

# Japan aims to bury greenhouse gas emissions

November 1 2009, by Kimiko de Freytas-Tamura

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Swathes of dirty clouds brood over a coal plant in rural Japan, but scientists are now hoping to send the pollutants the other way, deep into the bowels of Mother Earth.

The cutting-edge but controversial technology of carbon capture and storage (CCS) is being tested at the Mikawa power station, located near the coast of Japan's southern Fukuoka prefecture.

[Toshiba](#) Corp. has chosen it as a pilot site for a technology it sees as a necessary complement to renewable energies such as wind and solar in the battle to cut industrial emissions blamed for global warming.

"There is no silver bullet" to reducing [greenhouse gas emissions](#), said Toshiba engineer Kensuke Suzuki during a tour of the plant, about 900 kilometres (560 miles) southwest of Tokyo.

"Solar energy will not solve all the problems, and you can't just switch from coal to nuclear. You need to find a way to balance the reduction of emissions."

With worldwide coal use projected to rise in coming decades, especially in China and India, proponents of the technique say it can help fight climate change that is melting ice caps and threatening eco-systems.

"CCS will be the only technology to reduce emissions on a grand scale," said Shigeo Murai, who heads a study group on storing carbon dioxide, or CO<sub>2</sub>, at Japan's Research Institute of Innovative Technology for the

Earth.

"At the same time it won't be able to reduce overall emissions on its own. It will need help from solar and wind power."

Last month the six-storey Toshiba trial plant began trapping 10 tonnes of CO<sub>2</sub> from flue gas, which is created when coal is burnt to make electricity.

In what is called the post-combustion method, the gas is pumped into a boiler which mixes it with amines and other liquid solvents. Subjected to high and low temperatures, the CO<sub>2</sub> is then separated and compressed into a liquid.

The next step, still in the future in Japan, would be to pump the mixture deep underground -- into a [geological formation](#), a depleted oil reservoir or a saline field -- and lock it far away from the atmosphere.

Although Toshiba's pilot plant captures only 10 percent of the emissions and has yet to find a way to store the CO<sub>2</sub>, it says the technique promises to eventually trap up to 90 percent of the pollutants.

Many question marks still hover over the technology, which is slowly unfolding around the world. Five large-scale integrated CCS projects are now operating in North America, Europe and North Africa.

Environmentalists warn that the CO<sub>2</sub> could seep out, and some geologists worry that it could erupt to the surface or even trigger minor earthquakes.

Greenpeace labels it a "dangerous gamble" in a recent report, warning that large-scale projects "pose significant risks including negative health effects and damage to ecosystems (and) groundwater contamination."

There is also concern among green groups that CCS technology could give a new lease of life to fossil fuel use at a time when the world should quickly move on to cleaner energies.

Both critics and proponents say CCS could even boost fossil fuel use by helping to "flush out" hard-to-reach oil or methane deposits.

Toshiba experts say that in the so-called Enhanced Oil Recovery system, CO<sub>2</sub> would be injected into semi-depleted oil fields and help release remaining oil pockets by acting "like turpentine on hardened paint."

Then there is the question of cost.

A plant fitted with CCS burns up to 40 percent more energy and faces 60 percent more in costs than an ordinary plant, energy experts say.

For consumers, that translates into adding up to 65 dollars per tonne of CO<sub>2</sub> to the cost of electricity, according to a report compiled by the Pew Center on Global Climate Change based near Washington.

But Japan is aiming to drive down costs to 2,000 yen (22 dollars) a tonne by 2015 and to 1,000 yen by 2020 -- levels competitive with other types of green energy, according to a government report.

Toshiba, which also entered the solar energy market this year, aims to market CCS technology by 2015 and eyes revenues worth 100 billion yen by 2020.

Other Japanese companies have also joined the race, spurred in part by a Group of Eight developed nations pledge made in Japan last year to start 20 major CCS projects by 2010 and over 3,000 by 2050.

Mitsubishi Heavy Industries has conducted CCS-related research on a

liquid natural gas power station in western Osaka prefecture, a steelworks plant outside Tokyo and a coal power station in northern Nagano.

Japan's biggest coal user, J-Power, teamed up with IHI Corp and Mitsui to build a CCS plant in Australia to capture about 10 to 15 percent, or 100,000 tonnes, of the 30-megawatt plant's total emissions.

Japan may be spearheading CCS projects, but the efforts are mostly for export. The technology is unlikely to be used widely at home, experts say, because [Japan](#) is one of the most earthquake-prone countries in the world.

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