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# **UAE Energy Diplomacy**

**Exporting Renewable Energy to the Global South**

**Courtney Weatherby, Brian Eyler, and Richard Burchill**

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## Exporting Renewable Energy to the Global South

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# ENERGY DIPLOMACY PUBLICATION

## STATEMENTS FROM PRESIDENTS



**Dr. Ahmed Al-Hamli**  
President and Founder,  
TRENDS Research & Advisory

In a few years (2021) the UAE will be celebrating our achievements of 50 years as an independent nation. The UAE's growth and development since independence has been phenomenal. This growth and development has required the strategic use of our extensive energy resources. While the UAE possess extensive supplies of hydrocarbons our leaders have recognised that sustainable growth and development requires renewable and clean energy supplies. The UAE's approach and view on sustainable, clean energy is national and global. The UAE is of the view that national and global growth cannot be at the expense of environment through non-sustainable sources. This makes innovation in sustainable energy a national priority. As this report shows the UAE's extensive experience in sustainable energy provides opportunities for further support the world's quest clean, renewable energy for sustainable development. The UAE will remain committed to clean energy at home and will use its knowledge and skills to support the globe through clean energy diplomacy.



**Brian Finlay**  
President and CEO,  
The Stimson Center

Global energy demand is surging. Handled poorly, this demand will accelerate climate change and threaten the water security, food security, and well-being of billions of people around the world. There is a real need for individual countries with experience handling the emerging transition towards clean and sustainable energy sources to share their expertise with developing countries. With proper support, these countries—many of which are still in the early stages of building out their energy sector—have an opportunity to take a different path. The Stimson Center's Energy, Water, & Sustainability program aims to provide policy and technical assistance to developing countries around the world in meeting benchmarks from the Paris Agreement and U.N. Sustainable Development Goals. Our Clean Energy Diplomacy project identifies state-based, bilateral, and multilateral solutions to match emerging renewable energy innovations to areas of rapidly evolving energy demand around the globe. The United Arab Emirates has emerged as a clear leader on sustainable development in the MENA region, and its extensive experience working on clean energy has produced clear lessons for other developing countries around the world to learn from and emulate. This report explores some of these experiences and identifies specific and concrete initiatives that the UAE could integrate into its global engagement strategy on sustainable development. We hope this will be the first of many opportunities for the Stimson Center to support the UAE's leadership on clean energy around the world.

## UAE ENERGY DIPLOMACY: EXPORTING RENEWABLE ENERGY TO THE GLOBAL SOUTH

### Executive Summary

Over the past decade, the United Arab Emirates has emerged as a global leader in renewable energy innovation. The UAE's record-setting prices for utility scale solar caught the world by surprise in 2014 and continued to attract international admiration after Abu Dhabi and Dubai achieved solar prices below \$.03 per kilowatt-hour. This breakthrough served as a global bellwether to remove any remaining doubts that solar power can compete with fossil fuels and put the UAE front and center in discussions of renewable energy. Internationally, the UAE's spirited diplomatic support for the deployment of renewable energy projects in the Global South have placed it on equal footing with global powers such as the EU, US, and China. But compared to those countries, the UAE impressively achieved its success with far fewer resources at its disposal and thus serves as a standard bearer for developing countries. This success positions the UAE well to significantly expand efforts to promote sustainable development in the Global South and lead on renewable energy innovation.

An expansion of the UAE's clean energy diplomacy could not be more timely. Almost every country's Nationally Determined Contribution (NDC) for carbon emissions under the Paris Agreement singles out electricity production as a key driver of growing emissions. However, most developing countries still lack the financial, technical, and human capacity to effectively expand their energy sectors while simultaneously limiting carbon emissions. Within this context, renewable energy is clearly identified as a key arena where international engagement can lead to a more ambitious emissions reduction target. The US withdrawal from the Paris Agreement has left a void that other international actors—whether government or private sector—can strategically fill.

Like most countries in the Global South, the UAE faces development challenges related to rising energy demand, continued population growth, and ongoing industrialization and urbanization. Most analysis suggests that the Global South will contribute most of the projected carbon emissions in the coming decades under a business-as-usual scenario. Within this context, the Grand Transition—characterized by disruptive and innovative energy technologies like solar and wind, the digital revolution, and the shifting societal and economic environment as populations around the world grow and urbanize—presents a unique opportunity for strategic investment in renewable energy in the Global South. An appropriate application of policy engagement and pilot investment projects and policy engagement from renewable energy powerhouses like the UAE could reduce global carbon emissions and unlock billions of dollars of investment opportunities.

This publication provides context for renewable energy sector development in the UAE, identifies key lessons-learned from the UAE's first decade of renewable energy leadership and engagement, and explores specific opportunities for the UAE's leadership to further share these lessons with the Global South. The Stimson Center and TRENDS Institution stand ready to support the UAE in strategically expanding its renewable energy diplomacy and investment throughout the Global South, in particular Southeast Asia, in order to lay the groundwork for a more sustainable future.

# THE UAE'S LEADERSHIP ON RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT

“The UAE is striving to develop and boost its rich resources and expertise in the international energy markets and enhance its leading role as a world centre for renewable energy research and development.”<sup>1</sup>

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His Highness Sheikh Khalifa bin Zayed Al Nahyan , President of the UAE

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The UAE has a track record of engagement on sustainable development and renewable energy is at the heart of its approach to governance. For the UAE, the pursuit of sustainable development is exciting domestically and globally, and the simple statement “Leaving no one behind” encompasses the UAE’s approach and objectives.<sup>2</sup> The UAE was dedicated to the pursuit of the Millennium Development Goals (MDGs) and has remained dedicated to the successor Sustainable Development Goals (SDGs) after their adoption in 2015. The SDGs align closely with the UAE’s Vision 2021 which is an all-encompassing, human based strategy focusing on green growth for sustainable development.<sup>3</sup> The UAE takes a multi-dimensional view of social, economic and environmental development at the national level. This holistic view of how to foster peace and security both within the state and outside it is congruent with the development concepts embedded in the SDGs. On the global level the SDGs are a key component in the UAE foreign engagement and cooperation. As a major donor state, the SDGs have given the UAE a platform to transfer opportunity, foster prosperity and engage with the international community. Furthermore, the UAE views the SDGs as an opportunity to communicate its successful ideas, policies, and practices to the global community in support of furthering peace and prosperity across the globe.<sup>4</sup>

As a state committed to the SDGs, the UAE has created in 2017 a National Committee on the SDGs headed by H.E. Reem al Hashimy, Minister of State for International Cooperation and Chairwoman of the Federal Competitiveness and Statistics Authority (FCSA). The National Committee provides an inter-agency focal point bringing together a number of the federal ministries and other national authorities. The National Committee brings together domestic and overseas activities for managing the UAE’s Implementation Plan for the SDGs in line with the National Agenda. The emphasis on clean, renewable energy as part of the UAE’s approach to sustainable development starts at home and then has been shared globally. For example, in 2012, H.H Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, launched the Green Economy for Sustainable Development initiative.<sup>5</sup> In January 2015, in line with the UAE Vision 2021, the UAE Cabinet approved the UAE Green Agenda 2015-2030 as an overarching framework to implement the green development strategy and complement the 2014 UAE State of Green Economy Report. Continuing with this momentum, in June 2015, the Emirates Green Development Council (EGDC) was established under the chairmanship of the newly formed Ministry of Climate Change and Environment to coordinate collaboration between federal and local authorities as well as stakeholders and oversee the implementation of the Green Agenda.

From these national initiatives the UAE is becoming a global hub and a successful model for Green Economy policies and practices by innovating environmental solutions and leveraging public-private partnerships to export technology to developing nations. Following the UAE’s acceptance of the Paris Climate Change Agreement on 21 September 2016, the Dubai Declaration was issued in October 2016 at the 14th Global Roundtable of the UN Environment Programme Finance Initiative (UNEP FI). The Declaration sets out a plan for global leadership along with a fund worth Dh100 billion to get green projects at home and overseas off the ground.<sup>6</sup> The Dubai Declaration provides sustainable financing, in cooperation with the UNEP FI to support the government’s commitment to the Paris Climate Agreement and the SDGs.

