

Can Desert Sun Supply Europe's Energy?

The oil of the 21st century is not buried deep within the earth. Instead, it falls on its surface—as sunshine.

"The sun is the hidden asset of North Africa and the Middle East," says Gerhard Knies, a spokesman for the Trans-Mediterranean Renewable Energy Cooperation (TREC), a network of scientists and politicians from various countries who have taken it upon themselves to solve Europe's energy problem, *Businessweek* reported.

Their vision, which they call Desertec, is to turn desert sun into electricity, thereby harnessing inexhaustible, clean and affordable energy.

"We don't have an energy problem," says Hans Muller-Steinhagen, of the German Aerospace Center (DLR). "We have an energy conversion and distribution problem."

Muller-Steinhagen has been commissioned by Germany's Environment Ministry to check the feasibility of Desertec in several studies. His conclusion is that Desertec is a real possibility.

In his studies, he has scrutinized the energy situation in Europe, North Africa and the Middle East from the point of view of the post-oil era. Out of all the alternative energy sources, one stands head and shoulders above the rest: "No energy source even comes close to achieving the same massive energy density as sunshine," Muller-Steinhagen says.

And no other energy source is available over such a large area. Every year, 630,000 terawatt hours in the form of solar energy falls unused on the deserts of the so-called MENA states of the Middle East and North Africa.

In contrast, Europe con-



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sumes just 4,000 terawatt hours of energy a year—a mere 0.6 percent of the unused solar energy falling in the desert.

Europe needs a lot of electricity, but gets little sun. The MENA countries, on the other hand, get a lot of sun, but consume little electricity. So, the solution is simple: The south produces electricity for the north. But how would the enormous energy transfer work? And how do you turn desert sun into electricity?

It's actually relatively easy. Desertec is low-tech—no expensive nuclear fusion reactors, no CO₂-emitting coal power plants, no ultra-thin solar cells.

Curved mirrors known

as "parabolic trough collectors" collect sunlight. The energy is used to heat water, generating steam which then drives turbines and generates electricity. That, in a nutshell, is how a solar thermal power plant works.

Energy can be harnessed even at night: Excess heat produced during the day can be stored for several hours in tanks of molten salt. This way the turbines can produce electricity even when the sun is not shining.

Should the Sahara, therefore, be completely covered with mirrors? No, says Muller-Steinhagen, producing a picture by way of an answer. It shows a huge desert in which are

drawn three red squares. One square, roughly the size of Austria, is labeled 'world.' "If this area was covered in parabolic trough power plants, enough energy would be produced to satisfy world demand," he says.

A second square, just a fourth of the size of the first one, is labeled "EU 25," in a reference to the 25 member states the European Union had before Bulgaria and Romania joined in 2007. This area could produce enough solar energy to free Europe from dependence on oil, gas and coal. The third area is labeled 'D,' for Germany. It is merely a small dot.

Under the plan, the sun-

rich states of North Africa and the Middle East would build mirror power plants in the desert and generate electricity. As a side benefit, they could use residual heat to power seawater desalination plants, which would provide drinking water in large quantities for the arid countries. At the same time they would obtain a valuable export product: environmentally friendly electricity.

"The MENA countries are in a three-way win situation," says Muller-Steinhagen. But Europe also wins: it frees itself from its dependence on Russian gas, rising oil prices and CO₂-spewing coal power plants.

In the News

US, EU Biofuel Path Criminal

The United States and the European Union have taken a "criminal path" by contributing to an explosive rise in global food prices through using food crops to produce biofuels, the United Nations special rapporteur on the right to food said on May 1.

According to ENN, at a press conference in Geneva, Jean Ziegler of Switzerland said that fuel policies pursued by the US and the EU were one of the main causes of the current worldwide food crisis.

Ziegler was speaking before a meeting in Bern, Switzerland between UN Secretary-General Ban Ki-moon and the heads of key United Nations agencies.

Ziegler said that last year the United States used a third of its corn crop to create biofuels, while the European Union is planning to have 10 percent of its petrol supplied by biofuels.

The Special Rapporteur has called for a five-year moratorium on the production of biofuels.

Ziegler also said that speculation on international markets is behind 30 percent of the increase in food prices.

He said that companies such as Cargill, which controls a quarter of all cereal production, have enormous power over the market. He added that hedge funds are also making huge profits from raw materials markets, and called for new financial regulations to prevent such speculation.

The Special Rapporteur warned of worsening food riots and a "horrifying" increase in deaths by starvation before reforms could take effect.

> Hungry Children

Meanwhile, speaking in Rome on May 1, a nutritionist with the UN World Food Program said that "global price rises mean that food is literally being taken out of the mouths of hungry children whose parents can no longer afford to feed them."

