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## **Sustainability thru' public utilities how DEWA Dubai differentiates from others**

### **Introduction**

#### *Acknowledgements*

We hereby salute the inspiring innovations and leadership of Dubai Electricity and Water Authority (DEWA) Dubai, UAE.

#### *UAE Energy Strategy*

The UAE Energy Strategy 2050 aims to develop an energy mix that combines renewable, nuclear and clean energy sources to balance economic requirements and environmental goals. By 2050, the UAE aims to invest \$150 billion to meet the growing energy demand and ensure the sustainable growth of the country's economy. The strategy also seeks to increase the efficiency of energy use by individuals and organizations by 40% and achieve savings of US\$200 billion by 2050.

Dubai has become an international pioneer in the development of a number of techniques and practices to enhance the efficiency of the energy sector while rationalizing consumption and finding alternative solutions to conventional energy. This supports the sustainable development of the Emirate. The Dubai Clean Energy Strategy 2050 was launched by HH Sheikh Mohammed bin Rashid Al Maktoum, to provide 7% of Dubai's total power output from clean energy by 2020. This target will increase to 25% by 2030 and 75% by 2050. Dubai is the only city in the region to have launched such a promising strategy, with set goals and timelines that map the future of energy until 2050. The strategy consists of five main pillars infrastructure, legislation, funding, building capacities and skills, and having an environmentally friendly energy mix.

### *Main part*

#### *Public Utilities and Dubai*

A public utility is an organization that maintains the infrastructure for a public service (often also providing a service using that infrastructure). Public utilities are subject to forms of public control and regulation ranging from local community-based groups to statewide government monopolies [1].

The term utilities can also refer to the set of services provided by these organizations consumed by the public: electricity, natural gas, water, sewage, telephone, Transportation. Broadband internet services (both fixed-line and mobile) are increasingly being included within the definition.

Public utilities can be privately owned or publicly owned. Publicly owned utilities include cooperative and municipal utilities. Municipal utilities may actually include territories outside of city limits or may not even serve the entire city. Cooperative utilities are owned by the customers they serve. They are usually found in rural areas. Publicly owned utilities are non-profit. Private utilities, also called investor-owned utilities, are owned by investors, and operate for profit, often referred to as a rate of return.

#### *The Concept and Pillars of Sustainability*

Sustainability in its previous life, has been defined as a field of study that explains how 'biological systems endure and remain diverse and productive' [3]. But, the 21st-century definition of sustainability goes far beyond these narrow parameters. Today, it refers to the 'need to develop the sustainable models necessary for both the human race and planet Earth to survive'.

Sustainability is a balancing act. The United Nation's 1987 Report of the 'World Commission on Environment and Development: Our Common Future' noted that sustainable development meets the needs of the present without compromising the well-being of future generations.

The concept continues to expand in scope. In 2000, the Earth Charter broadened the definition of sustainability further to include the idea of a global society "founded on respect for nature, universal human rights, economic justice, and a culture of peace."

When we hear the word "sustainability" we tend to think of renewable fuel sources, reducing carbon emissions [2]. However, sustainability draws on politics, economics and, philosophy

and other social sciences as well as the hard sciences. It attempts to bridge social science with civic engineering and environmental science with the technology of the future. protecting environments and a way of keeping the delicate ecosystems of our planet in balance. In short, sustainability looks to protect our natural environment, human and ecological health, while driving innovation and not compromising our way of life.

In 2005, the World Summit on Social Development identified the following three core areas that contribute to the philosophy and social science of sustainable development. These are also called "pillars" in many national standards and certification schemes and form the backbone of sustainability (figure 1).

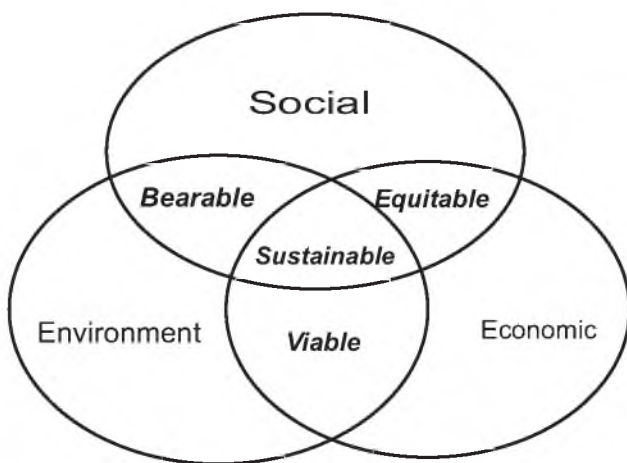


Figure 1 – Three areas of sustainable development

*Economic Development*

This is about providing incentives for businesses and other organisation to adhere to sustainability guidelines beyond their normal legislative requirements. Economic development is about giving people what they want without compromising quality of life, especially in the developing world, and reducing the financial burden and "red tape" of doing the right thing.

