Moroccan Hydrocarbons Sector

Morocco-UK Trade and Investment Forum

27th March 2018
I. Moroccan Energy Strategy

II. Moroccan Hydrocarbons Sector

III. Cooperation ONHYM-African countries
I-Morocco, a developing country

Towards integrated sustainable development

- Succession
- Advisory Council on Human Rights (CCDH)
- Family Code “Moudawana”
- Committee of Oulemas
- Law of parties
- Election Code
- Law on the Transfer of Nationality
- Central Agency for the Prevention of Corruption
- Consumer Protection Act
- Reform of the Constitution
- Establishment of the Economic and Social Council
- National Initiative for Human Development (INDH)
- New legal and institutional frameworks
- Advanced regionalization

- Energy
- Green plan
- Emergence
- Tourism
- Infrastructures

- Sectoral strategies:

- Energy
- Green plan
- Emergence
- Tourism
- Infrastructures

- News

- Sectoral strategies:
  - Energy
  - Green plan
  - Emergence
  - Tourism
  - Infrastructures

1997 1999 2001 2003 2005 2007 2009 2011 2013 2015

National Initiative for Human Development (INDH)

Equity and reconciliation instance (IER)
I-A growing energy demand

SUSTAINABLE DEVELOPMENT

- Agriculture
- Industry
- Tourism
- Housing
- Water
- Phosphate
- Energy
- Infrastructure
Morocco is facing increasing energy needs for the next coming years

Morocco's demand in primary energy:
- x2 by 2020
- x3 by 2030

Morocco's demand in electricity:
- x2 by 2020
- x4 by 2030
I-Energy strategy in Morocco

Four Strategic Orientations
- Diversified mix, optimized by reliable and competitive technology;
- Mobilization of national resources;
- Energy Efficiency;
- Regional integration.

Four fundamental objectives
- Security of supply and energy availability;
- Access to energy at low costs;
- Demand management;
- Preservation of the environment.
**I-Energy Mix**

By 2020: RE will represent 42% of total capacity

**Solar**
- Capacity: 2000 MW
- Inv.: $9 Million
- Annual saving: 1 Million TOE / year
- MASEN

**Wind**
- Capacity: 2000 MW
- Inv.: $3.5 Million
- Annual savings: 1.5 Million TOE / year

**Hydraulics**
- Construction of 2 550MW hydropower plants (Mdez EL MENZEL and Abdelmoumen)

**Fossil fuels**
- Thermal power plants under construction (2010-2015): 2x500MW
- Complementary projects 1000MW (Gas or clean coal) from 2018

Energy efficiency: 5% in 2020 and 20% in 2030
**I-Moroccan energy model**

By 2030: RE will represent 52% of total capacity

**10 100 MW** of additional renewable energy capacity by 2030

1. **Solar**
   - 4560 MW
   - 20%

2. **Wind**
   - 4200 MW
   - 20%

3. **Hydroelectricity**
   - 1330 MW
   - 12%
• **Estimated needs** at about 5 bcm per year and power plant feed (3.5 bcm/year);
• 2700 MW then 3500 MW of combined cycles;
• Total investment amount: $ 4.5 billion;
• **Construction of a LNG port**, a regasification plant, combined cycle electric cycles (2,400 MW) and a **gas pipeline connecting the gas terminal** serving Casablanca, Mohammedia, Kenitra and the northern regions, planned for 400 km;
• A draft law concerning the activities of the gas sector is being prepared in consultation with the main operators of the sector (public and private).
I-Morocco, a model for energy transition

I—Morocco, a model for energy transition

8 129 MW
8 129 MW
15 946 MW
20 070 MW
24 800 MW

2015
2020
2025
2030

Coal
Natural gas
Fuel
Wind
Solar
Hydroelectricity

+ 7 871
+ 4 124
+ 4 730

32% 40% 32% 20% 11% 5% 16% 25% 24% 11% 5% 2% 14% 16% 20% 2% 14% 16% 20% 2% 14% 16% 20% 2% 14% 16% 20% 2% 14% 16% 20%
Proven leadership to support Africa's energy transition
II-ONHYM : A catalyst for hydrocarbons and mining exploration

90 years of solid expertise

- **Conducting research, exploration and exploitation** of hydrocarbon deposits or oil shale, as well as mineral deposits and any mineral substance (excluding phosphates);

