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**Abu Dhabi Explores Energy Alternatives**

**By Hassan M. Fattah**

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On the outskirts of this Persian Gulf boomtown, past an oil refinery and a water desalination plant, the foundations are being poured for an ambitious project that will house a research facility and perhaps even a power plant, all intended to take this oil-producing giant into the next energy wave.

Oil, however, will have nothing to do with it. The sun, the wind and hydrogen will.

Abu Dhabi, the capital of the United Arab Emirates, the fourth largest OPEC oil producer with about 10 percent of the known reserves, is seeking to become a center for the development and implementation of clean-energy technology.

Last year, the emirate launched the Masdar Initiative (masdar is Arabic for source), which has signed up major oil and technology companies, universities around the world and U.A.E. ministries to help develop and commercialize renewable-energy technologies backed by hundreds of millions of dollars of Abu Dhabi's money.

At first, the Masdar effort drew skepticism and a few snickers. The United Arab Emirates has been singled out as one of the world's highest per capita emitters of carbon monoxide and other greenhouse gases.

The U.A.E. has especially high energy demand to maintain a luxurious life of air-conditioning, chilled swimming pools and even an indoor ski slope in the emirate of Dubai, a neighbor of Abu Dhabi. U.A.E. officials say the Masdar project is one way to reduce demand for fossil fuels internally.

The U.A.E. is only the most serious among Persian Gulf oil-producing countries whose thirst for electrical power has spawned efforts to find other sources of energy to save high value fossil fuels for export. Most Persian Gulf states get their water from desalinating gulf waters, an energy-intensive process. With their populations growing rapidly, domestic consumption of oil is commanding a greater share of production. Late last year Saudi Arabia and other gulf states began a research program looking into nuclear power; Iran, which has faced off with the United States and other international powers, insists that its nuclear program is intended to serve mounting energy demands domestically.

Some other Arab countries have dabbled with renewable energy. The Bahrain World Trade Center project in Bahrain includes wind turbines that, developers say, will meet up to 35 percent of the project's power needs. In North Africa and in countries like Jordan, residents have been encouraged to adopt solar heating to save energy costs.

The Masdar Initiative, however, is the most far-reaching program.

"They've seen the writing on the wall: where will all these places be, post-oil?" said Virginia Sonntag-O'Brien, managing director of BASE, a center in Basel, Switzerland, that promotes investment in energy efficiency and renewable energy. "It's their message that they are an oil-producing nation taking the energy and climate issue seriously and developing their own economy, which is important."

Alternative energy has attracted increasing interest over the past year as American industrial leaders have called for more aggressive action to be taken against the phenomenon of global warming and the Bush administration has focused greater attention on renewable energy. In Silicon Valley, the excitement over clean-energy technology startups recalls the flurry of new Internet companies in the 1990s.

From its gleaming high-rise towers to its \$3 billion marble-encrusted Emirates Palace Hotel, Abu Dhabi has long prided itself on being an example of what oil money, put to good use, can do. Oil helped turn Abu Dhabi from desert fishing village into an influential Arab capital. It helped build a citizens' trust fund that is estimated to be worth up to \$300 billion, whose investments are estimated to bring the emirate almost twice income as its oil sales do.

Now, Abu Dhabi hopes to show that petrodollars can develop innovation in clean energy. Masdar has drawn up a \$250 million Clean Technology Fund, and begun construction of a special economic zone for the advanced energy industry. Last month, Abu Dhabi announced plans to build a 500-megawatt solar power plant in the area -- one of the most ambitious of its kind in the world.

The plant will be the Persian Gulf's first, to be built in partnership with the Abu Dhabi Power and Water Authority, generating enough power for up to 10,000 homes. It should be operational by 2009, either as a stand-alone or as part of a desalination project.

Shortly after it announced those plans, Masdar announced an even more ambitious project to develop a graduate-level research center in combination with M.I.T. that will be focused on renewable-energy technologies. Scientists who join the program will be able to attend M.I.T. courses in Boston and will be assisted in developing research and courses at Abu Dhabi. M.I.T. administrators liken the effort to one that the university spearheaded in Bangalore during the 1960s that helped create the high-tech corridor there.

"This is the first oil-producing state that has accepted and agreed with the concept that oil may not be the only source of energy in the future," said Fred Moavenzadeh, director of the Technology Development Program at M.I.T. "That is a significant realization."

In a decade, Masdar's executives and M.I.T.'s administrators predict, Abu Dhabi is likely to have expertise in solar energy, photovoltaics, energy storage, carbon sequestration and hydrogen fuel.

Most important, they say, it hopes to prepare itself for a world that is not as reliant on fossil fuels as it is today. Abu Dhabi's expertise, they say, is in energy, not just in oil.

"We realize that the world energy markets are diversifying, so we need to diversify too," said Sultan A. al-Jaber, chief executive of the Abu Dhabi Future Energy Company, the government arm that manages the Masdar Initiative. "We see the growth of renewable energy as an opportunity, not as a problem."

Experts warn that the big investments have yet to occur, but note that the progress has underscored Masdar's seriousness.

"For a player in that world to recognize that there's this other component to the energy business is itself a recognition that the world is changing," said Marc Stuart, director of new business development at EcoSecurities, a company that structures and guides projects to reduce greenhouse gas emissions through the Kyoto Protocol, the international agreement that seeks to curb global warming, and also trades in credits earned by companies that make deep cuts.

"It is a very significant move because the Middle East is one of the areas where renewable energy has never made any strides."