*Social Development*

The topic is multi-faceted beginning with the awareness of and legislation protection of the health of people from pollution and other harmful

activities of business and other organizations. It is also about maintaining access to basic resources without compromising the quality of life. The final element is education - encouraging people to participate in environmental sustainability and teaching them about the effects of environmental protection as well as warning of the dangers if we cannot achieve our goals.

*Environmental Protection*

Environmental protection is the primary concern of the future of humanity. It defines how we should study and protect ecosystems, air

quality, integrity and sustainability of our resources and focusing on the elements that place stress on the environment. It also concerns how technology will drive our greener future; the EPA recognized that developing technology and biotechnology is key to this sustainability, and protecting the environment of the future from potential damage that technological advances could potentially bring [4,5].

While the United Nations Millennium Declaration identified principles and treaties on sustainable development, continued using three pillars, more recently, the Circles of Sustainability approach advocates to include culture as the fourth pillar of sustainable development.

#### *DEWA- Sustainability Makes it Different*

Dubai Electricity and Water Authority popularly known as DEWA was established in 1992, under the patronage of Sheikh Maktoum bin Rashid Al Maktoum- the ruler of Dubai. Dewa envisions to be “A sustainable Innovation World-Class Utility.” The mission statement of the organization is to remain committed to the happiness of the all associated stakeholders. This happens by advocating the vision of Dubai through clean water and energy services that are acclaimed across the world. Further, the mission is also to bring innovative utilities service offer through collaboration with partners and efficient service utilization.

DEWA employs over 9000 employees and provides its electricity and water services to over two million people. The company has also planned to increase its capacity to over 10000 MW by the year 2018. DEWA has attained top slot in the list of utilities service providers of the world, because its customer happiness rate of 95%. World Bank has ranked DEWA first in the MENA region for the fourth time [6].

The Corporate social responsibility (CSR) approach of DEWA realizes the mission and objectives of the organization by integrating CSR related projects to the routine work programs throughout the business sectors. The social work makes DEWA one of the leading contributors to society by partnering with various organizations concerned with social sustainability, responsibility, environment, and health & safety [7]. DEWA sponsors and implements various

social initiatives, evaluate different internal as well as external social programs to ascertain their relevance with the needs of the society. The organization also takes feedback from various stakeholders of the society to know if those initiatives are fulfilling social needs or not. Some of the DEWA’s CSR activities are blood donation campaign, charitable activities during Ramadan, organizing sports day, giving priority to people with disabilities, etc. [8].

DEWA has made sustainability a part of its business practices and has received the Sustainability Initiative of the year awarded in 2018. The award is given to that organization that makes sustainability their integral part [8]. For instance, basing the model of *independent power project*, DEWA set up and implemented Hassyan Clean Coal Power Plant adding a capacity of over 2400 megawatts.

Further, DEWA has introduced several smart projects to complement the Smart Dubai initiative. The first initiative is *Shams Dubai* to help support the owners to establish photovoltaic solar systems for electricity generation. The electricity will help fulfill domestic demand, and excessive energy will be added to the national grid. It helps broaden the energy base and promotes the use of clean energy. Yet another initiative is *Green Charger*, which installs infrastructure for charging stations for an electric vehicle. In this regard, DEWA has so far installed 100 charging stations.

DEWA conducts different workshops and seminars regarding the sustainability initiatives, for instance, it conducted a conference on *sustainability and climate change*, besides this, DEWA has also exceeded on Sustainability Culture Indicator by scoring 88.7%, which shows the commitment of top leadership to instill a culture of sustainability. DEWA is continually working to establish world-class energy infrastructure by allocating AED 3 billion to boost electricity, water, and clean energy programs.

DEWA has accomplished the brand image of a green and sustainable utility provider Dubai through hard work, focused innovations and sustained resource investments.

For instance, DEWA is overseeing and managing Dubai Solar Park. It is one of the

largest solar projects in the world and blessed with the capacity to generate 1000 MW by the year 2020 and 5000 MW by the end of 2030. The solar power includes an innovation center for research and development laboratories to oversee the progress of clean energy project.

