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Energy Crisis' and the Growing Need for a Uniform Global Solution

Electricity, like water and food is considered one of the most basic necessities for everyone in the Developed World. Our lifes are fully electrified, from the appliances at home, to the transportation sector, our work place, the elevators, the sports complexes, schools, shopping malls, media outlets and the information superhighway. The recent blackout in the Northeast yet again demonstrated the extent to which we rely on the elusive kilowatt-hour – silent, invisible to the eye, and yet powerful enough to change our lifes.

If the electric grid – along with the generators and the distribution substations -- operates in a normal manner, we all take electricity for granted. We also tend to overlook the fact that over 2 billion people on this planet do not have access to electricity and that providing electricity to them in a clean, efficient, expedited manner will bring about yet a new set of challenges.

The average consumer is blissfully unaware of where and how the kilo watt hour (kWh) is generated, the manner in which it travels along the grid to ultimately power any of a myriad of gadgets surrounding each and everyone of us. We also do not focus on the numerous social and environmental issues related to the production of the kilowatts that power our lifes, such as: the mining of finite fossil resources (oil, coal and gas); the transportation of fossil fuels via tankers, railways, pipelines, etc. the controversies related to the siting of power plants and power transmission lines, the harmful emissions of the smoke stacks and related air quality and global warming concerns, as well as the disposal of waste materials (some of which remain hazardous for 50,000 years, such as high level radioactive waste, for which we have yet to find a safe repository). To top it all off, the enormous quantities of fresh water utilized to cool thermal power plants appear to be totally disregarded. According to the US Department of Energy, cooling thermal power plants is the second largest user of fresh water in the U.S.

roughly 38% is consumed for cooling, agricultural irrigation squeaks ahead in a narrow lead at 39%. An estimated 190 million gallons per day of fresh water is utilized to cool power plants in the U.S. alone.

Taking all of the above into account – it is almost a miracle that we have as few interruptions as we do in the inherently complex mechanical system that exists for the generation and transportation of electricity. It is also interesting that the intrinsic vulnerability and associated social and environmental issues of an electric system relying primarily on large central power generators and an elaborate grid, only surfaces into the realm of public debate in a time of crisis. For example, the recent outages the Northeast US and Canada have sparked a heated debate as did the forced power shortages due to lack of adequate amounts of cooling water in Europe this summer, the 2000-2001 energy crisis in California, the power outage in the Northwest caused by sagging power lines in 1996, the Chernobyl disaster caused by human error and outdated technology in 1986, Three Mile Island, the energy crisis in the 70s, etc.

All of the crisis related discussions have identified certain common themes, such as a need to improve reliability of the system through better design; a need to diversify supply, increase the use of renewable energy and not to rely primarily on one type of fossil fuel or another – be that gas, coal or nuclear. Energy efficiency and clean distributed generation technologies are also important elements in the context of a comprehensive energy policy debate.

On a global scale, power supply is the most capital-intensive sector of all. Every industry and every aspect of social progress is heavily dependent on energy. Electricity can be transported over vast distances and its impact cannot be limited to a specific region. Indeed that impact can cascade through countries and continents (ground water contamination, air quality impacts, CO2 emissions, acid rain, post Chernobyl nuclear fallout, etc). Additionally, in light of the looming threat of Global Warming, countries are increasingly focusing on reducing CO2 emissions. The main burden for these reductions inevitably falls on the developing world, since they have yet to build the electricity infrastructure and supply. Our problems will only multiply if all of us collectively continue to follow the current model of conventional large-scale central power stations with elaborate and complex distribution and transmission systems.

In the escalating energy and related environmental degradation crisis proceedings on a multinational scale, it is important not to lose sight of several universal trends that could be just as easily implemented by Western nations, developing countries and nations in transition. Increasing the amount of electricity generated from renewable, non-finite resources such as wind, solar,

hydro, biomass, geothermal along with small scale, clean distributed generation on site – where the power is needed and a stronger emphasis on energy efficiency can certainly form the foundation of a new global energy policy that will not only improve overall system reliability and environmental quality all around, but also allow for social development and growth on a larger scale without escalating related air quality and resource depletion concerns.

