

Green Utopia in the desert

The world has a new energy giant. In oil-rich Abu Dhabi, the government-driven Masdar Initiative is investing billions of euros into clean energy projects all over the world. At home, Masdar is erecting a green Utopia aimed at turning this desert emirate into a Silicon Valley for green technologies.

| by *Stefan Nicola*

Abu Dhabi is not exactly the first place that comes to mind for a green revolution. The seaside capital of the United Arab Emirates is Opec's fifth-largest oil producer and sits atop significant natural gas reserves. Petrodollars have transformed Abu Dhabi from a fishing village into the world's richest city, complete with eight-lane highways, American-style shopping malls and shimmering high-rise office buildings. But the emirate's leaders know that the oil age won't last forever, and they're betting on alternatives.

Actually, they are betting big: Money from the state-owned sovereign wealth fund (estimated to be worth \$328 billion) is poured into clean technologies, green research projects and renewable energy companies all over the world. Last year, the crown prince of Abu Dhabi, Sheikh Mohammed

bin Zayed Al Nahyan, wrote a \$15 billion check to launch the Masdar Initiative. Named after the Arabic word for "the source," Masdar is aimed at turning Abu Dhabi into a green global player.

'We want to be the Shell, the BP of renewable energy,' Sultan Al Jaber, the chief executive officer of Masdar, who is said to have close ties to the Abu Dhabi royals, told the London Times. 'We will be a world-leading, recognised brand by 2020. It's ambitious, but everything in Masdar is ambitious.'

Opec giant |

Already, Masdar has established joint ventures building concentrated solar power plants in Spain, has kept alive with cash London Array, a large offshore wind project in the UK, and plans to produce solar panels in Erfurt, eastern Germany. Masdar recently

signed a deal with Nigeria to help the country reduce natural-gas flaring at its oil platforms, and is aggressively lobbying to host in Abu Dhabi the headquarters of Irena, the newly founded renewable energy agency. At a time when investments are scaled back from every corner of the economy, Masdar has cash even for experimental projects, such as researching CCS technology in Australia, or outfitting the Seychelles with a wind energy portfolio.

If you think that's unusual for an Opec giant, think again.

'Energy in the world today is not about oil anymore,' says Khaled Awad, a senior official at Masdar. 'For Abu Dhabi to remain a prominent energy player, not just an oil exporter, it must develop other sources of energy.'

The foreign investments are linked to grand domestic plans.



The Masdar Headquarters in Masdar City, designed by Chicago architecture firm Adrian Smith and Gordon Gill Architecture, will be the world's first large-scale, mixed-use 'positive energy' building, producing more energy than it consumes. Photo: Masdar Images

In January, the Abu Dhabi leadership announced plans to boost the share of renewable energy from virtually zero to 7 percent of the emirate's total power generation by 2020. While this may not sound like much, consider that Abu Dhabi is launching a sector from scratch.

The targets were announced at the second World Future Energy Summit, a yearly conference in Abu Dhabi that many already call the 'Davos of clean energy'. The 2009 summit (January 19-21) drew some 16,000 participants, including officials from major energy companies and oil ministers of Opec giants (other Gulf states 'are already thinking Masdar 2 and 3 and 4,' Awad says). The list of speakers featured former British Premier Tony Blair, who observers said enjoyed a six-figure payment, climate

change tsar Lord Nicholas Stern, and Vivienne Cox, the ceo of BP Alternative Energy. 'This conference has developed into the Mecca of energy planning,' Rajendra Pachauri, the chair of the Intergovernmental Panel on Climate Change (IPCC), said at the summit.

Not even the global financial crisis seems to be able to scale back this emirate's ambitions. As Opec states' oil revenues have dropped by as much as 66%, Abu Dhabi at the summit vowed that its clean energy efforts wouldn't be affected. 'Abu Dhabi is looking beyond the short-term price of oil,' Al Jaber, who mostly wears a flowing dishdash, said at the summit. 'Our world has reached a tipping point when it comes to renewable energy. We are heading in the right direction and it cannot be stopped.'

