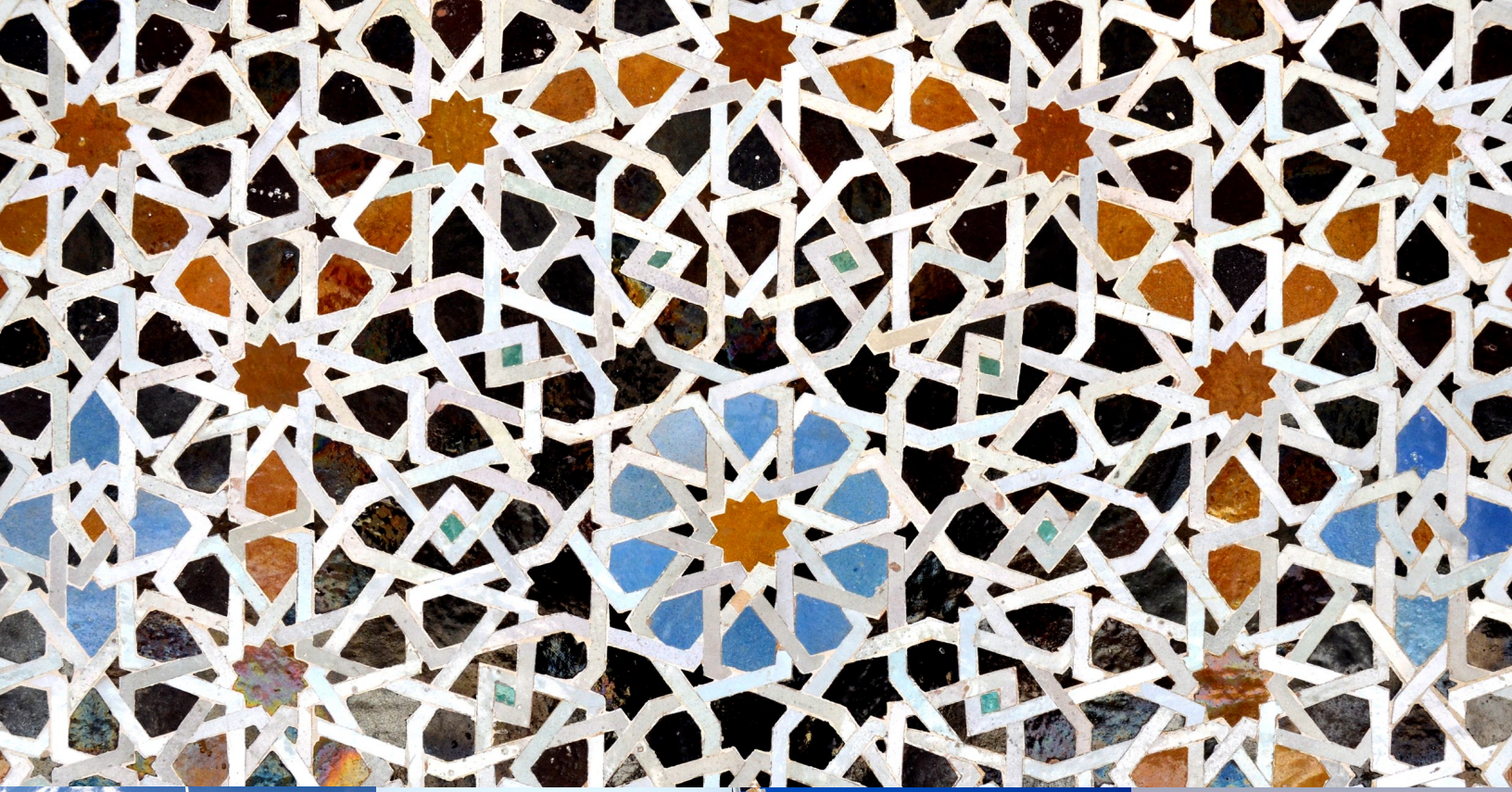

Dii Rabat Workshop Summary

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www.dii-desertenergy.org

Introduction

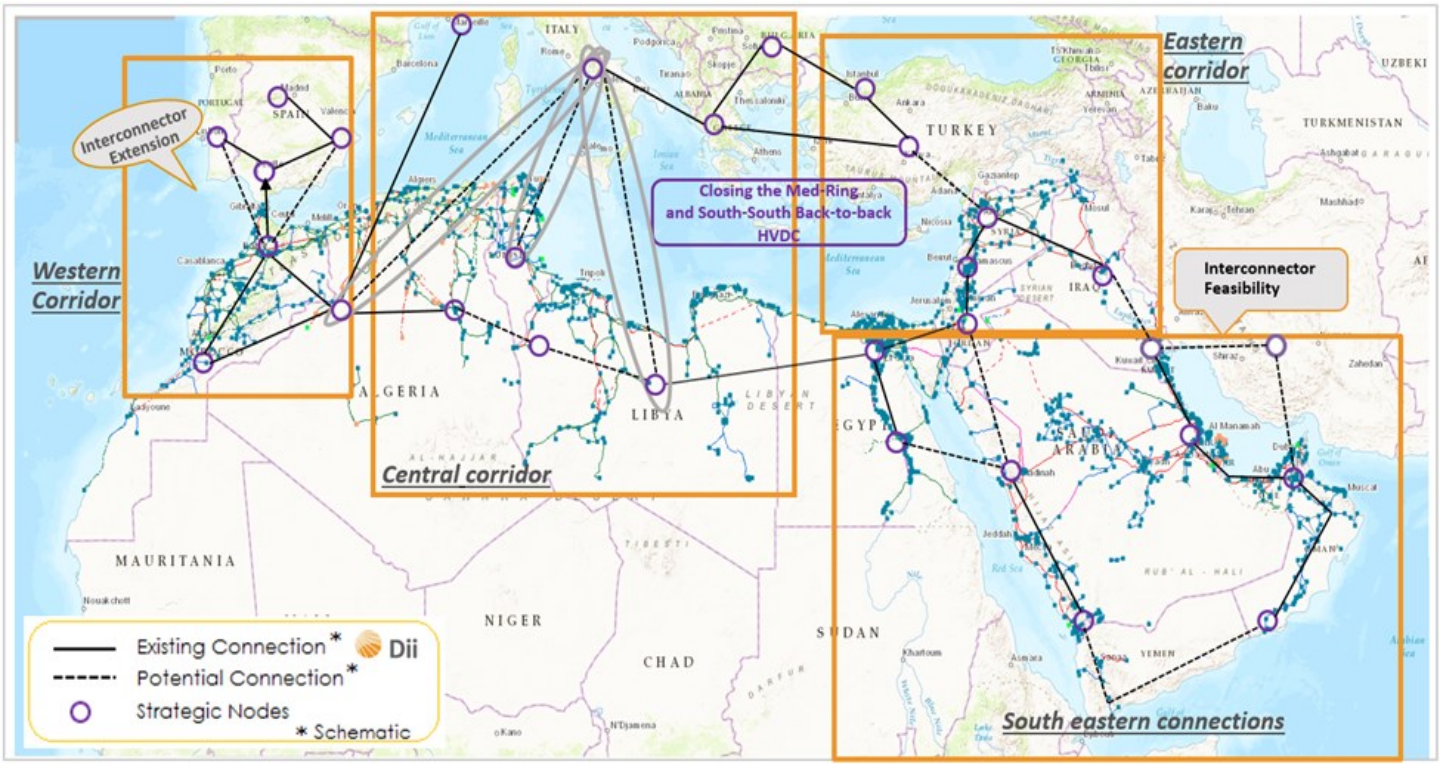
The energy industry as we used to know it for the last century was dominated by characteristics of fossil power generation and a government driven vertically integrated power sector. Long term planning and investments cycle with low risk in mind were the dominate sentiments across most countries. This reality remained prevalent until a promising disruption entered the power market and change began to unfold. The promising disruption of renewable energy technologies continues to shake up the power mix and allows countries to reevaluate their energy dependency and security status. Morocco, which for many years relied predominately on imports of fossil fuels from its neighbors for its energy demand, was one such example of a country that moved quickly towards a transition to renewable energy. Blessed with significant solar, wind and hydro power; Morocco was one of the first movers across the MENA region. Even now, Morocco plays a major role in leading the regional industry with promising government programs and innovative technology adaptation.