Andrew Thorne-Lyman said that even temporarily depriving children of the nutrients they need to grow and thrive can leave permanent scars in terms of stunting their physical growth and intellectual potential.

He said that families in the developing world are "finding their buying power has been slashed by food price rises, meaning that they can buy less food or food which isn't as nutritious."

A World Bank report issued April 9 agrees with the UN officials. According to "Rising Food Prices: Policy Options and World Bank Response," increases in global wheat prices reached 181 percent over the 36 months leading up to February 2008, and overall global food prices increased by 83 percent.

Increased biofuel production has contributed to the rise in food prices, according to this report. Concerns over oil prices, energy security and climate change have prompted governments to increase biofuel production and use leading to greater demand for raw materials including: wheat, soy, maize and palm oil.

Food price hikes are also linked to higher energy and fertilizer prices, a weak dollar and export bans.

The Group of Eight, G8, will take up this matter at its annual meeting in July. The meeting will be attended by the leaders of the eight countries—Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States—the same countries said by Ziegler to be on a "criminal path."

Prime Minister Yasuo Fukuda, as chair of the G8, expressed his intention to raise the matter at the G8 Hokkaido Toyako Summit in letters to UN Secretary General Ban Ki-moon and World Bank President Robert Zoellick on April 18.

> Large-Scale Production

Rapid increases in the large-scale production of liquid biofuels in developing countries could increase the marginalization of women in rural areas, threatening their livelihoods, according to a new study by the UN Food and Agriculture Organization, FAO.

"Unless policies are adopted in developing countries to strengthen the participation of small farmers, especially women in biofuel production by increasing their access to land, capital and technology—gender inequalities are likely to become more marked and women's vulnerability to hunger and poverty further exacerbated," said Yianna Lambrou, co-author of the paper, "Gender and Equity Issues in Liquid Biofuels Production—Minimizing the Risks to Maximize the Opportunities." Analysis being carried out by the world's largest international food aid organization supports World Bank estimates that about 100 million people have been pushed deeper into poverty by the high food prices.

The UN World Food Program, WFP, aims to feed 73 million people globally this year, but the agency now estimates it needs at least US\$500 million more than anticipated last year to meet its 2008 operational budget of US\$3.4 billion.

The half-billion dollar increase is solely due to the sharp hike in food and transport costs over the last few months.

WFP Executive Director Josette Sheeran of the United States says that high food prices are creating the biggest challenge that WFP has faced in its 45 year history, a "silent tsunami" of hunger. Sheeran said that WFP could only fill a cup with half the food that it could last year because of rising food prices.

Invisible Fossil

You can't see it, taste it or smell it, but given the current cost of natural gas, you can certainly feel its impact on your wallet. Like oil and coal, natural gas is a fossil fuel consisting of various combustible hydrocarbon molecules—chains of hydrogen and carbon—the vast majority of which is methane.

It is created through the decay of organic matter such as plants and animals over the course of millions of years. Geological pressures combined with high temperatures are the catalyst for this transformation, causing the carbon bonds in this organic matter to break down, the *Guardian* said.

Although often found alongside oil fields more than a mile deep, generally speaking the deeper you drill, the more a field will primarily consist of gas and sometimes even just pure methane. Despite its name, natural gas can also be used and transported in liquid form. Compared with other fossil fuels natural gas burns relatively cleanly, although it still produces the greenhouse gas carbon dioxide.

Natural gas has a slightly higher energy density than petrol—nearly 13 times that of dynamite. With the decline of the British coal industry, gas has become a major source of electricity production. It is also used as feedstock for producing a range of chemicals. But most of us are more familiar with its use to heat homes and as fuel for ovens and stoves.

The trade-off to this is safety. Much of the damage caused by the earthquake that hit San Francisco in 1906 has been attributed not to the quake itself, but rather to fires from ruptured gas lines.

And storage and transport of natural gas, which has a naturally low density, remains expensive. While pipelines can be economical, they are impractical to transport gas across oceans. In light of the high value of gas, the industry is increasingly taking to transporting it in liquid form, either through pressurization or using chemical processes to produce what is known as liquefied natural gas.

The Middle East is currently the largest source of gas, but dwindling energy supplies and high demand has led the industry to start looking elsewhere. Most gas is recovered alongside oil, or in natural gas fields that typically occur at greater depths at high temperatures.

But the industry has increasingly been getting natural gas from coal-derived methane and other less profitable sources such as gas shales. It is even starting to curb the wasteful practice of gas flaring. This is where, in some cases, gas found next to oil is considered to be too expensive to recover and is simply burned off into the atmosphere, to the detriment of the environment.

Besides its greenhouse effects, the use of natural gas also poses conservation issues.