Radical innovation – the challenges facing the energy industry

David Dumeresque of Tyzack Partners discusses how to stand out from the crowd in an ever-changing sector.

With the global population growing by an estimated 80 million people every year, including a significant increase in middle-class consumers, it is forecast that by 2030, the nine billion people living on this planet will need 40% more energy than is produced today. Yet already, some 1.3 billion people are without electricity. Do these statistics, as some commentators are suggesting, paint a rosy picture for energy producers, or are they more suggestive of a giant Gordian Knot?

The global well-being of people, industries and economies depends not only on the provision of environmentally safe, sustainable, secure and affordable energy but also on access to clean drinking water and nutritional food. Energy, water and food have become inextricably linked, and their scarcity and the complex connectivity requiries a radical rethink of corporate environmental behaviour.

In Europe, energy-related emissions account for almost 80 percent of the EU's total greenhouse gas emissions, with the energy sector representing around a third of these emissions. This compares unfavourably with transport (19 percent), industry (13 percent) and households (nine percent). Additionally, there is the further environmental impact of our energy production encompassing air and water pollution, and waste.

Our current energy systems and the way we produce, transform and consume energy are, therefore, unsustainable. Emphasis must be placed on developing more innovative ways of sustainable energy provision.

Reducing the reliance on fossil fuels by diversifying into wind is one answer to producing cleaner and more cost-effective energy. However, the big increases in the number of middle-class consumers globally has resulted in a massive change in the demand for food, especially meat products. Since it takes about eight kilos of grain to produce 500 grams of meat, there is an immediate conflict between the production of grain for food production and for biofuel feedstocks. Furthermore, according to Nestle CEO Paul Bulcke the crisis developing in the availability of suitable water could cut the global cereal production by some 30 percent by 2030.

Unless half of the world's population switches to a vegetarian diet, the current biofuels trend is not sustainable because we would need to have a doubling of agricultural output over the next 30 to 40 years. In the US alone, food production already accounts for around 50 percent of available land and 80 percent of fresh water.

Just as a billion people currently are without electricity, almost one billion people don't have access to safe drinking water. With the population forecast to rise to nine billion by 2030, and climate change forecast to further shrink the availability of suitable water, this situation is set to escalate. As President John F Kennedy said in 1962: "If we could produce fresh water

David Dumeresque

from salt water at a low cost, that would indeed be a great service to humanity, and would dwarf any other scientific accomplishment.”

Desalination plants are widely viewed as a vital option for the provision of water to support economic development and social stability, particularly in many arid, coastal areas around the world where fresh water is not easily accessible. A 2010 Global Water Intelligence report predicted that the demand for desalination will almost triple by 2016, resulting in a possible global desalination market that will top $US30 billion. Over the past few years, we have certainly made great strides in the provision of desalination plants around the world. However, the desalination industry has been limited by the fact that it requires significant amounts of energy which, perversely, has kept the cost of desalination plants too high and out of reach for the majority of those most in need fresh water.

Ongoing investment in desalination R&D, particularly in the areas of reverse osmosis (using membrane technology) and thermal desalination, is producing innovations that are reducing the industry’s energy requirements. Further efficiencies are being made by coupling thermal distillation plants with power plants. This dual-purpose approach uses waste heat from the power plant to warm the seawater for distillation.

Additionally, some areas of the Middle East are maximising on lower power use (and lower cost) during the cooler winter months (as people use less energy for air conditioning) to produce excess volumes of desalinated water. These reserves are then stored for use in the hotter summer months when energy costs are much more expensive. This is a win-win situation for both industries: lower cost for fresh water production and more efficient use of power plants over a 12-month period.

Whilst continuing investment and off-peak approaches are a positive move to providing cost-effective provision of drinkable water, most of the world’s desalination plants still rely on energy produced by fossil fuels. In the long-term this makes them unsustainable, both environmentally and economically. In the Middle East and North Africa, even though there are substantial supplies of oil in the region, major plans are afoot to change from fossil fuel to renewable energy.

With the world’s second largest proven crude oil reserves (after Venezuela), Saudi Arabia is actively pursuing alternative energy sources such a solar power. Whilst this may seem paradoxical, the overriding reason for this move is to reduce the use of expensive (and income-producing) oil for making drinkable water. It is believed that the Kingdom is also considering nuclear power as another option for powering its desalination plants, but there are geopolitical issues here regarding Saudi Arabia importing nuclear fuels and technology.

