

could, like me, be unfortunate enough to stumble on a silent war. And once you've seen it, keeping quiet, saying nothing, becomes as political an act as speaking out. There's no innocence. Either way, you're accountable." Maybe I had a destiny to fulfill.

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*"This is a time for a loud voice, open speech, and fearless thinking."*

—HELEN KELLER

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It's become a sort of heresy to talk about alcohol fuel or any form of alternative energy as a viable way out of our energy dilemma. Debate rages around available technologies and the readiness of our economic system to absorb massive change, but primarily the concern is with practicality. Ethanol, despite its promise, has been trashed in just about every publication and weblog in America.

Rest assured, there is enough land to produce solar energy in many forms, including alcohol, for a world that makes energy-efficient design a priority. We can have a large cooperative cellulose distillery operation in each county, producing ethanol and biomass electricity to keep our essential services running. We can have small integrated farms that produce fuel, food, and building materials. We can eat well on locally produced food and locally processed products. We can even cogenerate our electricity and hot water at our homes using our cars running on alcohol in a pinch, if we are clever enough (see Chapter 24).

The vituperative bile around fuel alcohol is totally misplaced. Used with a vision that incorporates organic farming—which means shifting totally away from industrial farming methods and implementing sustainable practices—ethanol is an excellent option to solve our energy problems. All of them, if we wish.

Now that you have picked yourself up off the floor, I'll explain.

I spent nine years as an organic farmer 30 miles south of San Francisco. I had a little over an acre on a 35-degree slope that I terraced and a little over an acre of flat valley bottom. From those bits of land, I produced enough vegetables to provide food for as many as 450 people. The USDA says this isn't possible. Over time, my organic matter content went from 2% to nearly 22%, the biological equivalent of converting desert sand to deep forest soil. My adobe clay soil went from one inch of topsoil to 16 inches. My loss to insect pests dropped more and more, so that by the fourth year I stopped spending any time worrying about it. I had a very nicely functioning, self-regulating, and self-maintaining ecological system that permitted me to produce huge surpluses of a great diversity of crops and make a decent living.

The key to the success of that long-term experiment was adherence to basic tenets of **permaculture**. Work with Nature, not against it. Everything is a yield; it's up to you to realize its value and find what to use it for. Be allergic to any extra work. Put things in the right place in relation to other things. Never fight gravity; it wins. The problem is the solution. Biology is constantly responding to stimulus, "learning" in response, and optimizing itself.

I'll talk more about the synthesis of permaculture (including organic farming) and ethanol production in our next chapter, but keep it in mind as we address the myths about alcohol fuel.

### HERE'S THE BIGGEST MYTH:

If you ask anyone what they know about alcohol fuel, you will find they almost always dredge up from their vague memory the certainty that it takes more energy to make alcohol than is contained in the fuel. No matter that the person can't remember where they heard it from, why they know that, or why it's important. Such is the mark of truly excellent propaganda.

One thing I have learned about corporate propaganda, however, is that it is rarely imaginative.

