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# Renewable and Alternative Energy in the U.A.E.

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Overview and Opportunities for Business



**January 2017**

## INTRODUCTION

Over the past decade, **the U.A.E. has demonstrated a serious commitment to the development of renewable and alternative energy.** The U.A.E. is currently installing four major nuclear power plants in the emirate of Abu Dhabi. It is also playing a leading role in solar, wind, and other renewable energy projects both in the U.A.E. and abroad.

These initiatives should not be dismissed as mere attempts to bolster the U.A.E.'s public image and international standing. Rather, **they are strategic choices by the U.A.E.'s leadership** to promote the economic well being of the country and its people. After all, these programs:

- **Help meet the U.A.E.'s growing demand for power.** The U.A.E.'s energy demand is increasing at an annual rate of about 9%, due largely to population growth and expanding industrial capacity.<sup>i</sup>
- **Reduce the U.A.E.'s dependence on natural gas imports.** The U.A.E. is currently a net importer of natural gas, with gas imports from Qatar via the Dolphin Pipeline meeting approximately 30% of the U.A.E.'s energy requirements.<sup>ii</sup>
- **Preserve the U.A.E.'s lucrative oil exports.** U.A.E. petroleum exports generated almost \$53 billion in 2015.<sup>iii</sup>
- **Protect the U.A.E.'s environment** and thus promote the health and wellbeing of its citizens.
- **Provide business opportunities** for U.A.E. companies and thereby create employment possibilities for U.A.E. nationals.

This last point is particularly important. Since its independence, **the U.A.E. has made great strides in diversifying its economy away from oil**, emerging as a regional hub for trade, travel, tourism, finance, healthcare, and education. As a result, in October 2015, U.A.E. Minister of Economy His Excellency Sultan bin Saeed Al Mansouri noted that the U.A.E.'s non-oil sector contributed to 70% of the country's GDP.<sup>iv</sup>

**The development of renewable and alternative energy is one of the next pillars of the U.A.E.'s economic diversification strategy.** As such, it will help the country realize the vision of His Highness Sheikh Mohammed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the U.A.E. Armed forces, to have the U.A.E. "celebrate" the export of its last barrel of oil.<sup>v</sup>

This report begins by reviewing the U.A.E. leadership's stated commitments to meeting certain renewable and alternative energy targets. It then provides an overview of key renewable and alternative energy institutions, projects,

investments, research, and events associated with the U.A.E. Finally, it concludes by highlighting opportunities and resources for businesses interested in this sector. Throughout, this report references the long history of successful U.S.-U.A.E. partnerships that have helped make the U.A.E. a regional leader in the renewable and alternative energy fields.

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## THE U.A.E.'S RENEWABLE AND ALTERNATIVE ENERGY COMMITMENTS

The U.A.E. has not only committed to implementing global climate change agreements, but it has also formulated ambitious plans for the introduction of renewable and alternative energy at a national and Emirate level.

In September 2016, **the U.A.E. ratified the Paris Agreement on climate change.** Under this agreement, 196 nations resolved to limit global warming to a maximum of 2 degrees Celsius. In ratifying this agreement when it did, the U.A.E. **became the first country in the Middle East to do so**, demonstrating its leadership role on this important issue.<sup>vi</sup>

**The U.A.E.'s signing of the Paris Agreement followed its creation of a Ministry of Climate Change and the Environment.** In February 2016, the U.A.E. restructured its government departments so as to increase efficiency and better reflect its strategic objectives. Its decision to rename the “Ministry of Environment and Water” as the “Ministry of Climate Change and Environment” demonstrated its commitment to a green economy and sustainability.<sup>vii</sup>



**This commitment is also apparent in the country's national vision – U.A.E. Vision 2021.** One of the six pillars of this vision is creating a “Sustainable environment and infrastructure.” Moreover, one of the key performance indicators for this pillar is **increasing the contribution of clean energy to the U.A.E.'s total energy mix from 0.23% in 2015 to 27% by 2021.**<sup>viii</sup>

**The U.A.E.'s dedication to renewable and alternative energy is also encapsulated in its “National Strategy for Innovation.”** This strategy identifies seven key innovation sectors, one of which is renewable energy.<sup>ix</sup> Building on this strategy, in November 2015, U.A.E. President His Highness Sheikh Khalifa bin Zayed Al Nahyan announced a 300 billion AED [\$81.7 billion] “Emirates Science, Technology and Innovation Higher Policy” fund, **200 billion AED [\$54.5 billion] of which was earmarked for renewable and alternative energy.**<sup>x</sup>