There are many hurdles to overcome for the Saudis (and others in the Middle East), not the least of which is sand and its deleterious effects on solar panels. However, the Kingdom is aiming to have all its desalination plants powered by solar within the next seven to ten years. With upwards of 300 hours of sunshine per month, this makes solar both a politically- and environmentally-viable alternative for renewable energy development.

The expansion of renewable energy projects in the Middle East and North Africa is not only being driven not only by the scarcity of drinkable water, but also by increasing energy demand and security enhancement, coupled with economic progress. Whilst solar energy is rapidly being pursued for water desalination, investment in wind energy projects is greater than any other renewable energy technology, with an average annual growth rate of almost 30 percent.

In Europe, the scene is very similar. In a recent report from the European Wind Energy Association (EWEA), offshore wind has become one of the fastest growing maritime industries, employing close to 60,000 people. And this figure doesn’t include all those involved with the supply chain side of the industry. By the end of 2012, there were more than 1,600 turbines totalling 5 GW of installed offshore wind capacity spread across 55 wind farms in 10 European countries. The forecast for 2020 is an eight-fold increase to 40 GW, which will satisfy approximately four percent of Europe’s electricity demand.

"More than 70 per cent of the energy companies surveyed believed they would not have sufficient leadership talent to meet the industry's future challenges"

However, it is widely held in the industry that to continue this growth and satisfy the increasing demand for 'clean' electricity, the development of deep water structures – in depths greater than 50 meters – is required. In a general sense, this is not a problem. The North Sea alone has water depths ranging to more than 200 metres. The challenge is to integrate a significant level of wind energy from deep water structures into existing electric grids, and to reduce costs and set pricing policies that will provide investors with the confidence they need to participate.

Regulatory uncertainty is a further challenge facing deep offshore wind deployment. Given that investments in the renewable energy sector have very long lead (and payback) times, there is an urgent need for a clear, stable and binding pan-European legislative framework essential to encourage such investments. Since the EU objective is to reduce green house gas (GHG) emissions by 80-95 percent by 2050 compared with 1990 levels, commitments to long-term renewable energy targets must also be established.

In addition to the environmental and economic advantages of wind power, the appropriate siting of deep water wind farms can also benefit the marine environment. The foundations and moorings of both fixed and floating wind farm structures can act as fish aggregating devices (FADs), becoming artificial reefs and contributing to an increase in maritime flora and fauna.

Since trawling is limited inside wind farms in most EU countries, restocking areas where excessive fishing has severely threatened both fish and invertebrates becomes a very real possibility through the careful siting of deep water wind structures. Companies involved in these projects would do well to include this outcome in their corporate environmental initiatives.

Advanced and more innovative ways of sustainable energy development will also benefit the availability of water and food on a global scale. However, much will depend on having the right people employed to achieve this objective. Even though we are starting to experience an increase in employment opportunities in the renewable energy sector, both at junior and senior levels, there is a shortage of key talent within the entire energy industry that has reached a critical level. For some years, the industry has registered a steady decline in the number of new recruits with science, engineering and technical (SET) skills, and this is being exacerbated by a large section of the industry's workforce now reaching retirement age.

In a 2008 report from the Energy Institute, more than 70 per cent of the energy companies surveyed believed they would not have sufficient leadership talent to meet the industry's future challenges. Given the number of new global energy projects on the drawing board, this has to be of concern to all senior executives and non-executive board members.

By aggressively raising their corporate profiles, energy companies can present themselves to young candidates as one of the most exciting and career-rewarding industries for the future. This needs to be backed up by improving the work-life balance of young recruits, providing appropriate mentoring programmes with more experienced staff members, and investing in innovative methods of ongoing training and development.

With older skilled workers, the corporate emphasis must be on the retention of vital intellectual capital and the knowledge transfer between generations. Those nearing retirement may find a move to a less stressful junior management position, even on a temporary basis, a non-executive position or even a consultancy post, quite rewarding.

Given that many of our current global energy systems and the way we produce, transform, store and consume energy are unsustainable, it is imperative that energy companies come up with innovative ways of developing and managing sustainable energy projects throughout the 21st century and beyond. By focusing positively on a shared experience among the generations of employees, the most successful companies will be those who are able to harness the power of experience with the vibrancy of youth. ■

www.tyzackpartners.com

About the company

David Dumeresque is a partner at Tyzack, a global executive search consultancy, where he recruits senior executives and board directors across the full range of group corporate centre functions. He has over 30 years' experience of advising many different organisations, from the largest multinational to small owner-managed businesses. A qualified solicitor, David is a graduate of the University of Durham.