Solar electric power is the technology that can best illustrate the benefits of renewable energy and distributed generation simultaneously. It is perhaps the most singularly versatile energy source of all. Solar electric systems are scalable and modular – able to power a pocket calculator, a phone, a computer, a home, the space shuttles, commercial buildings, schools or even an airplane. Solar power can be connected to the grid in developed urban areas, thus decreasing transmission congestion and at the same time, generating electricity during the highest electrical peak demand, thereby improving overall system reliability and the ambient air quality. Solar can also power off-grid applications ranging from traffic signals, water pumping stations, homes, communication centers and schools without the need for wires or fuel pipelines.

Solar electricity can offset building materials if it is integrated into the construction of new facilities, it can be a part of a building or a completely stand alone system in a remote area. Solar systems can be turned into building facades, windows and serve to shade parking structures, thus improving the efficiency of a building envelope and reducing the heat island effect. Solar systems can be translucent, flexible, multicolored, and impregnated into various building materials. It is the only energy source that can be architecturally pleasing, while retaining functionality.

In addition to the energy benefits, solar energy as well as other renewable energy technologies and distributed generation bring about local economic development through clean manufacturing process' and numerous installation jobs. The systems are quiet, virtually maintenance free, inflation proof (the price of sunlight or wind will not increase) and extremely safe. The costs have decreased dramatically over the years and with mass production and implementation solar systems will continue to decrease in price (note the solar powered pocket calculator as an example).

A solar system can be installed and operational in a matter of days, without the need for power lines and fuel sources. Thus, very much like wireless telecommunication, through a solar "wireless energy" system, a remote village in Africa or South America can have lights, refrigeration for medicines and supplies, access to education and medical help via TV and the Internet almost overnight.

Similarly homeowners in California can almost immediately insulate themselves from fluctuating electricity prices by installing a solar system on their home. The additional benefits of having power when the grid is down due to storms, earthquakes or other disasters is simply the icing on the cake.

As we struggle with the latest energy crisis and try to anticipate the next, before we plunge into yet another piecemeal solution, perhaps it is time to step back and take a comprehensive approach to solving the energy reliability and supply issue on a global scale. There are numerous common threads and technological solutions that can benefit all. An electric system that increasingly relies on local renewable energy generation, coupled with distributed on site generation and energy efficiency will work in any nation regardless of the level of development. Technology transfer and co-operation are crucial in ensuring that the world does not increase CO2 emissions while social progress continues at an escalated pace based on a diversified reliable energy system.

Some experts may argue that renewable energy and distributed generation is not a cost effective solution, however let's remind ourselves that pre Chernobyl nuclear power was going to be "too cheap to meter." Fossil power plants rely on finite resources and have inherent **human health** (in the form of increased instances of asthma lung disease, cancer and premature deaths every year) and **environmental costs** (acid rain, Global Warming, cancer causing particles, waste of precious water resources and poor air quality) which do not appear on the balance sheet of any power plant.

If we incorporate the cost of future air quality and health controls as well as the insulation from escalating power costs, and the threat of stranding 50 million people with no power in two of the most developed nations in the world, along with the need to bring electricity to the 2 billion people currently off the grid; we may find that renewables and distributed generation in the form of "wireless energy" are not only cheaper, but the next logical step for a global energy solution.

Certainly the transportation sector and water supply will also become a part of the overall energy equation and the sooner we recognize that each energy crisis is not isolated and that the lessons and solutions are universal, the better we will be equipped to formulate a comprehensive strategy for the benefit of everyone. Therefore, the New York blackout should be another wake-up call not just to the United States, but the entire world. Let us hope that we don't hit the snooze button again.