At the same time the U.A.E. federal government has laid out the country's vision for a green energy future, **Dubai has presented a complimentary emirate-level vision – the Dubai Clean Energy Strategy 2050.** This strategy, unveiled in November 2015 by U.A.E. Prime Minister and Ruler of Dubai His Highness Sheikh Mohammed bin Rashid Al Maktoum, **calls for clean energy to account for 7% of Dubai's energy needs by 2020, 25% of its needs by 2030, and 75% by 2050.** In order to meet these targets, the strategy entails the creation of both a new clean energy free zone called the Dubai Green Zone and a 100 billion AED [\$27.2 billion] clean energy fund called the Dubai Green Fund. In addition, the strategy involves a 50 billion AED [\$13.6 billion] expansion of Dubai's Mohammed bin Rashid Al



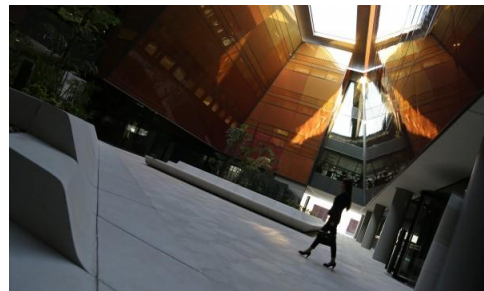
Maktoum Solar Park as well as the installation of rooftop solar panels throughout the Emirate by 2030.<sup>xi</sup>

## RENEWABLE AND ALTERNATIVE ENERGY INSTITUTIONS IN THE U.A.E.

In line with its commitment to renewable and alternative energy, the U.A.E. has become home to several world-class institutions in this field, such as IRENA and Masdar.

Since 2009, **the U.A.E. has hosted the global headquarters of the International Renewable Energy Agency (IRENA)**. IRENA is an intergovernmental organization that “supports countries in their transition to a sustainable energy future” by serving as a “platform for international cooperation, a center of excellence, and a repository of policy, technology, resources, and financial knowledge.”<sup>xii</sup> In 2009, Abu Dhabi was designated as the interim seat of IRENA. Two years later, the U.A.E. capital became IRENA’s permanent home, making IRENA the **first intergovernmental organization to be headquartered in the Middle East region**. IRENA officially inaugurated its 32,000 square-meter permanent headquarters in 2015.<sup>xiii</sup>

In addition to hosting the world’s leading international renewable energy body, **the U.A.E. is home to Masdar**. Masdar, which was established by the Mubadala Development Company in 2006 as the country’s future energy company, **built a sustainable urban development and economic freezone in Abu Dhabi called Masdar City** with the help of U.S. companies such as CH2M Hill and SolarOne.<sup>xiv</sup>



*Masdar City*

From this city, which serves as a “greenprint” for cities of the future, Masdar has advanced the “development, commercialization, and deployment” of renewable energy and clean technologies through businesses focusing on clean energy deployment and sustainable real estate. **The nucleus of Masdar City is the Masdar Institute of Science and Technology** – an independent, research-driven graduate university that works closely with the Massachusetts Institute of Technology (MIT).<sup>xv1</sup> Masdar City also has an incubator building, which is the site of exciting projects such as Lockheed Martin’s Center for Innovation and Security Solutions and General Electric’s Ecomagination Center.<sup>xvi</sup>

Masdar and IRENA are not the only institutions working to develop renewable energy in the U.A.E. **Ras Al Khaimah hosts a graduate-level campus of the École**

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<sup>1</sup> In October 2016, the Abu Dhabi Executive Council approved the merger of three of the capital’s most prestigious universities: Khalifa University, Masdar Institute, and the Petroleum Institute. It is unclear when the merger will take effect.

**Polytechnique Fédérale de Lausanne** that is focused on energy and sustainability.<sup>xvii</sup> Moreover, in November 2015, **His Highness Sheikh Mohammed bin Rashid Al Maktoum inaugurated construction works on the DEWA Energy Centre**, which includes a group of research and development laboratories under its umbrella with a total investment of 500 million AED [\$136 million].<sup>xviii</sup>

## **RENEWABLE AND ALTERNATIVE ENERGY PROJECTS IN THE U.A.E.**

With the support of these institutions, the U.A.E. has begun transforming its energy mix through renewable and alternative energy projects, particularly with respect to nuclear and solar energy.

### **A. Nuclear**

The U.A.E.'s most ambitious alternative energy project is in the field of nuclear energy. **The U.A.E.'s nuclear energy program first took shape in 2009 with the creation of two key government bodies:**

- **The Federal Authority for Nuclear Regulation (FANR)**, which regulates all U.A.E. nuclear activities.<sup>xix</sup>
- **The Emirates Nuclear Energy Corporation (ENEC)**, which oversees the design, construction, and operation of U.A.E. nuclear power plants; ensures the U.A.E.'s nuclear power program is coordinated with that country's industrial infrastructure plans; builds the human resource capacity among Emiratis for a successful nuclear program; and informs the public about this program.<sup>xx</sup>



