

Garbage In, Energy Out: Synova Power Turns Waste Into Electricity



Plastic waste is a major threat to ocean health but instead of dumping it, it could be a good and cheap fuel for the technology Synova has developed.

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Remember in *Back to the Future* where Doc rummages through Marty's garbage for "fuel"? He dumps it in to a home energy reactor called "Mr. Fusion" mounted to the back of the famous time traveling DeLorean. Sounds like what we need now, given the fact that we are drowning in garbage and hungry for electricity!

Certainly, the concept of turning bio waste into energy has been around for a while. But what about the biggest culprit, plastic? What if you could put bio and petrochemical waste in one end and get electricity out of the other?

We like to say, "If you really want to change the world, put a buck on it!" In other words, make it profitable to improve the world. Synova Power offers a practical, working solution to the world's garbage crisis. Their power plants remove the inert glass, metal and rock from the garbage, and then uses the remaining bio **and** plastic waste to produce gas which powers turbines to produce electricity. This has been tried before but it was unsuccessful due to the asphalt-like tar residue build-up which is inherent in waste or tar gasification. It quickly gummed up the turbines and made them inoperable.

Synova has discovered and owns a proprietary solution that cleans up the tars and converts them into gas as well. This gives Synova an exclusive process that promises to be a profitable answer to both the world's garbage problems and energy demand. Why toss it if you can make power out of it?

But what about the CO₂ exhaust from the turbines? It is more than offset by the fossil power foregone from the grid and stoppage of the much more dangerous methane that would otherwise escape into the atmosphere from the bio waste rotting in a landfill. Synova Power plants have a net negative carbon footprint.

They use a chamber devoid of oxygen which allows the waste matter to be heated to the level of gasification without ignition and incineration. The company's unique tar removal system then allows purification of the gas before it is used to make power or chemicals, creating a carbon-negative substitute for natural gas. After the system is heated to its processing temperature by outside fuels, the system become self-fueling.

We caught up with Giffen Ott, founder and chairman at his New York office to learn more about his new venture.

M&B: How did you get into this solution?

Ott: I was appalled at the growing gyres of trash in our oceans and wanted to do something about it. Producing more value from waste was a potential way of paying for sanitation in areas where they have been unwilling to pay the price of sanitary disposal. Disposal fees in the developing world are typically in the single digits, versus an average of \$51/ton in the USA and even much higher in the EU or Japan. I was introduced to the concept of applying a classic refinery solution to the core issue of tars, the issue which has kept gasification from delivering on its promise. We found the Dutch national renewable energy laboratories (the Energy Center of the Netherlands) were working on this approach and teamed up with them to commercialize the technology.

M&B: Where are your first plants?

Ott: First plants are in Portugal and India, and we have developed plants soon commencing construction in Southeast Asia (primary contributor of plastic in the oceans) and Europe (where the technology was developed).

M&B: Where are your next plants?

Ott: The U.S.A. is ultimately our largest market, and we have new projects underway on both coasts as well as new projects in Southeast Asia and Europe.

M&B: Do you have a waiting list?

Ott: Yes, we have hundreds that we have preliminarily prequalified and are tracking. Roughly 70 percent of the world has no sanitary solution to their waste, and they are drowning in it. We offer the first affordable solution. Even in the wealthier countries, where we bury or burn that which cannot

be mechanically recycled, there is a growing desire to create more value from the waste, a process we facilitate.

M&B: What is your biggest challenge bringing this solution to the market? (lead times, permits, pushback, etc.?)

Ott: An advanced solution like ours is completely different from incineration and more like recycling at the molecular level. Most countries do not have a precedent for this, and if we are not careful, we can find ourselves waiting for regulatory frameworks to be adopted.

By the way, we are recycling friendly – we do not need to “cherry pick” our feedstock – with the intention of molecularly recycling the plastic compounds and biomass which cannot or will not be mechanically recycled.

M&B: Where is the biggest demand coming from for Synova plants currently?

Ott: We see demand with a sense of urgency from all six of the populated continents. Modern conveniences like food delivery or web retail and the consumption that generally comes with rising GDP are overwhelming existing solutions, most egregiously in places with booming populations like Southeast Asia.

M&B: How many homes can a Synova Plant power? What are the limits?

Ott: Our three standard sizes can power the equivalent of 1,100; 5,700 and 16,500 average U.S. homes, respectively. There is no real upper limit on the technology’s ability to scale, but we favor a distributed model to reduce truck traffic. A huge amount of CO₂ is currently spent hauling waste long distances, and we can stop that.

M&B: How long does it take a plant to pay for itself and be in the black?

Ott: Breakeven in most markets ranges from four to six years. Unique features of the technology mean it uses far less steel, is relatively passive, and its primary energy for the process comes from ash that others waste. These combine to make it cost effective at a distributed scale.

M&B: What happens to the tar? Does it gasify? Does it get burned too? Are there any residual chemicals beside CO₂ in the turbine exhaust?

Ott: Waste or biomass contains three categories of impurities: particulate, tars and “acid gases” (e.g., sulfur, nitrogen). We remove all three, in separate streams, which allows us to recover the tars. Tars are a “family” of molecules which simply did not get fully broken down before they left the gasifier, and they contain roughly 15 percent of the latent energy of the feedstock. We recirculate them to the gasifier in a way that assures they are broken down to result in pure hydrogen and carbon molecules, without wasting energy. The end result is an exhaust steam that is clean like natural gas, but with a beneficial (negative) carbon footprint.

M&B: What is your vision for the future?

Ott: While our first units offer power, the technology was designed to provide a green feedstock for the production of liquid fuels, chemicals or renewable natural gas. The molecules we produce can be synthesized into these things today and will be featured on future plants.

Conclusion

While it's not quite “Mr. Fusion” yet, Ott's relatively new venture is certainly taking an important step in the right direction. Synova Power has demonstrated the technology works with several plants and is now deploying commercial plants, with a growing waiting list. Obviously, reducing waste benefits our world in many ways. And reducing energy costs is

a financial benefit Synova offers. In other words, they put a buck on it!

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