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Wolf Wars

ONCE PROTECTED, NOW HUNTED

Small Town Nukes

They'd be carbon free, relatively cheap, and according to the industry, inherently safe. An underground mini-nuke could power a village.

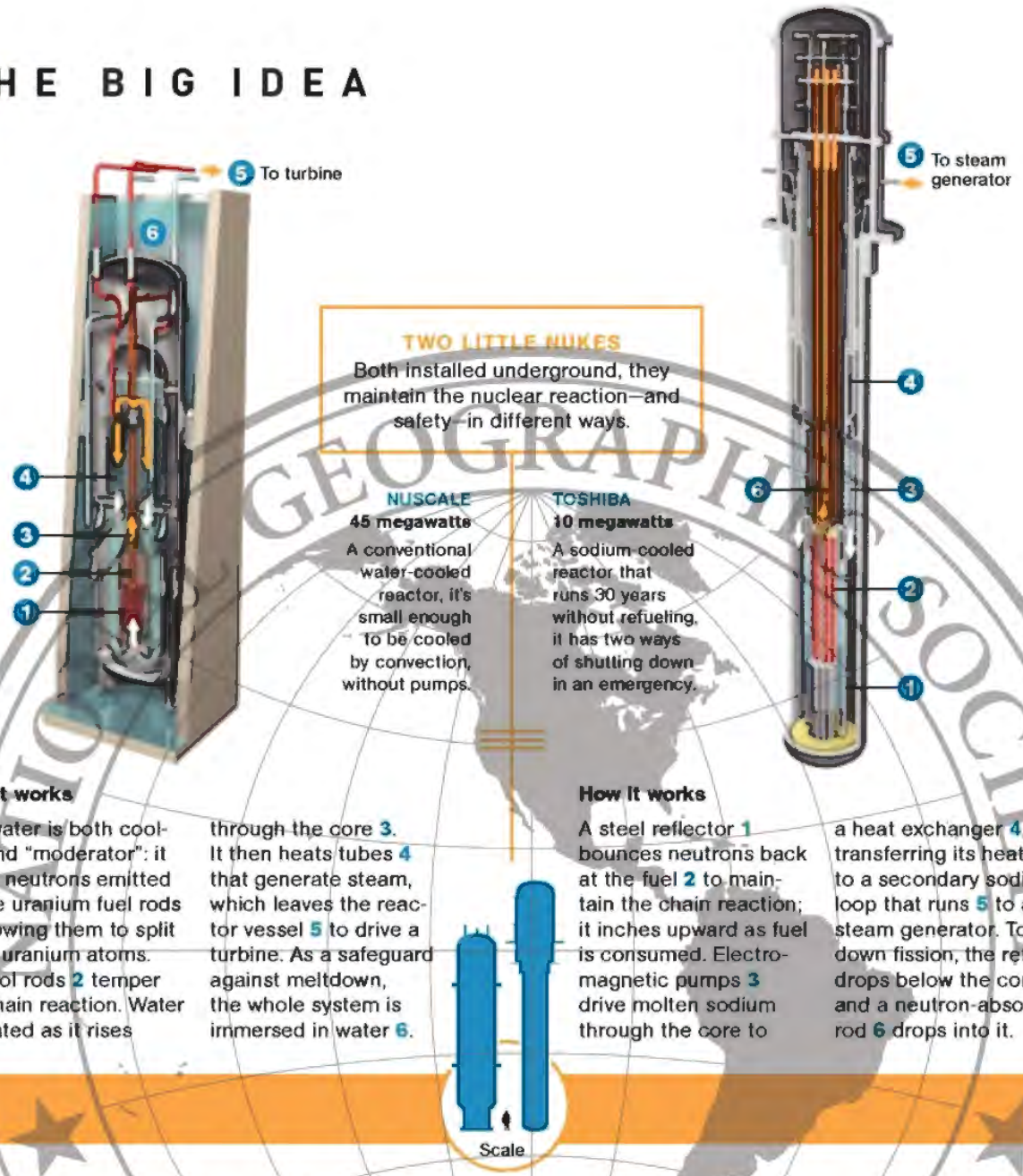
MOST NUCLEAR POWER PLANTS are behemoths, big enough to power a medium-size city. They are also behemoth investments, costing upwards of several billion dollars each to construct. Small wonder then that dozens of small-reactor prototypes are vying for attention in an industry newly energized by nuclear power's advantages as a low-emission alternative to fossil fuels.

"Small reactors can't address all the problems standing in the way of more nuclear investment, but they can address the biggest barriers—the economic ones," says Richard Lester, head of nuclear science and engineering at MIT. Building giant reactors, he points out, isn't the only way to achieve economies of scale; another way is to mass produce inexpensive mini-nukes. If they're designed as modules, a single unit might power a remote town or mine, while a dozen used in tandem could match the output of a traditional nuclear plant. In the developing world, small reactors would place less strain on fragile electrical grids. And the ability to start small and gradually add power modules could appeal to cash-strapped utilities everywhere.

None of the new small reactors have been deployed yet. Some, like the one designed by NuScale Power, *(Continued on next page)*

138,000,000 households / 8000 = 17,250 small nukes needed
US currently (May 2026) has 98 reactors, 57 nuclear power plants, 28 states

THE BIG IDEA



are light-water reactors that resemble ones long used on warships. Others are more novel. Toshiba and the Japanese Central Research Institute of Electric Power Industry are working on a liquid-sodium-cooled "nuclear battery." Delivered partially assembled and installed underground, the reactor would generate ten megawatts for 30 years until it needed refueling. The isolated Alaska village of Galena is in discussions with Toshiba to become its first customer.

Besides costing less to build, some small reactors could be inherently safer, says Vladimir Kuznetsov of the International Atomic Energy Agency. NuScale's design requires no reactor cooling pumps, while Toshiba's pumps are electromagnetic, without moving parts; either approach diminishes the possibility of a disastrous failure. Chinese researchers, meanwhile, are developing a small reactor in which the nuclear reaction itself is self-limiting. In a dramatic 2004 demonstration, they turned off the cooling system; the reaction just burned itself out. With any of the new reactors, of course, there will still be radioactive waste to contend with.

There are 56 reactors under construction in the world today, 19 in China alone. But with energy demand soaring—and the threat of climate change looming—even that much construction will not greatly increase nuclear's share of the global electricity supply. Small reactors could help, Lester says. "The point is to scale up low-carbon energy sources rapidly. Nuclear has great potential to do this." If regulators go along, that is. In the U.S., officials say some designs may win certification within five years. More innovative ones may take longer. *—Chris Carroll*

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