**After its creation, ENEC awarded two important contracts.** First, it tasked CH2M Hill with helping manage the U.A.E. nuclear program.<sup>xxi</sup> Then, it **charged a consortium led by Korea Electric Power Corporation (KEPCO) to build four 1400 MW reactors in Abu Dhabi's Western region: Barakah 1, Barakah 2, Barakah 3, and Barakah 4.**<sup>xxii</sup>

**The KEPCO-led consortium's construction of these four reactors is reportedly proceeding on schedule.** Starting in 2017, one of these reactors is due to come online every year for four years. When completed in 2020, these four reactors **will provide for one-quarter of the U.A.E.'s total electricity needs.**<sup>xxiii</sup>

Once these reactors are complete, **they will be operated and maintained by the Nawah Energy Company**, a recently-created ENEC subsidiary that is 18% owned by KEPCO.<sup>xxiv</sup> The plants are **expected to be operational for around 60 years.**<sup>xxv</sup>

While KEPCO is leading the consortium building these reactors, **U.A.E. companies have been critical in their construction.** In June 2016, ENEC said that over **11 billion AED [\$3 billion] in contracts had been awarded to approximately 1,400 local companies.** These companies included cable manufacturer Ducab, which is jointly held by Investment Corporation of Dubai and Senaat.<sup>xxvi</sup>

**U.S. companies have also been heavily involved in this project.** For instance, Bechtel has won design and project management support contracts,<sup>xxvii</sup> and Westinghouse is building cooling pumps and a digital control center as well as conducting large-scale training of Emirati engineers and staff.<sup>xxviii</sup> This extensive **involvement of U.S. companies in the U.A.E. nuclear program is made possible by the 123 Agreement for Peaceful Civilian Nuclear Energy Cooperation** that the U.S. and U.A.E. signed in late 2009.<sup>xxix</sup> Importantly, under this agreement, the U.A.E. committed to not enrich uranium and not reprocess spent fuel to extract plutonium. In forswearing these fuel cycle activities that pose the most serious proliferation risks, **the U.A.E. has been held up as a model for regional countries pursuing responsible civil nuclear energy development.**<sup>xxx</sup>

## B. Solar

In addition to taking steps to procure a quarter of its energy from nuclear power, **the U.A.E. has sought to introduce more solar power into its energy mix.** Given that the U.A.E. **averages over 10 hours of sunlight per day and roughly 350 sunny days per year,** this method of power generation has tremendous potential.<sup>xxxi</sup>

**The U.A.E.'s pursuit of solar energy began with Masdar.** Masdar first built a 10 MW solar photovoltaic (PV) power plant to provide electricity to Masdar City, with many of the panels coming from U.S. company First Solar. Masdar subsequently **partnered with Total and Abengoa Solar to construct a 100 MW concentrated solar power (CSP) plant called Shams 1 in the Western region of Abu Dhabi.** After its completion in 2013, this plant **became the largest renewable energy project in the Middle East,** generating enough electricity to power 20,000 homes.<sup>xxxii</sup>



*Masdar City Solar PV Plant*

From there, **the U.A.E.'s solar ambitions only grew – especially with the launch of the Mohammed bin Rashid Al Maktoum Solar Park.** This 50 billion AED [\$13.6 billion] project, which is overseen by the Dubai Electricity and Water Authority (DEWA), is ultimately scheduled to produce 5,000 MW of electricity by 2030, including 1,000 MW of CSP. When completed, this park **will reportedly be the largest solar park in the world,** powering an estimated 800,000 homes.<sup>xxxiii</sup>



**One of the most notable aspects of this project has been its ability to generate record-low bids** for the estimated cost of producing electricity.

- Saudi Arabia's ACWA Power and its Spanish partner TSK won a contract to build the second phase of this park, a 200 MW plant, with a **record-breaking bid of 5.84 cents per kilowatt-hour**.<sup>xxxiv</sup> Notably, ACWA and TSK awarded U.S. panel manufacturer First Solar (which was also involved in the park's first phase) a \$200 million engineering, procurement, and construction project, and it awarded GE a contract to provide inverters, transformers, and switchgears.<sup>xxxv</sup> To finance this project, ACWA took out a \$344 million loan from three banks including First Gulf Bank.<sup>xxxvi</sup>
- A Masdar-led consortium subsequently won a contract to build the third phase of this solar park, an 800 MW plant, with an **even lower record breaking bid of 2.99 cents per kilowatt-hour**.

