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**energy**



**island**

*How One Community Harnessed the Wind and Changed Their World*

## Nonrenewable Energy and Energy Independence

Samsø's gasoline and heat came from petroleum, coal, and natural gas, which are energy sources known as *fossil fuels*. This fuel had to be shipped to the island.

Electricity arrived in Samsø from electric cables under the sea. This electricity was made on the mainland by burning fossil fuels in power stations.

Fossil fuels come from dead plants, algae, and other organisms that were buried in swamps or under the sea and have slowly decayed. It takes millions of years for organic matter to decay into fossil fuels, which must then be dug up from the ground or piped to the Earth's surface.

Fossil fuels are called *nonrenewable* sources of energy because the Earth cannot create new fuels at the same rate that we humans consume them. One day, we will have used them all up.

Most places on Earth depend on nonrenewable sources of energy.

Søren Hermansen's goal was to do away with the need for petroleum, coal, and natural gas on the island of Samsø. If the islanders could use only *renewable* energy, from their own island, they would be *energy-independent*.

## Renewable Energy

Renewable energy comes from resources that will never run out, or that can be replaced. For example, wind is a renewable resource, since the wind will always blow. Windmills were invented to catch that energy.

Rivers keep flowing all year, so they are also a source of renewable energy. People have been using dams, water mills, and other means of harnessing water power for thousands of years.

Sunlight, which can be converted into solar power, is another example of a renewable resource, and so are the plants and trees that can be harvested and converted into *biofuels* and then replanted.

Scientists are even figuring out how to create energy from burning garbage and human sewage!

## The Problem of Nonrenewable Energy

Coal, oil, and natural gas are amazing sources of energy. They have helped create the modern world we live in—full of cars, plastic, and electricity. But that progress has come at a price, and that price is  $\text{CO}_2$ .

Carbon dioxide— $\text{CO}_2$ —is a gas produced as waste when fossil fuels are burned for energy.  $\text{CO}_2$  does occur naturally—in fact, you make some every time you breathe! But when we produce very large amounts of  $\text{CO}_2$ , as we do when we use fossil fuels, it can become a serious problem for the world.

When gases such as water vapor, methane, ozone, and carbon dioxide are released into the Earth's atmosphere, they trap heat. When heat is trapped inside the atmosphere, this is called the *greenhouse effect*. When the average temperature of the planet increases over time due to the greenhouse effect, it is called *global warming*. Global warming is a type of *climate change*.

## Global Warming

Global warming can have serious consequences for all living things. Scientists predict that in the coming years summers will become hotter, winters will become colder, and storms will be fiercer.

Many scientists also believe that global warming is causing the ice caps at the North and South poles to slowly melt away, which changes the level of water in the ocean and affects animals like polar bears and penguins, not to mention people living on coastlines all over the world.

That's one of the reasons why scientists are making such an effort to use less and less nonrenewable energy. One way to do this is to use more renewable energy, which usually releases less CO<sub>2</sub>.

But scientists can't do it alone! Today we should all be thinking about the problem of nonrenewable energy, just like the islanders of Samsø.

## Wind Energy

Windmills were first invented over 1,000 years ago in the land that is now Iran. Back then the windmills were used to grind corn and pump water. It's a strange coincidence that today Iran is a place where huge amounts of oil—a fossil fuel—are drilled from the ground and shipped all over the world.

Windmills are still used in the modern world, and they can do lots more than grind corn. The wind turbine, a modern type of windmill, actually makes electric power.

When wind blows across a wind turbine's blade, the blade turns and causes the main shaft to spin a generator, which makes electric power. The more wind there is outside, the faster the blades turn, and the more energy the turbine makes.

Before a turbine is built, scientists take measurements to discover which places are the windiest. Today there are turbines on hills, on top of city buildings, and even in the ocean! The electricity that is created by wind turbines can be used to power a single home or building, or it can be connected to an energy grid where the electricity is shared by a whole community.

## Energy in the World

The more fossil fuel a country uses, the more CO<sub>2</sub> it produces. The United States produces nearly six billion metric tons of CO<sub>2</sub> per year. That weighs more than eight hundred million elephants!

As countries across the world become more developed and use more energy, they produce ever-increasing amounts of CO<sub>2</sub>. Global warming is becoming a more frightening prospect every single day.

But there is good news. In this modern world we are able to share ideas and work together much more easily than ever before. Scientists are working on incredible new ways to use renewable resources and to save energy.

Some places are windy, some are sunny, some are hot, and some are cold. Each country or community must look at what special resources it has available, so as not to be dependent on nonrenewable resources in the future.

The Samsø Energy Academy is a place where people of all ages can share ideas about energy and how it is made and used.

## **Saving Energy**

One thing that will take a lot of pressure off our need for energy, both renewable and nonrenewable, is simply making an effort to save energy.

We waste huge amounts of power to keep warm in the winter and cool in the summer. Badly designed doors, windows, and walls mean our heating and cooling systems work harder than they should, and produce too much CO<sub>2</sub>. Building more efficient heaters and coolers, along with more efficiently designed buildings, would greatly help us cut down on the problems of global warming.

We can also save fuel by building new cars, trucks, and machines that waste less energy. Taking a bus or a train is another great way to cut down on energy use. And riding your bike is even better! To save energy, we need to think about how we use it every day.

## AUTHOR'S NOTE

In July of 2008, as world oil prices were skyrocketing, I was traveling home from an illustration conference, when I read an article by Elizabeth Kolbert in *The New Yorker* entitled "The Island in the Wind." This was my first introduction to Samsø and its people. It brought back memories of the 1970s oil crisis when, as a child, I noticed people in my neighborhood installing solar panels in an attempt to save energy and be less dependent on oil. I knew immediately that the subject of Samsø would make a great picture book. The photograph accompanying the piece showed wind turbines in the distance across the green fields, and above them lots of blue sky, with plenty of room for me to sketch out some initial ideas among the clouds. I took out my pen, and started to draw.

What has happened on Samsø is not simply a wind power project. The community came together and resolved to become energy-independent. Søren Hermansen, who was named a "Hero of the Environment" by *Time* magazine in 2008, is a remarkable leader and spokesman, but he could not have achieved his goals without the enthusiasm and commitment of the other islanders.

Samsø is an especially windy place, but the community also makes very good use of biomass and solar power. For more information on these and other resources, visit [www.energyislandbooks.com](http://www.energyislandbooks.com).

Thank you to Frances Foster, Lisa Graff, Malene Lunden, Mette Kramer, Brian Kjær, and Greg Benedis-Grab, for their help in bringing this book to life. I would especially like to thank Søren Hermansen, who not only advised me on this project, but who was also the first to inform me of the island's power outages.

For the sake of storytelling, some aspects of the timeline have been compressed. Jørgen Tranberg's large turbine, for instance, was in fact the first on Samsø, built before Brian Kjær's smaller one. Either way, both men are very happy when the wind blows, and so are all the islanders. Hold on to your hats!