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Dubai, the sustainable, smart city

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Abstract. Over the years, Dubai – UAE has achieved undoubtedly fascinating development in city styles and construction. The desert has been transferred to an advanced modern city with the tallest buildings in a considerable time. It has always encouraged achieving healthy and sustainable development in all sectors, explicitly building construction. It has and still working towards maintaining the balance between socio-economic development and environmental protection. It has been announced and put within the national vision that it is of priority for the Government to transform Dubai into a smart city with an eco-friendly economy. This is under the aim to make it the most sustainable city in the world by 2021. The other Emirates are also trying to build their own fully sustainable cities. A sustainable plan is "a building that reduces its environmental impact by decreasing energy and water use and reducing the waste production. Dubai's Green Building Regulations and Specifications encourage all contractors to build toward an eco-friendlier tomorrow, maintaining the future cohorts without negatively impacting the resident's health. It covers a wide range of topics related to green building design, including ecology planning, building vitality, resource efficiency in energy, water, materials, and waste management. Dubai has made the environment a part of its overall strategic plan, including many sub-plans, initiatives, and projects to improve the emirate's environmental conditions and reduce energy use. Dubai's strategic plan to become a green metropolis includes green buildings and green building materials. The difficulties that sustainable urban development presents are considerable. They are working on various techniques to lead today's urbanisation toward sustainability, including urban planning, transportation infrastructure, quality of life, and renewable energy use, to name a few. Green construction and green towns are part of a long-term national drive in the UAE to promote a green economy with the tagline "A green economy for sustainable development". This paper is highlighting the advanced initiatives, technologies, materials, strategies, difficulties and challenges that Dubai has been through to achieve sustainable smart city goals.

1 Introduction

The Green Buildings Regulations and Specification were declared required for governmental buildings in January 2011 and voluntary for private ones. The municipality made the standards mandatory for all new buildings in Dubai in March 2014, after 44 green governmental buildings had been built. The green buildings regulations and specifications address different aspects of green building design, such as ecology and planning, building vitality, energy, water, materials and waste [1].

By looking at end-use categories for energy, cleaner buildings and vehicle technologies must be focused on. In both cases, it is, of course, a choice between systems using carbon fuels and systems using clean electricity. Very simply, we need clean tech buildings, clean tech vehicles and clean electricity generation. Promoting these three should be seen as most important when we ask, What should we do? [2].

The most proven non-carbon ways to generate electricity are solar energy, hydro generation and wind turbines. Equally important is conservation, using less energy while still heating and cooling buildings and keeping the lights on. As the world population grows, it may seem impossible to conserve energy, but we can adopt green building technologies [3].

This study is to explore the main factors that have contributed to the initiatives and practices implemented by Dubai for their journey toward a Sustainable and smart city.

2 Buildings are the key

Buildings produce more emissions than any other source, accounting for over half of our total energy consumption. They also have the potential to serve as a powerful

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reminder of the importance of change daily. Our ability to overcome the challenges that our world faces. The only human shelter will contribute more than any other project to the psychosocial impetus now required to change our collective direction toward a better tomorrow. Figure 1 shows the type of buildings developed in Dubai [4].

3 The UAE Vision 2021

The National Agenda of the UAE focuses on [5]:
– Improving the air quality
– Preserving water resources
– Increasing the contribution of clean energy
– Implementing green growth plans.

4 Improving the air quality

In cooperation with the General Secretariat of the Executive Council of Dubai, Dubai Municipality released the Dubai Air Quality Strategy 2017–2021. The approach aims to meet the National Agenda and Dubai Plan 2021 air quality targets (Fig. 2) [1].

Creating a national air emissions inventory will give meaningful, current, and comprehensive data on pollutant emissions. Maintaining an accurate, trustworthy, and extensive list is critical for informing future air quality control programmes. One of the aims of the vision 2021 of the UAE is to improve air quality, with the National Agenda aiming to raise air quality in the UAE to 90% by 2021.

The project will be implemented in two phases in conjunction with the Global Green Growth Institute, GGGI. In the first phase, best practices and stakeholder consensus will be used to build a framework for an air emissions inventory for the UAE. The second phase will focus on developing a comprehensive national list that covers all central point, line, and area sources. Air Quality Index (AQI) is an artificial intelligence-based tool that monitors and analyses air quality in the UAE. The National Air Quality Platform uses the (AQI) platform to show information on air pollution.

5 Preserving water resources

Water is necessary for all life forms and is utilised for various functions in daily life and drinking. DEWA works relentlessly to increase its overall water production capacity, foresee future requirements and needs, and assure long-term sustainability to realise the wise leadership's vision. DEWA has established six focal areas in its water management strategy to increase the efficiency of water operations, correctly monitor water supplies, and reduce water losses [2], as in Figure 3.

An indicator monitors freshwater usage (including surface water, renewable water, and fossil water) as a percentage of overall renewable water in the UAE to assess water overuse. Desalination and wastewater treatment are weighted in the final result. Water Sustainability indicators were initiated. DEWA is committed to the efficient, effective, and cost-effective management of water resources

Fig. 1. Development of buildings in UAE.

through a set of rules and regulations as a leading sustainable creative global water corporation. The policies and regulations aim to promote sustainability concepts throughout the business performance, including water generation, transmission, and distribution. Continue to monitor and manage the most efficient use of its water resources by maintaining an innovative DEWA that adheres to a set of policies and regulations, which include, but are not limited to, the W&C Asset Management Mechanism, the Electricity and Water Supply Policy, the Jebel Ali Power Station (JAPS) potable water specification, the GSO 149/2014 drinking water guidelines (Standardization Organization for GCC), and the World Health Organization (WHO) [2].

6 Energy management and contribution of clean energy

The UAE government aspires to strike a perfect balance between economic and social development by ensuring sustainable development while protecting the environment. DEWA's management strategy includes a commitment to guaranteeing the consistency of its electrical supply throughout Dubai. DEWA is investing in new

Fig. 2. Vision 2021 UAE National Agenda [1].

Fig. 3. Focus areas in water management approached by DEWA [2].

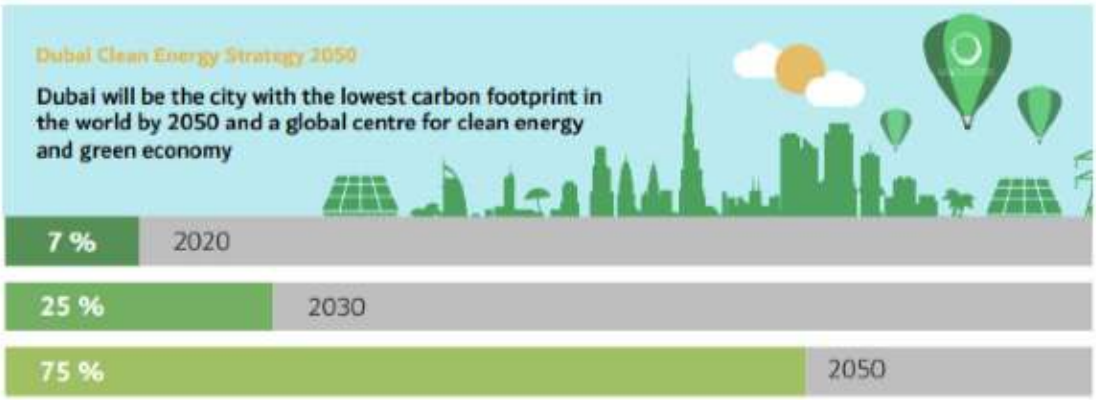

Fig. 4. Moving towards depending on renewable energy.