

# Floating Electricity

By Gunter Pauli

*This article introduces a creative approach to electricity generation in crisis areas as one of the 100 innovations that shape "The Blue Economy". This article is part of a broad effort to stimulate entrepreneurship, competitiveness and employment.*

## The Market

The world market for back-up electricity generators was in 2010 approximately \$ 11.5 billion. By 2009 some 9.3 million back-up energy supply systems had been installed worldwide. The number is expected to increase to 13 million units by 2013. Whereas the sector took a hard hit during the 2008 recession, the fact that an estimated 80 countries in the world face long term electricity shortages ensures that demand for energy security systems will pick up as soon as the economy rebounds. The crisis surrounding the meltdown of the three nuclear power stations in Fukushima, Japan has put this otherwise perfectly predictable country on the top of the list of buyers of emergency equipment adding 1.5 GW with small gas powered generators.

The aging infrastructure and the increase of climate change related disasters has further strengthened structural demand. Any region in the world regularly affected by typhoons and hurricanes, earthquakes and tsunamis is taking precautions. Even the United States, a market known for stable and cheap energy supply saw sales of back-up systems grow to \$1.2 billion in 2010. However, it was the mobile telecommunications sector that drove the market to unprecedented sales worldwide over the past decade. Each transponder tower requires back-up energy. While in 2005 still 81 percent of all back-up relied on diesel, emissions controls are forcing a shift towards gas and fuel cells. The market share of gas powered systems grew in five years from nearly nil to 12 percent. It is expected that the latest surge in Japan for this type of generators will lift it above 20 percent.

## The Innovation

In case of emergencies, exceptions to standard environmental regulations are quickly granted. Worse, renewable energies are seldom considered since solar panels and windmills take time to ship, install and operate and are more fragile to handle. Another stumbling block is that most renewable energy sources cannot provide the base load energy required to have a stable electricity supply. On top of these inconveniences, the cost for renewables is considerably higher. That is why local energy supply is typically secured through kerosene and compressed natural gas which are the favorite power for small and portable generators. While nearly all generators are noisy, these are most easily available due to planning and permitting issues. The innovations of these systems have therefore been limited to noise reduction and fuel efficiency.

Morten Sondergaard has earned over the years his marks as an entrepreneur in telecommunications and the internet. When Central Japan faced black-outs due to the shortage of electricity supply in the aftermath of the meltdown of the nuclear power stations in Fukushima, he wondered how to secure electricity to a megapolis like Tokyo. The installation of a series of small generators would only represent a minor patch on a large open wound. He recalled that oil platforms have energy supply ships that provide base load power to the operations at high sea. Since the local grid is intact -as is the case in Tokyo and inland Tohoku- it is possible to generate power with an energy ship, using existing turbines and co-generators already placed on the boat. This energy vessel produces megawatts of electricity with great flexibility and even mobility, something unheard of in the industry. In the case of Tokyo, the ship can be moored in the center of the city. However, if permitting proves difficult, the supply boat could be located in international waters, with a cable to connect to the shore feeding directly into the grid using a standard transformer.

### **The First Cash Flow**

Mr. Sondergaard went on to equip the energy vessel based in Dubai, installed two top generators from Siemens, and prepared the boat to house 8 generators, with a combined capacity of just under 200MW/hr. Then he masterminded to rely on biodiesel, making it the first ever biofuel energy ship ready to supply power to a disaster zone, or providing the supplementary electricity in peak periods like the hot and humid summer time in Japan where the nuclear disasters have left the local electricity supply in disarray.

The energy ship is not a unique vessel. There are an estimated 160 equivalents floating providers of electricity. However, the use for emergency relief has not been undertaken before. Morten's proposal is to have multiple ships equipped and on stand-by so that when disasters strike, like a nuclear meltdown, endangering the livelihood of large urban areas along coastal zones, these powerful generators can provide the massive support that is urgently needed. These ships typically are located in areas where offshore oil platforms are operational like the European North Sea, the Gulf of Mexico, the Middle East, off the Brazilian coast and along the West Africa from Angola to Ghana. Since the location of these ships spans the world, it is not only possible to plan for a fast arrival, it is also possible to plan for filling the ship's cargo space on the way to its destination with biofuels making this operation as sustainable as possible. A fully loaded ship could hold as much as 80,000 tons of biofuel securing an independent supply of electricity for 3 months non-stop at the rate of nearly 200 MW per hour. This strategic choice does not have to be limited to emergencies, it could also provide the additional power required for huge sporting events like the Olympic Games or the World Cup football.

## The Opportunity

The use of available vessels to quickly provide local renewable energy is an opportunity that is close to the concept of the Blue Economy. Whereas there are hard questions that must be raised with the use of biofuels, that cannot compete with food security, the option to power this back-up supply with multiple renewable fuels is potentially a plus. One of the core considerations is speed and cost. Since the ship can be operational on site in a matter of weeks, large scale power can be offered without the need for any investments in infrastructure. The second advantage is that the floating energy ship can deliver electricity to the end user at the same price as the grid, even though the intermediary will see margins shrink. But in case of emergency, it is only natural that the huge mark-up of factor 5 to 10, which electricity companies usually charge over production costs, does not apply. How could the electricity company make a fortune on a disaster - caused by their incapacity to fulfill a mandate?

In the case of Japan, the usual cost per kW/hr has been around ¥25, but lately the charges increased by 25% reflecting the higher cost of investment and fuel. Floating electricity can be delivered at the same rates. It represents in the Japanese context a huge marketing advantage and a window to open supply to qualified providers. Anyone interested in securing a summer without black-outs can buy over the internet their requirements. With the horrible experience of the citizens of Tokyo who had to go to work with an overnight bag, since for weeks no one was not sure how the roll-out of the black-outs would affect office or public transportation, it is expected that Japanese citizens will go for certainty. The floating electricity could then well become the people's power, breaking the monopoly of corporations. This offers the opportunity to build up social capital, a key concept of the Blue Economy.

# The Blue Economy

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... Further information on the 100 innovations at [www.theblueeconomy.org](http://www.theblueeconomy.org)

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