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Masdar: Abu Dhabi's carbon-neutral city

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Masdar City aims to be powered solely by renewable energy sources

The world's first zero-carbon city is being built in Abu Dhabi and is designed to be not only free of cars and skyscrapers but also powered by the sun.

The oil-rich United Arab Emirates is the last place you would expect to learn lessons on low-carbon living, but the emerging eco-city of Masdar could teach the world.

At first glance, the parched landscape of Abu Dhabi looks like the craziest place to build any city, let alone a sustainable one.

The inhospitable terrain suggests that the only way to survive here is with the maximum of technological support, a bit like living on the moon.

The genius of Masdar - if it works - will be combining 21st Century engineering with traditional desert architecture to deliver zero-carbon comfort. And it is being built now.

Masdar will be home to about 50,000 people, at least 1,000 businesses and a university.

It is being designed by British architects Foster and Partners, but it is the ruler of Abu Dhabi, Sheikh Khalifa bin Zayed Al Nahyan, who is paying for it. And it will cost between £10bn (\$15bn) and £20bn (\$30bn).

Renewable energy

The architects are turning the desert's greatest threat - the sun - into their greatest asset.



“ The quality of air will be better than any other street in the Gulf and in the world, and that alone will bring you safety, health and happiness ”

Kaled Awad, director of the Masdar project
They have built the biggest solar farm in the Middle East to power the city and to offset the inevitable burning of diesel and baking of cement in construction.

They are also experimenting. One project involves a circular field of mirrors on the ground, all reflecting towards a tower in the middle.

That, in turn, bounces the light down in a concentrated beam about a metre (3ft) wide to produce heat and drive generators.

But I was told firmly not to wander over and feel the warmth, as it could fry me in seconds.

The international team of engineers have real pride in their work.

This is more than building to them, it is a lab bench with the freedom to get it wrong, and Masdar's chief architect Gerard Evenden loves the concentration of expertise: "What Abu Dhabi is beginning to generate is the Silicon Valley of renewable energy."

Keeping cool

The Emirates have seen one of the world's most spectacular building booms paid for by oil and made tolerable by air conditioners, which also depend on oil to feed their vast appetite for energy.



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Gerard Evenden, architect
But Masdar will have to be low temperature and low carbon.

Part of the solution is apparent the moment you walk in. And you do "walk in" because this is a city surrounded by a wall, a defined boundary.

Unlike the upward and outward sprawl of Dubai or Abu Dhabi, Masdar is compact like ancient Arab cities.

Streets are narrow so buildings shade each other, and the walls and roofs of buildings will do their bit to shed heat too.

The vertical faces are dressed with screens which look like a terracotta mesh. They keep the sun out but let the breeze in.

And as architect Gerard Evenden says: "Lunar technology has begun to influence our thinking."

One idea being tested is using a thin foil surface covering, a gas or vacuum blanket, to keep the heat out. It is an idea dreamt up for a moon base.

To encourage a breeze, wind towers are being built, drawing draughts through the streets without using energy.

Masdar will still use electricity for gadgets, some air conditioning and, most crucially, to desalinate sea water but, when it comes to power, the city has a simple mantra: "Only use energy when you have exhausted design."

Driverless vehicles

Conventional cars must be checked in at the city gates and then you can choose between the oldest and newest modes of transport.



At street level, it is all pedestrianised and the planners have done their best to keep the city compact and foot-friendly.

But if fatigue overtakes you, then slip down a level and meet the Personal Rapid Transit or podcars.

These driverless vehicles are guided by magnetic sensors, powered by solar electricity, and they stop automatically if an obstacle appears. They are programmed to go where you ask.

Kaled Awad, director of the Masdar project claims: "The quality of air will be better than any other street in the Gulf and in the world, and that alone will bring you safety, health and happiness."

The future success of the project will be clear to see.

On top of the wind tower, there will be a beacon betraying the city's actual energy use: red for too much, blue for just right.

It will be 45m (147ft) up and visible for miles around so, when Masdar is finished in five to 10 years' time, we will all know if it is in the red.

Costing The Earth: Eco-City Limits will be broadcast on Monday 29 March at 2100 BST on BBC Radio 4 and will be available on the [BBC iPlayer](#).