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Arizona Corporation Commission
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May 29, 2013

Bob Stump, Chairman
Arizona Corporation Commission
Commissioners Wing
1200 West Washington
Phoenix, AZ 85007-2996

RE: **E-01345A-12-0290**
E-01345A-10-0394
E-01933A-12-0296
E-04204A-12-0297

Dear Mr. Chairman:

Most utility companies in the United States use coal or natural gas as inputs to create energy for their power plants – both are dirty, fossil fuels that are non-renewable. Coal is perhaps the dirtiest form of fossil fuel energy because it emits tons of pollution each year, including particulate matter and mercury, both of which contribute to a wide array of human health problems.

An even greater concern is the emission of greenhouse gases – the primary cause of climate change.

U.S. electric customers are now paying 43 percent more to build and maintain local power grids than they did back in 2002. At the same time, the grid is also becoming less reliable, with blackouts now taking 20 percent longer to fix.

The annual cost to maintain local electrical distribution equipment has risen but the reliability has no improved. Utility company simply pass these costs on to the retail customer, both commercial and residential.

R&D spending for the electric power sector dropped 74 percent, from a high in 1993 of US $741 million to $193 million in 2000. R&D represented a meager 0.3 percent of revenue in the six-year period from 1995 to 2000, before declining even further to 0.17 percent from 2001 to 2006. Even the hotel industry put more into R&D.

Blackouts have become more common too. Between 2005 and 2009, there were 349 power outages in the United States that affected at least 50,000

people. That's up from just 149 outages between 2000 and 2004, according to the University of Minnesota. Problems with the power grid now cost the economy some $150 billion per year.

With an average of nearly 500,000 people affected daily by U.S power outages, it is safe to say that the power grid is reaching its capacity and weakening with the age and declining infrastructure as its main culprits. Experts are worried and it's with good reason. With the yearly costs of U.S. outages running into the billions, the unease and unpredictability of the infrastructure as well as the lack of physical security, has caused some uncertainty among large-scale power users, such as data centers. As a result, data centers are being force to think outside of the box and become innovative with alternative power sources.

The original power grid pathways—similar to a highway system—were built in the early 20th century. Additionally, many utility companies have structures that have been running for 50 to 70 years. Unfortunately, the infrastructure age is causing further problems to the weakening grid. When first built, the lines were adequate; however, as time has progressed there are multiple areas of weakness that have started to show up, causing the uncertainty.

At the current rate the grid is falling, the existing competencies won't be able to stand up to the future needs without a billion dollar price tag to make the necessary upgrades possible. By pushing systems harder than they've been pushed before, the grid can be held accountable for several blackouts in the previous decade- including the infamous 2003 northeastern blackout.

Nearly 75% of transmission lines and transformers are 25 years or older and 60% of circuit breakers are more than 30 years old, according to the U.S. Department of Energy.

Industry analysts estimate that approximately 50% of distribution poles are 30 to 50 years old, and near the end of their useful life. With 2.2 million distribution miles in North America, the annual replacement of 1% to 2% of distribution miles (22,000 to 44,000 miles), at a cost of $140,000 per mile, represents approximately $3 to $6 billion per year. It is important to note that these figures do not include upgrades or new mileage.

Electricity use increased by 58% between 1980 and 1999. During the same time period, investment in transmission infrastructure declined by nearly half.

While no one expects the power grid to fail completely, high-power users can and should expect to make lasting changes to how they collect their power. By utilizing alternative technology, data center operators can rest easy knowing their systems will remain online at all times, even during storms as severe as Sandy. Though the aging infrastructure and lack of security will continue to

plague the grid, operators can begin to change their responses by taking action and thinking outside the box.

America's power grid is like an old car. It gets the job done, even if its performance is slipping. But the repair bills go up every year and experts say only a major overhaul will reverse its decline.

An analysis of utility spending and reliability nationwide found that electric customers are spending 43 percent more than they did in 2002 to build and maintain local electric infrastructure. Since then, power outages have remained infrequent; but when the lights do go out, it now takes longer to get them back on. Neither the spending nor the reliability trends are dramatic on their own. But experts say the combination is revealing: it suggests that the extra money from electric customers isn't being spent wisely — or that utilities aren't investing nearly enough to upgrade fragile equipment that is increasingly threatened by major storms.