As this report shows, the UAE is making great strides in sustainable development and renewable, clean energy, both at home and abroad. The UAE was the first state in the Middle East to ratify the Paris Climate Agreement. The government then renamed the Ministry of Environment and Water to the Ministry of Climate Change and Environment showing commitment in this space. Many domestic initiatives have followed as has the UAE contribution to the global efforts to minimize climate change through the production of clean and renewable energy. The decision to locate the headquarters of the International Renewable Energy Authority (IRENA), is testament to these efforts IRENA is an intergovernmental organization established to “promote the widespread and increased adoption of renewable energy with a view to sustainable development”. The UAE recognizes that effective development of clean and renewable energy is integral to sustainable development and maintaining security.

The UAE views sustainable development as comprising social, environmental and economic perspectives as these perspectives all overlap and impact the other. When it comes to energy, it is not only incorporating more renewable sources into an ever-diversifying energy mix but also working to make energy consumption more efficient and educate the populace on how individual behavior can impact emissions.<sup>7</sup> The UAE is also extending its global leadership in sustainable development based on efficient renewable energy through developing new technologies, supporting knowledge based economies, and finding new and better ways to support economic growth while minimizing impact to the environment. For the UAE, energy matters at home are part of the overall engagement strategy with the world. The UAE’s national efforts support a range of projects overseas, and Dubai’s hosting of EXPO 2020 approaches, the implementation of national measures will show visitors practical results of what can be done. This is a long-term and diversified approach in terms of

policy, linked with the long term and diversified approach to energy. Diversification works in both directions -- it is not just a matter for government as business, NGOs, communities, international organizations all have a role to play. The research presented here demonstrates the UAE's achievement to date and outlines a rationale for the promotion of ongoing development and success.



## UAE LEADERSHIP IN GLOBAL INITIATIVES

Over the last decade, the UAE has successfully leveraged early investment and coordinated a national approach to become a global leader in renewable energy. Apart from its bilateral and multilateral leadership on climate change and renewable energy, the UAE also plays an important convening role at the global level on these issues. Currently, the UAE plays a leading role in the following global activities:

- The annual **World Future Energy Summit**, which brings together experts from around the world to explore innovation, digitalization and market shifts in the global energy mix. In 2018, WFES brought together more than 33,000 attendees from 170 countries to network, dialogue, and do business across the energy sector. Approximately US \$15 billion of projects were announced in 2018.
- The **World Energy Congress** is a triennial event that brings together representatives from more than 150 countries to lay out a global strategy for a collaborative, sustainable, and innovative energy future and provide opportunities for dialogue. The UAE will be hosting the **24th World Energy Congress** in 2019.
- The **World Expo 2020 Dubai** includes sustainability as a key theme. Dubai Electricity and Water Authority (DEWA) is officially partnering with Expo 2020 Dubai and is investing AED 4.26 billion (\$1.16 billion) in sustainable infrastructure to support the Expo. Dubai created the \$100 million ExpoLive fund for start-ups in the lead-up to the Expo, with a focus on driving competition on energy and sustainability.<sup>8</sup>
- The **Clean Energy Ministerial** is a high-level global forum which brings together 24 countries which globally contribute 99% of clean energy investments and 75% of greenhouse gas emissions. The UAE hosted the Ministerial in 2011 and currently leads the Clean Energy Education and Empowerment initiative.

# UAE NATIONAL ENERGY PROFILE

## *The UAE's Renewable Energy Journey*

From an historical perspective, the United Arab Emirates is an energy rich country. As home to some of the largest oil and natural gas reserves in the world, the UAE exports more than two million barrels of oil per day.<sup>9</sup> While the export of oil undoubtedly brought great wealth and transformed the UAE into an economic dynamo, the country's power generation is largely dependent on natural gas. Approximately 98% of the UAE's electricity in 2017 came from natural gas turbines, with the remainder supplied by heavy fuel oil and the burgeoning solar industry.

As the UAE's population more than tripled from three million people in 2000 to an estimated ten million in 2017, the UAE's power demand has rapidly risen. As of 2017, the UAE had just over 27 GW of installed power generation capacity. Annual power demand for the future is projected to rise between 7-10% from 2014-2020 and will continue more sedately in the decades to follow.<sup>10</sup> The UAE's energy sector is closely tied with water production because thermal plants are used to generate both electricity as well as desalinate water. This process can negatively impact the efficiency of power generation. Equally notable, demand for air conditioning is responsible for about 60% of electricity consumption and can reach 75% of peak demand during the hottest summer days.<sup>11</sup> Even with longer-term efficiency gains, the UAE projects that electricity consumption will almost quadruple by 2050, requiring an installed capacity of 100 GW.

The country's reliance on natural gas has become a cause for concern. Despite having some of the world's richest natural gas deposits, the rapid rise in energy demand outstripped the UAE's domestic supply of natural gas in 2007. The UAE remains a net importer, with rising reliance on imports of natural gas. In recent years, this has become quite costly for the UAE: whereas domestically produced natural gas previously sold around US \$2 per MBtu, the price rose above \$7 per MBtu as of 2016.<sup>12</sup> The rising cost of natural gas—along with the energy security concerns regarding over-dependence on external supplies and rising attention to the UAE's carbon emissions in the face of climate change—prompted the UAE to diversify its energy mix through investment in renewables and nuclear power.

Ongoing advancements in transmission infrastructure, the digitalization of energy management, and the rapid price drop for renewables provide clear economic opportunities for the UAE as it pursues this diversification. These advancements will allow for smarter, more efficient, and more affordable electricity. In the long-run this will help drop the UAE's expenditures on imported natural gas and ensure the UAE's continued competitiveness as an investment location. The UAE's federal leadership laid a clear pathway for diversification of both the national economy as well as the national electricity supply through federal initiatives such as the UAE Vision 2021 and the Energy Strategy 2050.

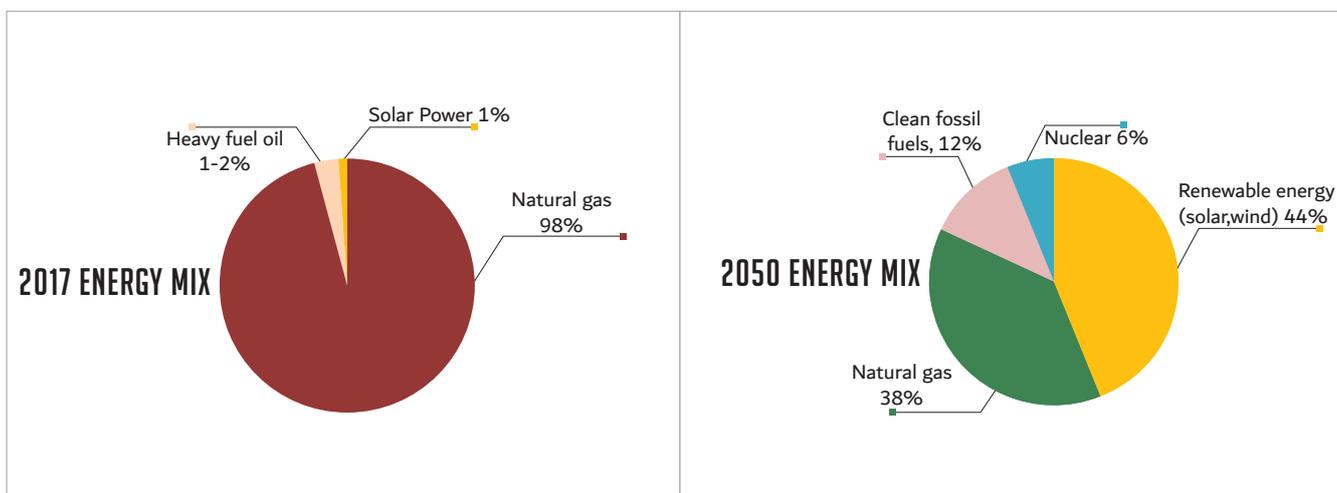
Environment is one of six pillars that the UAE Vision 2021 targets for improvement. A target of 27% clean energy generation for the UAE's energy mix by 2021 is a key indicator of success in the environment pillar.<sup>13</sup> While most of this 27% target will come from the Barakah Nuclear Plant, which will start producing electricity in late 2018 and provide approximately 20% of the UAE's electricity by 2020, the remaining 7% will come from renewable energy. After Barakah comes online, all new clean energy moving forward will come from renewables.<sup>14</sup>



The UAE Energy Strategy 2050 outlines a pathway towards reaching a drastically different energy mix by 2050. 44% of the mix will be dominated by clean renewable energy and include a balanced mix of natural gas (38%), clean carbon-capture fossil fuels (12%), and nuclear energy (6%).<sup>15</sup> UAE policymakers plan to contribute 600 billion AED (\$163 billion) towards renewable energy by 2050 to support this transformation.<sup>16</sup> The result will be a far more diverse and resilient energy mix that will be better positioned to handle shocks from technological disruptions to the natural gas supply and other potential shocks to the energy market.

