**CASE STUDY**

**Renewable Energy in China**

From ground level, Rizhao looks like any other midsized Chinese city. Located in Shandong Province about halfway between Beijing and Shanghai, Rizhao sits on the coastal plain with its back to the mountains. Rows of traditional houses alternate with high-rise apartments and office buildings. But from above, Rizhao shows a different face. More than 1 million gleaming solar collectors decorate the rooftops of this city of 2.8 million residents (fig. 12.1). More than 99 percent of all households get hot water and space heating from renewable energy.

In 2008, Rizhao became carbon neutral, one of the first four cities in the world to reach this milestone, a remarkable accomplishment in a developing country. Already, Rizhao has cut its per capita carbon emissions by half, compared to a decade ago, and its energy use by one-third. Generous subsidies for property owners, low-cost loans, and regulations that require renewable energy for all new construction have created mass markets for equipment that brings costs down, cleans the air, saves money, and creates thousands of local jobs. A solar water heater currently costs about (U.S.)$230 in Rizhao—about one tenth the cost in the United States—and pays for itself in just a few years.

Fortunately, Rizhao isn’t an isolated case. China is well on its way to becoming the world’s leader in renewable energy. For the past several years, China has controlled more than half the global market in solar panels. And in 2009, China passed Denmark, Germany, and Spain to become the world’s largest producer of wind turbines. The prospect of rapidly falling prices for renewable energy as China develops its technology and mass markets is great news for our global environment, but not such a happy prospect for American manufacturers.

In his 2010 State of the Union address, President Obama said, “I do not accept a future where the jobs and industries of tomorrow take root beyond our borders.” But that seems to be what’s happening. China’s push to dominate renewable energy technology raises the prospect that the United States and Europe may be trading their dependence on Middle Eastern oil for reliance on solar panels, wind turbines, and other energy supplies made in China. China already employs more than a million workers in clean-tech occupations, and is adding about 100,000 new jobs in this area every year.

China has several advantages in the race to produce sustainable energy. Around 250 million people have moved from the country to the city since 1990, and an equal number are expected to become urbanized in the next few decades, providing a huge market for new housing, electricity, and technology. To meet growing energy demand in just the next ten years, China will need to add about nine times as much electric generating capacity as the United States. Where utility managers are adding so much new equipment anyway, it isn’t hard to make some of it solar or wind. American and European utilities, on the other hand, may have to abandon some existing technology to move in a meaningful way to renewables.

China also benefits from low labor and raw material costs. Already, Chinese companies produce the lowest priced solar panels in the world. Polysilicon, the main ingredient in solar photovoltaics, cost about $400 per kg in 2008. China can now produce it for $45 per kg, and expects to drive prices down even further in coming years. Furthermore, China has a near monopoly on several rare earth elements, such as dysprosium and terbium, essential in green technology (see chapter 11). Solar power stations and wind farms are built with relative ease in China, meeting little of the public resistance that hampers Western developers. And government officials in China can simply order utilities to switch to renewable power.

The rapid emergence of China as a world leader in green technology is big news for both our global environment and world economy. Many people have wondered how China will provide jobs, housing, and energy for its huge population. Progress in renewable energy and the jobs it provides may show a way, not only for China, but also for other developing countries, to reduce their dependence on environmentally damaging fossil fuels and move toward sustainability. In this chapter, we’ll look at world energy resources as well as how we currently obtain the energy we use, and what our options are for finding environmentally and socially sustainable ways to meet our energy needs.

**Figure 12.1** China already has more than 40 million rooftop solar collectors and is well on its way to becoming the world’s leader in renewable energy.