

TODAY'S ENERGY TECHNOLOGY ADVANCEMENTS: PROVIDING CLEANER AND MORE EFFICIENT ENERGY

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SUMMARY - UTC Power, a subsidiary of United Technologies Corporation, is the world leader in commercial stationary fuel cell development and deployment. UTC Power also develops other innovative power systems for the distributed energy market. The company has developed an organic Rankine cycle technology known as the PureCycle® system for geothermal and waste energy resources. The PureCycle® system represents an innovative advancement in geothermal energy production that offers the possibility of tapping into significant previously unusable U.S. and international geothermal reserves for a domestic, renewable, continuously available source of power to meet the world's growing energy demands.

Geothermal energy addresses many of our global concerns, but its potential is largely untapped. UTC Power's PureCycle® system represents an innovative advancement in geothermal energy production and is operating successfully today at several sites, including: Chena Hot Springs Resort, Chena, Alaska, and Burgett Geothermal Greenhouses at Animas, New Mexico. UTC Power has also announced sales of 200 PureCycle® systems to Raser Technologies for deployment at a number of sites in the Western United States.

PureCycle® is also of particular interest for low-temperature geothermal and waste heat applications in New Zealand and Australia. Pacific Heat and Power is an authorized distributor of UTC Power's technology in this region.

1 DESCRIPTION OF PURECYCLE® TECHNOLOGY

The PureCycle® system is the product of a UTC brainstorming session focused on opportunities for organic growth. It is based on organic Rankine cycle (ORC) technology - a closed loop process that in this case uses geothermal water to generate 280 kW (gross) electrical power. A traditional air conditioner uses electricity to generate cooling. The PureCycle® system reverses this process and uses heat to produce electricity. The system is driven by a simple evaporation process and is entirely enclosed, which means it produces no emissions. The working fluid (R245fa) is non-ozone depleting, non-flammable, and non-toxic. The only byproduct is electricity, and the fuel – hot water – is a free renewable resource. In fact, after the heat in a geothermal application is extracted for power, the water is returned to the earth for reheating, resulting in the ultimate recycling loop.

2 INNOVATIVE FEATURES

The PureCycle® system reflects a number of key innovations and breakthroughs. Operating with geothermal fluid as low as 165° F, the Chena demonstration project has featured the use of

the lowest temperature geothermal energy resource in the world and the first time geothermal energy has been used to produce electricity in the state of Alaska.

While the PureCycle® system and its application to the geothermal energy market are new, the product draws upon decades of UTC innovation, operating experience and real-world expertise. Key components of the system are derived from commercial equipment produced by Carrier Corporation, a sister UTC company and a world leader in air conditioning and refrigeration technology. A significant portion of the PureCycle® system is based on UTC high-volume, off-the-shelf components that enhance the value proposition to customers. For example, the PureCycle® system heat exchangers and turbines can be built on the same manufacturing line as HVAC centrifugal compressors.

3 SIGNIFICANCE OF PURECYCLE® SYSTEM'S USE OF LOW TEMPERATURE GEOTHERMAL RESOURCES

The UTC Power geothermal system is unique in its ability to match the turbine design to working fluid properties, thus allowing the equipment to operate on a range of low to moderate temperature energy resources from 195° F (90° C) to 300° F (150° C). The ability to use small power units at lower temperature geothermal resources can make distributed generation much more viable in many different regions of the world. For example, the PureCycle® system has already added Alaska, and now New Mexico to the list of U.S. states using geothermal energy.

A large portion of the estimated known geothermal resources are expected to be in the low to moderate temperature range, including a large number of deposits associated with oil and gas wells that are currently not economically viable and therefore non-productive. For example, in addition to traditional stand alone geothermal opportunities, there are more than 500,000 oil and gas wells in the United States, many of which are unprofitable or unused due to their high volume content of water and relatively low percent oil. The use of this co-produced geothermal hot water, which is abundant at many oil and gas well sites, to produce a renewable source of electrical power could extend the life of many of these assets for both oil production and production of renewable electricity.

This would result in more efficient oil and gas production with significant positive environmental impact. The economic and energy independence impacts from power production via co-produced fluids could be significant. The innovative PureCycle® system technology offers the possibility of tapping significant global geothermal reserves for a domestic, renewable, continuously available source of power to meet the world's growing energy demands.

The low temperature capability of the PureCycle® system can also utilize separated brine from higher temperature geothermal flash plants as well as bottom many existing ORC binary power plants thus extracting more useful energy with no emissions. Compared to other geothermal technologies, the PureCycle® system produces electrical power at much lower pressure and utilizes non-flammable working fluids and therefore doesn't require attended operation.

4 CHENA DEMONSTRATION PROJECT

Alaska has some of the highest energy costs in the country for electric grid connected power and even higher costs for those off the grid. Chena is located 60 miles from Fairbanks, Alaska and 35 miles off the power grid. The Chena Hot Springs Resort, which operates independent of the

grid, pays 30 cents per kilowatt hour (kWh) for electricity. The UTC Power PureCycle® system allows the resort owners to save \$1,000 per day in fuel costs and eliminates the need for diesel fuel-burning generators and their harmful emissions.

Chena Hot Springs Resort has the distinction of being the first geothermal plant site in Alaska. By installing a UTC Power PureCycle® geothermal system, the resort enjoys all the benefits of its 24/7 renewable power source, including cleaner air and significantly reduced power costs. The site is the lowest temperature geothermal resource (165°F) ever used for geothermal power generation in the world. First commissioned as a demonstration project in August, 2006, the PureCycle® geothermal system has continued to operate successfully, while providing power for the resort's on-site electrical needs. The system availability is greater than 98 percent. This project has been recognized with numerous awards, including R&D Magazine's top 100 most technologically significant products introduced in 2007.

This project was made possible through a Public – Private Partnership between the U.S. Department of Energy, Alaska Energy Authority, Alaska Industrial Development and Export Authority, The Denali Commission, United Technologies Corporation, and Chena Hot Springs Resort.

5 CONCLUSION

In summary, the newly introduced PureCycle® technology provides a technology platform that lowers the useful temperature range for geothermal power production and offers expanded applications for sustainable and renewable electricity to meet growing global demand.

For New Zealand, this means providing power from shallower geothermal wells, smaller geothermal installations, and industrial and geothermal waste heat resources that are currently being wasted.

6 APPENDIX – ABOUT UTC POWER AND PACIFIC HEAT AND POWER

United Technologies Corporation (UTC) is a diversified company that provides high technology products and services to the aerospace and commercial building industries worldwide. UTC's products include Carrier heating, air conditioning and refrigeration equipment; Hamilton Sundstrand aerospace systems and industrial products; Otis elevators and escalators; Pratt & Whitney aircraft engines and power systems; Sikorsky helicopters; UTC Fire & Security systems; and UTC Power fuel cells and onsite power solutions. UTC is a Fortune 50 company and a component of the Dow Jones Industrial Average index.

Pacific Heat and Power Pty Ltd is an Australian company established to support the sale, integration, installation, commissioning, service and maintenance of UTC Power products in Australia, New Zealand and the Pacific.