In light of the UAE’s high per capita energy and water usage, the government has taken steps towards demand-side management in order to limit the amount of new capacity needed in the future energy mix. To reach this objective the government created the Estidama (pearl) rating system in 2008. The Estidama rating system builds on existing LEED (Leadership in Energy and Design) standards but is specifically tailored to the Emirates arid climate and accounts for local cultural design elements. The Estidama system offers flexible routes to comply with stringent standards of energy efficiency, resource conservation, and other sustainable design elements and is built into the local building code and permitting system.<sup>17</sup> The UAE requires all new buildings to receive at least a 1-pearl rating and all government buildings to receive at minimum a 2-pearl rating.<sup>18</sup> Estidama is a key part of Abu Dhabi’s urban plan through 2030 and underpins efficiency gains outlined in the UAE Vision 2021 and the Energy Strategy 2050.

The federal government’s relatively hands-off approach toward meeting these energy mix targets complements the existence of Emirate-level (local) leadership and identification of the right local pathways to meet the national targets. By providing specific targets but not being prescriptive on how to meet them, the government leaves space for individual and consumer choice. For instance, energy targets allow market trends to decide the type of energy generation technologies, and flexibility on building design requirements allow for individual consumer preferences to determine design elements. This decentralized approach supports a diversified approach throughout the Emirates, with Abu Dhabi and Dubai, in particular, developing distinct and complementary approaches to their energy strategies.



# ABU DHABI & FEDERAL ENERGY STRATEGY

Policy-makers in Abu Dhabi coordinate negotiations on these national initiatives and have largely adopted the federal policies as their Emirate-level guidelines. In this sense, the Abu Dhabi strategy flows from and feeds into the national strategy. The national strategy towards sustainable development and renewable energy is best characterized as both highly consultative and benefiting from top-down guidance. In particular, the leadership engages with stakeholders from all sectors early on in the target-setting process, allowing for feedback and broad consideration of potential impacts before setting official goals and guidelines. These qualities are particularly visible in the way that Abu Dhabi's leadership formulates national strategies and sets specific quantitative targets, which are measured regularly against the long-term goal for progress.

Experts throughout the UAE highlight that Abu Dhabi's focus on setting clear but non-prescriptive goals along with the inclusion of regular progress assessments and enforcement are critical for motivating the private sector to meet national Vision 2021 goals on energy mix and efficiency gains.<sup>19</sup> Regular revision of plans allows for additional adjustments to targets and policy where necessary, and feedback processes are established to inform the regulatory environment in a timely manner. Additionally, crowdsourcing feedback from outside experts helps to set targets and priorities in key strategic documents.<sup>20</sup> For instance, in January 2017 the Abu Dhabi leadership brought together a wide range of stakeholders to participate in a Future Energy Lab exercise. Lab participants identified and modeled various potential energy scenarios for the UAE through 2050, stress-testing them across potential disruptions and ultimately identifying an energy mix that then formed the basis of the Energy Strategy 2050.<sup>21</sup>

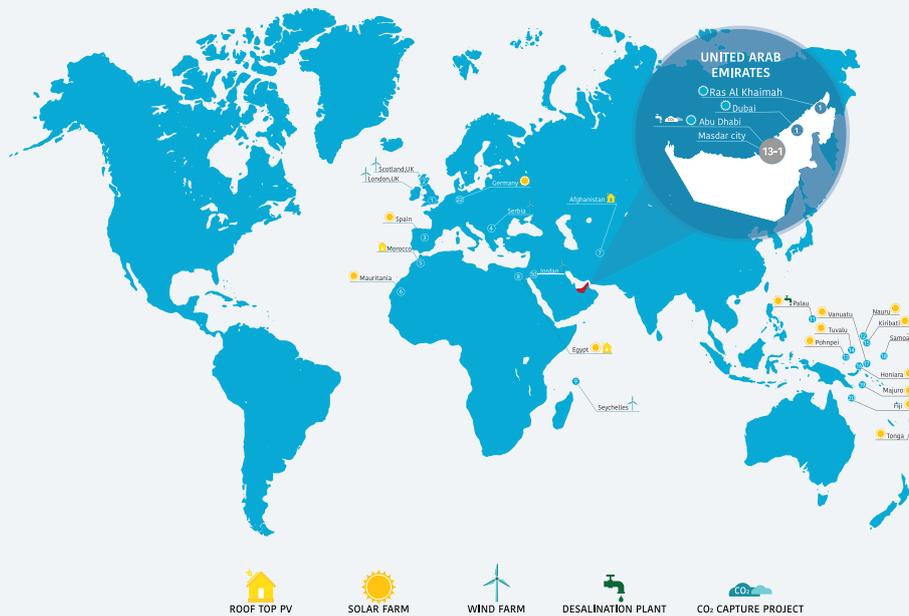
While energy security prioritization contributes the greatest motivation for policy shifts, Abu Dhabi has also made a separate argument for economic diversification which has benefited the alternative energy sector. In 2008, in consultation with the private sector, the government of Abu Dhabi laid out a strategy for economic diversification and growth in the Abu Dhabi Economic Vision 2030.<sup>22</sup> The overarching theme in the Vision was for economic diversification away from the oil and gas sector, which contributed 59% of Abu Dhabi's GDP in 2005.<sup>23</sup> The Vision's strategies for diversification have paid off, and the non-hydrocarbon sector grew to more than 69% of Abu Dhabi's GDP as of 2016.<sup>24</sup>

While the Vision did not directly reference renewable energy, energy diversification and infrastructure were identified as key economic priorities.<sup>25</sup> The renewable energy sector's competitiveness and economic feasibility evolved significantly since the Vision 2030 document came out in 2008. The sector's role in promoting high-value added technology with significant growth potential made it a natural beneficiary and perfect complement to the Vision's broader strategy. The UAE's early investment in Masdar, also known as the Abu Dhabi Future Energy Company, was an organic evolution of the Vision's strategy to support national champions as anchors of new industry.<sup>26</sup>

Masdar has benefited from significant support from the government of the UAE and close ties to its parent company Mubadala, a major oil and gas company with investments around the world. Created with the specific goal of helping Abu Dhabi become a world leader in sustainable energy, Masdar is a key player in many renewable energy projects in the UAE, including commercial-scale solar ventures such as the 100 MW Shams 1 solar project and phase three of the Mohammed Bin Rashid Al Maktoum Solar Park (800 MW) as well as a waste-to-energy project, a renewable desalination plant, a pilot carbon capture and storage project, and rooftop solar development.<sup>27</sup> It has also become famous for Masdar City, a future-looking technology center and sustainable eco-development zone in Abu Dhabi.



Masdar is the UAE’s national renewable energy champion and plays a key role in the country’s journey to become a global sustainability leader. In its early years, Masdar was viewed through many lenses: a leader in sustainable urban design; a clean energy investor; a world-class industrial research and innovation center, and; a sustainability educational institution.



While Masdar’s business activities still span these sectors, its it best known internationally as a global force in renewable energy investment and project development.

