

A GLOBAL SHIFT TO RENEWABLE ENERGY^{1,2}

Lester R. Brown[©]

As fossil fuel prices rise, as oil insecurity deepens, and as concerns about climate change cast a shadow over the future of coal, a new energy economy is emerging. The old energy economy, fueled by oil, coal, and natural gas, is being replaced by one powered by wind, solar, and geothermal energy. Despite the global economic crisis, this energy transition is moving at a pace and on a scale that we could not have imagined even two years ago. And it is a worldwide phenomenon.

Consider Texas. Long the leading U.S. oil-producing state, it is now also the leading generator of electricity from wind, having overtaken California in 2006. Texas now has 9,700 megawatts of wind generating capacity online, 370 more in the construction stage, and a huge amount in the development stage. When all of these wind farms are completed, Texas will have 53,000 megawatts of wind generating capacity—the equivalent of 53 coal-fired power plants. This will more than satisfy the residential needs of the state's 25 million people, enabling Texas to export electricity, just as it has long exported oil.

Texas is not alone. In South Dakota, a wind-rich, sparsely populated state, development has begun on a vast 5,050-megawatt wind farm (1 megawatt of wind capacity supplies 300 U.S. homes) that when completed will produce nearly five times as much electricity as the 810,000 people living in the state need. Altogether, some 10 states in the United States, most of them in the Great Plains, and several Canadian provinces are planning to export wind energy.

Across the Atlantic, the government of Scotland is negotiating with two sovereign wealth funds in the Middle East to invest \$7 billion in a grid in the North Sea off its eastern coast. This grid will enable Scotland to develop nearly 60,000 megawatts of off-shore wind generating capacity, close to the 85,000 megawatts of current electrical generating capacity for the United Kingdom.

We are witnessing an embrace of renewable energy on a scale we've never seen for fossil fuels or nuclear power. And not only in industrial countries. Algeria, which knows it will not be exporting oil forever, is planning to build 6,000 megawatts of solar thermal generating capacity for export to Europe via undersea cable. The Algerians note that they have enough harnessable solar energy in their vast desert to power the entire world economy. This is not a mathematical error. A similarly remarkable fact is that the sunlight striking the earth in just one hour is enough to power the world economy for one year.

Turkey, which now has 41,000 megawatts of total electrical generating capacity, issued a request for proposals in 2007 to build wind farms. It received bids from both domestic and international wind development firms to build a staggering 78,000 megawatts of wind generating capacity. Having selected some 7,000 megawatts of the most promising proposals, the government is now issuing construction permits.

In mid-2008, Indonesia—a country with 128 active volcanoes and therefore rich in geothermal

¹ Earth Policy Release, Book Byte, Earth Policy Institute, August 24, 2010, www.earthpolicy.org/index.php?/book_bytes/2010/pb4ch05_ss1

² Adapted from Chapter 5, "Stabilizing Climate: Shifting to Renewable Energy," in Lester R. Brown, **Plan B 4.0: Mobilizing to Save Civilization** (New York: W.W. Norton & Company, 2009), available on-line at www.earthpolicy.org/index.php?/books/pb4

energy—announced that it would develop 6,900 megawatts of geothermal generating capacity, with Pertamina, the state oil company, responsible for developing the lion's share. Indonesia's oil production has been declining for the last decade, and in each of the last five years the country has been an oil importer. As Pertamina shifts resources from oil into the development of geothermal energy, it could become the first oil company—state-owned or independent—to make the transition from oil to renewable energy.

These are only a few of the visionary initiatives to tap the earth's renewable energy. The resources are vast. In the United States, three states—North Dakota, Kansas, and Texas—have enough harnessable wind energy to run the entire economy. In China, wind will likely become the dominant power source. Indonesia could one day get all its power from geothermal energy alone. Europe will be powered largely by wind farms in the North Sea and solar thermal power plants in the North African desert.

The goals for developing renewable sources of energy by 2020 that are laid out in my book *Plan B 4.0: Mobilizing to Save Civilization* are based not on what is conventionally believed to be politically feasible but on what I think is needed. This is not Plan A, business as usual. This is Plan B—a wartime mobilization, an all-out response that is designed to avoid destabilizing economic and political stresses that will come with unmanageable climate change.

Implementing Plan B entails cutting net carbon dioxide (CO₂) emissions 80 percent by 2020. This would keep atmospheric CO₂ levels from exceeding 400 parts per million (ppm), up only modestly from 387 ppm in 2009, thus limiting the future rise in temperature. To make this ambitious cut, the first priority is to replace all coal- and oil-fired electricity generation with renewable sources. Whereas the twentieth century was marked by the globalization of the world energy economy as countries everywhere turned to oil, much of it coming from the Middle East, this century will see the localization of energy production as the world turns to wind, solar, and geothermal energy.

This century will also see the electrification of the economy. The transport sector will shift from gasoline-powered automobiles to plug-in gas-electric hybrids, all-electric cars, light rail transit, and high-speed intercity rail. And for long-distance freight, the shift will be from diesel-powered trucks to electrically powered rail freight systems. The movement of people and goods will be powered largely by electricity. In this new energy economy, buildings will rely on renewable electricity almost exclusively for heating, cooling, and lighting.

Can we expand renewable energy use fast enough? I think so. Recent trends in the adoption of mobile phones and personal computers give a sense of how quickly new technologies can spread. Once cumulative mobile phone sales reached 1 million units in 1986, the stage was set for explosive growth, and the number of cell phone subscribers doubled in each of the next three years. Over the next 12 years the number doubled every two years. By 2001 there were 961 million cell phones—nearly a 1,000-fold increase in just 15 years. And now there are more than 4 billion cell phone subscribers worldwide.

Sales of personal computers followed a similar trajectory. In 1980 roughly a million were sold, but by 2008 the figure was an estimated 270 million—a 270-fold jump in 28 years. We are now seeing similar growth figures for renewable energy technologies. Installations of solar cells are doubling every two years, and the annual growth in wind generating capacity is not far behind. Just as the communications and information economies have changed beyond recognition over the past two decades, so too will the energy economy over the next decade.

There is one outstanding difference. Whereas the restructuring of the information economy was shaped only by advancing technology and market forces, the restructuring of the energy economy will be driven also by the realization that the fate of civilization may depend not only on doing so, but on doing it at wartime speed.

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