

CANDID visions



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DIFFICULT GLOBAL ECONOMY PROVIDES OPPORTUNITY TO BUILD A SUSTAINABLE ENERGY INFRASTRUCTURE

THE FUTURE IS not canceled, the global economy will recover, and this is the perfect time to invest in the energy infrastructure. To that end, Dresser-Rand is seizing the moment. We're optimistic about the future of the energy sector and the incredible opportunities it offers us during the current economic crisis to maintain our focus, and to build a cleaner, more sustainable energy future.

The International Energy Agency (IEA) reports that demand for energy will be 40 percent higher in 2030 than it is today and will double by 2050. Make no mistake; fossil fuels (oil, natural gas and coal) will remain a critical part of that energy mix for the next three to five decades. IEA's data also indicate that 64 MBPD (million barrels per day) of gross oil capacity needs to be installed by 2030 – six times the current capacity of Saudi Aramco – just to keep up with the demand for current fossil fuel.

Whether or not you believe in global warming or putting clean coal power plants in your backyard, the fact is that 97 percent of the projected increase in energy-related CO₂ emissions between now and 2030 is coming from non-OECD countries, which includes China and

India – with non-OECD coal being the greatest source. One can argue that zero net emissions is a worthy goal. Renewables and alternative energy technologies have their place in the global energy mix as well. And so, as we have never experienced, energy and the environment become flagship issues for the Obama administration. As we go to press, a climate change bill is working its way through the U.S. Congress in preparation for the United Nations Climate Change Conference in Copenhagen this year. No doubt it will have aggressive goals similar to Obama's campaign promise to cut U.S. emissions of greenhouse gases by approximately 17 percent (to 1990 levels) by 2020 and to 80 percent below 1990 levels by the middle of the century.

It is with this backdrop that I am delighted to introduce this special issue of insights magazine, dedicated entirely to Dresser-Rand's environmental initiatives.

ENVIRONMENTAL SOLUTIONS WITH ECONOMIC VALUE

Dresser-Rand clients know us best for our ability to bring equipment solutions and premier service for high-speed rotating equipment to the energy infrastructure markets. Beyond oil and gas, our markets increasingly encompass power generation and its associated technologies. We continue to widen our markets by investing in new technologies and companies

that offer exceptional environmental benefits and the economic value propositions that allow our clients' facilities to operate more efficiently or help them to be more competitive in their markets.

In fact, two recent acquisitions are among a number of environmental technologies discussed. We're focused on markets in this issue, in particular the emerging "green" market opportunities: CO₂ sequestration; marine wave energy; floating LNG; combined heat and power; turbo-compound systems; and compressed air energy storage.

Dresser-Rand is determined to be well positioned and participate in the continued build out of the energy infrastructure in an environmentally responsible way for decades to come, so read on and stay tuned!

ENERGY STORAGE

Compressed air energy storage (CAES) offers an efficient, intermediate-type of load source, and provides utility operators the means to more efficiently operate their base load power plants. And CAES can be one of the most significant enablers to base load deployment of solar and wind, complementing these intermittent renewable energy sources. As utilities add new generation, CAES offers a green flexible option – one that Dresser-Rand is poised to offer clients.

Continued on page 2

CLEAN COAL TECHNOLOGY AND CO₂ SEQUESTRATION

With coal being the most abundant and affordable fossil fuel resource in North America and China, along with the projection / estimate that it will continue to be used for 46 percent of all power generation globally from now until 2030, it is no surprise that energy security advocates insist that clean coal technologies be a part of the energy mix, making carbon capture and storage (CCS) technologies critical to our energy industry future. Broadly speaking, the technologies associated with CCS exist or will be proved feasible in the near term, but it is the cost associated with implementing those technologies on a broad scale that is challenging. Our investment in Ramgen Power Systems supersonic compressor technology is projected to reduce the capital costs of CO₂ compression (one of the most expensive aspects of this process) by as much as 65 percent, and to reduce operating cost by a minimum of 25 percent.