Since then, **another U.A.E. project received new record-low bids for the cost of electricity generation**. A consortium of Japan's Marubeni and China's Jinko told Abu Dhabi Water and Electricity Authority (ADWEA) that they could produce power for as little as **2.42 cents per kilowatt hour at the 350 MW Sweihan solar PV plant**. This bid was slightly lower than a 2.54 cent bid by a consortium led by Masdar.<sup>xxxvii</sup>

At the same time that the U.A.E. has embarked on these landmark utility-scale solar projects, **Dubai has also encouraged households and businesses to adopt solar power through its Shams Initiative**. In late 2015, DEWA set up a net metering system allowing private home owners and businesses to install PV panels generating electricity equivalent to the amount of electricity consumed on average by the individual or company. **Any excess electricity produced by these panels could then be fed into the electric grid in exchange for credit toward utility bills**, providing a significant incentive for the installation of solar rooftops on residential and commercial establishments.<sup>xxxviii</sup>

**Many leading businesses have since embraced solar power.**

- **DP World**, for instance, announced in October 2016 that it would install 88,000 solar panels on its facilities in Jebel Ali Free Zone and Mina Rashid, providing energy for the equivalent of 3,000 homes.<sup>xxxix</sup>
- **Majid Al Futtaim**, the builder of Mall of the Emirates, said in August 2016 that it would produce 5% of its total energy in the next two years using solar PV technology.<sup>xl</sup>
- **Intercontinental Hotels Group** (IHG) announced in May 2015 that it would build Dubai's first fully solar-powered hotel, Hotel Indigo Dubai.<sup>xli</sup>

In addition to implementing the aforementioned solar projects, **the U.A.E. has also made broad investments in solar technology.** Dubai Investments, for instance, embarked on a joint venture with SwissInso to form **Emirates Insolaire**. This company aims to produce solar panels that can be integrated into building cladding with the help of Emirates Glass, a unit of Dubai Investments.<sup>xlii</sup>

### C. Other

**The U.A.E. has sought to harness other sources of renewable or alternative energy as well,** such as clean coal, geothermal energy, and biofuels.

- In June 2016, DEWA signed agreements with a consortium including China's Harbin Electric and ACWA Power to build and operate a 2,400 MW power plant as part of its **\$1.8 billion Hassyan clean coal project.**<sup>xliii</sup> General Electric is also reportedly involved in this project, as is U.S.-based NRG Energy.<sup>xliv</sup>
- As of July 2016, DEWA was requesting proposals for an **early-stage feasibility study on producing electricity from geothermal energy** for use in desalination.<sup>xlv</sup>
- In March 2014, Dubai-based Petrixo Oil & Gas announced that it would invest \$800 million to build a **proposed biofuels refinery in Fujairah** that would be capable of producing one million metric tons per year of bio-diesel, bio-jet fuel, and other products.<sup>xlvi</sup> Petrixo subsequently selected UOP, a Honeywell company, to provide the green fuels process technology for this refinery, which was lauded as the first commercial-scale renewable jet fuel production facility outside North America.<sup>xlvii</sup>

**The U.A.E. has also undertaken other large-scale clean technology projects.** For instance:

- **Abu Dhabi National Oil Company (ADNOC) and Masdar created Al Reyadah, a company focused on exploring and developing commercial scale projects for carbon capture, utilization, and storage.** In November 2016, Al Reyadah launched a 450 million AED [\$122 million] facility in Musaffah that will capture up to 800,000 metric tons of carbon dioxide emitted from Emirates Steel factory every year and transfer it to oilfields for enhanced oil recovery.<sup>xlviii</sup>
- In April 2014, **DEWA launched a Green Charger initiative to install and manage the required infrastructure for electric vehicles.** To date, DEWA and its partners have installed over 100 electric vehicle stations throughout Dubai.<sup>xlix</sup> Meanwhile, the U.A.E. government is working on a robust scheme to incentivize the adoption of electric vehicles.

## RENEWABLE ENERGY PROJECTS AND INVESTMENTS ABROAD

While transforming its energy mix at home, the U.A.E. is simultaneously investing in renewable energy projects abroad, particularly solar and wind projects.

### A. Solar

**Masdar has made major investments in utility-scale solar power plants throughout the world via its Masdar Clean Energy business unit.** Masdar built a 200 MW PV plant in Jordan, which became **Jordan's largest solar plant** when completed in 2016.<sup>i</sup>

Through a joint venture with Spanish engineering firm Sener called Torresol Energy, it also built three concentrated solar power plants with a total capacity of 120 MW in Spain: the 20 MW Gemasolar plant, the 50 MW Valle 1 plant, and the 50 MW Valle 2 plant.<sup>ii</sup>



*Gemasolar Plant*

In addition to these utility-scale ventures, **Masdar has also embarked on smaller solar energy projects, often in remote and complex locations.** For instance, it has installed a 10 MW PV power plant in Siwa, **Egypt** and 31.6 MW of solar power in **Mauritania**.<sup>iii</sup> It has also installed solar home systems in over 500 houses and 50 public facilities in **Afghanistan**, and it has installed over 17,000 such systems in rural **Morocco**.<sup>liii</sup>