- **Promoting and supporting any action to contribute to the development of exploration and exploitation** of hydrocarbons and minerals, particularly in the context of partnerships;

- **Provide rich, reliable and accessible databases** to any operator regarding soil and national subsoil, together with documentation on the administrative, financial and legal arrangements;

- **Negotiate with any potential partner**, in accordance with the contractual terms and applicable legal provisions.
II-Hydrocarbon exploration: keys facts

- **A very extended offshore domain:**
  
  - 3,000 km coastline on the Atlantic and 500 km on the Mediterranean sea

- **Large sedimentary basins of several geological and structural types:**

  - Total surface area: 918,237 Km² (Onshore & Offshore)
  
    - Consisting of Mesozoic and Cenozoic sedimentary basins.

- **But underexplored: Only 343 wells drilled.**

- **Fairly complex structural history** since the Middle Jurassic breakup between the North American-African plates

- Deep objectives have not yet been tested

- **Similar play concepts** to Nova Scotia, West Africa and the Gulf of Mexico;
10 ONHYM Partners on:
• 45 Exploration Permits
• 4 Reconnaissance contracts
Total area: 119 556 Km²

19 Partners of ONHYM on:
• 99 Exploration Permits
• 3 Reconnaissance contracts
• 9 Exploitation concessions
Total area: 170 002,72 Km²
- **Share of State interest:** 25% maximum.

- **Corporate tax:** Total exemption from corporation tax for 10 years.

- All equipment, materials, products and services required for the work are exempt from customs duties and VAT.

- Holders of an exploitation concession are exempted from the tax of the patents, the urban tax and the tax on the urban undeveloped land.

- **Tax exemption on the profits and dividends of the holders of an exploitation concession** and the shareholders of concessionary companies.

- **Low concession fees:**
  - Onshore and offshore at less than 200 meters of water depth: Oil 10%, Gas 5%.
  - Offshore at more than 200 meters of water depth: Oil 7%, Gas 3.5%.
## II-Seismic acquisition and drilling 2000 - 2017

<table>
<thead>
<tr>
<th></th>
<th>2000-2017</th>
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<tbody>
<tr>
<td>2D Seismic Km</td>
<td>93 533</td>
</tr>
<tr>
<td>3D Seismic Km²</td>
<td>59 997</td>
</tr>
<tr>
<td>Onshore drilling</td>
<td>71</td>
</tr>
<tr>
<td>Offshore drilling</td>
<td>15</td>
</tr>
<tr>
<td>Total drilling</td>
<td>86</td>
</tr>
</tbody>
</table>
Basins with proven Petroleum Potential

- **Gharb offshore:**
  Repsol made a non-commercial discovery of biogenic gas from Tertiary.

- **Essaouira onshore:**
  is a gas & condensate producing area since 1985.
  Most recent drilling activities revealed new potential zones within the Jurassic.
50 wells drilled leading to 30 commercial discoveries:
Although of small size, they are economically interesting because of the existence, in place, of a network of gas pipelines as well as the proximity of several local industries making them profitable.
**Key Achievement: Tendrara**

- **Tendrara:**
  Following the reprocessing and interpretation of 498 Km² of 3D seismic data and an evaluation study, ONHYM and its partner, Sound Energy **drilled 3 wells in the Tendrara area**, between 2016 and 2017. **Two of them discovered gas and condensate** in the Triassic and a concession for production is under negotiation.
15 wells was drilled offshore Atlantic between 2000 and 2017:

- **8 wells** with oil and gas show and presence of Oil with an API° Ranging from 12 to 26.

- **2 wells** encountered a non-commercial gas and condensate discoveries.
II- Key Achievement : Essaouira-Lagouira Offshore

Tarfaya- Agadir segment

7 wells drilled within the Agadir -Tarfaya Atlantic offshore segment between 2000 and 2017:

- **3 wells** chasing the Jurassic Carbonates in shallow waters, 2 of them confirmed the presence of oil with a 12 API° at JM-1 well and 26 API° at SM-1 Well.

- **4 wells** drilled in deep waters chasing Jurassic and Cretaceous Turbidites. 3 of them encountered oil and gas shows. Thus demonstrating working petroleum Systems.
Within this large area of about 200 000 Km² only one well was drilled up to know in 2014.