Dresser-Rand is already a leader in CO₂ compression and our advanced centrifugal compressor technology is already a part of CCS applications. These include the StatoilHydro Sleipner field CO₂ injection that has injected 10 million tons of emitted CO₂ since 1997, and Encana's selection for the IEA greenhouse gas Weyburn CO₂ monitoring and storage plant in Canada.

More recently, the DATUM[®] advanced centrifugal compressor is a part of a full-scale integrated gasification combined-cycle (IGCC) carbon capture demonstration project in Indiana, USA. Since its introduction in 1995, the DATUM compressor line has demonstrated superior efficiency and reduced emissions, and has enabled us to provide clients with the lowest life cycle costs. We continue to enhance this product line, adding new models such as the DATUM C for pipeline and storage applications and the DATUM I integrated compression

system (ICS) to meet compact compression requirements offshore and subsea.

Recently, Dresser-Rand joined with Praxair; the Jamestown Board of Public Utilities in Jamestown, New York; Foster-Wheeler; Ecology and Environment Inc.; State University of New York at Buffalo, Battelle, WorleyParsons, and Schlumberger to form the Jamestown Alliance where we have proposed to the U.S. Department of Energy to build a commercial demonstration of a fully integrated coal-fired power plant using integrated oxy-coal CFB (circulating fluidized bed) technology. Because this technology would change the way coal is burned, it is part of the technology roadmap to efficiently and cost effectively allow CO₂ to be captured and safely stored underground. This new technology also holds the promise of reducing the world's carbon footprint by retrofitting existing coal production plants, and is just one example of creating an environmentally responsible means to maintain coal production around the world.

Whether it's our current advanced DATUM centrifugal compressor or the supersonic Ramgen Power Systems technology that's under development, Dresser-Rand has the solutions to support these new carbon capture technologies as they develop.

RENEWABLE ENERGY TECHNOLOGIES

We are seeing renewable energy technologies emerge as a viable option to meet future energy needs in a clean and sustainable manner. Dresser-Rand's steam turbine line-up is respected in the renewable energy market with technology that uses captured waste heat in a combined cycle process for greater efficiency, as well as in processes burning biomass (*e.g.*, wood, waste, alcohol fuels) as a renewable fuel source to produce power. These processes reduce fuel emissions, significantly minimizing the amount of CO₂ entering the atmosphere.

WAVE ENERGY

When our UK subsidiary, Dresser-Rand Company Ltd., acquired certain assets of Peter Brotherhood Ltd. last year, it expanded our renewable energy capabilities. The company has considerable experience in steam turbine systems for combined cycle and cogeneration, and waste-to-energy, among other applications. But one of the most interesting technologies is the patented air turbine – the HydroAir[™] turbine – specifically targeted at the oscillating water column (OWC) or “wave energy” market. Marine renewable energy is becoming part of the renewable energy mix. Capturing just five percent of this theoretical global resource could satisfy 25 percent of the current global electricity consumption of 18,000 TWh/year. Our HydroAir turbine's unique energy recovery system can be applied to offshore, near-shore and on-shore applications.

FLNG AND ACCESS TO STRANDED GAS RESERVES

The “migration” of oil and natural gas production to deeper waters has increasingly come to include floating platforms such as semi-submersibles and floating production, storage and offloading (FPSO) vessels. One of the challenges, however, is transporting natural gas that remains untouched in the world's stranded reserves, or ESRs (also known as “stranded fields” or “stranded reservoirs”). These reserves are in remote areas where gas is often shut in, flared, re-injected, or otherwise wasted and, therefore, kept off the market.

The stranded gas contained in these reserves represents billions of dollars in potential energy supply. As accessible reserves have become more difficult to find, greater attention has been given to the feasibility of stranded reserves. Several reasons account for this change in outlook, including new technologies, more stringent environmental regulations such as anti-flaring and emissions policies, and greater cooperation between suppliers and govern-

ments when it is shown that gas extraction can benefit local municipalities.

