

Morocco Energy Exchange

Waldorf Astoria Edinburgh - The Caledonian - 12 October 2015

The **Morocco Energy Exchange** brings key members of the kingdom's energy team to Edinburgh from 09h00 to 15h00 on 12 October 2015. Speakers include:

HH Princess Lalla Joumala, Ambassador,
Embassy of the Kingdom of Morocco to the UK

Amina Benkhadra
Director General, ONHYM

Ahmed Baroudi
Director General, SIE

Abdellaziz El Gamah
Senior Advisor to the Minister of Energy, Mining,
Water & Environment

Saïd Mouline
CEO, ADEREE

Mostafa Terrab
Co-Chairman, Moroccan British Business Council

Ali Zerouali
Cooperation & Partnerships Director, MASEN

They will be providing updates and insights into developments from ambitious solar and wind generation projects to plans to import LNG and for exploration in promising areas along the Atlantic Margin. Also high on the agenda are ways these developments can be funded. Morocco has also placed the promotion of energy efficiency at the centre of its strategy.

Morocco has taken an integrated approach to energy policy, to mobilise the full range of carbons-based and renewable energy resources at its disposal. Energy investment programmes that are essential to speed Morocco's emergence as a middle-income economy are supported by the absolute commitment of the Moroccan government, which is searching for deep and enduring partnerships with private sector partners.

In the **Morocco Energy Exchange** format:

- 'Overview' sections in the agenda are for presentations.
- 'Panels' may allow for short statements but are mainly intended as moderated question and answer sessions.

- Early afternoon provides an opportunity for bilateral meetings or roundtable discussions (pending delegates' travel).
- There is some availability for press interviews.
- The language of the event is English.

Morocco: an integrated approach to energy

Across its energy industries, Morocco is launching projects that offer a range of opportunities for developers and contractors, investors, financiers, and other participants along the value chain.

LNG for power

One aim of the Morocco Energy Exchange is to unveil details of plans to import several billion cubic metres per year liquefied natural gas, in an estimated \$5 billion project to build a regasification plant at Jorf Lasfar, pipeline and other gas supply infrastructure, and the construction — preferably by private developers — of CCGT power stations.

Renewable energy

At Ouarzazate, work is progressing quickly to plans to supply over 500MW from Africa's single largest solar complex, Morocco has established targets of installing 2GW of solar and 2GW of wind generation by 2020, which are seen by experts to be achievable. Renewables are supplying local industry – with Moroccan developers and suppliers playing an increasingly important role – as well as ONEE's national grid.

Please contact **Lauren Andrews** for more information and to book interviews.

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Morocco Energy Exchange

Agenda – Monday 12 October 2015

08h30 to 09h00	Registration, breakfast & coffee
09h00 to 09h30	Introductions Chair: Jon Marks , Chairman, Cross-border Information Welcome note — Moroccan delegation HH Princess Lalla Jomala , Ambassador, Embassy of the Kingdom of Morocco to the UK Mostafa Terrab , Co-Chairman, Moroccan British Business Council Welcome note — Scottish government Andy McDonald , Senior Director, Europe, Middle East and Africa, Scottish Development International An independent view of how Morocco has developed its energy policy Jon Marks , Chairman, Cross-border Information Questions and Discussion
09h30 to 10h45	A major frontier for renewable energy (RE) projects Chair: Jon Marks , Chairman, Cross-border Information
09h30	Overview Saïd Mouline , CEO, ADEREE (Moroccan Agency for the Development of Renewable Energy and Energy Efficiency)
09h40	Financing options for renewables developers Ahmed Baroudi , Director General, Société d'Investissements Energétiques — SIE
09h50	Panel: Moroccan wind and solar programmes Gregor Paterson-Jones , Managing Director, Green Investment Bank Kevin Sara , Chief Executive Officer, Nur Energie
10h10	Presentation of a ground-breaking programme Ali Zerouali , Cooperation & Partnerships Director, Moroccan Solar Agency
10h20	Panel discussion Saïd Mouline, Ahmed Baroudi, Ali Zerouali, Gregor Paterson-Jones, Kevin Sara
10h45	Coffee