Dii, since its establishment in 2009 in Munich, was in place supporting Morocco during its move towards renewable energy by promoting the true competitiveness of renewables in MENA and the connection of the MENA power systems with Europe. Dii recently moved to Dubai, an innovation and inspiration centre in the region, identifying and solving practical hurdles faced by solar, wind and grid projects. The new energy world with innovations at all levels of power generation, transmission, storage and demand poses many new requirements.

The market has, thus, become less predictable with more risks in hand and a 'fail fast' mentality seems to be needed to cope with rapid changes of successful concepts. One observes on the one hand the need for stability, security of supply and cross border synergies through grids and large scale assets, on the other hand flexible, small and decentralized energy projects and solution. Integration is the big challenge. In the new energy world vision, guts and creativity are in demand.

As Dii is paving the way for new developments we are continuously looking for leadership. We clearly recognize Morocco as the country with the 'first mover leadership' in the energy transition in MENA. For that reason our Dii regional workshop in 2016 took place in Rabat on the 3rd October at the Sofitel Jardin des Roses. This one day workshop consisted of in-depth presentations, frank and constructive discussions and high-level networking with government officials, utility leaders, and developers at the heart of Morocco's renewables program. The workshop delivered remarkable insight of the solutions that Morocco has realized and is still developing. Discussions centered around practical experience, government leadership and organization, practical project hurdles, future developments and business opportunities for developers and industry. All in all participants took home a number of important lessons from Morocco's experience and leadership in MENA renewables that could serve other countries.

Potential Mediterranean Interconnections for capturing Synergies between markets



Morocco's Leadership Turns Vision into Reality

The first session at Dii's workshop presented an overview of Morocco's leading agencies involved in the renewable energy sector, and how over the past several years the country was able to turn its vision into reality. Morocco boasts one of the first and most successful renewable energy programs in the MENA region, and this is down mainly to the creation of strong local agencies with clear mandates to implement the energy transition programs.

The first session was moderated by Paul van Son, CEO Dii and included the following representatives of the Moroccan public sector agencies:

- **Zohra Ettaik**, Director of Renewable Energy and Energy Efficiency, Ministry of Energy, Mines, Water and Environment. Represented by Karim Choukri due to illness
- **Said Mouline**, Director General of ADEREE
- **Abderrahim Jamrani**, Technical Director, MASEN
- **Zakaria Naimi**, Head of Photovoltaic and Electrical systems, IRESEN

Key Messages

- Clear vision for Morocco's future energy mix is paramount for success.
- Clear objectives built on evaluation of most suitable technologies for local conditions.
- Strong institutional leadership is key :
  - » Clear allocation of responsibility for rules and regulation, energy supplier / transmission, solar energy developments, wind developments, innovations
  - » Effective coordination between leading stakeholders of Energy Ministry, MASEN, ADEREEE, ONEEE, IRESEN
- ADEREE highlight that 40% of energy consumption comes from Transport sector, still much work to be done in this area.

- IRESEN proven successful in short amount of time; researching the most suitable technologies for the Moroccan environment. Currently searching for additional funding sources and interest in joint studies
- MASEN now taking on all forms of sustainable energy, will be looking at wind, biomass, geo-thermal, hydro and tidal energy technologies.

Strategic Vision for a Prosperous Future:

The Moroccan government's vision for the power sector's future is based on a diversified energy mix optimized around a choice of reliable and competitive technologies. This would be achieved through a mobilization of national resources by increasing renewables part in the energy mix. Furthermore, energy efficiency is a national priority to improve the overall performance of the power systems and achieve better demand side management returns. In addition, regional integration of power systems is another promising approach to take which would ultimately increase energy security, deliver synergies and benefits, and create additional markets for energy export and trade.

