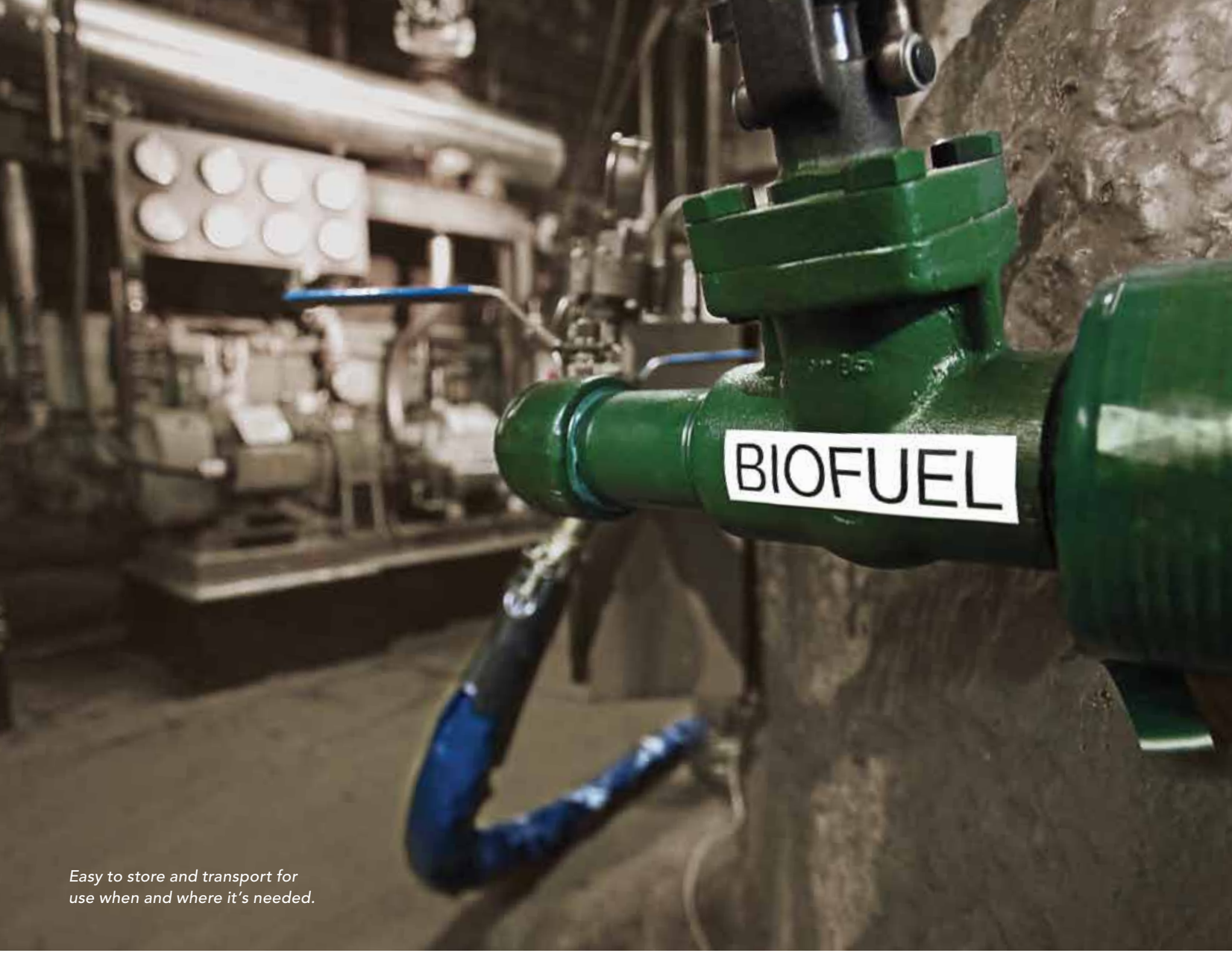


THE PRACTICAL, PROVEN PATH TO GREEN ENERGY.