**Masdar has often partnered with the U.A.E. government and associated development agencies to implement these projects.** For example, in 2013, U.A.E. Foreign Minister His Highness Sheikh Abdullah bin Zayed Al Nahyan set up the U.A.E.-Pacific Partnership Fund. As part of this effort, Masdar **used funding from the Abu Dhabi Fund for Development and assistance from the U.A.E. Foreign Ministry to implement 11 renewable energy projects in Pacific nations.** These projects, which helped those nations save on costly diesel fuel imports, spanned Kiribati, Fiji, Tonga, Tuvalu, Vanuatu, the Solomon Islands, the Marshall Islands, Nauru, Palau, and the Federated States of Micronesia.<sup>liv</sup>

**The Abu Dhabi Fund for Development (ADFD) has been active in supporting solar energy projects beyond the U.A.E. Pacific Partnership Fund.** In fact, ADFD has vowed to provide concessional loans worth a total of \$350 million over seven annual funding cycles to promising renewable energy projects in developing countries identified as such by IRENA. Since 2012, ADFD has **already allocated \$144 million in loans to 15 solar projects**, including projects in Cuba, Antigua & Barbuda, Cape Verde, Burkina Faso, Mali, Sierra Leone, and Senegal.<sup>lv</sup>

## B. Wind

**Masdar has also invested heavily in international wind projects.** Masdar invested in a 117 MW, 38-turbine, \$290 million wind farm in Jordan's southern governorate of Tafila, which was **the Middle East's first utility-scale wind power project.**<sup>lvi</sup> Moreover, beyond the region, Masdar has invested in both the 650 MW London Array and the 402 MW Dudgeon Offshore Wind Farm in the United Kingdom.<sup>lvii</sup>



*The London Array*

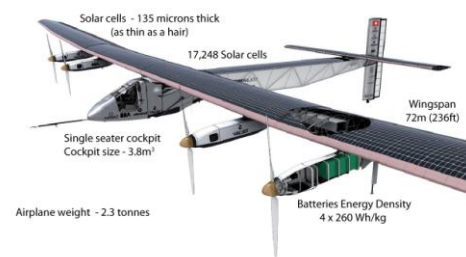
In addition to these utility-scale projects, **Masdar has installed smaller-scale wind farms in remote locations.** For instance, it installed a 6 MW, 8-turbine farm in the **Seychelles** thanks to a grant from the ADFD.<sup>lviii</sup> It also supplied a wind farm in **Samoa** as part of the aforementioned UAE-Pacific Partnership.<sup>lix</sup>

## RENEWABLE AND ALTERNATIVE ENERGY RESEARCH IN THE U.A.E.

While investing heavily in renewable and alternative energy projects both at home and abroad, the U.A.E. has also funded related research, particularly with regards to solar technology and biofuels.

### A. Solar

**Perhaps the most publicized demonstration of the U.A.E.'s commitment to solar energy research and development was the Solar Impulse 2 project,** which was hosted by Masdar. Solar Impulse 2 is a 2,300 kilogram plane designed to fly day and night entirely on solar power generated from the 17,240 solar cells on its wings. In 2015, this plane **embarked on the first ever round-the-world solar journey,** departing Abu Dhabi in March 2015 and successfully returning to the U.A.E. capital in July 2016.<sup>lx</sup>



*Solar Impulse 2*

Solar Impulse 2 is just a small part of Masdar's broader commitment to solar energy research. In January 2015, **Masdar launched the Masdar Solar Hub,** which is a "state-of-the-art solar testing and R&D hub" that allows for research on PV and concentrator photovoltaic (CPV) modules and CSP components, solar thermal equipment and solar receivers, and thermal energy storage systems.<sup>lxi</sup> Thanks to this hub, in January 2016, Masdar Institute researchers **demonstrated that desert sand could be a possible thermal energy storage material.**<sup>lxii</sup>

**Masdar Institute researchers have also made headlines for other avenues of research in solar technology and the associated field of energy storage. For instance, researchers from Masdar Institute and MIT collaborated to create a device that makes steam from the sun,** without the use of solar panels.<sup>lxiii</sup>

## **B. Biofuels**

Another avenue of renewable energy research in the U.A.E. is in the field of biofuels. At the beginning of the decade, **the Masdar Institute formed the Sustainable Bioenergy Research Consortium (SBRC)** with Boeing, Etihad, and UOP Honeywell as founding members.<sup>lxiv</sup> This consortium, which has since grown to include Takreer, Safran, and General Electric, has sought to advance research on sustainable aviation biofuels, with a focus on alternative fuels derived from halophytic (saltwater tolerant) plants. In 2016, the Consortium broke ground and **began construction of an integrated seawater, energy and agriculture facility at Masdar City**, which was designed with technical support from CH2M Hill.<sup>lxv</sup> This came two years after Etihad, Boeing, Takreer, Total, and Masdar Institute partnered to fly a Boeing 777 from Abu Dhabi to Al Ain using 10% biofuel.<sup>lxvi</sup>

