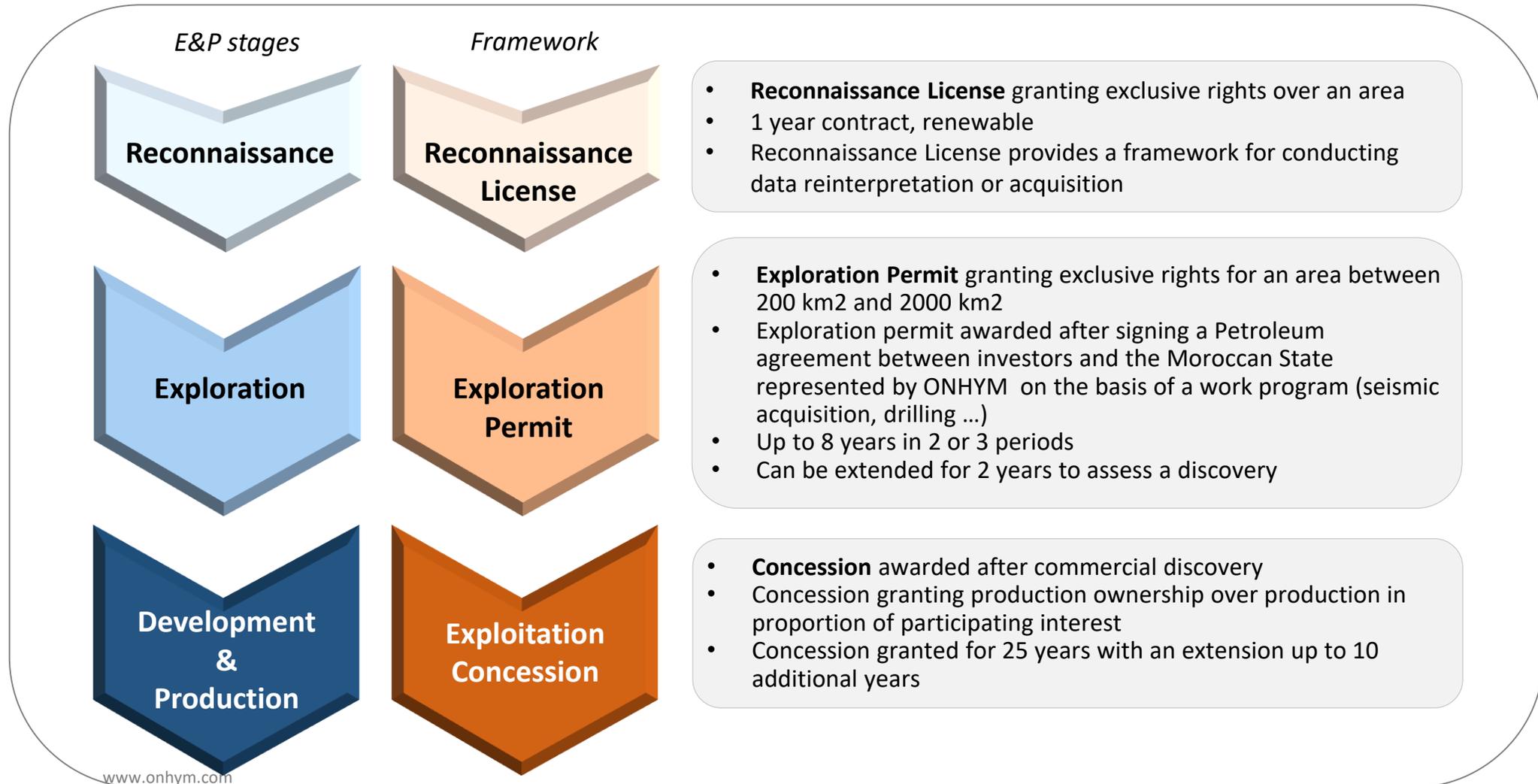
Main ongoing Exploration Activities in Offshore & Onshore Morocco (ONHYM & Partners)

- 3D & 2D seismic processing
- G&G Evaluation of the Areas of Interest
- Reservoir distribution studies & geochemical modelling
- Drilling activity in the Rharb onshore Basin
- Mid stream project
- Organization of Virtual Data Room