Masdar is currently the largest commercial provider of renewable energy technologies in the Middle East and has key partnerships with other clean energy investors around the world. As a result of this outreach, Masdar has globally contributed \$2.7 billion into joint investments worth more than US \$8.5 billion, with a total of approximately 2.7 GW of installed capacity in renewable energy projects.<sup>28</sup> Although Masdar has gained experience operating large plants in the UK and Spain, many of its projects are in developing countries such as Jordan, Afghanistan, and Mauritania. Masdar also plays a vital technical role in the UAE’s foreign aid to island nations in the Pacific Islands and the Caribbean, where it has acted as a contractor for special solar energy projects and renewable energy water desalination.<sup>29</sup>

Masdar’s unique breadth of expertise in solar photovoltaic technologies, solar desalination, and concentrated solar power (CSP) is notable. CSP differs from solar PV in that it focuses sunlight to generate heat to produce steam, which produces electricity through traditional turbines. CSP is more expensive than solar photovoltaic generation but can also store heat in liquid molten salts, allowing it to provide baseload power and avoid variability. Masdar has a decade of experience in CSP through joint-ventures in Spain as well as the Shams 1 plant in Abu Dhabi, making it uniquely qualified to expand solar investments in the Global South.

# DUBAI'S ENERGY STRATEGY

Like the UAE as a whole, Dubai has sought to diversify its economy away from the oil and gas sector and to build out an energy mix that is not dependent on imported natural gas. Dubai's oil reserves are anticipated to run out by 2020, and as a result, the leadership in Dubai has been more urgent in pursuing economic diversification and identifying alternative energy development options. In 2010, Dubai launched the Dubai Integrated Energy Strategy 2030 (DIES) which lays out a clear pathway to securing a sustainable energy future through energy mix diversification and the adoption of high energy efficiency standards. DIES also created the expert-led Dubai Supreme Council for Energy (DSCE) to implement the plans and actively pursue policies which support the adoption of smart grid technologies, demand-side management, and solar technologies. For example, in 2013 DSCE led Dubai to adopt a demand-side management strategy to reduce demand for water and energy by 30% through 2030.<sup>30</sup>

Sheikh Mohammed bin Rashid al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, and the Supreme Energy Council in Dubai have taken both a proactive and long-term view to energy planning, regularly setting and revising targets. When released in 2010, DIES included a renewable energy target of 1% by 2020 and 5% by 2030. Notably, these energy targets have evolved significantly. In 2015, these targets were revised to 7% by 2020 and 15% by 2030.<sup>31</sup> In 2017, after the price of solar plummeted and pilot projects in the UAE began to bear fruit, authorities in Dubai proactively laid out a Clean Energy Strategy 2050 that upgraded the longer-term targets to 25% in 2030 and 75% by 2050.<sup>32</sup>

Despite the similar adoption of high-level targets, Dubai's strategy is more market-led than Abu Dhabi's, and the private sector has provided the impetus for much of the sector's vibrancy locally in Dubai. Dubai's upward revision of its targets correlates closely with the surge in investor interest in solar energy and the success of the early investments in solar power at the Mohammed bin Rashid al Maktoum Solar Park in 2015 and 2016. Also relevant to Dubai's energy strategy is the Smart Dubai Initiative, which aims to develop public-private partnerships that promote an efficient, safe, and connected city for residents and visitors utilizing smart technology.<sup>33</sup>

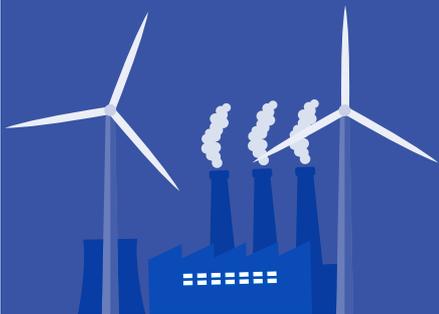
While the national government and DSCE establish the policy pathways to improve standards, Dubai Energy and Water Authority (DEWA) has played a key role in implementing the policies. DEWA has been particularly active on Dubai's Clean Energy Strategy 2050, which has five main pillars: infrastructure, legislation, funding, capacity-building, and the targets for building a sustainable energy mix. Within the Clean Energy Strategy 2050 DEWA leads activities to promote renewable energy and utilize smart-grid technology and digitalization of infrastructure to improve efficiency. Some key elements of DEWA and Dubai's approach to sustainable development include:

- The **Mohammed bin Rashid Al Maktoum Solar Park** is a multi-phase scale solar project that will eventually generate 5,000 MW when it is complete in 2030. The Solar Park is Dubai's initial foray into commercial-scale renewable energy generation and will play a key role in meeting Dubai's targets for clean energy. Launched in 2012 with an initial pilot project of 13 MW, as of March 2018 the Solar Park has a committed 1713 MW mix of solar photovoltaic and concentrated solar power. The Solar Park is Dubai's main investment in the infrastructure pillar of the Clean Energy Strategy 2050.
- The **Shams Initiative**—Dubai's rooftop solar initiative—is legislated and managed by DEWA. Shams aims to promote the adoption of rooftop solar in Dubai, and DEWA established net-metering and pricing schemes and a clear permitting process to support the adoption of rooftop solar by households and commercial buildings. DEWA's website provides a variety of resources and step-by-step guidelines for the adoption of solar, including a solar calculator, a clear outline of the permitting process, and a list of consultants and contractors who can perform installation.<sup>34</sup> As of mid-2017, the Shams Initiative had installed approximately 15 MW of solar capacity on 435 buildings throughout the city with an additional 40 MW planned or under construction.<sup>35</sup> To date, subsidized electricity rates and relatively high upfront costs for consumers means that Shams has been largely attractive to the commercial sector.<sup>36</sup> DEWA has set an ambitious target of installing rooftop solar on all buildings in the emirate by 2030.
- The **Dubai Green Fund**, the sustainable investment arm of DEWA, aims to stimulate private investment by offering support—both direct investment and low-interest rate loans—to businesses focused on renewable energy, energy efficiency, and smart grid projects.<sup>37</sup> A priority goal for the Fund is to provide initial funding for projects under the Demand-Side Management Strategy, with particular focus on energy efficiency and the rooftop solar program.<sup>38</sup> Launched in 2015 with a target of 100 billion AED (\$27.22 billion), the Fund has to date confirmed investment of 2.4 billion AED (\$653 million) from national banks and green bonds.<sup>39</sup>
- The **Smart Dubai Initiative** broadly aims to utilize smart technology throughout many sectors in order to help meet national and emirate-level goals. Within the energy sector, this is largely through utilization of smart-grid technologies to improve connectivity and efficiency such as net-metering in support of Shams Initiative, utilization of smart meters to help customers monitor electricity usage, and installation of electric vehicle charging stations around the city.<sup>40</sup>

- Dubai hosts numerous innovation hubs in order to take advantage of new technologies and entrepreneurial innovation to address emerging challenges of the 21st century. **The Dubai Future Accelerators Program** is a nine-week program aimed at bringing together entrepreneurs to brainstorm and test solutions to a variety of challenges identified by Dubai authorities, including application of new and disruptive technologies like energy storage and the application of blockchain technology to electricity and water services.<sup>41</sup> Program activities specifically aim to create actionable pilot projects in Dubai. The **Youth Hub** provides a physical co-working space in downtown Dubai for young and innovative creators, youth organizations, and thought leaders to come together for brainstorming, discussions, and seminars.<sup>42</sup> Ultimately the Youth Hub is positioned to help young entrepreneurs get their ideas off the ground.<sup>43</sup>

In addition to informing and collaborating on government initiatives, Dubai’s dynamic private sector provides support for sustainable development and renewable energy projects through coordination between banks on standards for projects and financing practices that help make renewable energy an attractive investment option. The clearest instance of this is the Dubai Declaration, which was announced in 2016 at the UN Environment Programme – Finance Initiative’s (UNEPFI) meeting in Dubai. At the time, eleven financial institutions in the UAE signed the Declaration to improve sustainable finance practices in support of the UAE Vision 2021.<sup>44</sup> Signatories committed to a range of sustainability commitments, including to identify a corporate social responsibility champion within the institution, to include climate change factors in risk assessments, to integrate sustainability requirements into existing products and/or create additional financial services to support sustainable development, and to meet international best practices.<sup>45</sup> Additional international institutions have signed on to reach total of 32 as of 2018.<sup>46</sup>

