

PROJECT CASE STUDY

Project: Masdar City

Client: Masdar

Location: Abu Dhabi, United Arab Emirates

Summary: Setting new global standards in sustainable development with the world's first zero carbon, zero waste city

WSP has been commissioned by the architects Foster and Partners to develop the sustainable infrastructure strategies for the detailed masterplan of the Masdar initiative in Abu Dhabi, UAE. This initiative is being led by 'Masdar', part of the Abu Dhabi Future Energy Company (ADFE). The Masdar Development will be the world's first zero carbon, zero waste city setting new global standards in sustainable development.

WSP is developing strategies for many aspects of the design to support the zero carbon, zero waste ambition of the project.

Masdar - the objective

With an estimated completion date of 2015, Masdar will not only be the world's first operationally zero carbon city but it will also be the first city to be built using zero carbon energy. Masdar is a 6 million square metre sustainable city designed to use low carbon technologies to achieve a car-free, zero waste, carbon neutral community. It has been designed using the principals of 'One Planet Living' (OPL), a set of ten guiding principals of sustainability, proposed in a joint initiative by WWF and Bioregional Development, whereby everyone lives within their fair share of the Earth's resources.

WSP is developing sustainable infrastructure strategies for several integral aspects of the Masdar development. This includes developing strategies for waste management, drainage and treatment of water and sewage and the distribution of energy and power throughout the city. We are also responsible for developing systems for IT and telecommunications for the city including all the necessary intelligent infrastructures such as security systems, fire sprinkler systems, cooling systems and wireless networks.



“a car-free, zero waste, carbon neutral community”

Lay-out & sustainable operation

Masdar is designed in two squares, one large square, and a smaller square. Its design of shaded walkways and narrow streets will create a pedestrian friendly environment in the context of Abu Dhabi's extreme climate. With expansion carefully planned, the surrounding land will contain energy farms, research fields, plantations and dense green spaces so that the city will be entirely self-sustaining, following the principals of OPL.

The first building phase of Masdar is expected to be completed in 2009. During this phase, all major infrastructures will be built including the ADFEC Headquarters, Masdar's own University and a large photovoltaic power plant, which will be the main source of energy to power the city. During the second phase of the project, the larger square of the city is to be completed and during the third phase, the smaller square of the city. The whole city of Masdar is expected to be completed by 2015.

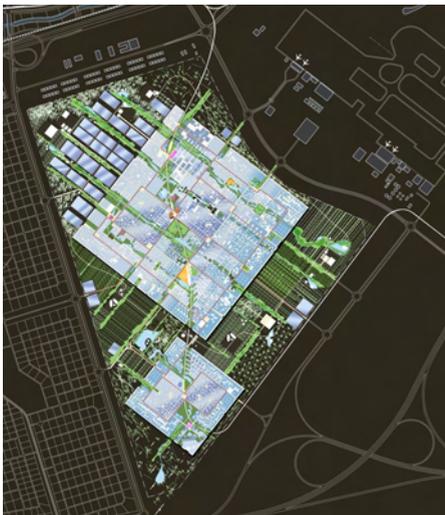
To generate the zero carbon energy to build the city, a temporary photovoltaic power plant will be installed on-site before any building commences. Zero carbon heavy machinery will be used during the construction process. As the city nears completion, the photovoltaic panels will be transferred to permanent structures within the city.

“WSP is developing strategies for waste management, drainage and treatment of water and sewage and the distribution of energy and power throughout the city”

WSP has developed an innovative strategy that will generate energy from the city's waste. The waste-to-energy strategy involves the implementation of on-site recycling facilities for municipal solid waste and the conversion of organic waste material into gas which then runs an engine which generates electricity. This supports the OPL principal of zero waste by cutting the amount of waste going into landfill to a minimum and generating electricity from the diverted waste. WSP has also developed a water strategy that reduces the demand for water. This involves water desalination to provide potable water for use in homes, the treatment of waste water and then the reuse of this water for toilet flushing and irrigation.

Masdar has several main power sources to meet the energy that the city will demand. There will be a large photovoltaic power plant, a solar thermal plant using parabolic troughs which work on the principal of concentrating solar power into steam, and the waste-to-energy plant. There will also be both wind and photovoltaic energy farms located in the land surrounding the city. The city will house clean technology companies as well as a research and development institution established in cooperation with the Massachusetts Institute of Technology.

A Masterplan of Masdar city



An artist's impression of the shaded walkways of Masdar city

Transport infrastructure

Rooted in a zero carbon ambition, the city itself is car-free. There are numerous car parks that surround the city for commuters and visitors to park their cars before entering the city. With a short distance to the nearest transport link and amenities, the compact network of streets encourages walking and is complemented by a Personalised Rapid Transport (PRT) system. This system is the world's first personalised electric transport system. It works on the principal of small electric driver-less cabs carrying up to 6 passengers at a time. A passenger can choose from designated destinations throughout the city to travel to.



An artist's representation of an internal piazza in Masdar city

To cater for the commuters who will travel in and out of the city every day, there is a Light Rail Transit (LRT). The LRT is an overland train that runs from Abu Dhabi city centre to the international Airport stopping at Raha Beach, a popular resort development just outside Masdar, and Masdar itself.

The project team

This project is being fully funded by the client 'Masdar', part of the UAE Government organisation ADFEC. Foster & Partners and a team of consultants have been appointed by Masdar as the Masterplan architects for the first stage of the project. WSP has been commissioned by Foster & Partners to develop the sustainable infrastructure strategy for the design stage of the project which is expected to be completed by November 2007.

CH2m Hill have been appointed as programme managers. Also involved in the project are ETA (design of renewable energy), Transsolar (environmental design guidance), Cyril Sweett (cost consultancy) and Systematica (transportation consultancy).

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SUMMARY

- Zero carbon, zero waste city
- Estimated completion date of 2015
- A 6 million square metre sustainable city
- Using principals of One Planet Living
- Personalised Rapid Transport system