RTP™ rapid thermal processing from Envergent Technologies

Envergent
TECHNOLOGIES
A Honeywell Company



Easy to store and transport for use when and where it's needed.

RTP VERSUS...

Direct Combustion

Direct combustion delivers considerably less useable energy per unit of feedstock than RTP. Burning residuals results in more variable energy production than burning more consistent, energy-dense RTP green fuel. And with direct combustion, once feedstock conversion begins, the energy must be used immediately on-site, unlike RTP green fuel, which can easily be stored for later use or transported to another facility.

Gasification

The processes associated with gasification are, themselves, energy-intensive. Gasification occurs as a result of high temperatures and high pressure, unlike RTP, which requires lower temperature and pressure. This makes RTP units considerably less expensive to build and operate. Gasification products are also less flexible than RTP green fuel because they're not transported as easily and must be used where and when they're produced.

Pelletization

While initial capital investment for pelletization is relatively low, the return on investment is notably higher with RTP technology. Pelletization is another form of direct combustion with the same shortcomings at a higher cost. Because the energy produced cannot be transported or stored, market options are reduced. Also, many users find the liquid RTP green fuel easier to manage than a solid.

Learn more about the advantages of RTP technology for your business.

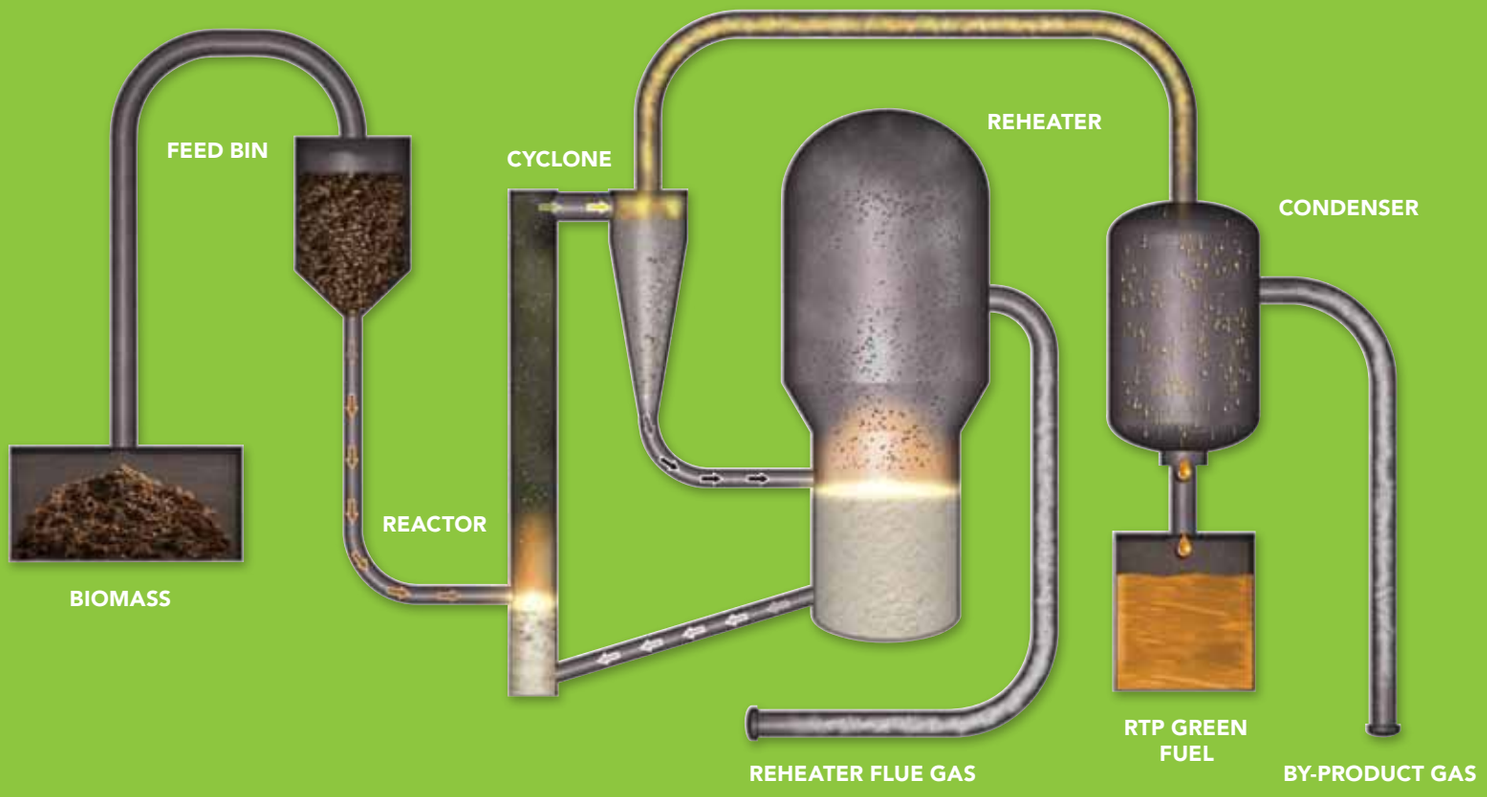
Visit our website, EnvergentTech.com, for complete information including video and an animated diagram of our process.

