SPECIAL REPORT

Nuclear fuel: keeping it civil

In the third of a series of articles examining nuclear issues, **Jeff Tollefson** looks at options for fuelling a global boom in nuclear power stations without enabling nuclear proliferation.

Billionaire investor Warren Buffett put US\$50 million on the table in 2006 and challenged the world to raise another \$100 million for an international nuclear fuel bank. He called it “an investment in a safer world” — a world that will soon host an expanding group of nuclear power reactors. The idea was developed by the Nuclear Threat Initiative (NTI), a charity based in Washington DC that works to reduce the dangers of nuclear technology, and the proposal has met with enthusiasm from politicians, think-tanks and bureaucrats.

But the offer expires in September, and so far only the United States has stepped up, tucking \$50 million into a \$555-billion spending bill passed by Congress last month.

The premise behind an international fuel bank is that it will encourage countries who are building nuclear reactors to forgo uranium-enrichment technology because such technologies also provide most of the means for developing nuclear weapons.

Dozens of countries are starting to express an interest in nuclear energy. And established nuclear powers that had all but abandoned new plants are laying the groundwork for a new boom. Plans to expand enrichment are underway among the biggest nuclear-energy suppliers — the United States, Russia, France, the Netherlands, Germany and the United Kingdom.

“Any legislative attempts to impose limits on enrichment technology are going to fail”, warns Laura Holgate, a vice president at the NTI. “The challenge is to create attractive alternatives to indigenous fuel cycles,” she says. One such alternative is to make enriched fuel available without hindrance to any country that agrees not to make it itself.

Mohamed ElBaradei, director general of the International Atomic Energy Agency (IAEA) helped to kick-start the discussions for an international fuel bank in 2003. He proposed a system in which all uranium enrichment and fuel would be placed under international

control. Since then, numerous countries and organizations have sent in proposals, all of which are still before the IAEA board of governors for debate.

Tariq Rauf, who heads verification and security-policy coordination at the IAEA, explains that the fuel bank would be a “reserve of last resort”, where countries could purchase two or three years of fuel if they had their supply cut off as a result of some sort of diplomatic pressure. It would thus allow countries some assurance of continued access to fuel even if aspects of their non-nuclear policies were unpopular. Their supply would be severed, though, if there were a fear that they would use the fuel for proliferation purposes. “We wouldn’t supply a country if we were investigating that country for safeguards issues,” Rauf says.

A virtual bank

The NTI proposal would purchase enough fuel to fill one reactor core, which would fit into three semi tractor-trailers (lorries) and could be parked in any country. Alternatively, the fuel could be left in place with a guarantee for future IAEA access. Such a ‘virtual’ fuel bank might seem easy to set up but there are fears that it would be subject to the kind of political disputes that the fuel bank is supposed to avert.

Unsurprisingly, most of the fuel-bank proposals emanate from the major nations that already supply the current commercial nuclear market; other countries have been less enthusiastic. South Africa and Brazil, for instance, question the very premise, suggesting that the proposal would widen the divide between nuclear and non-nuclear states by eroding the right to pursue enrichment for peaceful purposes, agreed under the Treaty on the Non-proliferation of Nuclear Weapons (NTP).

“The fuel bank is a worthwhile thing to do, but its importance should not be exaggerated,” says Matthew Bunn, a non-proliferation expert at Harvard University in Cambridge, Massachusetts. Most of the countries that would tap

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into such a bank are likely to be upstanding members of the NTP and have access to the international market, he says. “Aside from India and Iran, most countries have very secure fuel supplies through the commercial market.” And countries such as South Korea seem content to take their chances on the current market.

Meanwhile, Russia is moving forward with a proposal to create what it calls an international uranium-enrichment facility that would be placed under IAEA safeguards in Angarsk, near Lake Baikal in Siberia. Partners will be able to ship their own uranium to the facility and benefit from either the fuel itself or the sales. Russia has already signed an agreement with Kazakhstan and others are expected to join. It has also agreed to make a stockpile of roughly two reactor-core loads available to the IAEA, but experts are not clear what kind of non-proliferation requirements might be imposed on countries seeking to use its stockpile or to participate at Angarsk. The United States has proposed creating its own stockpile of about 6.5 reactor-core loads, but that fuel would be available only to countries that refrain from uranium enrichment.

Holgate says that these proposals complement the international fuel bank by addressing another possible motivation for developing enrichment technologies: the desire to make

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as being too risky, premature, expensive and overly ambitious. Last month Congress scaled it back to a research and development programme, although the Energy Department continues to push the idea internationally.

Law changes

President Bush has also reversed US policy on India, a pariah on nuclear issues since its first nuclear test in 1974; India declined to sign the NPT and has been blacklisted on the commercial market ever since. Although it has received aid from Russia in recent years, India has struggled to provide fuel for energy and for its weapons programmes due to a paucity of domestic sources. In 2006, Congress amended US law to allow nuclear trade with India as long as it does not contribute directly to the weapons programme. But the deal is now under assault by the Communist Party in India because of concerns about the loss of sovereignty and the level of US influence over the nation. The Indian government is nonetheless pushing

forward in negotiations with the IAEA to bring more — but not all — of its nuclear facilities under IAEA safeguards. The Nuclear Suppliers Group, which represents major nuclear exporters, must also change its rules to allow exports to India, a move that would open the entire international market to India.

The country might need that access if it wants to fuel a new fleet of nuclear power plants in the coming decades. Western companies in the Nuclear Suppliers Group also stand to reap the benefits. From a non-proliferation

standpoint, however, there is nothing to prevent India from purchasing fuel internationally and then diverting its domestic supply to the weapons programme. It is this kind of situation that makes Potter question whether the world is ready for an expansion of nuclear energy.

“Are we simply cheerleaders? Or are we open-minded critics looking at the positive and negative consequences of a significantly expanded global nuclear environment?” he asks. “I worry that commercial considerations will trump non-proliferation, nuclear-terrorism and nuclear-safety considerations.”

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M. ROSE/GETTY

Nuclear power: another Chernobyl-style disaster in progress or the promise of a greener future?

money in what is presently a closed international market. “If you are a wool producer, you would rather sell the cloth than the wool, or better yet sell the suit,” she says.

Even if none of these proposals alters the equation on its own, together they might help to expose the hedgers by removing the most plausible reasons for uranium enrichment. From this perspective, Holgate credits Russia’s recent decision to provide Iran with fuel to aid its nuclear-energy programme as “exposing concerns that Iran’s enrichment is questionable at best”.

No guarantees

In the end, there is nothing to prevent a country such as Iran from moving forward with enrichment because it doesn’t want to depend on major nuclear powers for its energy — or because it wants to develop its nuclear-science base and keep its options open for a future weapons programme. “It’s all in the eye of the beholder,” says Bill Potter, director of the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies in California. “The same technologies are applicable to nuclear weapons and power

— the key issue is understanding countries’ motives.”

Perhaps the best way to promote a broad expansion of nuclear energy would be to not just guarantee the fuel but also take back spent fuel so that new nuclear nations don’t have to worry about storage. Such a ‘fuel-leasing’ programme would provide a big incentive for nations to enjoy nuclear power, but the politics are tricky because nobody wants to deal with somebody else’s trash, says Bunn.

The Bush administration unveiled an ambitious solution in 2005, envisioning an international alliance that would lease fuel to non-nuclear nations and then take it back for reprocessing. The plutonium could then be used in advanced reactors by legitimate nuclear-weapons states. But this ‘Global Nuclear Energy Partnership’ was roundly panned by scientists, including a panel convened by the US National Academy of Sciences,

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