Follow the money |

At the conference, officials from Europe were all trying to get the attention of Al Jaber, the 35-year-old, barrel-chested Masdar ceo. It's easy to understand why. At a time when banks and hedge funds are reluctant to hand out loans or invest in risky projects, Masdar's cash has saviour potential. 'Even in this sector, it's about "follow the money",' said one observer from Europe. 'Right now, these guys have the money.'

To be sure, Abu Dhabi is still far away from being a sustainable role model. Endless construction, 24-hour air conditioning and a weakness for gas-guzzling American SUVs eat up frightening amounts of natural resources. As a result, this emirate has one of the biggest per-capita carbon footprints on the globe. Experts have warned that

climate change may render large parts of the Gulf region uninhabitable – so Abu Dhabi's push for green leadership may come just in time.

At the heart of this push is Masdar City – the world's first large-scale carbon-zero city, currently under construction near Abu Dhabi's airport.

This 6 square kilometre green utopia upon its completion in 2015/2016 will be home to 50,000 people and 1,500 businesses. Masdar City will emit no carbon, satisfy its entire electricity needs with renewables and be home to a world-class green university. The total investment runs to an estimated \$22 billion.

Right now, the construction site is but a forest of tower cranes colouring the horizon. In less than a decade, it will be transformed into a 'vibrant place, full of brains and talent

trying to create the best clean solutions that will save the world,' said Awad, as he led a group of journalists to peek at the site from a distance.

Masdar will be a 'huge living laboratory' where sustainable technologies are developed, tested and integrated into daily life, Awad says. The ambitions surrounding this green laboratory are enormous. Abu Dhabi wants Masdar City to evolve into a clean-tech hub to rival the scientific and economic clout of California's Silicon Valley. Masdar City is to become 'the definition for innovation in clean technology,' Awad says.

To power the green utopia, its developers intend to harvest what Abu Dhabi has plenty of: sunshine.

A 10 MW solar power plant – the largest in the Middle East – is already up and running, its 87,000 solar panels aligned in the desert sand like bath towels on a busy Mallorca beach.

The plant will provide power for Masdar City's construction and later some 17,500-megawatt hours of clean electricity each

year. As a result, Masdar can offset 15,000 tons of carbon, 'equivalent to 11,000 people flying from Abu Dhabi to London,' says Sami Khoreibi, chief executive officer of Enviromena, an Abu Dhabi startup firm managing Masdar City's solar portfolio. 'This is a big field, but there's a lot more to come,' Awad says.

Masdar City will need an estimated 200-240 MW of electricity generation capacities (so at least 20 times the existing solar plant), and 80% of that will come from PV panels placed on top of the city's buildings. More than 3 million square meters of roof space will eventually be available, Masdar officials say. (The rest will be generated by concentrated solar power, or CSP, plants placed near the city, and from waste-to-energy and biofuel projects, officials say).

Over the next eight years, Masdar will be buying panels for its rooftops, and 'we want to make sure that we are procuring only the best products,' says Sameer Zaid,

infrastructure manager at Masdar City.

Touch-screen |

To identify its products of choice, Masdar is currently testing the efficiency of solar PV products from 41 different international manufacturers under real-life conditions in a fenced-in field in the desert. Thin-film and crystalline panels from Europe, the US and Asia have to stand the test of sandstorms and humidity, as well as extreme heat during the day and cold during the night. US-based First Solar and Suntech from China won the race to deliver the panels for the 10-MW plant, but Zaid says later procurement might favour other producers.

Living in this city could be quite exciting. Designed by British star architect Sir Norman Foster, walls will protect Masdar City from desert winds; European piazzas combined with narrow alleys will provide shade and shelter from the heat. A solar-powered desalination plant will supply its water, and

irrigated fields nearby will supply fresh produce. Waste will be completely recycled, and cars will be banned entirely.

Instead, Masdar has developed what it calls a 'personal rapid transit system'. The system relies on an electricity-powered, driverless futuristic vehicle that Masdar unveiled at this year's summit. This sleek white taxi will be waiting at stations across the city to transport one to four passengers to their desired destination via touch-screen technology.