- This well made a no Commercial discovery of gas and condensate in the Cretaceous Turbidites

Boujdour segment
II-Oil shales

- Important oil shale resources

- Over 10 oil shale indications located in the Rif, the Atlas and the Southern provinces with two main fields:
  - **Timahdit:** supplies evaluated at 15 billion barrels of oil;
  - **Tarfaya:** supplies evaluated at 23 billion barrels of oil.

- **3 MOU:** ZONATEC (Russia), GOS (UK) et GENERAL STRADE (Italy).
Regional geology supports opportunities for shale gas exploration and production.

3rd largest opportunity in North Africa.

4 Basins geologically favorable for shale gas resources accumulations:
- Bas – Draa- Zag
- Boudenib & Ouarzazate basins
- High Plateaux
- Tadla & Haouz
II-: Petroleum Exploration 2017: Key Achievements

- Geophysical acquisitions by ONHYM and its partners:
  - 3D seismic: 6,865 km².
  - 2D seismic: 16,889 km including 850 Km acquired by ONHYM alone on the Mesorif (North of Morocco) and 13,195 Km of 2D multi-client on the Atlantic offshore.

- Drilling of six (6) exploration wells by our partners, three of them are positive.

- Signature of 5 new petroleum agreements and 2 new reconnaissance contracts.

- Partners’ investments: 1.242 Million MAD

- ONHYM’s investments: 26.87 Million MAD
**II-ONHYM Alone 2017: Key Achievement**

**Objectives: Studies and promotion Offshore Tangier – Tarfaya:**
- Interpretation of 4,800 Km of 2D seismic and 9028 Km² of 3D
- Preparation of promotional material and portfolio of prospects

**Objectives: Tarfaya-Lagwira Offshore Studies and Promotion:**
- Interpretation of 4,100 Km of 2D seismic
- Preparation of promotional material and portfolio of prospects

**Objectives: Triassic, Jurassic and Cretaceous Mesorif Basin:**
- Reprocessing of 500 km of 2D seismic
- Acquisition of 850 Km of new 2D seismic
- Geological and Geophysical Study

**Objectives: Unconventional hydrocarbons: Shale gas and oil shale:**
Geological and geophysical study and mapping of all Paleozoic Potential intervals

**Objectives: Paleozoic, Jurassic, Cretaceous & Tertiary Lemsid:**
- Processing and interpretation of the 456 Km 2D seismic.
- Regional synthesis study

**ONHYM achievements in 2017**
- Acquisition of 850 Km of 2D seismic,
- Reprocessing of 500 Km of 2D seismic,
- Interpretation of 9 506 Km of 2D seismic and 9028 Km² of 3D seismic
II- ONHYM and Partners: Key Achievements in 2017

- **Repso (Gharb offshore south):** Further processing and interpretation of 1218.5 km² of 3D seismic.
- **Chevron / Qatar Petroleum (Cape Cantin and Cape Walidia):** Processing and interpretation of 4322 km² of 3D seismic data.
- **New Age (Foum Ognit offshore):** Acquisition of 999 Km² of 3D seismic.
- **Kosmos / Capricorn (Boujdour Maritime):** Acquisition of 1745 km² of 3D seismic.
- **ENI (El Jadida offshore):** Oil potential assessment study and reprocessing of seismic data.
- **Chariot (Mohammedia offshore):** Acquisition of 2246 Km of 2D seismic and 317Km² of 3D seismic.
- **Chariot (Kenitra offshore):** Acquisition of 707 Km² of 3D seismic.
- **ENI / Woodside / Chariot Oil (Deep Offshore Rabat):** Geological Evaluation and Selection of the Prospect for Drilling.
- **SDX Energy (Central Sebou & Western Rharb):** Drilling of 4 wells; KSR-14, KSR-15, KSR-16, ELQ-1.
- **Sound Energy (Matarka):** Acquisition of an Aero-Gradiometric Coverage of 4568.42 Km.
- **Sound Energy (Tendrara):** Drilling of the TE-8 well. Acquisition of 1168.60 km of Aero-Gradiometric coverage and 598 km of 2D seismic.
- **Sound Energy (Anoual):** Acquisition of an Aero-Gradiometric coverage of 11080.80 Km.
- **PEL / Forpetro (Haha onshore):** Drilling Tamanar-2 well.