## **C. Other**

Beyond solar and biofuels, Masdar has engaged in significant additional research related to renewable and alternative energy. For instance:

- **Masdar launched a renewable energy desalination pilot program** to test innovative energy-efficient desalination technologies that could ultimately be used in renewable energy-powered desalination plants. One of the commercial partners for this program was U.S.-based Trevi Systems.<sup>lxvii</sup>
- **Masdar Institute and MIT researchers have partnered to develop Redox Flow Batteries** that would enhance renewable energy products by more efficiently storing electrical energy as chemical energy and converting it back into electrical energy when needed.<sup>lxviii</sup>

## **RENEWABLE AND ALTERNATIVE ENERGY EVENTS IN THE U.A.E.**

In addition to becoming a home for research, the U.A.E. has also emerged as a regional hub for important renewable and alternative energy events, most notably the Abu Dhabi Sustainability Week and the Water, Energy, Technology and Environment Exhibition.

**Every year, the U.A.E. is host to the Water, Energy, Technology and Environment Exhibition (WETEX).** This exhibition – under the patronage of HH



Sheikh Hamdan bin Rashid Al Maktoum, Deputy Ruler of Dubai, Finance Minister of the U.A.E. and President of DEWA – spans nine large halls at the Dubai International Convention and Exhibition Center. These halls showcase the latest products, solutions, and technologies from almost 2,000 exhibitors.<sup>lxxix</sup>

In addition, every January, **Masdar hosts Abu Dhabi Sustainability Week**. This global forum brings public and private sector stakeholders together to address challenges and celebrate achievements in sustainable development and clean energy. The week kicks off with the **IRENA General Assembly**, and includes renowned events such as the **Zayed Future Energy Prize Awards Ceremony** and the **World Future Energy Summit**.<sup>lxx</sup>



*HH Sheikh Mohammed bin Zayed Al Nahyan Attending ADSW*

On top of these annual events, **the U.A.E. will soon be host to Expo 2020 Dubai**. Expo 2020's theme is "Connecting Minds, Creating the Future," and **one of its subthemes is "Sustainability"**.<sup>lxxi</sup> This theme provides myriad opportunities for countries and companies to demonstrate the latest innovations in renewable and alternative energy technology.

## **BUSINESS OPPORTUNITIES**

In keeping with its national strategy and global commitments, **the U.A.E. is investing heavily in the construction of renewable and alternative energy infrastructure**, particularly in the field of nuclear and solar energy. In fact, in October 2015, U.A.E. Energy Minister His Excellency Suhail Al-Mazrouei said that the U.A.E.'s **investments in nuclear and solar power alone would reach \$35 billion by 2021**.<sup>lxxii</sup>

**This heavy investment in renewable and alternative energy infrastructure means potentially lucrative contracts** in a variety of areas, ranging from the design and build of infrastructure, to the provision of key technologies, to the training of personnel to operate these technologies. It also provides opportunities for contracts in the realms of consulting and legal services.

**The U.A.E.'s commitment to renewable and alternative energy also offers potentially attractive investment opportunities**, particularly since some of these projects are public-private partnerships. In October 2016, eight U.A.E. Banks - National Bank of Abu Dhabi (NBAD), Commercial Bank of Dubai, Dunia Finance, Emirates NBD, HSBC, National Bank of Fujairah, RAKBank, and Union National Bank – signed the **"Dubai Declaration" to expand sustainable financing** over the next

five years given what they saw as a potential 10 billion AED [\$2.7 billion] financing gap for sustainable projects.<sup>lxxiii</sup> This came seven months after the National Bank of Abu Dhabi announced that it would commit \$10 billion in financing over the next 10 years to fill gaps in financing the clean energy sector, with funding geared toward projects that are more than \$100 million in value.<sup>lxxiv</sup>

Finally, **the U.A.E.'s pursuit of alternative energy provides opportunities for clean tech entrepreneurs and startups.** Masdar provides companies interested in establishing operations in the U.A.E. with the benefits of being located in a free zone. These benefits include the freedom to operate with 100% foreign ownership, the ability to move capital and profits outside the U.A.E. without restrictions, and the absence of import tariffs, corporate taxes, or individual taxes.<sup>lxxv</sup>

## RESOURCES

For companies interested in exploring the opportunities in the U.A.E.'s renewable and alternative energy sector, they can start by consulting the U.S.-U.A.E. Business Council's recently-released [guide](#) to "Doing Business in the United Arab Emirates." They can also turn to numerous U.S. and U.A.E. government agencies and trade councils for additional guidance and advice.

### A. U.S. Government Institutions

Firms can rely on the assistance of U.S. government institutions, located both in the U.A.E. and Washington, D.C.

