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When the January/February 2003 issue was published, the Doomsday Clock remained at 7 minutes to midnight, where it had been since February 27, 2002 when the United States rejects a series of arms control treaties and announces it will withdraw from the Anti-Ballistic Missile Treaty. Terrorists seek to acquire and use nuclear and biological weapons.

viet history for science have not been squarely confronted in Russia. Although the ideological controls exemplified by Lysenko have disappeared, the role of the security services remain strong and there have been attempts to monitor contacts with foreign scientists.

An equally important question is whether biology is representative of Soviet science as a whole. Birstein suggests that it is, but I think that implies too uniform a picture of Soviet science.

The book's four chapter titles convey the outline of the author's argument: "Science under Siege"; "Deadly Science"; "Collaborators"; and "Resistance." Some people were brave enough to criticize Lysenko and defend those who were arrested, but the fact that there were so few resisters underscores Birstein's view that most scientists collaborated willingly.

The best known resister was Andrei Sakharov, the renowned Soviet physicist, dissident, and Nobel Peace Prize winner who died in 1989. In his biography of Sakharov, Richard Lourie, the translator of the scien-

tist's memoirs, uses transcripts of KGB tapes and the testimony of those who knew Sakharov to complement what he wrote about himself. The result is a very readable account of the life of a man who was caught up in two of the most important developments of the twentieth century—the invention of nuclear weapons and the evolution of the international campaign for human rights.

Lourie's focus is not Sakharov's scientific work (which included, among other things, a design for the hydrogen bomb); rather, the author describes in compelling detail the scientist's family and friends and his importance in modern Russian history.

On the broader issues Sakharov's life raises, Lourie is less successful. At the beginning of the book, he quotes the Oxford-trained theorist Ernest Gellner, who wrote that the triumph of physics and the collapse of Marx-

ism are the two great phenomena of the twentieth century. That makes Sakharov a pivotal figure, in Gellner's view. Yet Lourie does not pursue this interesting idea or ask how the two phenomena are related.

What these books show very clearly is how complex and multifaceted the history of Soviet science is. We cannot understand that history without paying attention to the Soviet system and the controls that were established over science. We also fail to understand it if we ignore the individual scientists—of whom Sakharov was without doubt the most remarkable—and the choices they made while working and living in that system. ✧

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Why not wind?

Wind Power in View: Energy Landscapes in a Crowded World
Edited by Martin J. Pasqualetti,
Paul Gipe, and Robert W. Righter
Academic Press, 2002
248 pages; \$59.95

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WIND POWER IS THE FASTEST-GROWING energy source in the world and one of the most promising near-term clean electricity technologies. In suitable areas, wind turbines can produce electricity at costs per kilowatt-hour that are competitive with convention-

al sources. Unlike fossil fuels, wind does not produce harmful air pollutants or greenhouse gas emissions; unlike nuclear power, it does not generate radioactive waste or pose safety threats to nearby communities.

So, what's not to like about wind power? Plenty, according to its critics—a group that includes environmentalists and community advocates. In Massachusetts, for example, a proposal to build the first U.S. offshore wind project near Cape Cod and Martha's Vineyard has drawn heated opposition from a coalition of homeowners, boaters, fishermen, and

prominent environmentalists like Robert F. Kennedy Jr. Other, lower-profile projects throughout the northeast also face resistance.

Wind Power in View puts this seeming paradox into context. The book's contributors—who include architects, geographers, historians, engineers, and landscape designers—examine the visual impact of wind turbines on landscapes. Drawing on the records of projects in Europe and California, the authors describe some wind power successes and outline many of the hurdles to its growth.

Denmark and Germany have some

of the largest wind power sectors in the world: Wind provides about 15 percent of Denmark's electricity supply, and nearly 3.5 percent of Germany's. Both governments have given wind power significant economic and political support, and in both countries wind is widely viewed as preferable to nuclear power.

Other factors also help explain the relatively broad acceptance of wind facilities in places like metropolitan Copenhagen. Developers there are required to minimize noise, visibility, and bird strikes. And because aesthetics are a major consideration, designers blend wind installations into the landscape. Further, in Denmark and Germany, many wind installations are partly owned by local residents, who thus have an economic stake in their success.

Wind is less popular elsewhere. In Britain, only one in four proposed wind projects has been approved. Author Laurence Short argues that the wind industry has not recognized Britons' strong attachment to their landscape. Developers have offered "solutions that are packaged and parachuted onto each proposed site," rather than proposals that mirror the character of individual locations. Additionally, the British wind industry has not given the public an opportunity to invest in wind projects, helping create the perception that it is an aggressive external force.

Early U.S. wind projects in California suffered from similar mistakes. According to Paul Gipe, developers followed an "extractive" growth model to concentrate wind turbines in large geometric arrays that were spaced closely together. Turbines of varying sizes and types were crammed into sites, making for a cluttered visual image. Bro-

ken turbines were often left standing next to working units, and highly visible "boneyards" of abandoned hardware began to grow. Also, access roads were cut around the turbines, causing erosion and flooding.

The wind industry has corrected some of these mistakes, but the authors' broader argument remains valid: Installing wind turbines industrializes natural landscapes, which can provoke strong opposition. Developers and supporters should not expect wind to be universally welcomed simply because it is a clean power source. But wind power will be of little use if it is only developed in remote areas that are far from power grids and transmission lines.

The authors offer a number of proposals for making wind projects more acceptable to the public, emphasizing three basic points:

First, wind projects must be designed so that they blend into the surrounding landscape and reflect the character of the site. Choices such as clusters versus curving or straight rows will help determine whether the visual impact of an installation is pleasing or jarring. Developers should think architecturally about site histories, available light, and local materials.

Second, local citizens should be given the opportunity to invest in wind projects as a way of generating pride in and support for the projects. At the very least, surrounding communities should be involved in all phases of planning.

Finally, while there is no universal definition of beauty, arguments against wind power almost always boil down to the belief that wind turbines will ruin an attractive landscape. Accordingly, aesthetics should be a central part of wind develop-

ment, from turbine design to plans for wind power sites.

The authors fail to address a few important issues. For example, should some potential sites be declared too beautiful to develop? Who would choose those sites? And how should the quantifiable benefits of wind power—lower electricity prices and reduced damage to human health and the environment—be weighed against the aesthetic impact of wind installations? This last question is especially relevant to large wind installations because their negative visual impact is seen locally while their benefits tend to be felt in much larger areas.

Author Christoph Schwan alludes to another important point: Renewable energy in itself does not constitute a national energy strategy. Schwan writes, "Only by confronting our so-called need for electricity can we develop a more responsible policy for the use of energy." He adds, "Cities such as Berlin . . . could contribute far more to an alternative energy system by reducing their consumption than by installing a few wind turbines inside the city."

Despite its somewhat narrow focus, this book provides valuable perspective for renewable energy advocates—especially those involved in contentious initiatives like the Cape Wind project in Massachusetts. History shows that wind opponents are not just "environmental NIMBYs," as they are often dubbed in the press. It is not enough for wind to be ecologically sounder than coal or nuclear power. Even energy technologies that are environmentally friendly in the abstract must win public acceptance site by site. The recommendations in this book will help wind power developers and proponents win the public over. ❄

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