Morocco Energy Exchange

Agenda — Monday 12 October 2015

11h15 to 11h50	The emerging hydrocarbons industry Chair: John Roberts , Energy Security Specialist, Methinks
11h15	Status and outlook of hydrocarbons exploration in Morocco Amina Benkhadra , Director General, ONHYM (Office National des Hydrocarbures et des Mines)
11h30	Panel discussion <ul style="list-style-type: none">• Exploration ambitions and IOC relations• Conventions and unconventional (including shale) reserves• Refining, products and other downstream needs Ian Watson , Exploration & Asset Manager, Morocco, Cairn Energy
11h50 to 12h30	Moroccan gas plan Chair: John Hamilton , Director, Cbl
11h50	Overview Abdellaziz El Gamah , Senior Advisor to the Minister of Energy, Mining, Water & Environment
12h05	Panel discussion <ul style="list-style-type: none">• Gas imports: the LNG project and other developments• Integrated development David Drury , Managing Consultant, Gas Strategies
12h30	Conclusions Jon Marks , Chairman, Cbl
13h00	Lunch at the Caledonian
14h00	One-to-one meetings in the Castle Suite
15h00	End of programme

Morocco Energy Exchange

Biographies



Ahmed Baroudi, Director General, Société d'Investissements Energétiques (SIE)

Before returning to create SIE — Morocco's Energy Investment Corporation — in February 2010, Ahmed Baroudi spent 32 years in France, completing his doctoral thesis in 1989 and working with Alcatel, Thales Group and other large industrial groups across different areas of high-technology activities. He also collaborated with several African countries for seven years.

SIE is the Moroccan state's financial tool that drives private investment in new sectors of renewable energy and energy efficiency.

Co-founder of the International University of Rabat, Baroudi won the first Technological Innovation Prize for "Labs/Industry" cooperation in France. His education includes a thesis on industrial systems and electronics, undertaken at the French CNRS Laboratoire d'Imagerie Numérique de Caractérisation des Semi-Conducteurs (LINCS) and a highly marked doctorate (avec félicitations) obtained in 1989. In 1986 he received a DEA diploma in Signal Processing and Communications from the Montpellier Electronic Center (CEM-USTL).



Amina Benkhadra, Director General, Office National des Hydrocarbures et des Mines (ONHYM)

Prior to heading the Moroccan states national hydrocarbons and mines department, Amina Benkhadra was Minister of Energy, Mines, Water and Environment. Prior to that she served as Secretary of State responsible for mining sector development.

Benkhadra qualified in 1987 as a Civil Engineer of Mines from the École Nationale Supérieure des Mines de Nancy and as a Doctor Engineer from the École Nationale Supérieure des Mines de Paris (ENSM Paris). She undertook management training at the University of Columbia in 1990.

Her career started in 1982 at the Bureau de Recherches et de Participations Minières (BRPM) in Rabat, where she held several positions of responsibility including undertaking the feasibility of mining projects and managing a portfolio of more than 30 subsidiaries. In 1994, she was appointed Director of Mines at the Ministry of Energy and Mines, and then Secretary of State in charge of mining sector development (1997-98) – leading and supervising the implementation of a new strategy to develop Morocco's mining sector. Benkhadra was appointed Director of BRPM in 1998, and then, in August 2000, Director General of the national oil exploration and exploitation department, Office National de Recherches et d'Exploitation Pétrolières (ONAREP). She held this role — in the process significantly increasing Morocco's promotion of exploration — until ONAREP and BRPM merged to create ONHYM, of which she was appointed Director General on 11 November 2003. Benkhadra supervised the project to create ONHYM, oversaw the merger of BRPM and ONAREP, and led in shaping the new organization's structure and strategy.

In October 2007, Benkhadra was appointed Minister of Energy, Mines, Water and Environment, leading new strategies in all these sectors in conformity with the vision of His Majesty King Mohamed VI. This involved the launching of many

Morocco Energy Exchange

Biographies

programmes, particularly in the renewable energies field and the enactment of new laws and decrees.

Among Benkhadra's awards is the Prize for Arab-European Organization for Environment—Legion d'Honneur of the Embassy of France.