Even construction is being kept as sustainable as possible: Masdar has been using recycled steel from mostly local suppliers, instead of flying in cheap steel from China.

The West is impressed. 'This is showing the world what can be done,' said Blair. 'Here, in one of the carbon centres of the world, this country decided to become a centre of alternative energy.'

Masdar in Europe

Masdar may be a company born in the desert of Abu Dhabi, but its investments are reaching into the heart of Europe.

An overview:

- In Spain, Torresol Energy, a joint venture between Masdar and Spanish engineering group Sener, is building three solar power plants for an estimated \$800 million, one of which will be a CSP Central Tower Receiver System. By 2012, Torresol wants to deploy this technology on a wide scale.
- In Germany, Masdar recently signed an alliance to develop renewable projects with energy giant Eon. It also broke ground on a major PV plant in Erfurt, where Masdar PV will produce 210 MW of amorphous thin film photovoltaic modules per year.
- In Finland, Masdar invested €120 million in WinWinD, a promising manufacturer of technologically advanced 1 MW and 3 MW wind turbines.
- In the UK, Masdar is involved in London Array, the largest proposed offshore wind farm in the world. When Royal Dutch Shell left this flagship project of the UK's renewable energy ambitions, Array looked like collapsing. Masdar then bought a one-third stake through a joint venture agreement with Eon. Although the economics of the project still look shaky, there is a chance that it will now become reality, observers say.



Masdar City canopies made of solar cells provide shade and collect power at the same time. Photo: Masdar Images



Sultan Al Jaber, the 35-year-old ceo of Masdar. Photo: Stefan Nicola

Doubts |

Of course there remain doubts about the feasibility of such a project in these troubled economic times. Masdar has set aside roughly \$4.5 billion to help the city get built. It hopes to get the remainder from investors, universities and companies researching and producing here – a difficult task, given that investments in renewable energy projects have been slowing down considerably because of the financial crisis. But Masdar promises that interest in its city space remains high, and that it's merely about when companies would move in, and not if.

'You're not finding a lot of promising opportunities for investments these days,' says Awad. 'Masdar City is one of them.'

Companies in Masdar City would then benefit from the brains pooled by the Masdar Institute for Technology (MIT), a green-tech university developed in close cooperation with the Massachusetts Institute of Technology. The faculty is already selected, and 24 pre-class students are currently doing research projects before they begin their studies this fall.

Susan Hockfield, the president of MIT and one of the US's leading brains, said projects like Masdar could help bring the global economy back on its feet. 'I am convinced that the next economic growth will come from innovation,' she said at the summit, 'and the most powerful promise for innovation lies in the renewable energy sector.'

US energy giant General Electric has been unveiled as the city's first tenant; it will build an 'Ecomagination Centre' aimed at supporting research and development there and showcasing GE's clean technologies.

More industry giants, including Siemens and BP Alternative Energy, are expected to open showrooms or research facilities in the city. By drawing on the synergies created in Masdar City, Abu Dhabi hopes to become an exporter of clean technologies that could help reduce the carbon footprints of cities around the world.

Roughly half of the world's population is living in cities, with millions still streaming into them, or creating new ones. Demand for sustainable technology perfected in Masdar City will be plentiful, Awad says.

'We have enough Abu Dhabis, Dubais or Houstons in the world,' Awad said in reference to cities that rank among the most energy-inefficient in the world. 'So why not create a different model?'

This model's success will depend largely on whether Masdar finds the cash and the stamina to steer its projects through the economic storm.

Revenues are expected to come from carbon financing. Masdar is developing a multitude of projects under the Clean Development Mechanism (CDM) framework, to turn its efficiency and CO₂ reduction efforts into cash. But with the price of carbon still unclear, it remains unsure how much money will be generated that way.

This doesn't worry Eduardo Goncalves, who manages a large sustainability campaign at the World Wildlife Fund. Goncalves said at the summit that he was convinced that Masdar would succeed despite the difficult environment.

'A lot of people these days are talking about a green New Deal,' Goncalves said. 'Well, Masdar may be the real deal.' ■