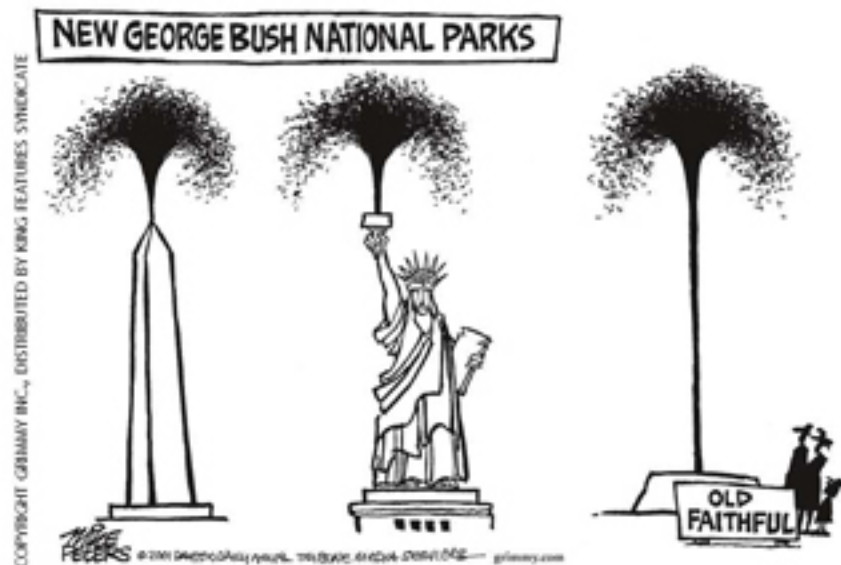


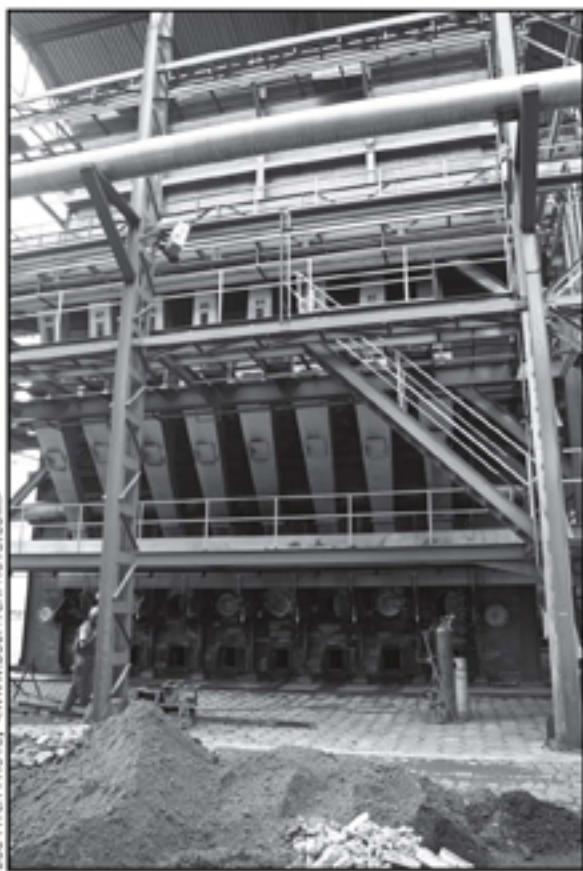
Fig. 2-2

Once something works, it is repeated in another form in a successive campaign.

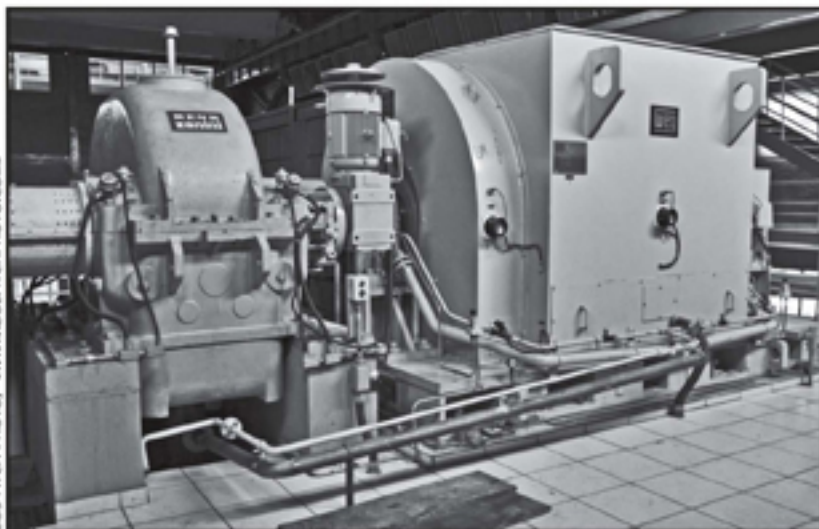
Take the upcoming discussion about **energy returned on energy invested**. EROEI propaganda has its origins in the 1970s in crude, obviously phony studies done by oil companies, using the energetics of beverage distilleries. Such distilleries made so much profit on alcohol as a beverage that no effort whatsoever went into energy efficiency, since it made far less than a 1% difference in the retail price. But for the short time before these studies were debunked, the energy lie was obviously a powerful sound bite that affected the public. This spawned the more sophisticated attack that follows.

### **Myth #1: It Takes More Energy to Produce Alcohol than You Get from It!**

Most research done on ethanol over the past 25 years has been on the topic of energy returned on energy invested (EROEI), or energy balance. In Appendix A, we detail how public discussion of this issue has been dominated by the American Petroleum Institute's aggressive distribution of the work of Cornell professor David Pimentel and his numerous studies. We cite his distortion of key calculations, his unfamiliarity with farming in general,



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**Fig. 2-3 Sugar plant generator.**

*Built with government loans, this steam-powered generator puts three-quarters of its electricity into the national grid, since the alcohol plant only uses about one-quarter of the power.*

his ignoring of studies from Brazil that disagree with him, and his poor understanding of the value of **co-products** and their contribution to an accurate portrayal of energy accounting in the ethanol manufacturing process. In fact, he stands virtually alone in portraying alcohol as having an EROEI that is negative—producing less energy than is used in its production (see Appendix A, Figure A-2).

In fact, it's oil that has a negative EROEI. Because oil is both the raw material and the energy source for production of gasoline, it comes out to about 20% negative. That's just common sense; some of the oil is itself used up in the process of refining and delivering it (from the Persian Gulf, a distance of 11,000 miles in tanker travel).

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*"If they can get you asking the wrong questions, they don't have to worry about answers."*

—THOMAS PYNCHON

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As Dr. Barry Commoner of the Center for the Biology of Natural Systems once said, "It's always possible to do a good thing stupidly,"<sup>1</sup> and some existing scenarios for making alcohol on a grand scale prove just that. However, the most exhaustive (and least-cited) study on the energy balance, by Isaias de Carvalho Macedo of Brazil, shows an alcohol energy return of more than eight units of output for every unit of input—and this study accounts for everything right down to smelting the ore to make the steel for tractors.<sup>2</sup>

But perhaps there's a more important measurement to consider than EROEI. What is the energy return for fossil fuel energy input? Using this crite-

**LEFT: Fig. 2-4 Boilers burning bagasse.** After crushing to remove the sugary juice, surplus sugarcane fiber, **bagasse**, is burned to produce all the heat and electricity used in the alcohol plant, without using fossil fuels.