



Chapter 17

Capturing Energy

THE MAIN IDEA



Dirty energy is most convenient, and clean energy is most abundant.

[17.1 Energy through Electricity](#)

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17.4 Sustainable Energy Sources

The fossil fuels currently available to us are limited. At present rates of consumption, known recoverable oil and gas reserves will disappear by the next century and coal reserves several centuries after that. Furthermore, burning fossil fuels adds undesirable amounts of greenhouse gases to the atmosphere, as well as other pollutants. Nuclear fission reactors do not emit greenhouse gases, but they generate massive quantities of radioactive wastes. Nuclear fusion reactors discussed in Chapter 5 offer many potential benefits, but it may take many decades before they are technologically and economically feasible. So, what do we do?

What we ultimately need are sustainable energy sources, and we need access to those sources as soon as possible. The ideal sustainable energy source is not only inexhaustible but also environmentally benign. The nuclear fusion reactor has the potential to become an excellent sustainable energy source, but the ultimate source of sustainable energy is the nuclear fusion that goes on within our Sun. Other astronomical sustainable energy sources we can tap include the warm interior of our own planet Earth, as well as tidal forces resulting from the close proximity of the Moon. For the remainder of this chapter, we discuss various technologies that allow us to tap into these solar-system-sized energy sources.

Switching to sustainable energy sources will require commitment from the general public. Perhaps the greatest obstacle to our switching to sustainable energy sources is the present abundance of fossil fuels, which are packed with energy and are incredibly convenient. There's no question that sustainable energy sources are most desirable. But can people think long term and put their hard-earned money toward the development of sustainable energy technology? Fortunately, technologies are progressing rapidly, and the cost of energy from sustainable sources continues to drop. This is a

Collective choices arise from our individual choices.



READING CHECK

What is perhaps the greatest obstacle to our switching over to sustainable energy sources?

critical point, because in a market economy, it is the dollar that speaks. For the remainder of this chapter, let's take a look at what some of the major alternative sustainable energy technologies have to offer, as well as some of their potential drawbacks.



▲ Sihwa Lake Tidal Power Station, Sihwa Lake, Gyeonggi Province, South Korea



▲ Geothermal Power Plant in Iceland



▲ What is the total cost of energy for the convenience of everyone owning their own car?



▲ Local train at Tomioka, Japan. Are trains a cleaner and more efficient solution?

CONCEPT CHECK

What is a sustainable energy source?

CHECK YOUR ANSWER A sustainable energy source is an energy source that has the potential to be available indefinitely. The technologies that take advantage of these sources should be environmentally benign.