The diminishing returns on investment reflect several trends: The grid is getting old, making it more expensive to maintain service at current levels of reliability; day-to-day weather and major storms have become more extreme, meaning wires, poles and transformers have to be replaced more frequently; and when utilities replace aging or broken equipment, they are not always upgrading to modern technologies common in other industrialized nations.

When utilities spend on equipment, regulators allow the companies to pass those expenses on to customers. In recent years, this portion of customer bills — the cost of delivering power — has been rising and pushing bills higher even though the cost of the power itself has fallen dramatically.

Despite the higher levels of spending over the past decade, service is getting no better, and evidence is mounting that it may be getting worse. Experts say this is a sign that the grid is less stable and in need of significantly more — and smarter — investment.

A series of recent outages caused by massive storms and equipment problems have raised the awareness — and ire — of electric customers:

- — Sandy knocked out power to 8.5 million customers in October in 21 states, the largest storm-related outage in U.S. history. A week later, 650,000 homes and businesses were still dark.
- — In late June of last year, a set of storms called a "derecho" ripped through the middle of the country, killing power to an estimated 4 million homes and businesses along a path between Indiana and Virginia. A week later, 416,000 homes and businesses were still dark.
- — In October 2011, a Northeast snowstorm knocked out power to 3 million homes and businesses. A week later, 176,000 homes and businesses in Connecticut were still without power.
- — In September 2011, a technician made an error while replacing equipment on a line in Arizona, leading to the largest blackout in California history.

Every day, 500,000 Americans lose power for an hour or more, Amin said. Outages cost the economy $80 billion to $188 billion per year.

Some power failures are unavoidable. But others aren't, and experts say shockingly low-tech equipment is to blame. Across the country, some utilities don't know if a customer has lost power unless that person calls to complain. Many utilities still rely on paper maps of their systems that become outdated quickly.

In short, they struggle to find and repair problems, never mind preventing them.

Consider the following look at industries and business functions that are severely hampered by power failures:

1. Manufacturing Industries
Power outages bring production lines to an abrupt halt. This may translate into loss of material, breakdown of machinery, and loss of productive time. This may also cause supply chains to shut down altogether.

2. Financial Corporations
It is not difficult to imagine the chaos a power outage can cause to the stock market. In an industry where millions of dollars can be made in profit within a fraction of a second, power outages render financial corporations unable to carry out crucial transactions on time. This is synonymous with millions of unrecoverable dollars per minute of downtime followed by several additional hours of recovery time.

3. Consulting and Information Technology (IT) Services
Consulting services firms and software development facilities house hundreds of highly paid professionals. Even a brief period of downtime leaves them stranded and results in loss of billable hours. In an age where IT operations are an organization's window to the rest of the world, power outages result in crashed computer systems, lost data and abrupt termination of communications with clients. This is often followed by several weeks of effort spent in recreating hundreds of man-hours of work. Programs and data may get corrupted resulting in software recovery operations that may not be resolved for weeks.

4. Data Centers
Data centers form the backbone of operations for several organizations such as financial services firms, insurance companies, and IT services firms among many others. Power failures here can cause an irrecoverable loss of thousands of records stored over the years and disrupt ongoing transactions as well.

5. Perishable Items
Pharmaceutical industries, petrochemical industries and food processing plants rely heavily on uninterrupted availability of power for storage and preservation of perishables that have extremely limited life spans. Power outages can cause in-process products worth several millions of dollars to be discarded due to damage, spoilage or contamination.

6. Control Centers
Traffic signal operations, public transport systems like the railways, control centers for air traffic management, telecommunications and utilities, all rely heavily on continuous power supply for smooth functioning. Disruption in such critical operations can jeopardize the safety and security of millions of unsuspecting consumers in an instant.

7. Medical Facilities
In hospitals, patients' lives are delicately supported by health monitoring systems. Any discontinuity in the normal functioning of medical equipment can directly translate into loss of many lives.

8. Military Operations
Power outages render valuable equipment, weaponry and even personnel, defenseless, and hence, exposing them to the risk of attack.

9. Entertainment Venues
Cancellation of money-spinning events even for brief periods of time equates to huge losses of revenue for entertainment facilities. For instance, an extended power outage in a casino can translate into losses of more than US$ 1mn per day. In addition to resulting in forced losses of revenues, abrupt termination of routine operations can also become hazardous to visitors and operating personnel as well.

