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KEY FACTS

- 67% of U.S. greenhouse emissions come from the production of power and heat
 - 42% from generating electricity
 - 25% from generating heat
- A typical U.S. power plant is about 33% efficient, throwing away two of every three units of energy—same as it was in the 1950s.
- Cogeneration plants—also called combined heat and power (CHP)—are usually 80-90% efficient.
- Recent U.S. EPA and DOE studies suggest energy recycling could provide 200,000 megawatts (MW) of power, twice what the United States now gets from nuclear power.
 - One-third (65,000 MW) would come from waste energy recovery—100% clean, fossil-fuel free energy
 - Two-thirds (135,000) would come from CHP
- These studies suggest energy recycling could provide about 40% of U.S. electricity needs while slashing greenhouse pollution by 20% (as much as if we took every passenger vehicle off the road).
- Energy recycling could save the United States an estimated \$70 billion a year on energy costs.

FREQUENTLY ASKED QUESTIONS

Q: What is energy recycling?

Waste energy, which primarily comes in the form of excess heat, is a natural byproduct of 1) power plants, and 2) manufacturing processes that bake, boil, cook, burn, dry, distill, melt or otherwise heat things—in short, most industrial processes. Vast amounts of waste energy are thrown out or vented into the atmosphere, leading to smokestack after smokestack of untapped energy. Energy recycling captures this waste energy and converts it into power as clean as wind or solar—slashing energy costs and global warming pollution at the same time.

Q: How much energy recycling potential is there in the United States?

Recent U.S. EPA and DOE studies suggest that energy recycling could provide 200,000 megawatts of power—enough to replace about 400 coal plants and provide 40 percent of the country's electricity needs.

- One-third of that power (65,000 megawatts) would come from waste energy recovery (WER), which turns waste energy (mainly heat) into clean electricity and useful steam.
- Two-thirds (135,000) would come from combined heat and power (CHP) plants that recycle the waste energy that conventional power plants throw away.

In all, energy recycling could cut U.S. greenhouse emissions by 20 percent while reducing power costs by an estimated \$70 billion a year.

Q: How inefficient is our current energy system?

The U.S. electric industry's average efficiency—which hasn't improved measurably since the 1950s—is about 33 percent, meaning a power plant burns three units of fuel to generate just one unit of power. To put that into perspective, the country's first power plant, the Pearl Street Station built by Thomas Edison in 1882, was approximately 50 percent efficient. How did Edison achieve what today's power generators cannot? Simple: he recycled energy by using the plant's excess heat to warm nearby buildings. The stakes today, of course, are far greater, as two-thirds of all U.S. global warming pollution comes from the production of power and heat.

Q: If energy recycling is so beneficial, why isn't more being done?

The answer is simple: our electricity regulations are out of date. Crafted in the early 1900s, they were designed to protect the utilities that were rapidly electrifying the countryside. Today, however, these rules stifle competition and innovation. In most places, for instance, no one but the local utility is allowed to run an electric wire across a public street—thereby keeping would-be energy recyclers from selling excess power and heat to neighboring buildings. Meanwhile, the utilities themselves have no incentive to be efficient since they are allowed (indeed mandated) to pass all operating costs on to consumers.

Moreover, our environmental rules have erected inadvertent barriers to efficiency. Under the Clean Air Act, for instance, old power plants are permitted to make efficiency improvements only if they invest millions of dollars to meet modern pollution control standards. The result is that many plants choose to make no improvements at all.

The good news is that these rules are changing, in part because of RED's advocacy efforts at the state and federal level. While RED will continue to tackle barriers, we are working within the existing system to obtain as much value as possible from our projects.

Q: What's the difference between waste energy recovery (WER) and combined heat & power (CHP)?

Both forms of energy recycling take energy that's normally wasted and turn it into clean power and heat.

CHP involves a power plant located on-site at a manufacturing facility, hospital, university, or other large institution. A CHP plant typically runs on natural gas or some other traditional fuel source. But as it produces electricity, it recycles and reuses the excess heat emitted in the process—thereby generating power two or three times more efficiently than the large, centralized plants that generate most of the country's electricity.

WER, on the other hand, simply captures the waste energy that a manufacturer is already emitting and turns it into clean electricity and useful forms of heating and cooling. No additional fossil fuels are used in this process. WER therefore piggybacks on an industrial plant's existing energy infrastructure, rather than building it anew, as is the case with CHP.

About RED

Q: What is Recycled Energy Development's (RED's) mission?

RED seeks to profitably reduce greenhouse gas emissions. Our projects must benefit manufacturers, investors, and society.

Q: What energy recycling projects has RED done so far?

RED's first deal is a \$95-million waste heat recovery project at West Virginia Alloys (WVA), a subsidiary of Globe Metallurgical and the nation's largest silicon producer. This project will convert 1,200° F waste heat from WVA's six furnaces into approximately 45 megawatts of clean power—reducing WVA's carbon emissions by 290,000 tons a year, equal to removing nearly 207,000 cars from the road. The project also will slash WVA's future power costs, enabling more production, boosting WVA's industrial workforce by 20 percent, and bringing silicon manufacturing back from China to the United States. RED will supply all capital and energy expertise in exchange for a contract to provide power to the facility for 20 years.

Q: What is RED's technology?

RED has no proprietary technology. Rather, we find novel ways to arrange existing, proven technologies in order to make manufacturing processes as energy-efficient as possible. As a result of our work, manufacturers pollute less, cut costs and improve their competitiveness.

Q: Who are RED's competitors?

Several companies provide pieces of the energy recycling puzzle. Process engineers figure out where a company can improve its energy efficiency. Detailed engineers create the plan. Equipment manufacturers provide components, contractors do the installation, and banks provide financing. But RED does it all, bringing these disciplines together in a single company. We are aware of no other firms that put all of the pieces together, particularly in the \$10-100 million range where most energy recycling opportunities lie.

Q: How many clean energy projects have the Castens developed and managed?

Tom and Sean Casten have managed more than 200 energy recycling projects since 1977, over 175 of which they developed and built themselves. In the process, they've invested more than \$2 billion of capital, generated more than 10,000 megawatts (roughly equivalent to the output of ten large nuclear reactors), and displaced more than 5 million tons of CO₂. All of these projects have achieved at least double the 33 percent energy efficiency of an average U.S. power plant, in some cases reaching 90 percent.

Q: What is RED's relationship to Denham Capital Management?

[Denham](#) is a leading global private equity firm. It makes direct investments in the energy and commodities sectors in the United States, Canada, South America, Europe, and Asia. These investments involve natural resources, metals and mining, power and utilities, carbon, and energy-related infrastructure and services.

In November 2007, RED announced a strategic partnership with Denham to develop a \$1.5 billion portfolio of waste energy recycling projects. The partnership serves as an investment platform to fund projects developed and managed by RED that will profitably reduce energy costs and greenhouse gas pollution.

Q: What is Turbosteam?

Headquartered in Turner Falls, Massachusetts, [Turbosteam](#) supplies equipment and expertise to convert waste energy into electric power, typically on a smaller scale than RED. From 2000-2006, Sean Casten served as president and CEO of the company, which is now a wholly-owned subsidiary of RED. Since 1986, Turbosteam has installed more than 180 systems that have saved its customers more than \$200 million in energy bills and reduced CO₂ emissions by more than 3 million tons.