The other initiative is the Smart Applications and Meters, which seeks to establish a fast-service connection, quicker response and rationalizing the use of energy. Both the initiatives are documented below in this research paper.

*Dewa Sustainability Initiative 1*

***Advanced Metering Infrastructure (AMI)***

Dubai Electricity and Water Authority (DEWA) is a strong supporter of sustainability explained earlier and has been practicing sustainability in a huge manner. It has recently launched several initiatives – the major one includes the introduction of the Advanced Metering Infrastructure (AMI).

AMI seeks to measure, collect and analyzes energy usage from advanced devices such as electricity meters, gas meters, and water meters through various communication media (table 1).

Table 1- Comparative Evaluation of the Manual, AMR & AMI Energy Meters

<b>System Element/Feature</b>	<b>Manual</b>	<b>Automatic Meter Reading (AMR)</b>	<b>Advanced Metering Infrastructure (AMI)</b>
<b>Meters</b>	Electromechanical	Hybrid	Hybrid or solid-state
<b>Data collection</b>	Manual, monthly	Drive-by, monthly	Remote via communications Network, daily or more often On Demand
<b>Data recording</b>	Total consumption	Total consumption	Time-based (usage each 15 Mins. Or more often)
<b>Primary applications</b>	Total consumption billing	Total consumption billing	Pricing options Customer options Utility operations Emergency demand response
<b>Key software interfaces</b>	Billing and customer information system	Billing and customer information system	Billing and customer information system Customer data display Outage management Emergency demand response
<b>Additional Devices Enabled (But not included in base infrastructure)</b>	None	None	Smart thermostats In-home displays Appliance controllers
<b>Leak Detection</b>	After Monthly Reads	After Monthly Reads	When it Occurs
<b>Alerts</b>	None	None	When it Occurs
<b>Customer Service</b>	Reactive	Reactive	Proactive

Benefits to the DEWA

- Increasing accuracy of meter readings
- Reducing the number of estimates and misreads
  - Reducing difference between water production and customer sales
  - Reducing or eliminating potential theft of service, meter tampering issues, and bad debt

Benefits to the DEWA consumers

- On-demand access to consumption information
  - Involvement in managing utility cost
  - High usage & demand response notice
  - Leak detection notice
  - Budget tracking/setting

#### Additional Benefits

- Strengthens relationships with consumers
- Improves customer service
- Educates consumers on the importance of conservation
- Promotes consumer understanding of rate increases
- Reduces billing “surprises”
- Enhances communication with consumers

#### *Dewa Sustainability Initiative 2:*

#### **Mohammed bin Rashid Al Maktoum Solar Park Dubai**

In January 2012, HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, launched the Mohammed bin Rashid Al Maktoum Solar Park. It is the largest single-site solar park in the world. The solar park will generate 1,000MW by 2020 and 5,000MW by 2030, with total investments worth up to AED 50 billion. Upon completion, the solar park will reduce over 6.5 million tons of carbon dioxide emissions annually.

The solar park will use a range of photovoltaic and concentrated solar power technologies to provide clean energy to the citizens and residents of Dubai. It aims to provide clean energy to over 270,000 homes in Dubai, which is estimated to reduce 1.4 million tons of power generation-related carbon emissions per year. The solar park, which was launched in 2012, can generate up to 700 megawatts of clean energy daily. It incorporates an Innovation Centre, a Research & Development center, testing facilities and a solar powered water desalination plant.

The MBR Solar park has progressed in phases and achieving milestones and program on time or earlier (source, published sources, company websites and promotion material).

The first phase of the park was a 13 MW<sub>p</sub> solar farm (DEWA 13) constructed by First Solar. It was commissioned on 22 October 2013. It uses 152,880 FS-385 black CdTe modules and generates about 28 GWh per year which corresponds to a capacity factor of 24.6%.

The second phase is a 200 MW<sub>p</sub> photovoltaic plant built at a cost of US\$320 million by a consortium led by ACWA Power and Spanish company TSK. The second phase was scheduled to be commissioned by April 2017. It was completed ahead of time, and commissioned on 22 March 2017. TSK served as the primary contractor for the project, while ACWA Power will operate the plant. The phase includes 2.3 million photovoltaic solar panels spread over an area of 4.5 km<sup>2</sup>. ACWA Power secured a 27-year debt financing loan worth \$344 million from the First Gulf Bank, the National Commercial Bank and the Samba Financial Group. The plant uses First Solar's CdTe modules.