The Second Wave of Energy Strategy:

- Development programs of large and medium-sized photovoltaic power plants (ONEE & MASEN)
- Opening of the medium voltage to allow the development of photovoltaic solar power projects
- Opening the low voltage to allow the development of large-scale use of PV in residential and low voltage connected tertiary
- Establishment of an independent regulatory authority
- Implementation of support programs in industrial integration and R & D dedicated to PV

Business Models for RE Development:

Moroccan RE Program

- BOOT public tender for green field project development
- PPA with ONEE as off-taker
- Private-Public Partnership
- local content as a key requirement

RE Projects under Law 13-09 (58-15)

- RE projects can sell the power produced to a large consumer
- Access to the grid
- ONEE as last supplier of electricity
- ONEE can buy the excess of electricity
- Ability of export the electricity generated from RES
- Ability to build direct transmission line

Key Targets and Reforms:

- New Target: 52% from Renewables by 2030, Solar = 4560, Wind = 4200, Hydro = 1330. 2020 Targets are on track, however, estimated $40 billion is required to reach 2030 targets.
- The objectives of energy efficiency is based on, among others, the adoption in 2009 of law no 47-09 on energy efficiency. The objectives of this law are
  - » Definition of performance and energy efficiency principles
  - » Definition of the purpose and content of energy impact assessment
  - » Implementation of a mandatory energy audit
  - » Establishment of a technical verifications

- Major Regulatory and Institutional Reforms
  - » Opening of the electricity market from renewable sources to the Medium Voltage.
  - » Opening the Low Voltage network to residential and tertiary sectors.
  - » General Regulation laying down rules for building energy performance in buildings.
  - » The law allowing large electricity self-producers, requiring more than 300 MW capacity, to develop clean production capacities.
  - » Establishment of an independent Energy Regulatory Authority.

Regulatory and Financial Sector Stability Yielding Positive Results

The second session of Dii's workshop was moderated by Silvia Pariente-David, an energy consultant and regional expert, and included the following representatives from leading financial and legal institutions operating across Morocco and the MENA region.

- **Samir Belrhandoria**, Energy Finance Consultant / Former CEO, Moroccan Infrastructure Fund
- **Ouns Lemseffer**, Clifford Chance
- **Adama Moussa**, Principal Electrical Engineer, African Development Bank

Key Messages:

- Success in Morocco's RE program is a result of an overall attractive framework for renewable energy project in Morocco
- Liberalization of energy production and sale has been a major catalyst for RE industry growth.
- Stable financial and banking sector is positively contributing to Morocco's energy transition.
- Some regulatory gaps still exists that are hindering the the growth of the renewables sector specifically related to land owndership and registration outside of urban areas.

- The active portfolio of ADB in Morocco in 2016 consists of 29 operations and is the banks most important with a total commitment amount of UA 1.53 billion, or nearly 2 billion Euros. Nearly 50% of ADB's portfolio in Morocco is devoted to investment projects the energy sector, 75% for renewable energy projects (solar and wind), 14% rural electrification and 11% for network transmission.

Key Achievements and Reforms:

- Morocco is one of the first countries to liberalize in 2010 the production and sale of electricity from renewable sources. Now, private producers may produce and sell (and even export) to private clients the electricity produced from renewable sources, whether in very high, high, medium and since the January 2016 amendment, low voltage. The January 2016 amendment has also explicitly confirmed the possibility for ONEE to buy the excess electricity produced, but within the limit of 20% of the production of each year.
- In May 2016, a new independent regulator has been set up (called ANRE) which will be primarily in charge of the management of the grid. Furthermore, in August 2016, the law governing MASEN has been amended to extend its mission to the whole renewable sector with a transition period of 5 years to take back all the renewable projects (e.g. in the wind sector) currently managed by ONEE.

Key Challenges or Issues:

- For private projects (under the law 13-09 regime): the possibility for ONEE to buy the excess electricity produced is (i) limited to 20% of the production of each year and (ii) subject to commercial conditions to be set out by regulation. This raises an uncertainty of the project company's revenues to be sufficient to cover the sums due to the lenders financing the project. The lenders will have to assess the credit risk of the private clients buying the electricity.