RTP CONVERTS BIOMASS TO LIQUID BIOFUEL FAST

Less than two seconds. That's all the time it takes to quickly convert biomass into RTP green fuel.

During the process, biomass is heated rapidly to approximately 500°C in the absence of oxygen. A circulating transported fluidized bed reactor system is at the heart of the process.

A tornado of hot sand vaporizes the biomass, which is then cooled rapidly, typically yielding 65 to 75% RTP green fuel. This pourable liquid can then be used for heat or electricity generation or upgraded to green transportation fuels.



RTP YIELDS

Rapid thermal processing quickly converts a wide range of biomass feedstocks into high-value RTP green fuel. This lignocellulosic biomass is readily available and does not compete with food crops, making it ideal feedstock for green energy conversion.

BIOMASS MATERIAL	YIELD (WT%)	HIGHER HEATING VALUE (BTU/LB)
Hardwood	70–75	7,400–8,200
Softwood	70–80	7,300–8,000
Hardwood Bark	60–65	7,180–8,680
Softwood Bark	55–65	7,180–8,500
Corn Fiber	65–75	7,570–8,680
Bagasse	70–75	8,100–8,200



RTP green fuel has almost no sulfur and is an ideal option for companies looking to reduce their carbon footprint.

DRAMATICALLY REDUCE GREENHOUSE GAS EMISSIONS

RTP green fuel contains almost no sulfur and is virtually carbon-neutral. It can be easily adapted for use in a wide variety of industries including pulp and paper, refining and petrochemicals, electrical generation and most energy-intensive heavy industries.

RTP is virtually self-sustaining, using the co-products produced to generate much of the heat and power required to operate the unit. The process produces char, which is consumed internally to generate the required heat for the process. Another co-product is gas, which can be used to dry the incoming biomass or for heat integration into the overall facility. These features are a distinct benefit for companies looking to reduce their greenhouse gas emissions.

RTP VERSATILITY MAKES GREEN ENERGY PRACTICAL. TODAY.

Modular delivery combined with minimal utility and infrastructure requirements make RTP ideal for remote or existing facilities. Modular equipment minimizes installation costs and time, and it keeps the units compact in design. Currently, commercial designs are available at 150 and 400 bone dry metric tons per day.

RTP can also handle a wide range of readily available feedstocks—forestry and agricultural residuals, postconsumer, wood-based construction and demolition materials as well as sustainable energy crops such as poplar and willow, miscanthus and switchgrass.

RTP is a proven, practical way to reduce your company's carbon footprint. Starting today.

