[Letter] Nuclear power: serious risks

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Advancing nuclear power comes with serious risks

In their Policy Forum “China-U.S. cooperation to advance nuclear power” (5 August, p. 547), J. Cao *et al.* make the case for low-carbon energy trajectories that use “next-generation” nuclear reactors. However, they fail to address the challenges inherent in the reactors they advocate.

Cao *et al.* correctly assert that “some studies suggest that a doubling or quadrupling of nuclear output is required in the next decade.” They neglect to add that there are also numerous peer-reviewed studies showing that 100% renewables scenarios are technologically feasible and economically competitive. Unlike some of the reactors proposed by Cao *et al.*, these could be deployed rapidly (1–3). Moreover, more scalable and commercially available energy efficiency options can displace the need for new sources of nuclear supply.

Cao *et al.* also correctly state that renewable sources of energy in Germany have been heavily subsidized. However, Germany has devoted subsidies to the nuclear industry that more than double those allotted to all renewables put together (4). The United States has provided the nuclear industry with at least 10 times the subsidies devoted to renewables (5). Despite these investments, renewables costs are falling fairly quickly over time, whereas nuclear costs continue to rise (6–8). In India and China, despite late starts on development, electricity production from wind has already overtaken nuclear (9). In restructured markets that allow consumers to choose from a variety of energy options, renewables have been shown to be cheaper than nuclear power (10).

Cao *et al.* portray a variety of reactors as “innovative” and “next generation,” yet similar reactors have been under development since the 1960s (11). Sodium-cooled fast reactors and liquid metal-cooled fast reactors, as well as conventional small pressurized water reactors, have a history of costly experiments. In the West, these earlier programs were abandoned, despite decades of R&D commitment and high governmental prioritization, due to economic unviability and safety issues. Even if some newer versions of these technologies prove viable and acceptable, the time scale to commercial deployment will inevitably be measured in decades.

Cao *et al.* suggest collaborative plans, especially for small modular reactors, be-

tween consortia in China and the United States as possible ways forward. However, it is unclear why these projects should have priority in terms of governmental support. Tellingly, there is no commercially operating small modular reactor anywhere in the world (12,13). There is also very limited licensing experience with small modular reactors. The cost is essentially unknown, and public acceptability completely untested.

Pouring resources into “innovative” reactor technologies could be a damaging distraction. As with tobacco, chlorine chemicals, and fossil fuels, entrenched industrial interests can impede desirable transitions, to the detriment of wider social priorities (14). We must give balanced consideration to a full range of alternative low-carbon energy options rather than focus uncritically on nuclear energy.

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