

NUCLEAR REINCARNATION

Using nuclear power on a grand scale requires that spent nuclear fuel be reused. **Emma Marris** finds out which of the world's nations could jump on a reprocessing bandwagon.

It used to be that people were either pro or anti nuclear power — and that they would let you know which through a sticker on their car bumper. Now the debate is shifting. As evidence for global warming mounts, getting rid of nuclear power, with its very low carbon emissions, looks harder to justify in today's world than it did in the 1970s; hence the talk of a 'nuclear renaissance'. But there is a difference between keeping today's nuclear-power capacity (about 365 GW of capacity, which is responsible for generating roughly 16% of the world's electricity) and greatly increasing it. With extensive nuclear expansion depending on reprocessing spent nuclear fuel, whether or not to reprocess is now shaping up to be a new dividing line in the nuclear debate.

Reprocessing retrieves plutonium and unused uranium from used nuclear fuel. If you want to make sophisticated nuclear weapons, you need to have a reprocessing capacity, and the world's main nuclear-weapon powers all do. But not all of them have the capacity to reprocess spent fuel for civilian purposes. The United States has eschewed reprocessing as a way of making reactor fuel for the past 30 years. Now it is reconsidering it, sparking a reappraisal of the technology around the world.

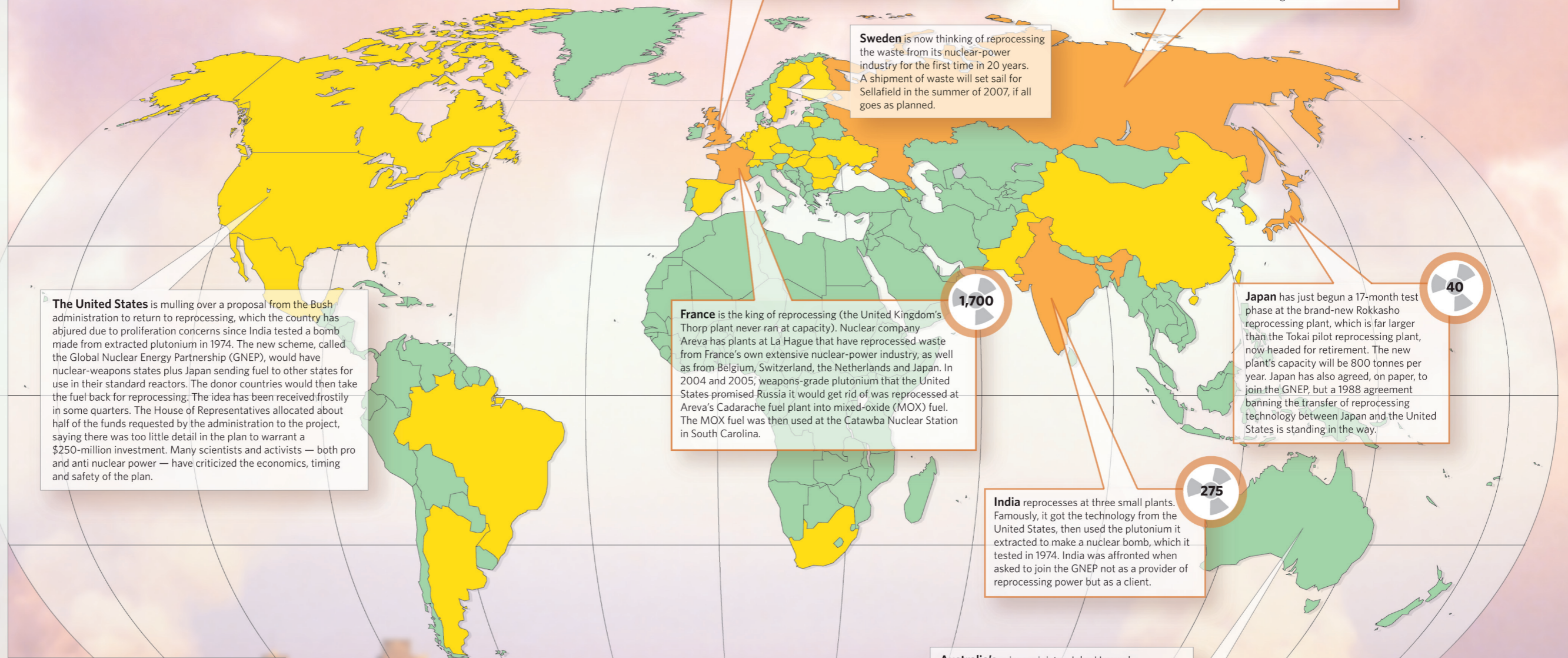
Reprocessing makes usable fuel out of unusable waste, and in doing so reduces the volume and activity of what's left behind. The proposed conversion to civil reprocessing in the United States is being spurred in part by a desire to limit the amount of waste that needs to be put into long-term storage at the contentious Yucca Mountain site in Nevada. Supporters point to the reduction of waste and the increase in the amount of energy that can be extracted from a fixed amount of fuel as 'green' credentials for the technology. They also point out that the world's uranium supplies may not be sufficient to support an aggressive expansion of nuclear power unless fuel is reused.

But reprocessing is also accident-prone, expensive and makes available the sort of stuff that can be used to build bombs. No country has yet managed to make reprocessed fuel cheaper than the enriched uranium that is used in most reactors,

undercutting any economic rationale at today's uranium prices.

The reprocessing method the US Department of Energy proposes, called UREX+, aims to reduce the possibility of reprocessed plutonium being used in weapons by leaving it mixed with other highly radioactive metals. This supposedly leaves it too radioactive for malefactors to handle. But many opponents believe that the methods being discussed are still a security risk.

The issues are a little too complex to get on to a bumper sticker. But the current state of play can be displayed on a map.



Orange: Countries with commercial reprocessing capability
 Yellow: Countries with nuclear power
 Green: Countries with neither

Reprocessing capacity (tonnes per year)