Germany’s Clean-Energy Push Fuels Interdisciplinary Focus

By PAUL HOCKENOS

BERLIN

GERMANY HAS SET AN AMBITIOUS GOAL: TO RUN its economy entirely on renewable energy by 2050. The Energiewende, or clean-energy transition, is often compared in scope to the country’s postwar reconstruction. It will require wide-ranging changes in German society beyond energy supply alone—like in architecture and agriculture, urban planning and economic markets, and more. Treading onto this unknown territory, Germany has called on its universities to help make the transformation work. While Germany is supporting university research into solar power and other clean energy, perhaps the biggest innovation in higher education is how the Energiewende has triggered the creation of new interdisciplinary approaches, pushing institutions to develop new courses, degrees, and departments.

Green technology is not necessarily where the breakthroughs need to happen, said Karl-Friedrich Ziegahn, head of the renewable-energy department at the Karlsruhe Institute of Technology’s School of Energy. In terms of the transformation, Germany’s biggest challenges today, he said, “are socioeconomic in nature: public awareness, cost, and community involvement.” This is the thinking, for example, behind the University of Freiburg’s master’s in renewable-energy management, one of several hundred sustainability-related degree programs offered in Germany. Almost all of them have been added over the last six years.

The degree, which is offered through the university’s Center for Renewable Energy, is designed to close the gap between the technical aspects of renewable energy and a broader vision of the future of sustainable development. “This combination of skills is urgently needed right now,” said Stefan Adler, the center’s managing director. Since it was first offered, in 2008, the degree has grown in popularity. The initial year, the center received 70 applications for 30 spots. In 2013-14, more than 500 applicants worldwide applied for the same number of places, and the center will offer more spots next year.

Germany has already made enormous strides in clean-energy generation. In roughly a decade, the country has expanded its green-power supply to account for a quarter of its electricity—which is twice the United States’ share of renewables. On especially sunny and windy days, when its wind farms and solar parks churn out power at peak volume, more than two-thirds of the country’s electricity needs are covered by renewables alone. There are 180 universities and polytechnic colleges in Germany involved in the energy transition, with the federal research ministry providing some $2.65 billion in competitive grants during 2011-13.

“The ethos of sustainability is now integral to all of Germany’s universities these days,” said Thomas Schomerus, a professor of environmental and energy law at Leuphana University, in Lüneburg, and director of its Institute of Sustainability Governance. “It’s not an extra anymore in the curriculum or something exceptional for research.” Leuphana University, for example, has an entire school dedicated to sustainability science. Its 25-member faculty hails from both the humanities and natural sciences.

"Sustainability means that everything is connected, so much so that dividing it up into traditional disciplines means losing the big picture. Sustainability is the big picture, and we need to go deeper into it,” said Mr. Schomerus. “It’s a new level of doing research.” And Leuphana University practices what it preaches: The university has run on renewable energy since 2012, and its new central-administration facility will be a net-zero-emission building. It is being designed by Daniel Libeskind, an American architect who designed the master plan for the rebuilding of the World Trade Center in New York City.

Leuphana’s research ministry has also supported collaborations between universities and the private sector. In Berlin, for example, the Technical University is teaming up with Schneider Electric, an electrical-engineering firm, along with other companies, to test innovations in electric mobility and urban smart grids on a new campus.

“The campus is a ‘living lab,’ said Kai Strunz, a professor of electrical engineering involved in the project. It will eventually employ electrical engineers, computer scientists, mechanical engineers, sociologists, behavioral psychologists, and others.

The country’s research agenda reflects a commitment to renewable energy and a concern about climate change shared broadly by political parties, academia, and the public. The priorities are similarly different,” said Mr. Adler, who notes, however, that collaboration can take place. His university is working with the Massachusetts Institute of Technology and the Fraunhofer Center for Sustainable Energy Systems, in Boston, to expand its online master’s program in photovoltaics. “This is just beginning now” in the United States, said Mr. Schomerus, who thinks that American universities could be a catalyst in promoting the principles of sustainability. But German academics can’t tell their American counterparts “just to do what we do,” he said. “This wouldn’t work. They have to figure out their own way.”