

Masdar City – April 2011

A dusty construction site on the edge of an Arabian desert is an unlikely place for a model of green living. But this is Masdar City, an \$18bn (£11bn) Norman Foster-designed project where just a few hundred people are guinea pigs in the world's most advanced laboratory for hi-tech environmental technology.

Here, residents live with driverless electric cars, shaded streets cooled by a huge wind tower and a Big Brother-style "green policeman" monitoring their energy use.

Conceived in 2006, phase one of the city is now complete after three years' work and a spend of \$1.4bn. The development, near Abu Dhabi, in the United Arab Emirates, consists of six main buildings, one street, 101 small apartments, a large electronic library, and the [Masdar Institute](#).

This offshoot campus of the Massachusetts Institute of Technology (MIT) has 167 students and 43 academics, most of whom are from other countries, the US, Europe, Asia and elsewhere in the Middle East. On campus there is a bank, a sushi bar, canteen, organic food shop and a concrete basement where 10 driverless vehicles whiz people along the 800 metres from the entrance of the city to the institute.

Here are some of Masdar City's other features. The 45-metre Teflon-coated wind tower shows citizens how much energy the community is using; argon gas insulates the rammed earth and steel walls; solar air-conditioning and desalination plants are being tested, as are thermal energy and "beam down" solar plants that use mirrors to concentrate the sun and heat water to generate electricity.

Phase two, due to be finished this year, will add 222 more apartments, and more streets and shops. An \$800m HQ, which will house the new [International Renewable Energy Agency \(IRENA\)](#), should be finished by 2013. By 2015, Masdar City is expected to have 7,000 residents and 12,000 people commuting from Abu Dhabi.

"It felt like culture shock," Laura Stupin, a young American engineer and one of the first inhabitants of the city, wrote. "The buildings are beautiful here, and they look so different from anything I've ever seen, anywhere. I keep telling people that it feels like I'm living in a psychology experiment. Every time I flip a light switch in the living room and the faucet in the bathroom starts running, or I desperately push all the buttons on the stove to try to turn on a burner, I can't help looking over my shoulder and wondering if there's a scientist observing my behaviour and reactions in this strange environment."

That's because of the monitors, which analyse every human and mechanical action requiring electricity. Every machine the students use, every fridge door they open, or light they leave on, is recorded via an intelligent digital grid that senses and controls energy use and lets the power provider intervene. Showers turn off after a few minutes, sensors switch on fridges and lights. Temperature and water use can be centrally controlled.

The Big Brother approach to cutting energy is likely to become the norm as computerised smart grids are rolled out in Europe and the US, he adds. "I want to know exactly how these buildings work. I can pinpoint who is using most energy and water, whether in an apartment or the academy. Certain students have been used to having the air conditioning on at 16C (61F), here it is 24C. Yes, they complain. But I have told them that's how it is."

Fred Moavenzadeh, head of the institute, and a Harvard professor, says: "The shock of having to conserve energy is part of the Masdar human experiment. We are living and experiencing what we are trying to ... educate people about ... We're using roughly half the energy of a normal building of this size. Our water consumption is less and our waste generation is relatively low."

The plan was to make Masdar the world's first zero-carbon city, but as the global "cleantech" market stalls in the recession, compromises are made. Foster planned to accommodate 50,000 residents and 40,000 commuters and the city was due to be completed by 2016; now the final population will probably not exceed 40,000 and the completion date has been put at 2021 or 2025. The idea of a second Masdar City has been dropped; a \$2.2bn hydrogen power project has been called off, as has a "thin film" solar manufacturing plant, intended for Abu Dhabi.

Foster's vision was for Masdar's streets to be pedestrian-only with pilotless vehicles running via magnets and fibre-optic cables. But this is now thought a white elephant. The rest of the city will be built on one floor, saving hundreds of millions of pounds. And people might move about in "golf buggy" taxis.

The master plan was to desalinate groundwater with solar energy, but for now water is piped in from one of Abu Dhabi's gas-fired, high-energy, desalination plants. The revised plan no longer counts on-site energy generation as the only source of power. A scheme for covering all roofs with solar panels was found to be more costly than a centralised power plant. Meanwhile, the photovoltaic panels outside the city are proving less efficient than expected because of dust storms and haze, which can cut solar insolation by 30% – the panels must be cleaned by hand.

People living in the city say they quickly get used to the technology but not the setting. "It's quite a mind flip to be in such a strangely beautiful environment, then look out of a window and see flat dusty landscape stretching out to the horizon. It makes me feel like I'm living in a science fiction novel," wrote Stupin.

Masdar City – February 2016

Ten years on, however, only a fraction of the town has been built - less than 5% of the original plan. The completion date has been pushed back to 2030.

The core of Masdar City is in place, anchored by the large square-ish building that is the Middle East headquarters of Siemens. A 45-metre Teflon-coated wind tower helps channel

cooling breezes down a shaded street equipped with a grocery store, bank, post office, a canteen, and a couple of coffee shops.

As many as 300 other firms also have an official presence – though in many cases that just amounts to a hot desk.

The International Renewable Energy Agency (IRENA) took over the other major building for its shimmering steel headquarters last year.

By UAE standards, both the Siemens and the Irena buildings are state-of-the-art in terms of optimising energy use – but it's less clear how they stack up globally. The UAE uses its own ratings system which does not readily translate to more familiar green building standards.

In addition, the agency's 90 or so staffers are the only occupants of the six-storey, 32,000m space. Fewer than 2,000 people work on the campus, according to tour guides.

Only 300 live on-site, all graduate students of the Masdar Institute of Science and Technology, who are given free tuition and accommodation.

The pioneering autonomous transport system - which was originally supposed to stretch to 100 stations - was scrapped after the first two stops.

There is a bike-sharing station – though it's a good 10 miles away from Abu Dhabi, and there are no bike paths.

And the rationale for Masdar City – demonstrating a model of green living – has been abandoned. “The original aim was to be net zero, yes, but that was when we were looking at the city in isolation,” said Chris Wan, the design manager for Masdar City.

Meanwhile, the jet-set transport system was overtaken by technological developments in the auto sector. The expensive purpose-built system no longer made sense in an era when zero-emission electric cars were widely available.

But he insisted that Masdar was not a total failure. “Masdar is part of an evolutionary process,” Wan said.

sources

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<https://www.theguardian.com/environment/2016/feb/16/masdars-zero-carbon-dream-could-become-worlds-first-green-ghost-town>