## THE ROLE OF UTILITIES



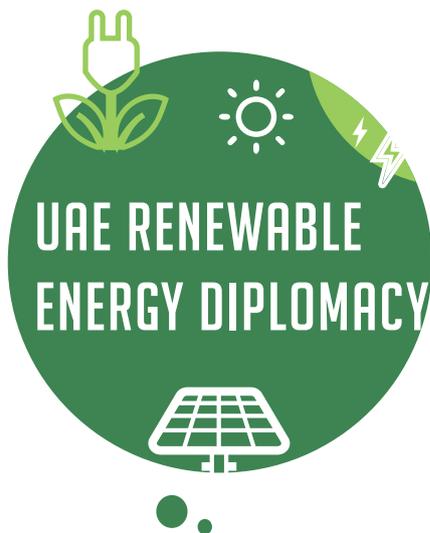
Public utilities in the United Arab Emirates have played key roles in the UAE’s sustainable development. There are four utilities in the UAE: Abu Dhabi Water and Electricity Authority (ADWEA), Dubai Electricity and Water Authority (DEWA), Sharjah Electricity and Water Authority (SEWA), and the Federal Electricity and Water Authority (FEWA).<sup>47</sup> ADWEA, DEWA, and SEWA supply the emirates of Abu Dhabi, Dubai, and Sharjah respectively, and the northern emirates are all supplied by FEWA. ADWEA and DEWA are the largest utilities companies, and both feed electricity to the northern emirates via FEWA.<sup>48</sup> Given their roles as the sole purchasers of electricity and partial-owners in most energy generation capacity in their respective emirates, ADWEA and DEWA play a vital role in the renewable energy transition in the UAE.

ADWEA and DEWA manage a variety of initiatives to help meet national renewable energy and energy efficiency targets. As the sole purchaser of electricity and manager of new project tenders in Abu Dhabi and Dubai, they provide project pre-development support, set expectations, negotiate and guarantee long-term power purchase agreements, and co-own most of the renewable energy generation projects in the UAE. These utilities’ dual role as purchaser and co-owner provides significant benefits for investors, including access to low interest loan rates and balanced risk allocation.

# THE OTHER EMIRATES

For the other Emirates of the UAE most of their energy needs are sourced from ADWEA and DEWA. As a result, the Northern Emirates coordinate their responses to the national targets closely with ADWEA and DEWA. A few local developments separate from national strategies are:

- The Emirate of Ras al Khaimah established an Energy Efficiency and Renewable Energy Office in mid-2017 and is expected to announce local energy targets sometime in early 2018. Ras al Khaimah is currently fully dependent on imported natural gas for electricity, and it is expected that RAK will target 25-30% renewables by 2040.<sup>49</sup>
- The Emirate of Fujairah is exploring biofuels and wind energy potential, although the local government is in the process of figuring out how to best optimize land and zoning practices in order to pursue these alternatives.
- The Emirate of Ajman's Municipality and Planning Department is actively exploring stronger partnerships with DEWA in order to pursue green energy.<sup>50</sup>
- Sharjah Electricity and Water Authority encourages customers to utilize decentralized solar and mini-grids to help shave peak demand.<sup>51</sup> In 2017, Sharjah announced a 27 MW waste-to-energy power plant that will help meet local demand and address the Vision 2021 target of reducing solid waste.<sup>52</sup>



Apart from the UAE's numerous domestic initiatives, the country's diplomatic framework supports sustainable development and renewable energy within the countries of the Gulf Cooperation Council (GCC)<sup>53</sup> and increasingly on the global stage. The UAE is outspoken on its support both for meeting the Paris Agreement commitments and the United Nations Sustainable Development Goals (SDGs).

The UAE ratified the Paris Agreement on September 21, 2016,<sup>54</sup> making it the first country in the Middle East to do so. This early leadership set the tone for much of the UAE's diplomatic engagement on climate change in the years since. UAE policymakers often emphasize the need for the country to lead by example, and it has undoubtedly done so through the impressive list of policies detailed above. However, the UAE quietly works with many other members of the GCC and the Arab League behind closed doors to promote regional interest in alternative energy technologies. This was likely a factor in the announcement at the 2016 Middle East and North Africa Renewable Energy Conference that the GCC would invest a combined \$100 billion in renewable energy through 2036.<sup>56</sup>

The UAE also avidly courted the opportunity to host the International Renewable Energy Agency (IRENA), with the country's diplomatic corps engaging in spirited lobbying to build support for locating the institution in Abu Dhabi.<sup>57</sup> Winning the vote was a significant victory for the UAE—IRENA is one of very few international organizations to have headquarters in a non-Western country, and it is the first to be located in the Arab world. The UAE's coalition building was important from both a practical and symbolic perspective—the UAE built support for its bid to hosting IRENA mainly by garnering support from other developing countries in Africa, the Pacific, and throughout the Middle East. These are the very countries that face steep energy demand growth and most need to utilize IRENA's expertise.

Initially, some environmental organizations were critical of the decision to locate IRENA in a country previously known for its oil investments.<sup>58</sup> But this criticism has evaporated in the years since, as the UAE has proven its dedication and emerged as a renewable energy leader. The UAE provides significant financial support to show its commitment to renewable energy, including assistance to construct the new office headquarters in Masdar City, \$136 million to cover IRENA expenses in the first 6 years of its operation, and a commitment of \$350 from the Abu Dhabi Fund for Development to support renewable projects in developing countries that would be identified through IRENA.<sup>59</sup>

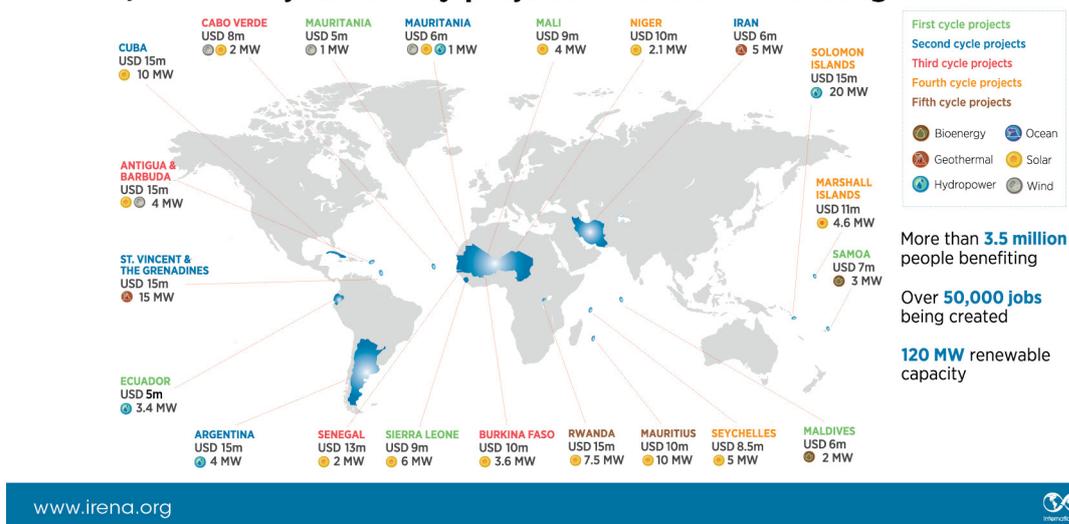
The International Renewable Energy Agency (IRENA [www.irena.org](http://www.irena.org)) is an intergovernmental organization that acts as a platform for international cooperation on the global renewable energy transition and promotes the adoption of renewable energy. IRENA provides authoritative research, tools, and policy guidance to countries interested in deploying renewable energy, including but not limited to solar, wind, biomass, geothermal, hydropower, and other emerging renewable technologies.

