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tens of thousands of her countrymen, she is running her zippy red Fiat on pure ethanol extracted from Brazilian sugar cane. On a recent morning in Brazil's largest city, the clear liquid was selling for less than half the price of gasoline, a sweet deal for the 26-year-old lawyer.

"You save

money and you don't pollute as much," said Rossini, who paid about \$18 to fill her nearly empty tank. "And it's a good thing that the product is made here."

Three

decades after the first oil shock rocked its economy, Brazil has nearly shaken its dependence on foreign oil. More vulnerable than even the United States when the 1973 Middle East oil embargo sent gas prices spiraling soaring, Brazil vowed to kick its import habit. Now the country that once relied on outsiders to supply 80 percent of its crude is projected to be self-sufficient within a few years.

Developing

its own oil reserves was crucial to Brazil's long-term strategy. Its domestic petroleum production has increased sevenfold since 1980. But the Western Hemisphere's second-largest economy also has embraced renewable energy with a vengeance.

Today

about 40 percent of all the fuel that Brazilians pump into their vehicles is ethanol, known here as alcohol, compared with about 3 percent in the United States. No other nation is using ethanol on such a vast scale. The change wasn't easy or cheap. But 30 years later, Brazil is reaping the return on its investment in energy security while the United States writes checks for \$50-a-barrel foreign oil.

"Brazil

showed it can be done, but it takes commitment and leadership," said Roland Hwang, vehicles policy director for the Natural Resources Defense Council in San Francisco. In the United States, "We're paying the highest prices at the pump since 1981, and we are sending over \$100 billion overseas a year to import oil instead of keeping that money in the United States. ... Clearly Brazil has something to teach us."

Much

of Brazil's ethanol usage stems from a government mandate requiring all gasoline to contain 25 percent alcohol. Vehicles that ran solely on ethanol fell out of favor here in the 1990s because of an alcohol shortage that pushed drivers back to gas-powered cars. But thanks to a new generation of vehicles that can run on gasoline, ethanol or any combination of those two fuels, more motorists such as Rossini are filling up with 100 percent alcohol again to beat high gas prices.

The

exploding popularity of these "flex-fuel" vehicles is reverberating across Brazil's farming sector. Private investors are channeling billions of dollars into sugar and alcohol production, creating much-needed jobs in the countryside. Environmentalists support the expansion of this clean, renewable fuel that has helped improve air quality in Brazil's cities. Consumers are tickled to have a choice at the filling station.

Officials

from other nations are flocking to Brazil to examine its methods. Most will find Brazil's sugar-fuel strategy impossible to replicate. Few countries possess the acreage and climate needed to produce sugar cane in gargantuan quantities, much less the infrastructure to get it to the pump.

Still, some

Brazilians say that their government's commitment to ditching imports and to jump-starting homegrown energy industries were the real keys to Brazil's success.

"It's

a combination of strong public policy and the free market," said Mauricio Tolmasquim, president of a federal energy research agency based in Rio de Janeiro. "That's the Brazilian secret."

Brazil's

fortunes have been tied to sugar since the Portuguese conquerors found that their tropical colony boasted ideal conditions for cultivating the tall, grassy plant. Brazilians produce and eat more cane sugar than any people on the planet, so the notion of using it to power their vehicles was a natural. After all, Henry Ford once viewed ethanol, which can be made from corn, barley and other crops, as a strong contender to fuel the Model T.

But

the discovery of cheap, abundant petroleum changed everything. Like much of the rest of the world, Brazil guzzled imported crude until the 1970s oil shocks put its economy over a barrel. So totally reliant was Brazil on foreign oil that surging prices wreaked havoc on its balance

of trade. That led to massive borrowing, huge deficits and, eventually, hyperinflation and a devaluation of its currency.

Thus the Brazilian government, then a military dictatorship, launched efforts in the mid-1970s to wean the nation off imports. Those efforts included its National Alcohol Program, known as Proalcool.

"To become less dependent was a matter of life and death," said Jose Goldemberg, secretary for the environment of the state of Sao Paulo.

With the help of public subsidies and tax breaks, farmers planted more sugar cane, investors built distilleries to convert the crop to ethanol and automakers designed cars to run on 100 percent alcohol. The government financed a mammoth distribution network to get the fuel to gas stations and kept alcohol prices low to entice consumers. It worked. By the mid-1980s, virtually all new cars sold in Brazil ran exclusively on ethanol.

But a 1989 shortage coupled with low gas prices soured many on the renewable fuel. Sales of alcohol-only cars tumbled in the 1990s, and the government gradually withdrew its subsidies and lifted price controls on ethanol. Demand stalled.

Some critics at the time chalked it up to the inevitable consequences of government meddling. But today many laud Brazil's Proalcool program for creating a viable domestic market for ethanol, and for spawning an industry with tremendous export potential that now employs more than 1 million Brazilians.

Meanwhile, ethanol remains little more than a boutique fuel in the United States. Although the United States is the world's second-largest ethanol maker, producing 3.4 billion gallons last year compared with around 4 billion gallons for Brazil, ethanol's main use is as a gasoline oxygenate to boost air quality rather than as a serious replacement for foreign oil. But high gas prices have some farm belt legislators pushing Congress to mandate greater use of domestic corn-based ethanol in the U.S. fuel supply to reduce oil consumption. Wednesday, the U.S. Senate backed a plan to mandate that at least 8 billion gallons of ethanol be added to the United States' gasoline supply annually by 2012.

Virtually all cars sold in the United States since the early 1980s can run on gasoline containing as much as 10 percent ethanol. In addition, there are an estimated 5 million "flex-fuel" vehicles already on U.S. roads that can burn a mixture as high as 85 percent ethanol. But big logistical and political hurdles remain. Only a few hundred of the nation's approximately 169,000 retail gas stations are equipped to sell so-called E85 fuel. Nationwide distribution would require station owners to invest hundreds of millions of dollars in special tanks and pumps.

Although

U.S. ethanol makers say they could easily double their output to meet any increase in demand, experts say that's still a drop in the bucket compared with the tens of billions of gallons that would be needed annually to displace meaningful amounts of petroleum. The U.S. industry is loath to give up tariffs that protect it from cheaper alcohol from Brazil. Meanwhile, some environmentalists say feedstock such as grasses and municipal waste offer much more promise than corn. But huge investments in research are needed to bring the costs down for this so-called "cellulosic" ethanol.

What

most can agree on is that Brazil is an example of what might have been if America had seriously committed itself 30 years ago to renewable energy.

"If we

would have spent one-hundredth of the money that we have spent to send tanks around the world to protect our oil supplies ... we would already be using cellulosic ethanol," said Michael Bryan, chief executive of BBI International, a Colorado-based bio-fuels consulting company.

Near

the city of Ribeirao Preto in northeastern Sao Paulo state, the harvest is under way in Brazil's richest sugar cane producing region. Trucks lumbering under mounds of fresh-cut cane creep into Jardest Sugar & Alcohol. The vast milling and distilling complex, owned by Brazilian sugar trading giant Crystalsev, will run 24 hours a day nonstop until the season ends in December. The air is fetid with char from the fires that are clearing the fields of debris and vermin in preparation for the arrival of teams of scythe-wielding cutters. A lush emerald sea of cane rolls toward the horizon in every direction.

And

there is a lot more where that came from. Brazil has about 13.5 million acres planted with sugar cane currently. More than 200 million dormant acres lay ready to cultivate.

"Oil

is running out. The world needs more clean, renewable fuel," Crystalsev executive Maurilio Biagi Filho said. "And we are going to be there to supply it."

Times correspondent Reed Johnson contributed to this report.

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