- Other issues (common to private and IPP projects):
  - » ***Land issues***: in Morocco, most of the land located outside urban areas are not registered within the land registry. This might be a source of legal risk (as in the absence of a land title, the ownership over the land may be challenged) and also prevents the lenders from taking a mortgage to secure their financing;
  - » ***Security interest***: In Morocco, all security interests (except those granted over sums of money) may only be enforced through a judicial auction. A reform (the draft of which is ready) is being discussed and finalized between the various authorities and should be enacted shortly, enabling the lenders to take possession over the assets in case of default (out of courts). Furthermore, today, it is not possible to grant a security over an asset which is subject to a retention title clause (since the project company is not the legal owner). In most turbine supply agreements, wind turbines are subject to these type of clauses whereby the wind turbine supplier retains the ownership of the wind turbine until the complete payment of the price. This prevents the lenders from taking a security over such assets at the time when the financing is put in place. This issue is also addressed in the reform which will enable companies to grant security interests over an asset which is subject to a retention title clause;
  - » ***Banking monopoly***: pursuant to Moroccan banking monopoly rules, a lender must be licensed by the Central Bank in order to grant credits to borrowers located in Morocco on a habitual basis, unless benefiting from one of the exceptions set out in the banking law;
  - » ***Foreign exchange control regulations***: while there is a foreign exchange control regulation in Morocco, there is a liberalized regime for foreign investments (including foreign financings) enabling Moroccan companies to transfer outside Morocco the proceeds of such investments or financings (e.g. dividends, interests, fees, principal of the debt) subject to complying with reporting requirements;

- In IPPs, **Government support letters (GSLs)** are generally granted to secure the payment of the termination amount by the off taker under the PPA. The enforceability of such GSLs is subject to the enactment of a financial law (once the termination amount is known, depending on the termination event and the time of termination) in order to register such amount in the State's budget and allow the State to order such payment.

Front lines Stories: The Developer's Perspective

The third and final session of Dii's workshop was moderated by Nabih Cherradi, CTO Desert Technologies, and included the following representatives from leading developers working in the region and Europe with different backgrounds and perspectives on the promise of the Moroccan experience resonating across the MENA region.

- **Badis Derradji,** Morocco Country Manager, ACWA Power
- **Paul van Son,** Chairman MENA and Turkey, Innogy
- **Karim Chraibi,** Business Development Advisor, Masdar

Key Messages:

- Industrialization must be considered during the energy transition and not just local content for big projects in order to see full benefits to the local markets and communities.
- Developers face challenges with working with local communities and planning for life after construction.
- Job creation during Noor 1 construction was 200, permanent jobs thereafter 50.
- Job creation and community engagement are tied to Corporate Social Responsibility efforts by ACWA Power.

- The Moroccan solar plan and the wind energy initiatives seem to be more encouraging companies especially developers to make their foot print on the Moroccan soil thereby increasing the projects portfolio and also promoting regional development in the areas of the projects. The support from the agencies such as MASEN and ADEREE welcomes foreign developers to bid for projects in morocco through their successful policy frameworks in the RE industry thereby providing a positive move towards the national target of 52% of RE generation by 2030.

- The potential interconnections within the countries of the MENAT regions and the European continent can further improve the status of market for capturing synergies. North Africa proves to be an area of vast solar resources that can even enable power export to other countries through interconnected energy networks.

The Possibility of 100% Renewable Energy Mix:

- Cost comparison of the RE technologies with the existing best practices of fossil power generation shows that the RE technologies are way cheaper than the fossil fuels except in solar thermal which is expected to reach below the level of fossil fuel power generation soon. PV production costs have declined to a very low range of few cents/kWh of energy generated and thereby nearing a point where it can become the backbone technology in the sunny areas. Recent bids show a price of around 2.42 $cents/kWh as per Swaihan tender in Abu Dhabi. Wind energy can be used as base load power generation system due to its recent advances and drop in price nearly 4.7 $cents/kWh in WPD Chile project.

- Near zero spot prices of the energy generated during the sun-hours and the ability of solar power generation to balance the demand during the day time has enabled solar power to grow more.
- Renewable energy can be made to interact with the demand and can be utilized for cold storage to cover the cooling demand during day and night and even for desalination purposes. Interaction of Wind, Solar, Hydro and Conventional Generation with Storage and Demand.
- Various storage types and facilities of storing the excessive power generated supports the RE generation further more beyond any demand restrictions.

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