One new approach to do just that has been developed by Flex LNG Ltd., a London-based company founded in 2006 to commercialize mobile liquefaction technology. The company has commissioned the world's first floating LNG (FLNG) facility in an effort to exploit stranded reserves on a commercially profitable scale. Dresser-Rand was selected last autumn to supply the gas turbine/compression equipment for this important industry first. There are more than 1400 small-to medium-sized gas fields with reserves between 0.25 and 5 TCF that provide market opportunity for using floating LNG technology.

TWO (OR THREE) FOR ONE: COMBINED HEAT AND POWER ALTERNATIVES

A tri-generation system designed and installed by Aircogen CHP Solutions Inc. for a pharmaceutical plant in the northeastern U.S. demonstrates how the correct application of a packaged tri-generation system can help clients deliver on their carbon reduction promises while delivering energy savings. The system provides electricity, heating and cooling year-round to the company's manufacturing facility and is helping meet its mandate to reduce energy costs and greenhouse emissions seven percent by 2010.

Dresser-Rand is a global distributor of and provides a service support network in the oil and gas market for Ingersoll Rand Energy Systems microturbine product line. Microturbine technology exemplifies an emerging method of cogeneration, producing both thermal and electric energy simultaneously to create energy from a single fuel source. By reducing levels of nitrogen oxide, and by providing electricity and heat with the same fuel, cogeneration helps protect the environment. Furthermore, increased fuel efficiency reduces pollutants,

and every percentage point gain in efficiency proportionally reduces greenhouse gas (ghg) emissions.

TACKLING CARBON ISSUES AND EFFECTS OF CLIMATE CHANGE

Dresser-Rand's acquisition of Enginuity® last autumn further positioned Dresser-Rand as a provider of emissions technology solutions. We recognized early that Enginuity (a private, U.S.-based provider of combustion and catalytic emissions technology solutions, controls and automation, and aftermarket services for reciprocating gas engines used in the gas transmission market) had a great deal to offer in meeting emissions standards. With the impact that these solutions already have on clients, Enginuity had the experience and the necessary relationships to strengthen and move Dresser-Rand's position forward in this important market. Enginuity's solutions reduce many pollutants such as NO_x, CO, hydrocarbons, hazardous air pollutants, and ghg that include both hydrocarbons (primarily methane) and CO₂. In fact, Enginuity's installed solutions reduce NO_x emissions by about 120,000 tons a year and greenhouse gas emissions by more than 100,000 tons a year.

Dresser-Rand has also licensed certain technology from TransCanada Corporation and is developing a supersonic ejector technology that captures and reclaims gases ordinarily vented into the atmosphere. These ejectors offer exceptional environmental benefits while enabling facilities to operate more efficiently.

FCC ENERGY CONVERSION – RELIABLE, PROFITABLE, GREEN

In the early 1960s, we began designing, manufacturing, installing, and servicing power recovery expanders applied in oil refinery catalytic cracking units. These units are installed in both fluid catalytic cracking (FCC) and resid catalytic cracking (RCC) units.

The FCC process in refineries operates at elevated temperatures and pressures. Capturing the energy from the flue gas stream before it is exhausted to the atmosphere via our power recovery expander can enable a refinery to significantly reduce its expense for purchased energy and to improve its overall energy index rating.

DOING OUR PART "HERE AT HOME"

Our new Technology Center under construction in Olean, New York, demonstrates our ongoing commitment to environmental stewardship and responsibility. The facility, which will accommodate nearly 500 employees, is designed to meet the standards of the most widely accepted rating system for evaluating high-performance green buildings – the Leadership in Energy and Environmental Design (LEED) rating system of the U.S. Green Building Council (USGBC). LEED-certified buildings provide work environments that improve employee health and comfort and contribute to higher productivity.

It is also interesting to note that approximately 90 percent of our client contract drawings are issued electronically and are, therefore, paperless. Not only does this ease the burden on the environment, but this format gets information into our clients' offices faster – and in a format that's generally easier to manage.

MOVING FORWARD

Dresser-Rand is proud of its history and its continuing commitment to responsibly meeting global energy demands. And we're excited about the opportunities ahead. We're helping our clients improve their process efficiencies, meet increasingly stringent environmental regulations and increase energy capacity worldwide...all the while remaining focused on the environment. ■