**Achievements of ONHYM and Partners in 2017**
- Acquisition of 26,817.82 km of Aero-Gradiometric coverage.
- Acquisition of 2,844 of 2D seismic and 6,865.13 km² of 3D seismic.
- Drilling 6 wells; three are positive (Gharb).
## Drilling results in 2017

<table>
<thead>
<tr>
<th>Partner</th>
<th>Permit</th>
<th>Well</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>Sound Energy</td>
<td>Tendrara Lakbir</td>
<td>TE-8 (Tendrara-8)</td>
<td>Gas show</td>
</tr>
<tr>
<td>PEL/Forpetro</td>
<td>Haha Nord –Centre-</td>
<td>Tamanar-2</td>
<td>Gas show</td>
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<td>Sud</td>
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<tr>
<td>SDX Energy</td>
<td>Sebou Central</td>
<td>KSR-14 (Ksiri-14)</td>
<td>Gas discovery</td>
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<tr>
<td></td>
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<td>KSR-15 (Ksiri-15)</td>
<td>Gas discovery</td>
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<tr>
<td></td>
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<td>KSR-16 (Ksiri-16)</td>
<td>Gas discovery</td>
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<tr>
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<td>ELQ-1 (Elqodia-1)</td>
<td>Dry well</td>
</tr>
</tbody>
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II-ONHYM: 2017 promotion achievements

- **Chariot Oil & Gas**
  - (Kenitra Offshore)

- **ENI**
  - (El Jadida Offshore)
  - (Tarfaya Offshore Shallow)

- **SDX Energy**
  - (Rharb Occidental)
  - (Sebou Central)
  - (Matarka)

- **Sound Energy**
  - (Anoual)

**Legend:**
- Exploration Permits
- Reconnaissance Licenses
## II-Partner achievements in 2016-2017 and 2018 forecast

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
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<tbody>
<tr>
<td><strong>2D seismic (km)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Acquisition /Processing</td>
<td>-</td>
<td>2 844</td>
<td>2 330</td>
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<tr>
<td><strong>3D seismic (km²)</strong></td>
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</tr>
<tr>
<td>Acquisition / Processing</td>
<td>5 540,5</td>
<td>6 865</td>
<td>10 595</td>
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<td><strong>Drilling</strong></td>
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<tr>
<td>Exploration Wells</td>
<td>02</td>
<td>06</td>
<td>06</td>
</tr>
</tbody>
</table>
ONHYM and its Partners investments, between 2000 and 2017, reached 25.2 billion MAD 96% of which are supported by the partners.
ONHYM at conferences:
- Annual NAPE Summit, APPEX, AAPG; International Exhibition of Energy and Oil in Africa; EAGE Conference & Exhibition; Africa Assembly, 22nd World Petroleum Congress; Tunisia Oil & Gas Summit, Africa Upstream and organizing a door-to-door promotion campaign in Houston.

Technical presentations and Data Rooms made to 7 oil companies visiting ONHYM
III-Cooperation ONHYM-African countries
ONHYM has signed **13 cooperation agreements with 10 African countries**

**III-Cooperation ONHYM-African organizations**

- **Guinea Conakry**
  - SOGUIPAMI
  - ONAP

- **Mali**
  - DNGM
  - AUREP

- **Gabon**
  - SEM

- **Mauritania**
  - OMRG
  - SMH

- **Senegal**
  - PETROSEN

- **Madagascar**
  - OMNIS

- **Nigeria**
  - NGSA

- **South Sudan**
  - DGS

- **Ghana**
  - MINERALS COMMISSION

- **Zambia**
  - MINISTRY OF MINES AND MINERAL DEVELOPMENT
Purpose of agreements

▪ Scientific and technical cooperation;
▪ Training actions in the various disciplines of oil and mining exploration and management;
▪ Potential participation of both Parties in mining, oil and gas projects.

ONHYM’s Building Capacity Manual

▪ Theme I: Mining Exploration and Mining Asset Management;
▪ Theme II: Oil Exploration and Hydrocarbon Asset Management;
Structuring project allowing:
- Accelerating West African Access to Energy
- Accelerating electrification projects for the benefit of populations
- Creation of a competitive regional electricity market
- Exploitation of clean energy
- Contribution to the industrial and economic development of all countries crossed.
- Emergence of an integrated North-West African zone
What Morocco has to offer?

- Dynamic energy sector;
- Growing local energy demand;
- Huge opportunities of investment;
- Favourable and attractive terms of hydrocarbons law;
- An easy place to operate;
- A gateway to Africa, Europe and Middle East;
- An exciting future...