LEGAL FRAMEWORK

A FLEXIBLE CONTRACTUAL FRAMEWORK TO ADAPT TO OPERATORS EVOLVING NEEDS DURING E&P STAGES

Government interest share : 25% maximum



MOROCCO INDIAN COOPERATION PROSPECTS

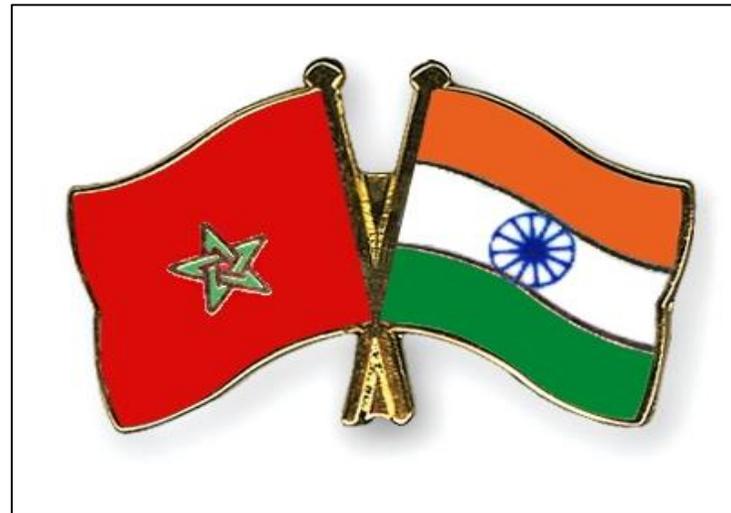
- **Bilateral** relations between **India** and **Morocco** reinforced following the India-Africa Forum Summit in New Delhi in 2015.
- The accelerated economic growth of India has contributed towards the growing of **energy demand** and **dependence** on energy imports. **India** would be crucial for the **future** of the global energy markets.
- **Increasing** of the **demand for energy** of **India**: Diversification of energy basket. **Morocco** would be considered as one of the alternatives.
- **Morocco** is a **safe** and a **stable country** for investors. It is fast becoming one of the **best emerging markets** for investment.
- Morocco has become a **favored destination for energy seekers** :
 - New technological advances (Access to deep offshore resources).
 - Very favorable contractual terms to international and national oil companies.



MOROCCO INDIAN COOPERATION PROSPECTS

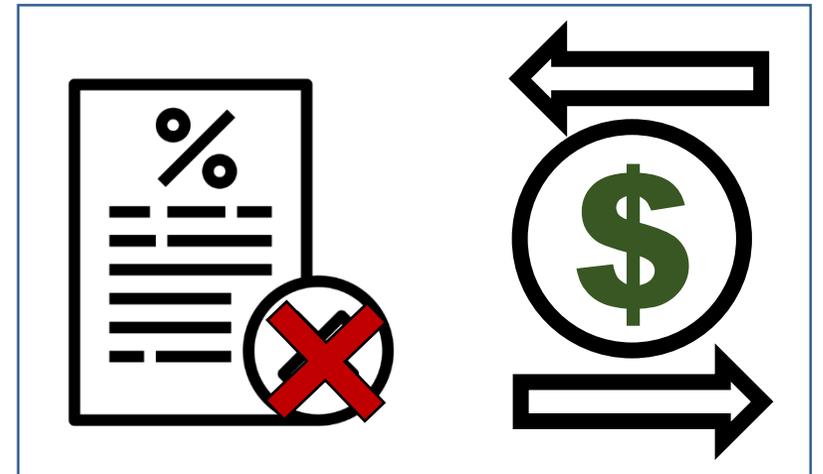
Future cooperation between India and Morocco covering the following aspects:

- **Downstream** cooperation in refineries, pipeline projects and other energy-related infrastructure.
- Encouraging **Indian state-owned** and **private energy companies** to acquire **assets**, through **acquiring equity in oil**, gas blocks or stakes in exploration and production (E&P) companies abroad.
- Investing in capacity building, **human resources** and **infrastructure development**, bridging the **information** gap, and forging closer **cultural contacts** with Morocco.
- Providing the **relevant experience** and **technical & financial resources**, by India, to assist Morocco to exploit its untapped potential for hydrocarbons.
- Partnership between **Indian** companies and **Moroccan** or **foreign** companies to produce more **sustainable** and **cleaner forms of energy** to combat climate change pressures.



SUMMARY

- **Favourable Geology** for oil and gas exploration and production
- Still largely **underexplored** onshore and offshore basins
- Play concepts with **analogues** to those identified in North Africa, Nova Scotia, West Africa and the Gulf of Mexico
- **Myriad of prospects and leads**. The so far drilled wells have discovered modest local hydrocarbon to prove existence of working petroleum systems
- **Favourable** and attractive **terms**
- **An easy place** to operate and an **outstanding opportunities**





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