After decades of discussion and preliminary negotiations, IRENA was founded in Bonn, Germany in January 2009 with 75 states signing on as members.<sup>60</sup> Since then, the membership has grown to 170 member states and IRENA has become synonymous with technical excellence on renewable energy. Among the practical resources that IRENA provides are the following:

- Renewables Readiness Assessments, which are done collaboratively with individual governments and regional organizations to assess the current situation and identify ways to accelerate renewable energy deployment on a national or regional basis
- The Global Atlas, which is a web resource showing maps of renewable energy resource potential around the world.
- Renewable Energy Roadmap (REmap), an initiative to help double renewable energy's share of the global energy mix by 2030.
- The IRENA/ADFD Project Facility, which utilizes IRENA's technical expertise to identify scalable renewable energy projects in developing countries and is funded by the Abu Dhabi Fund for Development

Most of the UAE's foreign assistance is channeled through the Abu Dhabi Fund for Development (ADFD), which prioritizes support for projects aimed at addressing the UN SDGs. ADFD plays a two-part role, on one hand acting as a financial institution and provides concessional loans to developing country governments for key infrastructure projects. On the other hand, the ADFD also manages direct grant assistance for the UAE government. Since 2009, the ADFD has partnered with IRENA to review proposals for supporting renewable energy projects around the world through the IRENA/ADFD Project Facility.

## IRENA/ADFD Project Facility projects selected for funding



The Project Facility unites the UAE's willingness to provide aid assistance with the technical expertise of IRENA, which is responsible for reviewing and selecting projects that need seed funding. The most significant factor in the selection process is that winners have the potential for replicability, scalability, and which could have transformative impact on host countries' emerging energy sectors. Within this framework, the ADFD has earmarked \$350 million for concessional loans to support renewable energy projects in developing countries to be disbursed in seven \$50 million funding cycles starting in 2014 and finishing in November 2018.<sup>61</sup>

In addition to the ADFD's broad support for renewable energy infrastructure, the UAE's Ministry of Foreign Affairs has also targeted bilateral assistance for renewable energy development abroad towards island nations through the UAE-Pacific Partnership Fund and UAE-Caribbean Renewable Energy Fund. Both funds are explicitly aimed at helping island nations meet SDGs and Paris Agreement commitments and respond to recipient calls for assistance.

The UAE-Pacific Partnership was announced in 2013 in direct response to a call from Pacific Leaders Meeting with IRENA in 2012.<sup>62</sup> The UAE-Pacific Partnership committed an additional \$50 million to support eleven renewable energy projects in the Pacific Islands, including ten solar farms and one wind farm.<sup>63</sup> The Pacific Partnership program was managed as a government assistance initiative through the ADFD and utilized Masdar's expertise as a project developer. Following on the success of the UAE-Pacific Partnership, the UAE announced in 2017 the creation of a new US \$50 million UAE - Caribbean Renewable Energy Fund to support similar assistance for Caribbean island nations. The second round of support for seven recipient countries was announced at Abu Dhabi Sustainability Week 2018, including an additional contribution of \$10 million in light of the 2017 devastating hurricanes that swept through the Caribbean region and destroyed key energy infrastructure.<sup>64</sup>

The UAE is already an extremely generous contributor to overseas development assistance. Globally, the country ranks among the highest contributors of aid as a percentage of gross national income.<sup>65</sup> The UAE's published strategy for international assistance between 2017 and 2021 prioritizes international cooperation on areas where there is significant opportunity to enhance the UAE's reputation as a leader. The strategy also seeks to provide technical cooperation to enhance the effectiveness of foreign aid and benefit from international initiatives based in the UAE.<sup>66</sup>

Renewable energy clearly fits the objectives of this strategy. The UAE has taken up a leadership position on sustainable development issues through its diplomatic engagement on the Paris Agreement, hosting of IRENA, and slow but steadily rising investment in renewable energy through the Abu Dhabi Fund for Development. As host to a range of multilateral initiatives, conferences, and events that include sustainable energy as an underlying theme, the UAE already has achieved the credibility and volume of linkages necessary for launching deeper engagement on renewable energy and energy access throughout the Global South. There is a significant opportunity for the UAE to capitalize on these existing strengths and enhance its effectiveness as an aid partner by further prioritizing support for renewable energy and energy access within its foreign aid portfolio.

The UAE's foreign aid strategy through 2021 does not specifically prioritize renewable energy diplomacy. Although the existing foreign aid strategy includes supporting other countries in meeting their own SDG targets as a guiding principle, SDG-7 (increasing access to sustainable energy) is currently not considered a key focus of assistance.<sup>67</sup> However, supporting SDG-7 would likely have knock-on effects for many of the SDGs that the UAE has prioritized during this timeframe. In particular, there are clear areas of overlap and complementarity between SDG-7 and UAE priorities of SDG-9 (building resilient infrastructure and promoting sustainable industrialization) and SDG-17 (South-South cooperation, capacity building, and technology sharing). There are clear opportunities for UAE foreign assistance on SDG-9 and SDG-17 to effectively utilize the UAE's own journey in the renewable energy sector to inform their aid projects. In the case of SDG-9, energy infrastructure—including generation and transmission—is an area where the UAE's experience integrating renewable energy could inform the build-out of smart grids that are best positioned to take advantage of the renewable energy transition. In the case of SDG-17, the UAE's experiences provide clear lessons-learned on the deployment and integration of variable renewables into the grid.



## ECONOMIC OPPORTUNITIES FOR UAE INVESTORS ABROAD

High-level officials in the UAE, including H.E Reem Al Hashimy, UAE Minister of State for International Cooperation, have recently noted how investment in renewable energy throughout the world builds a framework for broader commercial engagement further down the road.<sup>68</sup> Reliable electricity access unlocks billions of dollars of investment opportunities, ranging from industry to agribusiness in developing countries. In this light, renewable energy acts as a thematic bridge between foreign policy and the continued diversification and expansion of the UAE's national economy and foreign investment.

Many companies that invest in renewable energy internationally have headquarters in Dubai or Abu Dhabi, but most of these companies are relatively early in the process of investing overseas. Masdar is a significant exception, with more than twenty-two joint investment projects around the world.<sup>69</sup> Notably, this exceeds Masdar's domestic investments at this point.

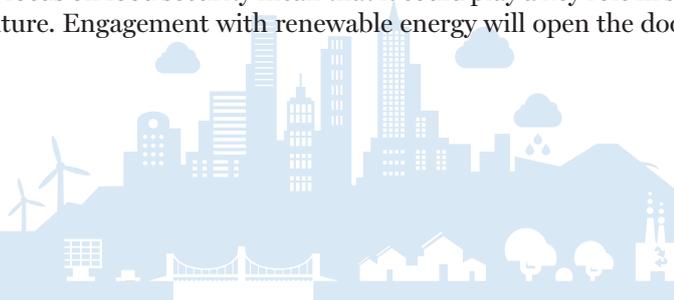
A trend that holds true for Masdar is that outbound investments have been successful due to the company's ability to leverage existing international connections. This is also true for other locally based companies, many of which have facilitated their expansion overseas through acquisition of developers who already had existing renewable assets.<sup>70</sup> This process has been a key step for many companies that wanted to expand into the renewable energy sector to quickly acquire technical expertise and existing project pipelines. As a result, despite apparently having a large amount of installed capacity in their pipeline, many of these companies have limited experience implementing and managing projects abroad from the ground up.

