

objected to the company's broad demands, arguing that material related to work done after the August 2010 Coast Guard report was off-limits. That second phase "was an academic exercise" that resulted in scholarly papers and was not relevant to the request, Madin says. WHOI lawyers also quoted from a 1998 federal appeals court ruling that concluded that "academicians engaged in pre-publication research" should be "accorded protection commensurate to that which the law provides for journalists" in some states, shielding them from disclosing sensitive sources and working notes.

After some wrangling, however, WHOI agreed to give BP some 5000 documents related to the Coast Guard report. That material included some raw sonar data, sampling results, and technical discussions. Still, attorneys for BP said fuller disclosure by the scientists was "critical" to their case. And they argued that the distinction between the

two phases of work was, at best, murky. In March last year, for example, Camilli was listed as an author on a government report, led by the Department of the Interior, which cited WHOI's sonar work in settling on the 4.9-million-barrel figure. WHOI argued that Camilli's role in that report was "negligible," but the company argued that it highlighted its need to see all of WHOI's sonar analyses, because they were central to the government's conclusion.

In April, federal magistrate Sally Shushan of the Eastern District of Louisiana ordered WHOI to turn over all relevant documents produced up to March 2011, including drafts of research articles and give-and-take with peer reviewers. The documents won't be made public, but BP "has a substantial need" for the material, she wrote, adding that the release "will not hamper WHOI's future research efforts or that of similarly situated scholars."

That remains to be seen, some researchers

say. "What's not going to be good is if scientists start communicating with one another as if they are testifying in a court, knowing that their e-mails could be quoted," says Cary Nelson, president of the American Association of University Professors in Washington, D.C.

Others note that the WHOI-BP clash is the latest in which litigants or public critics are demanding—and often obtaining—private correspondence between researchers. "We're seeing more ... industry attempts to penetrate the peer-review process with the goal of trying to impeach environmental science," says Jeff Ruch of Public Employees for Environmental Responsibility, a Washington, D.C., nonprofit organization.

At WHOI, researchers are still absorbing the episode, says Madin. "Some people say it's business as usual," he says. But "some are sort of shocked at the idea that their e-mails could be accessed if a court decided they were relevant to a case."

—ELI KINTISCH

JAPAN

Growing Distaste for Nuclear Power Dims Prospects for R&D

TOKYO—As part of the nation's soul-searching after the Fukushima disaster in March 2011, the Japanese government promised a sweeping review of the country's nuclear-centric energy policy. On 28 May, a governmental advisory body hinted at what's to come when it laid out options for the mix of energy sources in 2030, along with projected effects on the economy and carbon dioxide emissions. Targets for nuclear power range from 35% of generating capacity down to zero—a total nuclear phase-out. Those close to the deliberations believe the government will settle on 15% when it finalizes the policy this summer. That would equate to roughly half of the nuclear-generating capacity before the accident—at that time, 26% of the mix—and would mesh with a recent decision to limit reactor operating life to 40 years.

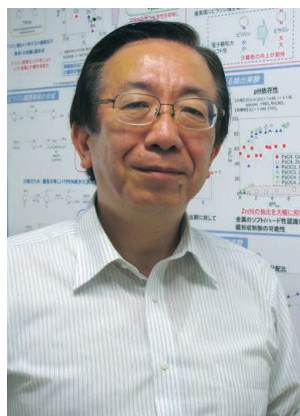
While that scenario would not require Japan to go cold turkey on nuclear power, it would rule out building new reactors for the immediate future. It would also cloud prospects for R&D. Governmental support for nuclear research has already declined for more than a decade and is now shifting

to decontamination and decommissioning studies. Utilities will have less incentive to invest in nuclear R&D. Already, universities are taking a hit: Enrollments in nuclear energy departments at seven universities dropped 16% for the school year starting on 1 April, according to Kyodo

nuclear power option in the face of uncertainties surrounding global energy markets and the capabilities of renewables. "Japan should continue fundamental studies" in nuclear energy, says Satoru Tanaka, a nuclear engineer at the University of Tokyo and president of the Atomic Energy Society of Japan. But in putting their case to policymakers and the public, nuclear scientists and engineers are clearly on the defensive.

The political scales have tipped further against nuclear power as details of the disaster have emerged. Last month, Tokyo Electric Power Co. (TEPCO), Fukushima's operator, announced that 900,000 terabecquerels of radioactivity were released from the stricken reactors in the first few weeks of the crisis, more than double previous estimates. (By comparison, approximately

5.2 million terabecquerels of radiation were emitted during the 1986 Chernobyl disaster.) An ongoing independent investigation authorized by the Diet, Japan's legislature, is producing a troubling picture of bungling, confusion, and indecision in the early days of the disaster. Several government officials have testified that at one point



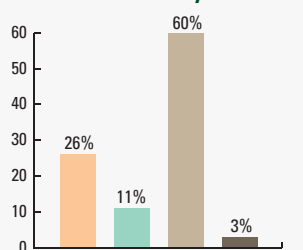
Brownout? Satoru Tanaka (left) and Kenji Takeshita (right) worry that Japan's new energy policy will crimp nuclear research.