David Drury, Managing Consultant, Gas Strategies

David Drury is a Managing Consultant with Gas Strategies, a leading specialist business consultancy serving the gas and LNG industries. His consultancy interests include LNG, project finance advisory support and North African gas, and he has acted as commercial advisor to the majority of LNG project financings over the last decade.

Dr Drury is a well-known figure in the North Africa and Mediterranean's region's hydrocarbons industry. Prior to his consulting career, Drury held a variety of senior posts with BP, including director of Southern Europe Gas and country manager posts in Algeria and Turkey.



Abdellaziz El Gamah, Senior Advisor to the Minister of Energy, Mining, Water & Environment

Abdellaziz graduated as engineer in electrical and mechanical sciences in 1987 and has accumulated more than 25 years of experience in the aeronautic sector.

Currently he ensures the function of adviser to the Minister of Energy, Mines, Water and Environment.



John Hamilton, Director, Cross-border Information (Cbl)

John Hamilton is director of Cross-border Information's London office, where he plays a key role in the company's business development and strategy. A specialist in North Africa, he produces regular analyses, detailed monitoring reports and briefings on the Maghreb countries and Egypt for Cbl's clients. He has been covering these countries since 2007 and has followed closely the political changes that started in 2011.

Hamilton is a contributing editor of Cbl's African Energy newsletter, and is a regular correspondent from across the region. He is a frequent commentator on North African (and especially Libyan) energy, security and politics at conferences, and in national and international media.

Hamilton reads, writes and speaks standard Arabic, and is also fluent in Bulgarian. His travel memoir of five years spent in Bulgaria entitled *The Good Balkans* was published by Wild Man Books in 2009.

Morocco Energy Exchange

Biographies

responsible for planning studies for the project to build Damman international airport in Saudi Arabia; he was also a member of the team in charge of economic studies for the fixed link project across the Strait of Gibraltar. From September 1986 to August 1989, he was an assistant professor at MIT and, from September 1989 to July 1993, a consultant with the Draper Laboratory, Cambridge, Massachusetts. In 1988, he received the Frederick C. Hennie III Award for his outstanding contribution to the MIT Department of Computer Science and Electrical Engineering's teaching programme. From 1990 to 1992, he was an assistant professor at the Rensselaer Polytechnic Institute, Troy, New York, in the Department of Decision Sciences and Engineering Systems and the Department of Civil and Environmental Engineering.

In 1992, Terrab was appointed Chargé de Mission in the Moroccan Royal Cabinet. In 1995, he took up the position of Secretary General of the Executive Secretariat of the Middle East/North Africa Economic Summit. From April 1996 to July 1999, he was a member of the late King HM Hassan II's G-14 Think Tank

On February 9, 1998, he was appointed Director General of the National Telecommunication Regulatory Agency (ANRT), before leading the World Bank's Information for Development (infoDev) programme and taking up the position of Lead Regulatory Specialist from April 2002 to February 2006. Terrab was appointed Director General of OCP in February 2006 and Chairman of the OCP Group's Board of Trustees in June 2008.



Ali Zerouali, Cooperation & Partnerships Director, MASEN

Ali Zerouali is Masen's Director of Cooperation and Partnership, and is in charge of developing the Moroccan Solar Agency South-North, South-South and Middle East and North Africa cooperation.

Graduating with a computer engineering diploma (with a specialisation in the management of information systems) at HEC and Mines Paris, Zerouali worked at BNP Paribas Personal Finance, focusing on international strategy in the bank's Mars project. Mars' aim was to operate mergers and create business and back office synergies between subsidiaries in Eastern Europe. Also at BNPP, Zerouali participated in the acquisition of pure online credit players.

Zerouali subsequently joined Accenture Financial Services and worked especially on projects including the merger between Cetelem and UCB to form the first European player in personal loans; the Sofinco-Finaref merger that created the French market leader in consumer finance; and the restructuring of several Moroccan companies as Phone Group (the first call center in Morocco) and energy player Emteyco.

Zerouali then joined UTC (a group including OTIS, RFM, Pratt & Whitney, Carrier and Chubb) to create and oversee an outsourcing platform in Casablanca that would address the group's needs in Europe.