While Masdar has not acquired foreign companies in this manner, it built strong joint-investment linkages with other large international players in the renewable energy sector. This network grants Masdar access to large solar and wind projects even as a relative latecomer in more developed energy markets such as the UK and Spain. In Masdar's case, many of its twenty-two projects abroad have been brokered with assistance from the UAE government—such as the eleven projects in the Pacific Islands—while others benefited from early connections to local energy officials and operatives through Masdar's parent company of Mubadala.<sup>71</sup>

Masdar and other Emirati companies are looking for commercially viable projects abroad, but they rely on existing ties and partnerships to gain access in many markets. Most major actors in the UAE energy sector have strong ties and investment abroad. Mubadala, which is state-owned, has an asset portfolio of more than \$126 billion and is active in more than 30 countries globally.<sup>72</sup> Much of this has diversified beyond the oil and gas sector that provided the initial funding. In addition to being the parent-company for Masdar, Mubadala invests in number of key tech companies. ADNOC—the Abu Dhabi National Oil Company—is the 12th largest oil producing company in the world and is exploring carbon capture and storage through a joint venture with Masdar.<sup>73</sup> ADNOC does not invest directly in other countries but has recently started to strategically expand its partnerships and co-investment model. A key goal of this shift is to position ADNOC more advantageously as economic weight shifts towards Asia as energy (and oil) demand there skyrockets.<sup>74</sup>

The UAE's Ministry of Foreign Affairs and International Cooperation, Mubadala, and ADNOC already have connections and experience abroad in many growth markets globally and can play a key role in matching UAE-based companies with opportunities in countries that have the right investment climate for renewables. Expansion of the UAE's diplomatic engagement on renewable energy and strategic utilization of commercial connections with the Global South would have clear positive knock-on effects for the commercial sector.

Currently, these ties could be utilized in a wider scope to support the export of renewable energy technology. Building a framework for coordination will also open doors further down the road to collaboration on broader resource management challenges. Broadly speaking, countries in the Global South which currently struggle to meet energy demand in a sustainable manner also face a future that will be defined by the interactions within the food-water-energy security nexus. The UAE's early investments in solar-desalinization and growing focus on food security mean that it could play a key role in supporting effective global management of nexus issues in the future. Engagement with renewable energy will open the door to these opportunities.



# SHARING THE UAE'S EXPERIENCE

The UAE's investments in domestic renewable energy projects identify a model for effective engagement with the private sector which leads to real progress on-the-ground in deploying renewable energy technologies, particularly solar. After significant discussion with stakeholders on the ground, this report identifies six key factors that have supported a robust and engaged solar sector in the UAE:

1. **Start small and scale up targets for renewable energy deployment based on pilot project experience.** The UAE leadership was cautious, starting with relatively small targets for the adoption of renewable energy targets at a time when the technologies were relatively new and unproven in the local climate. The first commercial-scale projects—a 13 MW pilot solar PV project in Dubai's Mohammed bin Rashid al Maktoum Solar Park, the 10 MW solar PV project in Masdar City, and the 100 MW Shams 1 concentrated solar power project in Abu Dhabi, both of which came online in 2013—were still relatively risky.

Indeed, these pilot projects faced challenges. The Shams 1 project was not as commercially successful as initially hoped for by investors. The Masdar City project was initially intended to be rooftop solar, but shifted to ground-level scale solar projects after cleaning solar panels proved a challenge to efficient energy production. These early investments were vital first steps which provided Masdar and the UAE with vital insights into effective management of solar projects.

These pilot investments provided developers and public utilities with the opportunity to identify challenges and address issues with managing and integrating solar energy into the national energy mix. This overall learning process provided insight into how a larger future rollout would work and has laid the groundwork for successful follow-up investments.<sup>75</sup> As these pilot projects began to prove successful and investor interest rose, the government was able to safely revise targets upwards based on lessons learned through the initial investment process.

2. **Utilize a multi-phase, scalable project development structure to build investor interest.** A unique characteristic of the UAE's power plants is the multi-phase process of building out solar projects. Dubai explicitly adopted a multi-phase bidding process for a single solar park, while the UAE has provided multiple tenders for projects, but both have deliberately sought to provide a clear, long-term vision and commitment to the scalable deployment of solar power. Doing so has raised investor confidence and motivated investors to compete for business inside the UAE. The multi-phase setup promotes economy of scale, a clear schedule for project tenders, and promotion of sustained investor interest over a multi-year timeframe.

The large size and significant investment opportunities in the UAE's renewables sector promotes fierce competition. This has led to significant downward pressure on the price of solar power in the long-term and also supports scalability. As a prime example, the Mohammed bin Rashid al Maktoum Solar Park in Dubai will ultimately constitute 5,000 MW of solar power. To date the Solar Park has held four phases of solar auctions: an initial 13 MW pilot solar PV project commissioned in 2013, a 200 MW solar PV plant commissioned in early 2017, an 800 MW solar PV plant that will open in 2020, and a 700 MW concentrated solar power plant that will commission in multiple stages through 2030. The lowest bid for the phase three in 2016 was a full 50% lower than the lowest bid for the auction for phase two in 2015, despite a difference of only one-year.<sup>76</sup>

3. **Construct an open and relatively transparent auction process for solar project tenders.** The utilities in the UAE typically use a reverse auction process for solar project tenders, that supports competitive processes early-on. An auction format generally works best in countries with a stable regulatory regime, an inexpensive and guaranteed financial regime for loans, and transparency in auction bidding.<sup>77</sup> The UAE meets these criteria. The process has been relatively transparent, with final bids announced in the press after the bidding process closes.<sup>78</sup> The relative openness on final bid prices ensures a high level of competition in the early stages as well as after the process closes, as negotiation with bidders tends to continue even after the bidding process closes.

Serving as a bellwether for this process, the Sweihan solar project in Abu Dhabi gained international attention by garnering three world-record breaking bids under 2.6 cents per kilowatt-hour. The auction was originally for a 350 MW plant, but the final project will reach a final installed capacity of 1.7 GW, which will position Sweihan among the largest single-site solar projects in the world.<sup>79</sup> The low price was achieved specifically because of the project's large scale and the open bidding process that fostered fierce competition.

- **Auctions versus Feed-in Tariffs:** Many developed countries promote a feed-in tariff (FiT) structure to level the playing field for renewable technologies against traditional fossil fuels. In early years, this was necessary to attract exploratory investment. However, the rapid global price drop for solar and wind technologies that has played out since 2009—largely due to economy of scale and overproduction capacity for solar technologies in China—means that solar and wind are now at or below grid parity in many locations around the world. Within this context, an open auction allows the market to drive the price down and reduces government burdens to support Feed-in-Tariffs.

4. **Allow utilities to play a proactive role in taking on some project risk in order to ensure long-term success.** DEWA and ADWEA both provided significant project pre-development assistance for renewable energy projects inside the UAE. One major factor was providing project packages to bidders: public utilities worked with federal and emirate level officials to identify portions of land available for the project, provided basic infrastructure (roads, interconnections, transmission lines, water lines) to the project, and provided permit assistance.<sup>80</sup>

The public-private partnership model that utilities have pursued through taking on part-ownership of the projects is an equally important factor. In the case of the Mohammed bin Rashid al Maktoum Solar Park, DEWA is a partial owner of the project as well as the guaranteed off-taker.<sup>81</sup>

DEWA and ADWEA also generally provide a long-term, guaranteed off-take of electricity produced through these bids. This provides passive benefits for investors as both utilities have extremely high credit ratings. Having reliable guarantees allows project developers to receive preferable terms for financing, which also helps drop the overall cost of the project.<sup>82</sup> Equally important, firm guarantees allow for a high debt-to-equity ratio, which further drops costs for investors.<sup>83</sup> It is widely recognized that project bidders may be operating on a low profit margin, but the business model ultimately is still commercially viable because of how risk allocation is distributed between developers and public utilities.<sup>84</sup>

5. **Provide clear targets for renewable energy but avoid being over-prescriptive on how to reach them.** All of the federal and emirate level strategies to date provide clear targets for the future energy mix. While the government actively consults with a wide range of stakeholders in identifying these targets and potential pathways to meet them, authorities largely allow the market to dictate what technologies and approaches are used to meet targets. DEWA and ADWEA generally open auctions for energy tenders with general guidelines for the desired amount of installed capacity, but bidders can freely determine the type of energy production.<sup>85</sup>
6. **Allocate affordable and available land for solar project development.** The UAE has three geographic advantages for the deployment of solar projects: land located in inland areas is almost entirely state-owned and can be easily granted as concessions; there is a large expanse of remote, unused land outside urban areas; and aridity translates into limited competition for land-use in these areas. Given that land acquisition often comprises a significant portion of capital costs for solar project development, the relative availability and affordability of land in the UAE makes solar deployment far more cost effective than in highly populated areas.