News. The cumulative effect will be "a gap in knowledge and expertise in the future," says Hisashi Ninokata, a nuclear engineer who recently retired from the Tokyo Institute of Technology.

Ninokata and others worry that this gap will leave Japan poorly equipped to develop and deploy advanced reactors and maintain a

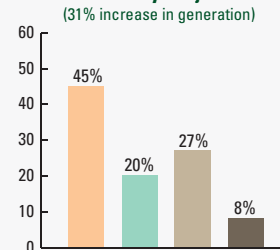


2010 Actual Electricity Production

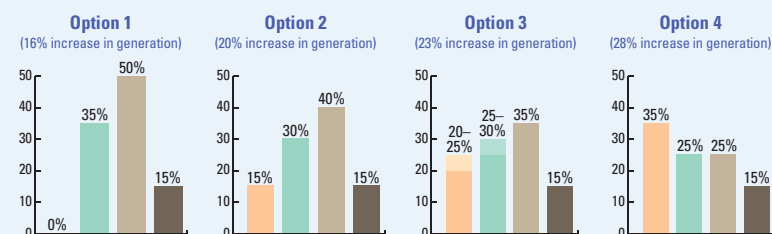


2010 Policy Projection

(31% increase in generation)



Four Scenarios for the Energy Mix by 2030



Fallout. Meltdowns at Fukushima, being inspected by disaster minister Goshi Hosono (left) will likely lead the government to scale back reliance on nuclear power from among energy options for 2030 presented by an advisory committee.

TEPCO wanted to withdraw all personnel from the site for safety reasons, a move that could have resulted in more extensive core meltdowns and massive radiation releases. (TEPCO officials have denied this.) The government considered evacuating parts of Tokyo. Reports of warnings ignored and precautions not taken have many agreeing with Ninokata, who says, "This was a manmade disaster." And now taxpayers are footing the bill. Last month, the government decided to nationalize TEPCO, promising \$12.5 billion to help it cover the costs of the accident.

The revelations have hardened opposition to nuclear power. In an unpublished report, Shunsuke Managi, a resource economist at Tohoku University in Sendai, Japan, and U.K. colleagues state that in April 2011, a month after the accident, 10% of the population still backed increasing the use of nuclear power, but this support fell to 2% by October. Over the same period, the number in favor of decreasing or phasing out nuclear power increased from 41% to 68%. "People lost trust in TEPCO and the energy policy itself," Managi says.

Japanese law requires nuclear reactors to shut down periodically for maintenance. By tradition, local governments must OK restarts. In the past, this was routine. Since the accident, local governments have refused to give the nod. As a result, all 50 of Japan's functional nuclear reactors are now offline. (Fukushima's four damaged reactors will be decommissioned.) The national government and utilities warn that without nuclear

power, the nation faces crippling shortages this summer. But local governments continue to oppose restarting reactors.

Against this backdrop, the options (see graphs) presented by the 25-member advisory committee studying the energy mix "are political compromises, not the product of technically well-informed decisions," says Paul Scalise, an energy policy specialist at the University of Tokyo. Shortly after the accident, the government announced it would scrap a 2010 policy calling for increasing nuclear power's share to 45% of generation capacity. The committee declared that its most nuclear-heavy option—relying on reactors for 35% of capacity—was for reference, not consideration. Scalise says zeroing out nuclear power is certain to be rejected because of the economic consequences of scrapping expensive power plants before their time. Of the two middle-of-the-road choices, Tanaka, a committee member, thinks the 20% to 25% scenario would allow the nuclear industry to maintain some vigor. But press reports suggest the government is leaning toward the 15% option. This would allow existing reactors to run until they turn 40 years old, a decommissioning age favored by the ruling party.

Nuclear scientists say the panel's projections of ramping up renewable energy from 11% of capacity in 2010 to 25% to 35% by 2030 are overly optimistic. It will be impossible to meet emission-reduction targets without nuclear power, Ninokata argues. He

and others urge Japan to maintain nuclear power capability to give the country flexibility in meeting its energy needs.

Japan's nuclear researchers have their hands full with Fukushima-related projects. For example, Kenji Takeshita, a chemical engineer at the Tokyo Institute of Technology who studies nuclear fuel recycling and the transmutation of minor actinides, is working with private-sector partners to develop a technique to capture cesium from contaminated soil. In what he calls a "very quick" jump from bench to field, a pilot plant will soon be testing the process at an industrial scale. The goal is to apply the technique to thousands of tons of soil scraped from schoolyards and parks across northeastern Japan. He's also joining a consortium to wrestle with the problem of the heavily contaminated water pooled at the bottom of Fukushima's reactors. Scientists elsewhere are working on other approaches to decontamination, decommissioning, and modeling the core meltdowns. Meanwhile, the fate of the experimental Monju fast breeder reactor will be revealed when the government releases its energy policy. Ninokata hopes researchers can run Monju long enough to gather data that would be useful if the nuclear power industry were to someday experience a renaissance.

For now, however, Japan's nuclear researchers are hunkering down. "We will have a very hard time [working on] new ideas," Tanaka says.

—DENNIS NORMILE