Morocco Energy Exchange

Media Briefing

ENERGISING A GROWING ECONOMY

Morocco has taken an integrated approach to developing its diverse energy industries, mobilizing the full range of carbons-based and renewable energy resources at its disposal. The kingdom's administration — comprising the elected government, parastatal companies and state agencies — is committed to underpinning Morocco's emergence as a middle-income economy with a long-term, sustainable energy supply policy.

This will help to raise incomes and improve living standards for the 34 million population. It also provides a range of opportunities for local and international power project developers and contractors, investors and financiers, international oil companies (IOCs) and other participants along the value chain.

Through events focused on a professional audience, such as the Morocco Energy Exchange to be held at the Waldorf Astoria Hotel in Edinburgh on 12 October, the kingdom is seeking to establish an enduring dialogue with British and other energy industry professionals that promotes its long-term, sustainable vision of energy development.

That vision comprises a number of innovative schemes, including Africa's largest solar complex, to generate 500 megawatts (MW)-plus at Ouarzazate, and the installation of at least 2 gigawatts (GW) of wind power. It also involves a substantial opening to offshore oil and gas exploration, and plans to build a liquefied natural gas (LNG) regasification plant, which will supply a new generation of combined cycle gas turbine (CCGT) power plants, as well as Morocco's industrial growth.

This programme is supported by the absolute commitment of the Moroccan government, starting with the head of state, King Mohammed VI — who has taken a strong personal interest in renewable energy and other technologies.

Private enterprise is essential

Corporate players that have become involved in this holistic policy include independent power producers (IPPs), IOCs, midstream gas, pipeline

and other developers, refiners and a wide range of renewables specialists.

But given the extent of Moroccan (and neighbouring African and European) demand, and the ambitious projects envisaged to meet supply challenges, there is room for more players to become involved. This is a key message of the senior Moroccan delegation visiting Edinburgh for this Morocco Energy Exchange.

Parastatals like state utility Office National de l'Electricité et de l'Eau Potable (ONEE) remain key players in the Moroccan energy mix. But liberalisation, under way since the 1990s, has created a market with room for investors of all sizes.

The government in August 2015 took another major legislative step to dismantle ONEE's historic monopoly on the sale of electricity, when it approved amendments to the renewable energy law which will allow small-scale renewables producers to sell power directly to clients via the low- and mid-voltage grids.

Commercial approach to financing a continent

The government's programme could not work without a deep and enduring partnership with the local and international private sector. It is mobilising debt and private equity finance from a range of international sources, but also from the ever-growing number of private equity and other specialist financiers who are based in Casablanca.

The Moroccan commercial capital has developed a vibrant business culture, where recent initiatives such as the Casablanca Finance City (CFC) free zone provide a base for financing innovative projects in Morocco, but also in its African neighbours.

It is notable that among institutions basing in the CFC is the Africa50 Fund, the spearhead of an African Development Bank (AfDB)-led effort to draw billions of dollars-worth of investment into African infrastructure. Africa50 achieved its first close on 15 June 2015, having raised over \$700 million on its way to reaching its initial \$3 billion target.

Morocco Energy Exchange

Media Briefing

Growing economy

Morocco has shown sustained growth in recent years. Following its most recent Article IV Consultation with the International Monetary Fund, the IMF observed (www.imf.org/external/pubs/ft/scr/2015/cr1543.pdf) that while "real GDP growth slowed in 2014, hampered by negative agricultural output growth and the impact of weak external demand, economic activity is showing signs of recovery. Subject to steadfast implementation of reforms, and assuming a continued recovery of external demand, real GDP growth is projected to increase, starting in 2015, and to stabilize over the medium term in the 5-5½ per cent range."

In this growing economy, installed generation capacity stands at 7,892MW, of which 68% is thermal (in 2014, coal accounted for nearly half of all generation). Government data show primary energy demand has been growing at 5.3% per year (/yr), but this is projected to double by 2020 and triple by 2030.