#### *U.S. Government Contacts in the U.A.E.*

Senior Commercial Officer: Dao M. Le  
U.S. Embassy, Commercial Section  
P.O. Box 4009, Abu Dhabi, U.A.E.  
Tel: +971-2- 414-2665 Fax: +971-2- 414-2228  
E-mail: Dao.Le@trade.gov  
Website: [www.buyusa.gov/unitedarabemirates](http://www.buyusa.gov/unitedarabemirates)

Commercial Officer: Gary Rand  
U.S. Embassy, Commercial Section  
P.O. Box 4009, Abu Dhabi, U.A.E.  
Tel: +971-2-414-2530 Fax: +971-2-414-2228  
E-mail: Gary.Rand@trade.gov  
Website: [www.buyusa.gov/unitedarabemirates](http://www.buyusa.gov/unitedarabemirates)

Commercial Attaché: Nasir Abbasi  
U.S. Consulate General, Commercial Section

P.O. Box 121777, Dubai, U.A.E.  
Tel: +971-4-309-4963 Fax: +971-4-309-4841  
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14th Street & Constitution Avenue, N.W.  
Washington, DC 20230  
Tel: (202) 482-1902 Fax: (202) 482-5179  
Email: Christian.Reed@trade.gov

U.A.E. Desk Officer: James Cramer  
U.S. Department of Commerce  
U.S. and Foreign Commercial Service  
International Trade Administration  
14<sup>th</sup> St. & Constitution Avenue, N.W.  
Washington, D.C. 20230  
Tel: (202) 482-0879 Fax: (202) 482-0878  
Email: James.Cramer@trade.gov

**B. U.A.E. Government Institutions**

Firms can also turn to U.A.E. government institutions in both the United States and the U.A.E.

***U.A.E. Government Contacts in the United States***

Commercial Counselor: His Excellency Saud H. Al Nowais  
U.A.E. Embassy, Trade & Commercial Office  
3522 International Court, NW  
Washington, DC 20008  
Tel: (202) 243-2425 Fax: (202) 243-2408  
Email: [trade@uaeembassy-usa.org](mailto:trade@uaeembassy-usa.org)  
Website: <http://www.uaetrade-usa.org/>

Consul General of the U.A.E. in Los Angeles: His Excellency Abdulla Alsaboosi  
1999 Avenue of the Stars, Suite 1250  
Los Angeles, CA 90067  
Tel: (310) 551-6534  
Email: [protocol.la@mofa.gov.ae](mailto:protocol.la@mofa.gov.ae)

Consul General of the U.A.E. in New York: His Excellency Majid Al-Suwaidi  
535 5th Ave., 32nd Floor  
New York, N.Y. 10017  
Tel: (212) 419-7670  
Email: nycon@mofa.gov.ae

Consul General of the U.A.E. in Boston: His Excellency Salem Alshamsi  
One International Pl, Suite 2901  
Boston, MA 02110  
Tel: (617) 948-8800  
Email: consboston@uaeembassy-usa.org

***U.A.E. Government Contacts in the U.A.E.***

Ministry of Finance  
P.O. Box 433, Abu Dhabi, U.A.E.  
Tel: +971-2-698-7500 Fax: +971-2-698-7414  
P.O. Box 1565, Dubai, U.A.E.  
Tel: +971-2-698-7500 Fax: +971-4-393-9724  
Website: [www.mof.gov.ae](http://www.mof.gov.ae)

Ministry of Economy  
P.O. Box 901, Abu Dhabi, U.A.E.  
Tel: +971-2-613-1111 Fax: +971-2-626-0000  
P.O. Box 3625, Dubai, U.A.E.  
Tel: +971-4-314-1555 Fax: +971-4-358-1811  
Website: [www.economy.ae](http://www.economy.ae)

Abu Dhabi Department of Economic Development (DED)  
P.O. Box 12, Abu Dhabi, U.A.E.  
Tel: +971-2-815-8888 Fax: +971-2-672-7749  
Website: <https://ded.abudhabi.ae/>

Dubai Department of Economic Development  
P.O. Box 13223, Dubai, U.A.E.  
Tel: +971-4-445-5555 Fax: +971-4-445-5554  
Website: [www.dubaided.gov.ae](http://www.dubaided.gov.ae)

Sharjah Economic Development Department  
P.O. Box 829, Sharjah, U.A.E.  
Tel: +971-6-512-2222 Fax: +971-6-528-7999  
Website: [www.sedd.gov.ae](http://www.sedd.gov.ae)

Ras Al Khaimah Department of Economic Development  
Tel: +971-7-227-1222  
Website: <http://www.ded.rak.ae>

Ajman Department of Economic Development  
P.O. Box 870, Ajman, U.A.E.  
Tel: 971-800 70  
Website: <https://www.ajmanded.ae>

Umm Alquwain Department of Economic Development  
Al Roudah, Shaikh Rashid Bin Saeed Al Maktoum Street  
Tel: 971-6-765-2200  
Website: <http://ded.uaq.ae/>

### **C. Trade Associations**

Finally, firms can consult major U.S. trade associations and chambers of commerce and their counterparts in the U.A.E.

