

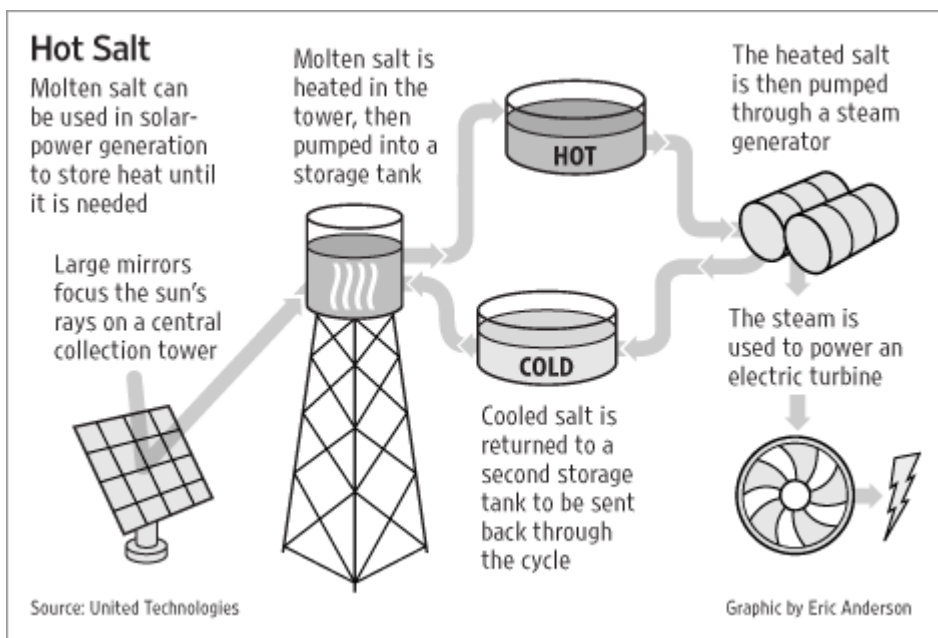
Solar Venture Will Draw on Molten Salt

United Technologies, US Renewables Link Up For Clean-Fuel Project

By J. LYNN LUNSFORD

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WINDSOR LOCKS, Conn. -- **United Technologies** Corp.'s Hamilton Sundstrand unit, more commonly known as a major supplier of components for the aerospace industry, believes it can draw on lessons learned from a 25-year-old science project to help change the way electric power is generated.



Hamilton Sundstrand is scheduled to announce today that it has teamed with US Renewables Group to commercialize a new type of solar-power plant that will use molten salt to store the sun's heat so it can be converted to electrical power even when the sun isn't shining. Company officials say rising fossil-fuel prices have made it possible for such plants to be competitive,

particularly for generating electricity during periods of peak demand when utility companies pay premium prices. US Renewables Group is a \$575 million private-equity firm that specializes in renewable-power and clean-fuel projects.

"We think there's a huge market out there," said David Hess, president of Hamilton Sundstrand, which reported 2006 segment revenue of \$5 billion. Mr. Hess estimated that Hamilton Sundstrand can generate a total of about \$1 billion in sales of solar-power equipment in the next 15 years.

The solar-power business is the latest in a string of developments for a United Technologies unit that rarely receives attention when compared with its big-name corporate siblings such as Otis (elevators), Carrier (air conditioning) and Pratt & Whitney (jet engines). Although Hamilton Sundstrand generates about one-third the revenue of

Otis or Carrier, it has chalked up some big wins on important airplane programs that have helped it become one of the leading names in aerospace.

Hamilton Sundstrand got a boost when it won contracts for a majority of specialized systems on **Boeing Co.**'s 787 Dreamliner, upsetting previously dominant rivals such as **Honeywell International Inc.** Hamilton's equipment content on the 787 alone totals about \$2.5 million per airplane, with orders for 790 planes on the books.

The company also won key roles in providing equipment for European Aeronautics Defence & Space Co.'s Airbus A380 and A400M and for Embraer Empresa Brasileiras de Aeronautica SA's ERJ 170 and 190 regional jets. It supplies systems for the National Aeronautics and Space Administration's Orion crew vehicle being developed for the planned return of astronauts to the moon.

Hamilton Sundstrand officials say the solar-power business will be managed through a new entity called SolarReserve, which will hold the exclusive license to market and operate utility-scale solar-power plants world-wide. Under the agreement with US Renewables Group, Hamilton Sundstrand's Rocketdyne segment will provide heat-resistant pumps and other equipment, as well as the expertise in handling and storing salt that has been heated to more than 1,050 degrees Fahrenheit. The company says plants using this method will be able to generate as much as 500 megawatts of peak power or run continuously at 50 megawatts. One megawatt is enough power to supply about 1,000 U.S. households.

"Due to the unique ability of the product to store the energy it captures, this system will function like a conventional hydroelectric power plant, but with several advantages," said Lee Bailey, managing director of US Renewables Group. "This product is more predictable than water reserves, the supply is free and inexhaustible, and the environmental impact is essentially zero."

Mr. Bailey said US Renewables has invested in geothermal, biomass and other environmentally friendly power projects, but it hadn't found an appropriate solar technology until it learned of Rocketdyne's method of using molten salt to hold heat. According to the company, molten salt loses only about 1% of its heat during a day, making it possible to store energy for long periods of time. The salt is a mixture of sodium and potassium nitrate.

The solar-plant technology was first demonstrated by Rocketdyne in the 1980s, using the sun's heat to convert water into steam to drive generators. In 1994, the project was modified to include the use of molten salt for energy storage. In such a system, the molten salt is pumped through a tower, where it is heated by the sun's rays. The salt is then stored in insulated containers until it is needed. It is then used to convert water into steam that drives turbines that generate electricity. The solar demonstration project was decommissioned in 1999.

United Technologies bought the Rocketdyne business from Boeing for \$700 million in 2005 and split up the unit's businesses among Pratt & Whitney and Hamilton Sundstrand.

While it might be promising for some areas, so-called concentrated solar-power stations will likely represent only a small part of the world's power-generation needs. They are most suited for regions that have a combination of predominantly sunny climate and large open spaces that can handle the 1,200-acre field of mirrors, called heliostats, needed to reflect the sun's energy to a 600-foot tower that houses the receiver for collecting the sun's energy. Ideal locations include the U.S. Southwest as well as southern Europe, Australia and Africa.

In November, the U.S. Energy Department said it would provide \$5.2 million in funding to support the development of low-cost concentrated solar power such as that being advocated by SolarReserve. An additional \$7.2 million has been earmarked to support commercialization of clean energy technologies.

Write to J. Lynn Lunsford at lynn.lunsford@wsj.com¹

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