Meanwhile electricity demand has been growing by 7%/yr and is forecast to quadruple by 2030. ONEE reported record demand at 21h30 on 28 July, when heavy demand for air conditioning (during a heat-wave), from irrigation pumps and other major users led to consumption reaching 5,860MW. The previous high was 5,670MW, recorded on 27 August 2014 at the same time.

Gas plan

The Morocco Energy Exchange Edinburgh meeting will unveil further details of plans to import 3-5 billion cubic metres (bcm)/yr of LNG, in an estimated \$4.6 billion project to build a regasification plant at Jorf Lasfar, pipeline and other gas supply infrastructure, and the construction — preferably by IPPs — of combined cycle gas turbine (CCGT) power stations.

The siting of the required liquefaction plant at Mohammedia, six planned CCGT power plants with combined 6.3GW capacity, pipelines and other infrastructure, which will also promote wider industrial gas usage, are shown in the map above/below. This was based on data supplied by the Ministry of Energy, Mines, Water and Environment in mid-year.

According to the ministry's projections, and the amounts of electricity produced by the new CCGT plants, Morocco's natural gas consumption is forecast to increase from 0.9bcm in 2014 to 4.5bcm-5.5bcm by 2025. By 2025, some 3bcm-3.5bcm/yr is expected to go to CCGT, 1bcm/yr to Mohammedia-based refiner Société Marocaine d'Industrie de Raffinage (Samir), and 0.5bcm-1bcm/yr for industry, which is located mainly in the axis of Jorf Lasfar, Mohammedia, Kenitra and the phosphate plants operated by Morocco's industrial champion, Office Cherifien des Phosphates (OCP).

Morocco Energy Exchange Edinburgh will update these plans, which have already aroused considerable interest from British and other European companies.

These developments are expected to be accompanied by a new gas law, but even before that passes through parliament, the government is working to launch a gas-to-power (GTP) project based on imported LNG. To achieve this, the government in Rabat is looking for financing to come from private investors.

The planned CCGT power projects include the conversion of existing oil-fired plants at Mohammedia and Kenitra to 450MW CCGT units; new two-by-600MW plants at Dhar Doum, about 120km south of Tangier; Oued El Makhazine, 100km south of Tangier; and Al Wahda; and additional 600MW capacity to be developed at Tahaddart. The power offtaker is state utility ONEE.

The government is envisaging each tranche of the project to be privately financed, with international partners taking substantial equity in the regasification and CCGT plants.

The sourcing of gas has still to be decided. The LNG will be required from 2021 as Morocco moves to further diversify its energy mix — with more renewables entering ONEE's grid — and to guarantee security of supply.

Regional potential

The LNG project, coupled with increased wind and solar generation, would open the way for Morocco to further develop its regional electricity

Morocco Energy Exchange

Media Briefing

interconnections. The Ministry of Energy, Mines, Water and Environment has drawn up preliminary technical studies for three new projects:

- a third 400kV interconnection with Spain, of 700MW capacity;
- a 1GW capacity link with Portugal; and
- a 400kV connection with Mauritania, via Dakhla and Nouadhibou.

ONEE is also launching major new solar and coal-fired projects, as well as installing 850MW of wind power.

Its planned 1.32GW coal-fired plant at Nador, is similar to the 2x600MW Safi project now under construction.

ONEE is also developing its own solar projects, including the 75MW-100MW Noor Tafilalet scheme, which is supported by the World Bank. Noor Tafilalet is the first phase ONEE's project to install 400MW solar PV in 2015-18. Phase two (of three), called 'Atlas', is expected to install 200MW, helping to balance the eastern and southern extremities of the grid.

An integrated approach to renewables

The government's ambitious plan to import LNG to support new CCGT generation plants across northern and central Morocco is part of a wider strategy to develop a sustainable, diversified and secure energy mix. This strategy is led by the project to install 2GW of solar and 2GW of wind capacity by 2020.

This will be supported by the addition of coal and gas base load, which is seen as essential, not just to ensure sufficient supply and power industrial development, but also to enlarge state utility ONEE's grid, which by 2020 will have to cope with much greater amounts of renewable energy.