RTP GREEN FUEL APPLICATIONS



HEAT

RTP green fuel has been used successfully in industrial burner applications, generating process heat or steam with very low SOx emissions. Burning of this fuel can also reduce greenhouse gas emissions by as much as 90 percent. RTP green fuel can be used as a cost-competitive direct replacement for natural gas or fuel oil, or it can be co-fired with coal or other fossil fuels.

To date, more than 15 million gallons of RTP green fuel have been used commercially to produce process heat, and the fuel has been proven to be a viable energy source in a variety of industrial burners. RTP green fuel can significantly contribute to the energy demand of large industrial facilities while reducing plant emissions and stabilizing energy costs. Each trial has clearly illustrated the economical and environmental benefits available with this new source of energy.



TRANSPORTATION FUELS

RTP green fuel can be upgraded to renewable transportation fuels using established UOP hydroprocessing technology. The process yields high-value, drop-in green transportation fuels, which can be blended directly into the existing fuels transportation infrastructure and does not +require any changes to vehicle or aircraft engines.

Envergent Technologies' parent company UOP is currently building a demonstration-scale facility in Kapolei, HI, backed by a $25 million award from the U.S. Department of Energy. The project, scheduled for initial start-up in 2015, will convert biomass feedstocks local to Hawaii to green transportation fuels. The effort is focused on showcasing the viability of the upgrading technology and better understanding the potential for environmental and economic benefits.



POWER

RTP green fuel can be used in modified turbines and stationary diesel engines to produce renewable electricity. Testing has shown that power production is possible at approximately 40% electrical efficiency (biomass to power) using 100% RTP green fuel in a stationary diesel engine. This approach is a highly cost-effective and environmentally responsible route to the production of green electricity.



Rapid thermal processing uses readily available, relatively low-cost biomass feedstocks that don't compete with food crops.

RTP™ RAPID THERMAL PROCESSING CONVERTS LOW-VALUE BIOMASS INTO A HIGH-VALUE LIQUID ASSET—RTP GREEN FUEL.

Envergent Technologies offers a practical and commercially proven path to green energy. This advanced technology is called RTP, or rapid thermal processing.

RTP is a fast thermal conversion process used to convert cellulosic biomass feedstock, usually forestry or agricultural residuals, into RTP green fuel—a light, pourable, clean-burning liquid biofuel. This fuel provides a sustainable, cost-effective and virtually carbon-neutral alternative for process heat, power generation and, with further refining, renewable gasoline, diesel and jet fuel.

Envergent is a biofuel pioneer backed by more than a century of energy experience.

As the first commercially available fast pyrolysis process and the only one with commercial units in operation today, RTP is leading the charge on this path for clean energy. The proven, commercially available technology provides sustainable fuel for heat and power generation in a variety of industrial processes. And companies around the world are currently developing projects with Envergent to take advantage of the benefits it can offer.

This worldwide success is the direct result of Envergent Technologies' rich heritage; the biofuel pioneer is a joint venture between two recognized technology leaders—**Ensyn Corp.** and **UOP, a Honeywell Company**.

UOP
A Honeywell Company

ENSYN

To date, Ensyn has designed and built seven commercial RTP plants in the United States and Canada. These plants currently process biomass for use in the manufacture of more than 30 commercial products ranging from food flavorings to adhesive resins for construction. Co-products are also used in a variety of commercial thermal applications. RTP has produced more than 30 million gallons of product for commercial use.

For almost a century, Honeywell's UOP has been delivering cutting-edge technology and products to the refining, petrochemical, gas processing and biofuel industries. Today, 60% of the world's gasoline and 85% of biodegradable detergents are produced using UOP processes.

UOP's efforts in renewable energy are focused on the production of drop-in fuels that utilize existing refining infrastructure and technology. Today, it licenses technologies for the production of Honeywell Green Diesel™ and Honeywell Green Jet Fuel.™







Envergent
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