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MASDAR: DESIGNING A 'GREENPRINT' FOR SUSTAINABLE URBAN DEVELOPMENT

The discovery of oil in 1958 fostered rapid development in the United Arab Emirates (UEA). Now,, with a GDP of $360 billion, the UAE ranks third in the Middle East North Africa region, and thirtieth in the world. Anthony Mallows, Planning and Delivery Director, Masdar, explains, it is committed to growth and diversifying its economy by investing in human capital development and innovation.

The discovery of oil in 1958 fostered rapid economic and social development in the United Arab Emirates (UEA). Today, with a GDP of $360 billion, the UAE ranks third in the Middle East North Africa region, and thirtieth in the world. It is committed to maintaining its economic growth and diversifying its economy by investing in sectors that encourage human capital development and innovation.

This thinking was enshrined by the late Sheikh Zayed bin Sultan al Nahyan, Founding Father of the UEA, who said, "We must not rely on oil alone as the main source of our national income…We have to diversify the sources of our revenue and construct economic projects that will ensure a free, stable and dignified life for the people."

Masdar Smart City is itself part of Masdar, a subsidiary of the Mubadala Development Company, which is mandated to expand the UAE's energy portfolio by advancing, commercializing and deploying future energy and clean technologies. It operates across the industry value chain by merging higher education, R&D, investment and large-scale clean energy development. Our holistic business model fosters innovation and commercializing viable technologies – see Figure 1.

FIGURE 1: A PIONEERING APPROACH TO BEING SMART

Source: Masdar

Integrated approach to renewable energy

The vision is to make Abu Dhabi the pre-eminent source of renewable energy, knowledge, development, implementation and the world's benchmark for sustainable development. The mission is to advance renewable energy and sustainable technologies through education, R+D, investment, commercialization and adaptation.

The Masdar Institute of Science and Technology was established in collaboration with the Massachusetts Institute of Technology. It is an independent, graduate-level research university dedicated to advancing renewable energy and sustainable technologies, carrying out research into:

- water
- environment and health
- energy systems
- micro-systems and advanced materials
- biomass-derived fuels
- smart-grid applications
- saltwater desalination and
- energy-efficiency technologies.

As a commercial-scale, renewable energy developer, we have built some of the world's most sophisticated clean energy projects. The UAE is the only OPEC nation delivering both hydrocarbons and renewable energy to international markets.

Investing in the Future

Masdar Capital manages third-party capital under a license from the UAE Central Bank. It invests in the world's most promising cleantech companies and matures technologies that will power a more sustainable tomorrow.

Masdar City

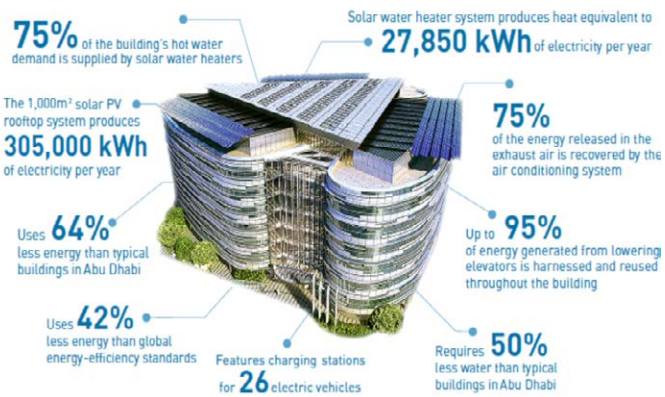
Masdar City is powered entirely by renewable energy, is one of the most sustainable urban developments in the world. It is a cleantech cluster, free zone and investment zone, designed to attract companies from all over the world to commercialize and deploy new energy technologies.

The vision is that some 50,000 people will work in Masdar City and some 40,000 people will live there. The site is about 600 hectares, with over 20 percent of the area as open space. About 60 percent of it will be residential, 17 percent commercial, 12 percent for community facilities, and 11 percent for light industrial use and R&D. The gross floor area will be 3.7 million square metres.

Organizing principles

Mixed uses are integrated: There are pedestrian and prioritized clusters; narrow, shaded streets; low-rise, high-density urban fabric; high-performance, low-carbon buildings; and a mobility strategy linked to transit. The

FIGURE 2: IMPACT OF GREEN TECHNOLOGIES ON IRENA GLOBAL HQ



Source: Masdar

city's orientation is based on solar and the direction of prevailing winds and its buildings cooled by wind, water and innovative façade shading (see main picture on page 48).

Masdar City uses SoFI, a high performance software tool, developed by Masdar Institute to measure, benchmark and forecast their sustainability performance. Figure 2 shows impact the development and deployment of these green technologies has had on the Irena Global Headquarters in Masdar City, opened in June 2015.

Its development principles are pioneering, with the city intended to be a sustainable urban development that will serve as a 'greenprint' for cities of the future. It is pushing the boundaries of sustainability, through architecture, design and technology.

Masdar City's building design requirements must take the following into account, given its location:

- energy consumption
- renewable energy provision
- interior water use
- exterior water use for landscaping
- construction waste management
- operation waste management
- embodied carbon in materials
- sustainability rating system
- building performance monitoring
- economic performance over time after the global financial crash of 2008, and in a change to the original thinking, the city is to be financially self-sustaining, offering business opportunities as an R&D hub, investment zone and free zone.

Masdar has built 200,000 square meters of buildings since it started six years ago and will build the same again every year for the next five years.