The UAE's successful model in supporting renewable energy takes advantage of the UAE's niche capabilities and unique geographic benefits. Many of these lessons learned are transferable to developing countries which lack the UAE's financial resources but have high potential for renewable energy development.



## CONCLUSION - POLICY RECOMMENDATIONS & LESSONS LEARNED

The UAE's experience proves that under the right conditions renewable energy projects are commercially competitive compared to traditional fossil fuels. Countries still in the early stages of operationalizing their electricity systems can leapfrog forward with the right combination of capacity-building, financial assistance, and investment partnerships. As the UAE modifies its foreign aid approach to include capacity building on renewable energy sector development in the Global South, its domestic experience could serve as an effective case study for policy guidance in other countries.

Our analysis identifies three arenas where the UAE can strategically expand its clean energy diplomacy in order to help mitigate carbon emissions in developing countries: capacity building, strategically targeted foreign aid, and increased commercial ties in the renewable energy sector in developing countries. At the heart of these recommendations is an opportunity for the UAE to build its soft power and reap commercial benefits by helping countries throughout the Global South implement renewable energy projects. Within this context, we recommend that:

- **The UAE should create a new budget line in the Abu Dhabi Fund for Development strategically targeted towards a set of countries with significant energy demand growth through 2040.** The IRENA/ADFD Project Facility plays a key role in supporting renewable energy in developing countries around the world, but projects are selected primarily through competition on commercial grounds. ADFD's investments recognize that developing countries need both financial assistance and technical assistance to deploy renewable energy. Currently ADFD's efforts at addressing this challenge are admirable.

There is an opportunity to strategically target investments now towards countries with high rates of energy demand growth in order to support a broader future energy transition. Countries investing now in fossil fuels will face significant challenges relayed to path dependency, making it harder to transition to renewable energy. Countries which gain experience investing in renewable energy over the next five years will be far better poised to take advantage of these technologies as prices continue to drop in the future. The UAE should consider setting up a similar fund for the cohort of developing countries which will be adding the greatest energy generation capacity through 2040, in order to prepare them to reap benefits of the additional technological shifts like battery storage and anticipated price drops in renewables through the mid-2020s.

- **The UAE should expand government-to-government exchanges with energy officials from developing countries, particularly among least developed countries.** Energy planners in developing countries face both technical challenges and perception challenges when it comes to renewable energy sector development. Specifically, most decision-makers were trained at a time when renewable energy was widely perceived as expensive, unreliable, and difficult to integrate into grid systems. The UAE's experiences domestically have proven that this is no longer the case, and UAE energy planners and utility operators offer valuable lessons for policy makers and grid operators from developing countries.

Official exchanges—both high-level visits at the ministerial or vice-ministerial level as well as scholarly exchanges with working-level officials—can help share lessons learned in the UAE. High level exchanges pave the way for investment opportunities. For instance, Indonesia's Energy Minister's visit to the UAE in early 2017 helped build connections which led to Masdar's recent investment in floating solar in Indonesia. Improved publicity surrounding these visits, coupled with a full demonstration of engagement benefits, can open the door to additional commercial opportunities for UAE stakeholders.

- **UAE government agencies, university research centers, and think tanks should publish case studies and policy briefs on UAE policy innovations in the renewable energy sector. These should be actively promoted towards countries pursuing the renewable energy transition.** The UAE's record-setting solar projects are well known to experts watching the renewable energy sector, but the UAE can reap greater gains by detailing how UAE's renewables experience can be applied in other countries. There is a literature gap among academic and policy circles on this matter. Emirati academics and think tank institutions can address UAE's success in a way that would actively promote discussion in developing countries. Further publication and promotion of case studies in targeted languages on projects like the Sweihan Solar Plant, Shams Initiative, and Mohammed bin Rashid al Maktoum Solar Park will generate international interest and promote the UAE's reputation as a leader. For countries considering renewable energy and looking for partners, improved awareness of and access to UAE case studies could lead to an increase of official exchanges and investment opportunities down the road.

- **The UAE should create short-term capacity building programs for energy planners from other developing countries to attend Khalifa University and Masdar Institute’s sustainability programs.** Masdar is best known internationally for its role as a renewable energy investor and for the first-rate example of sustainable urban planning that is Masdar City. However the Masdar Institute also provides significant opportunities for capacity building on sustainable energy research and development. After combining with Khalifa University in 2017, the UAE could benefit reputationally from creating short-term capacity building exchanges for government officials from developing countries. Much like the well-known International Visiting Leadership Program in the United States, an exchange program targeted towards sustainable development could utilize significant expertise at Masdar and Khalifa University as well as site visits to energy projects throughout the UAE.
- **The UAE’s Ministry of Foreign Affairs and International Cooperation should consider explicitly adding SDG-7 as a priority for the next guidelines on strategic engagement.** Many actors in Abu Dhabi and Dubai have spent significant effort and financial resources on developing a reputation as leaders in clean energy. However, the UAE’s current foreign policy strategy does not take full advantage of its niche expertise. Incorporating SDG-7 and sustainable energy as a key focus in the next five-year strategic guideline would help promote private sector interest in outbound investment.
- **Southeast Asia should be a priority target for UAE clean energy diplomacy.** The IEA estimates that Southeast Asia’s energy demand will rise approximately 67% through 2040, requiring an estimated 565 GW of installed capacity.<sup>86</sup> Investment opportunities that parallel this demand are significant, with an estimated \$2.7 trillion of investment needed through 2040.<sup>87</sup> This will require significant support from international financial institutions and widespread mobilization of the private sector. Under the business as usual scenario a significant amount of the new capacity will be in coal thermal facilities, making Southeast Asia a priority area of engagement for climate issues. While interest in renewable energy is rising at a meteoric rate, most countries in Southeast Asia are still early in the policy development process and eager to learn from case studies.

The UAE can play a leading role in Southeast Asia’s energy transition. Like the UAE, Southeast Asian economies are growing quickly and face challenges of rising energy demand, moving up the value-added chain, and diversifying their economies. Engagement with regional policymakers indicates significant interest in learning from the UAE’s successes in reaching affordable and record-setting solar prices, as investor interest in this sector is rising rapidly. Local officials in Southeast Asia are not familiar with the technology and policy shifts needed to support the renewable transition. Notably, lessons learned in the UAE depend on top-down leadership and executive authority structures that are also present in many Southeast Asian countries.

UAE policymakers have already laid the initial groundwork for additional engagement. The ADFD has an MOU with the Asian Development Bank, which is the largest international financial institution currently supporting renewable energy in Southeast Asia. The UAE is diplomatically active throughout the region and recently hosted high-level official exchanges on energy issues with Thailand and Indonesia. Broader energy connections already exist. For example, Mubadala and ADNOC are invested in oil and gas assets throughout the region with particular focus in Thailand, Vietnam, Malaysia, and Indonesia.<sup>88</sup> Numerous businesses based in Abu Dhabi and Dubai indicate interest in Southeast Asia. Masdar has made an initial foray into the region, signing a floating solar deal with Indonesia in November 2017,<sup>89</sup> but there is significant scope for additional engagement with both UAE commercial interests and policymakers.



**T**he Stimson Center and TRENDS Institute stand prepared to assist the UAE in expanding its clean energy diplomacy initiatives globally, particularly in Southeast Asia. The Stimson Center has been active in Southeast Asia for more than a decade, with priority work on the food-water-energy nexus in the mainland countries of Thailand, Vietnam, Myanmar, Cambodia, and Laos. Our engagement on strategic water and energy planning identifies clear opportunities for renewable energy leaders like the UAE to strategically engage in Southeast Asia now. We hope to work with UAE stakeholders to identify opportunities for longer-term collaboration between the Stimson Center, TRENDS Research & Advisory and stakeholders in Southeast Asia and the Global South to expand the UAE’s efforts for renewable energy diplomacy. This report provides substantial evidence of the UAE’s global leadership in renewable energy and sustainable development. Our institutions are committed to supporting the further development of the UAE’s energy diplomacy.

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