#### ***U.S. Trade Associations/Chambers of Commerce***

U.S.-U.A.E. Business Council  
505 Ninth Street, NW  
Washington, D.C. 20004  
Tel: (202) 863-7285 Fax: (202) 863-7289  
Email: [info@usuaebusiness.org](mailto:info@usuaebusiness.org)  
Website: [www.usuaebusiness.org](http://www.usuaebusiness.org)

AmCham Abu Dhabi  
P.O. Box 43710, Abu Dhabi, U.A.E.  
Tel: +971-2-631-3604 Fax: +971-2-633-0489  
Email: [admin@amchamabudhabi.org](mailto:admin@amchamabudhabi.org)  
Website: [www.amchamabudhabi.org](http://www.amchamabudhabi.org)

The American Business Council of Dubai and Northern Emirates  
P.O. Box 74648, Dubai, U.A.E.  
Tel: +971-4-379-1414 Fax: +971-4-379-1515  
Email: [director@abcdubai.com](mailto:director@abcdubai.com)  
Website: [www.abcdubai.com](http://www.abcdubai.com)

#### ***U.A.E. Trade Associations/Chambers of Commerce***

Federation of U.A.E. Chambers of Commerce & Industry  
P.O. Box 3014, Abu Dhabi, U.A.E.  
Tel: +971-2-621-4144 Fax: +971-2-633-9210  
Email: [info@fcciuae.ae](mailto:info@fcciuae.ae)  
Website: [www.fcciuae.ae](http://www.fcciuae.ae)

Abu Dhabi Chamber of Commerce and Industry



P.O. Box 662, Abu Dhabi, U.A.E.  
Tel: +971-2-621-4000 Fax: +971-2-621-5867  
Email: [contact.us@adcci.gov.ae](mailto:contact.us@adcci.gov.ae)  
Website: [www.abudhabichamber.ae](http://www.abudhabichamber.ae)

Dubai Chamber of Commerce & Industry  
P.O. Box 1457, Dubai, U.A.E.  
Tel: +971-4-228-0000 Fax: +971-4-202-8888  
Email: [customercare@dubaichamber.com](mailto:customercare@dubaichamber.com)  
Website: [www.dubaichamber.com/](http://www.dubaichamber.com/)

Sharjah Chamber of Commerce & Industry  
P.O. Box 580, Sharjah, U.A.E.  
Tel: +971-6-530-2222 Fax: +971-6-530-2226  
Email: [scci@sharjah.gov.ae](mailto:scci@sharjah.gov.ae)  
Website: [www.sharjah.gov.ae](http://www.sharjah.gov.ae)

Ajman Chamber of Commerce & Industry  
P.O. Box 662, Ajman, U.A.E.  
Tel: +971-600-595-959 Fax: +971-6-747-1222  
Email: [info@ajmanchamber.ae](mailto:info@ajmanchamber.ae)  
Website: [www.ajmanchamber.ae](http://www.ajmanchamber.ae)

Fujairah Chamber of Commerce and Industry  
P.O. Box 738, Fujairah, U.A.E.  
Tel: +971-9-223-0000 Fax: +971-9-222-1464  
Email: [chamber@fujcci.ae](mailto:chamber@fujcci.ae)  
Website: [www.fujcci.ae](http://www.fujcci.ae)

Ras Al Khaimah Chamber of Commerce and Industry  
P.O. Box 87, Ras Al Khaimah, U.A.E.  
Tel: +971-7-207-0222 Fax: +971-7-226-0112  
Email: [info@rakchamber.ae](mailto:info@rakchamber.ae)  
Website: [www.rakchamber.ae](http://www.rakchamber.ae)

Umm Al Quwain Chamber of Commerce & Industry  
P.O. Box 436, Umm Al Quwain, U.A.E.  
Tel: +971-6-765-1111 Fax: +971-6-765-5055  
Email: [uaqcci1@eim.ae](mailto:uaqcci1@eim.ae)  
Website: <http://www.uaqchamber.ae/>

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<sup>iii</sup> <http://www.masdar.ae/en/energy/detail/siwa-solar-pv-plant-egypt>; <http://www.masdar.ae/en/energy/detail/15-mw-solar-plant-in-mauritania>; <http://www.arabianbusiness.com/uae-s-masdar-completes-8-rural-solar-projects-in-mauritania-654352.html?ref=nnm>

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<http://www.thenational.ae/business/energy/masdar-completes-pacific-islands-solar-power-projects>;  
<http://www.masdar.ae/en/energy/detail/masdar-special-projects-uae-pacific-partnership-fund>;  
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<http://www.thenational.ae/business/energy/masdar-buys-stake-in-one-of-the-worlds-biggest-offshore-wind-farms>;  
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