The 200 MW<sub>p</sub> second phase of the project caused worldwide attention, as the winning bid of the tender set a new record-low tariff of only US \$5.89 per kilowatt-hour. This is about 20% lower than any previous, unsubsidized power purchase agreement (PPA) the world has seen before. The PPA is set to a 25-year time frame. [5][9] Assuming the same capacity factor as for phase 1 (24.6%) the annual production will be approximately 430 GWh/yr.

In April 2015, Dubai Electricity and Water Authority (DEWA) publicly announced the third phase of 800 MW<sub>p</sub>. A consortium led by Abu Dhabi Future Energy Company (Masdar) was awarded the contract for phase three in June 2016. The phase is expected to be completed by 2020.

The Mohammed bin Rashid Al Maktoum Solar Park is one of the world's largest renewable project based on an independent power producer (IPP) model. Besides the three phases that consist of solar farms using PV technology, the long-term project will also include concentrating solar power (CSP). The total capacity of the entire project is planned to reach 5,000 MW<sub>p</sub>.

DEWA released a request for the Expression of Interest (EOI) for the 2006 MW<sub>p</sub> CSP project (fourth phase) on 4 October 2016 and awarded the project works at 9.45 US cents/kWh purchase price in June 2017. DEWA also awarded the 700 MW<sub>p</sub> CSP project (fifth phase) in September 2017 at record breaking purchase price of 7.30 US cents/kWh.

**Conclusion**

*DEWA Impact on Sustainability*

The countries of the Gulf Cooperation Council region are expected to reap returns of up to \$200 billion by 2030 through the integration of renewable energy projects and plans (figure 2). There are currently 30 of these projects in the region which are either in the planning or construction stage, or have been completed, according to estimates of the International Renewable Energy Agency (IRENA).

Dr. Matar Hamed Al Neyadi Undersecretary of the Ministry of Energy, noted that all the countries of the Arabian Gulf have developed projects to diversify their energy sources, and that these countries attach great importance to the use of clean energy, including renewable energy. “Gulf countries seek to reach a production capacity of up to 60 GW by 2032. To achieve this target, these countries have put in place programs to implement a number of clean energy projects according to approved timeframes”.

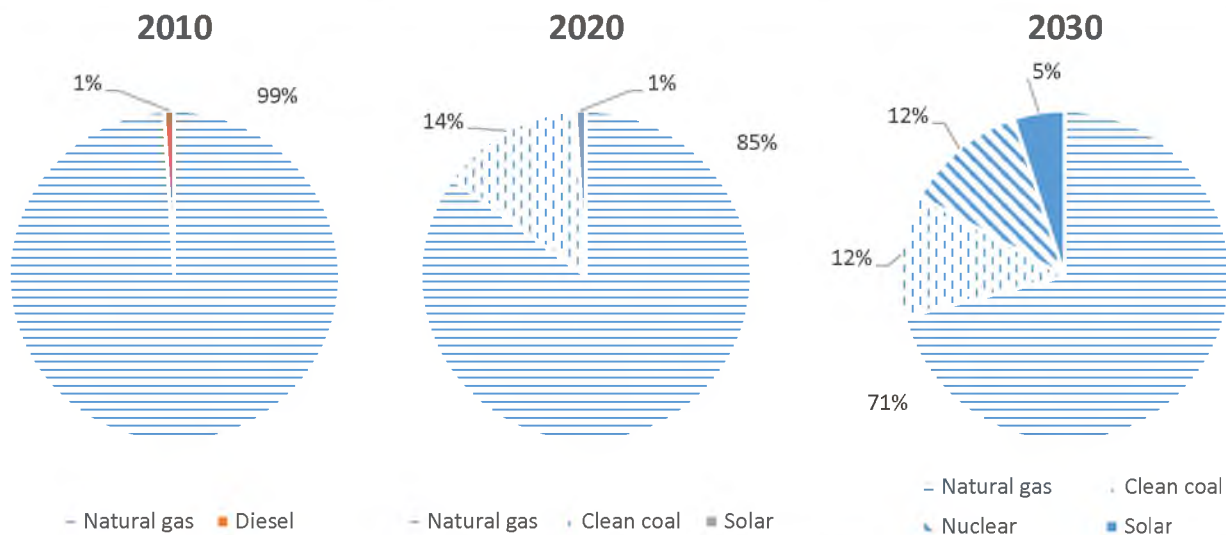


Figure 2 – Projected Electrical Generating Capacity (through 2030)  
*References*

