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SMALL CHANGE

# The Unsung Solution

*What rhymes with waste-heat recovery?*

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Painting: Alexis Rockman

From his desk in an office in Chicago, Jeff Smith has a bird's-eye view of the American landscape. Combing through a huge database of information compiled by the EPA, he can, almost literally, peer down every smokestack in the nation and figure out what's going on inside.

And what he sees is heat. Waste heat—one of the country's largest potential sources of power, pouring up out of those smokestacks. If it could be recycled into electricity, that heat would generate immense amounts of power without our having to burn any new fossil fuels. By immense, I mean, speaking technically, humongous. Even after he's winnowed the nation's half a million smokestacks down to the most likely customers, that leaves twenty-five thousand stacks. "An astronomical number," Smith says.

His boss at Recycled Energy Development, Sean Casten, leafs through the reams of data Smith has compiled. The biggest sources of waste heat are some gas turbines used to generate power, but there are endless other examples. "Let's look at Florida," he says. "Here's a Maxwell House coffee roaster in Duval County. They're roasting beans, so all that heat has to go somewhere. About twelve megawatts' worth of potential electricity is going up the stack." Casten could take the equipment he sells, a "waste-heat recovery boiler," and stick it on top of the stack. "Basically, there's a network of tubes with water in them. The heat would hit one side of it, produce steam, and we'd use that to turn a turbine and generate electricity. It's like any other boiler, just without a ?ame, because the heat is already there."

Does that sound suspiciously pie-in-the-sky? Casten can drive a few miles from his Chicago office to an East Chicago plant run by Mittal Steel. A few years ago, a predecessor energy-recycling company installed this kind of equipment on the smokestacks of the plant's coke ovens. In 2004, this single steel plant generated roughly the same amount of clean energy as was produced by all of the grid-connected solar collectors throughout the world. Casten's company estimates that recycling waste heat from factories alone could produce 14 percent of the electric power the U.S. now uses. If you took much the same approach to electric

generating stations you could, says Casten, conceivably produce the same amount of energy we use now with half the fossil fuel.

Let's cut the numbers in half to account for corporate enthusiasm. Hell, let's cut them in half again. You're still talking about one of the most effective ways to cut carbon emissions that we've got, a mature technology ready to go. You're talking about a recycling project infinitely more important than all that paper we've been bundling and glass we've been rinsing for the last two decades. Why isn't it happening everywhere? The first answer, says Casten, is that very few companies spend much time thinking about their waste heat. "How much time do you think about the useful things you could be doing with your urine?" asks Casten. "The guy at the coffee roaster is spending all day focused on roasting coffee beans so they taste good."

In a perfectly rational market, however, lots of players would see that heat disappearing up the stack, realize they're watching hundred-dollar bills spewing into the atmosphere, and set up businesses like Casten's to try and harvest it. It's not exactly simple—you need to understand how much heat each plant generates, how it varies day by day, how corrosive the other gases in the stack are, and so forth, but it's no harder than a million other technical feats that a million other companies perform every day. No harder, for instance, than singeing a coffee bean to produce a robust and roasty blend. The obstacle lies in the phrase "perfectly rational market." Electricity is essentially the opposite, a heavily regulated semi-monopoly where many of the laws work to protect the profits of utilities, and where, if you deregulate carelessly, you end up with fiascos like Enron's calculated bludgeoning of California's ratepayers.

For instance, in almost every state it's illegal for anyone but the utility to run wires across a public street. So if Casten's company generates more electricity from the smokestack of the coffee roaster than the factory can use itself, his company can't sell the surplus to the guy making coffee cans across the street. They have to sell it to the utility, which wants to pay the lowest price possible for it. The utility argues that it still bears the cost of maintaining the network of wires that constitute the grid, and if it's not selling to the coffee-can plant, that cost will have to be passed on to, say, residential customers.

This is a conundrum that environmentalists are going to have to help solve. They need to pressure regulators to pressure utilities to treat low-carbon energy as a precious resource, to make reducing global warming at least as crucial a goal as ensuring a reliable energy supply and keeping rates down. And indeed environmentalists have begun to have some successes along these lines. In lots of states, for instance, people with solar panels on their roofs can now connect to the grid more easily, and in some cases get a decent price for the power they generate.

However, solar panels and windmills are somewhat sexier than waste-heat recovery boilers, and it's possible that environmentalists have skewed their priorities accordingly. In Massachusetts, for example, Casten led an ultimately futile bid to get recycled energy included in the state's "renewable portfolio standard," the government mandate to generate an increasing percentage of the state's energy from clean sources. His opponents included some in the renewable community, who feared recycled energy would edge out wind turbines and photovoltaics for dollars. "We shouldn't set them up in a zero-sum game against each other," says Alan Nogee, director of the Clean Energy Program for the Union of Concerned Scientists. Instead, he proposes yet another new standard, this one just for recycled energy—a sound idea, probably, but while it waits to get adopted, the carbon content of the atmosphere keeps on increasing.

Seth Kaplan, director of the Clean Energy and Climate Change Program at the Boston-based Conservation Law Foundation, calls the controversy a perfect example of "the climate advocate's mantra: whatever the choice is, you've got to do both." It's "absolutely nuts," he says, for there to be tension between the sun-and-wind guys and the backers of recycling schemes like Casten's, especially since retrofitting factories to recover waste heat picks the lowest-hanging fruit while developing renewables helps build the energy system we'll need in the decades to come.

Kaplan's right, but if heat recycling is going to happen on the scale and at the pace required to deal with climate change, it will mean enviros being willing to focus on stuff like smokestacks and utility regulation

with the same enthusiasm with which we rhapsodize about the spinning blades of windmills. That's hard—there aren't any good folk songs about waste-heat recovery boilers. And it's going to mean utilities, and the politicians who regulate them, understanding that they now have three missions: keeping the lights on, at something approaching affordable prices, on a habitable planet.

Once in a while, it turns out, we get to work on all three simultaneously. Casten just signed a contract with a factory in the Southeast that makes silicon. He'll recycle the waste heat from their stack, and as a result the solar panels made with that silicon will require a third less fossil fuel to produce. There must be a song there somewhere.

*Bill McKibben's most recent book is* Deep Economy: The Wealth of Communities and the Durable Future.



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