Global-scale solar

Moroccan Agency for Solar Energy (Masen) has made huge progress in its ambitious project to install 500MW-plus of solar capacity at Ouarzazate, having reached financial close for the 200MW Noor II and 150MW Noor III concentrated solar

power (CSP) plants, estimated to cost nearly \$2 billion. These plants are being developed by Saudi Arabia's Acwa Power and Spain's Sener Grupo de Ingeniería. This group also developed the Noor I CSP project), which is scheduled to start generating in 2015.

Noor II and III are funded on an 80/20 debt/equity basis. A 17bn Moroccan dirham (MD) (\$1.74bn) debt package has been put together by Masen, mobilising funds from development finance institutions including the World Bank, AfDB, Agence Française de Développement (AFD), Clean Technology Fund, a European Commission grant from the EU's Neighbourhood Investment Facility, the European Investment Bank (EIB) and Germany's Kreditanstalt für Wiederaufbau (KfW).

The Noor projects are structured by Masen as special purpose companies (in which Masen Capital holds 25% of the equity and the developers the rest) to supply electricity to ONEE.

This electricity is competitively priced: the Noor II power purchase agreement (PPA) with Masen is priced at MD1.36/kWh and Noor III at MD1.42/kWh. Masen, in turn, has a PPA to supply the power to ONEE.

A 225kV transmission line has been built to link into ONEE's 225/60kV substation in Ouarzazate. ONEE has been undertaking other transmission work, including construction of a 300km high-voltage line between Ouarzazate and Errachidia, and the 140MVA Tinghir II substation, and upgrading substations at Ouarzazate, Tazart and Errachidia. Finance for this has been provided by the AfDB, AFD (helping to make Morocco the French development agency's single largest client) and KfW.

Masen plans to bring the Ouarzazate complex's capacity to a minimum 500MW with Noor IV, a 50MW solar photovoltaic (PV) unit. It also has two other new PV projects: the 150 GWh/yr output Noor Laayoune and 40 GWh/yr Noor Boujdour schemes, to be supported with a long-term PPA.

Morocco Energy Exchange

Media Briefing

Wind projects progressing

Morocco envisages installing at least 2GW of wind power by 2020, building on an industry that developed Africa's first wind farm — Koudiat El Beida at Tangier — and now includes significant local content.

ONEE has a major project to supply 850MW of wind power, to be commissioned in 2017-20 at an estimated cost of \$1.7 billion. The projects are intended to install 100MW each at the Tanger II unit in the north and Boujdour, 150MW at Midelt, 200MW at Jbel Lahdid and 300MW at Tiskrad. ONEE is calling for substantial local content to be included in these schemes, which becomes ever more achievable as Morocco develops its renewables-focused manufacturing base.

Local operators are making a major contribution, underlined by the plans of Energie Eolienne du Maroc, owned by local developer Nareva Holding, to double capacity at its Akhfennir (Tarfaya) wind farm to 202MW.

Having been allowed to build bigger units to supply industrial facilities (selling the surplus into ONEE's grid), major cement and other industrial companies are developing new facilities. Lafarge Maroc now obtains some 85% of its power supply from wind. Italcementi's local affiliate Ciments du Maroc is planning to install 10MW of wind to serve its Safi plant.

Saving as well as spending

While much attention has been focused on Ouarzazate and other renewables generation projects, Morocco has not forgotten that most economic of all is the saving of valuable energy resources. Aderee head Saïd Mouline is one of Africa's leading exponents of promoting energy efficiency projects, and will be explaining this policy at Morocco Energy Exchange.

Oil and gas: a new frontier for exploration

The pace of exploration in the Moroccan offshore has speeded up considerably in the last three years, reflecting industry interest in the 'Atlantic Margin', as well as in onshore and, potentially, Mediterranean opportunities. International oil

companies have identified parallels in Morocco's Atlantic geology with such exciting regions as Nova Scotia, Brazil's Santos Basin and offshore Angola.

No one doubts that Morocco has been under-explored. As of 2014, it had a drilling density of only 0.04 wells/100km². The kingdom offers a range of oil and gas, conventional and non-conventional prospects, which has attracted a growing number of IOCs.