10. Safety and Security
In addition to causing inconvenience, power outages can endanger the safety of the common man. People trapped in or out of buildings with automated access control systems, elevators that come to a sudden halt and are plunged into darkness, fire alarms and water sprinklers that cease to function, inability to communicate via phone or email with emergency services – these are just a few examples of power outages becoming more than just a nuisance factor and threatening to endanger the safety and lives of millions of people simultaneously.

Electrical power outages, surges and spikes bring about more than $150 billion in annual damages to the U.S. economy. Every year, an estimated $104 billion to $164 billion goes down the drain due to power interruptions, while another $15 billion to $24 billion is lost on account of poor power quality such as voltage fluctuations, power surges and spikes. Specifically,

industrial and digital business firms suffer losses amounting to $45 billion annually. Some industries, such as manufacturing, can lose as much as $6.45 million per hour of downtime. The benefits of investments made in necessary power backup arrangements far outweigh the shocking costs related to irreparable damages and irretrievable loss of revenues caused by downtimes.

Consider: a society where technology reigns supreme, America is relying on a centrally planned and controlled infrastructure created largely before the age of microprocessors that limits our flexibility and puts us at risk on several critical fronts.

If the grid were just 5% more efficient, the energy savings would equate to permanently eliminating the fuel and greenhouse gas emissions from 53 million cars. Consider this: If every American household replaced just one incandescent bulb with a compact fluorescent bulb, the country would conserve enough energy to light 3 million homes and save more than $600 million annually. Clearly, there are terrific opportunities for improvement.

Solar Is THE Green Alternative

Unlike traditional power generation sources, solar technologies produce electricity using a renewable source – the sun – so there's no limit to how much energy can be gained by tapping into the sun.

Solar is not the question. The question is when will we implement a strategy for greater reliability and strengthen the transmission backbone augmenting highly efficient grids that combine heat, power, and storage systems. In the long run, we need a smart grid with self-healing capabilities (total cost, $165 to $170 billion).

Solar systems also generate electricity without creating noise or emitting pollutants such as greenhouse gases, smog, acid rain, or water pollution. Even when the emissions related to solar cell manufacturing are counted, solar panels produce less than 15% of the CO2 emitted from a conventional coal-fired power plant.

On Monday, the 15th of April, 2013, the approximate 1.3 million solar power systems in Germany set a new domestic/world record by reaching a peak power output of 22.68 GW at noon (equivalent to the output of 20 nuclear plants).

This new record is almost 0.5 GW above the "old" record of 22.2 GW, which was set on May 25th, 2012. However, the biggest news might be that "just" 22.68 GW is apparently no longer newsworthy in Germany, because above 15-20 GW of solar have become a regularity.

During the first two weeks of April, solar surpassed the 20 GW mark on several occasions and made a meaningful contribution to the domestic power supply on every single day. For everybody remotely familiar with German or Central European weather conditions, it's needless to say that it wasn't all sunshine & cloudless skies in April.

On average, there are 299 sunny days per year in Phoenix, AZ. This does not include Partly Sunny or Partly Cloudy days. Berlin Germany has 72.4 sunny days per year.

Are we doing something wrong, or are they doing something correctly?

A solar system allows utility customers both residential and commercial users to make an immediate environmental impact, at no cost. We make helping the planet "pencil out". Typical clients keep 746 tons of greenhouse gases out of the atmosphere, which is the equivalent of preserving 147 acres of forest and taking 232 tons of waste out of our landfills.

Studies show that a solar system installed on a single family residential roof could have enormous benefits for the environment with long-term, positive gains for the property owner as well. For example, a 13.1 kW solar system that generates over 20,960 kWh of clean energy annually is equivalent to:

- Trees planted: 5,506
- Cars take off the road: 41.4
- Homes powered: 26.3
- Gallons of gas saved: 24,374
- Tons of CO2 emissions cut: 239.19

Net metering allows homeowners who have installed renewable solar energy systems to sell extra energy back to the utility. Some of the advantages are:

- Net metering encourages people to use renewable energy.
- Net metering saves consumers money.
- Once people install a renewable energy system, they are generally more aware of how much energy they are using, and consequently, they use less energy.
- Net metering is relatively inexpensive and easy to use.
- Net metering reduces the production pressure on electric grids.

- Net metering encourages individuals to take an active role in producing renewable energy.
- Electric companies that participate in net metering programs can potentially save money in meter installation, meter reading and billing costs.

Opposition to the usage of solar energy in Arizona or net metering, is beyond my comprehension. We must do this now.

Sincerely,

Mack Mitchell

Mack Mitchell