The Mohammed bin Rashid Al Maktoum Solar Park contributed to DEWA winning the Best Sustainable Project of the Year in the UAE at the 2014 MEED Quality Awards. This is the first time this award was given to a renewable energy project in the region. DEWA also won an award for Distinguished Technical Project, for phase 1 of the Mohammed bin Rashid Al Maktoum Solar Park at the 18th Dubai Government Excellence Programmed Awards (DGEP). DEWA founded Shuai Energy 1, in cooperation with the consortium led by ACWA Power and TSK. It has won three awards for the second project of the solar park: the Solar Project deal of the Year

from the IGI Global journal, the MESIA Utility-Scale Solar Project of the Year from the Middle East Solar Industry Association, and the Private Finance Deal of the Year at the Bonds, Loans & Sukuk Middle East Awards 2015. DEWA also won the ‘2017 Middle East and Africa Renewables Deal of the Year’ by Project Finance International (PFI) magazine for the third phase of the solar park.

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### Түйін

Бұл ғылыми жұмыста қоғамдық ұйымдар қызметінің жасыл тұрақты өсімге ықпал етуіне талдау жүргізіліп, сондай-ақ, соңғы Dubai Electricity and Water Authority (DEWA) инновациялары зерттеледі. Мақала авторлары DEWA-ның тұрақты өсу бойынша міндеттің маңыздылығына назар аудара отырып, өзінің қоғамдық және пайдалы рөлін кеңейткенін сипаттайды және тұрақты қоғам мен коммуналдық ЭКО-кеңістікте жаңа халықаралық стандарттарды ендіруге мүмкіндік беретін үздік әлемдік тәжірибелерге салыстырмалы талдау жасау арқылы қолданыстағы тәжірибені саралаған. Соңғы жылдары DEWA Дубай әмірлігін жасыл орбитаға кіргізу үшін тұрақтылық, сапа және жетілдіру саласындағы бірқатар бастамаларды іске асырды. Біздің зерттеу өніміміз DEWA-ның тұрақты даму саласындағы міндеті мен көзқарасын, оның қалай басқалардың нысандарын саралап, тұрақты даму саласындағы екі бастаманың мүдделі тараптарға ықпалын өлшейтінін айқындайды.

*Түйін сөздер:* энергетикалық стратегия, тұрақтылық, Дубайдың (DEWA) су ресурстары мен электр қуатын басқару, Дубайдың күн паркі, озық өлшеу инфрақұрылымдары.

### Аннотация

Проведен анализ деятельности общественных организаций в содействии устойчивого зеленого роста, а также исследованы последние инновации Dubai Electricity and Water Authority (DEWA). Описано как DEWA расширила свою общественную и полезную роль, сосредоточив основное внимание на важности миссии по устойчивому росту, и дифференцировала имеющийся опыт путем сравнительного анализа лучших мировых практик, которые способствуют внедрению новых международных стандартов в устойчивом обществе и коммунальном ЭКО-пространстве. В последние годы DEWA предприняла ряд инициатив в области устойчивости, качества и совершенства, чтобы запустить эмират Дубай на зеленую орбиту. Подчеркнуты миссия и видение DEWA в области устойчивого развития, как она дифференцирует формы других и измеряет влияние двух инициатив в области устойчивого развития для заинтересованных сторон.

*Ключевые слова:* энергетическая стратегия, устойчивость, управление водными ресурсами и электроэнергией Дубая (DEWA), солнечный парк Дубая, передовые измерительные инфраструктуры.

### Abstract

The research paper analyses the emergent role of public utility organizations in fostering sustainability and green society and, researches recent innovations and initiatives of Dubai Electricity and Water Authority (DEWA). The research paper outlines how DEWA has expanded her role as public utility by focusing strongly on the importance and mission of sustainability and differentiated itself from others in the world by benchmarking the best in the world and in many cases, setting new international standards and best practices in sustainable societies and utilities eco-space. In recent years, DEWA has launched a slew of initiatives in sustainability, quality and excellence to launch the Emirate of Dubai into a green orbit. Our research product underlines the mission and vision of DEWA as it relates to the domain of sustainability, how it differentiates from others and measures the impact of two sustainability initiatives on the stakeholders.

*Keywords:* Energy strategy, Sustainability, Dubai Water and Electricity Authority (DEWA), Dubai Solar Park, Advanced Meter Infrastructures.