A key player is state oil and mineral resources company Office National des Hydrocarbures et des Mines (ONHYM), whose director-general Amina Benkhadra — who will be in Edinburgh for the Morocco Energy Exchange — is a widely respected figure in the industry. ONHYM has attracted over 30 IOC partners to the kingdom, including majors — led by BP, which in October 2013 farmed into Kosmos Energy's offshore Agadir Basin acreage, and Chevron Corporation.

Partners as of September 2015 (in the order listed by ONHYM and not including minority equity holders) include 27 companies looking for conventional hydrocarbons: Gulfsands Petroleum Morocco Ltd, Chariot Oil & Gas Investments (Morocco) Ltd, Maghreb Petroleum Exploration s.a, Repsol Exploracion, Kosmos Energy, Pathfinder Hydrocarbon Ventures Ltd, Circle Oil Maroc Ltd, Samir, San Leon Energy, Longreach Oil & Gas Ltd, Serica B.V, Teredo Morocco Ltd, PVD Exploration Morocco SARL AU, PXP Morocco B.V., Total E&P Maroc, BP Exploration (Morocco) Ltd, Capricorn Exploration and Development Company Ltd, Genel Energy Ltd, Chevron Morocco Exploration Ltd, Oil & Gas Investment Fund, New Age Morocco Ltd, Glencore Exploration & Production (Morocco) Ltd, SK Innovation Co. Ltd, Woodside Energy (Morocco) Pty Ltd, MDC Oil & Gas Holding Company LLC (Mubadala Petroleum), Maxim Resources Inc. and Petroleum Exploration Private Ltd (PEL).

Several of these partners are involved in seismic and drilling campaigns —and investors are waiting on the significant find that will confirm Morocco as an important hydrocarbons frontier.

Morocco Energy Exchange

Media Briefing

Continued attraction

Morocco continues to attract IOCs despite the downturn in global oil prices that has discouraged exploration worldwide.

- On 22 September, ONHYM announced that the major Royal Dutch Shell had signed a reconnaissance contract covering the Issouka onshore area in north-east Morocco.
- On 9 September, ONHYM announced the signature of a reconnaissance contract with Spain's Repsol Exploracion Atlas for the onshore Aoufouss area, in eastern Morocco.

Newcomers who have recently farmed in to acreage include UK-based Mediterranean upstream player Sound Energy.

Drilling also continues. ONHYM on 29 September announced that, with its Irish partner San Leon Energy, the Laayoune-4 well on the 7,730km² Tarfaya onshore permit had been drilled to 1,814 metres and had found indications of gas. Further work is expected to firm up the potential.

Unconventional potential

Several IOCs have been looking at the potential for tapping unconventional hydrocarbons, including Anadarko Petroleum Corporation and San Leone Energy, whose Timahdit shale oil play envisages eventually supplying some 5,000 b/d of refined crude to the Moroccan market.

Morocco has a surprisingly long history of unconventional hydrocarbons. According to ONHYM, exploration for the recovery of oil shale started at Tangier with the creation of Société des Schistes Bitumineux de Tanger, which built a pilot plant with a production capacity of 80 tonnes per day of oil shale between 1939 and 1945. The Timahdit and Tarfaya deposits were discovered late in the 1960s. Studies in 1975-85 allowed the identification of reserves in place and the characterization of oil shale in Timahdit and Tarfaya, which showed that Moroccan shale could produce hydrocarbons by pyrolysis. Morocco then initiated the T3 plant, with initial development of three deposits of Tangier, Tarfaya and Timahdit.

To carry forward Morocco's unconventional

potential ONHYM has been working to create the right fiscal and operational environment.

ONHYM lists four partners interested in unconventional hydrocarbons: San Leon Energy (in the Timahdit North Area), Taqa (Plateau Tassemakht), Global Oil Shale (Tarfaya South Oil Shale deposit) and Zonatec.

Onshore gas

Onshore gas finds have already provided feedstock. Players include London

AIM-listed Circle Oil, which has done extensive drilling in the Sebou region.

AIM-listed Gulfsands Petroleum has taken a growing stake in the Rharrb Basin and neighbouring areas, which are the source of Morocco's current onshore gas supplies, along with a small field off Essaouira.