SPECIAL TOPIC

Energy risks

Power trip

Power cuts are becoming more and more frequent. Large-scale, supra-regional blackouts are increasingly a realistic scenario. Even small outages can have disastrous effects on unprepared businesses.

NEIL HODGE

Many companies are unprepared for business disruptions caused by power blackouts, and are often unaware of the true costs and impact that they can have on their operations.

While the majority of power failures from national grids last only a few hours, some blackouts can last days or even weeks, completely shutting down production at companies and critical infrastructures such as telecommunication networks, financial services, water supplies and hospitals.

Furthermore, it is likely that power blackouts will become more frequent owing to the lack of incentives to invest in aged national grid infrastructures in Europe and the US, as well as the fact that energy from decentralized, "volatile" renewable sources is not well aligned to work on electricity grids that were designed 50 or 60 years ago. Also, as more and more grids are interconnected, a blackout in one region can trigger a domino effect that could result in supra-regional blackouts. Heightened risk from terrorism, cyber attacks and solar flares also highlights how vulnerable the world's energy grids are to systemic failure.

Research shows that the financial impacts of even a small power cut can be catastrophic. Analyses from blackout events in the US show that a 30-minute power cut results in an average loss of US$15,709 for medium and large industrial clients, and nearly US$94,000 for an eight-hour interruption. Even short blackouts – which occur several times a year in the US – add up to an annual estimated economic loss of between US$104 and US$164 billion.

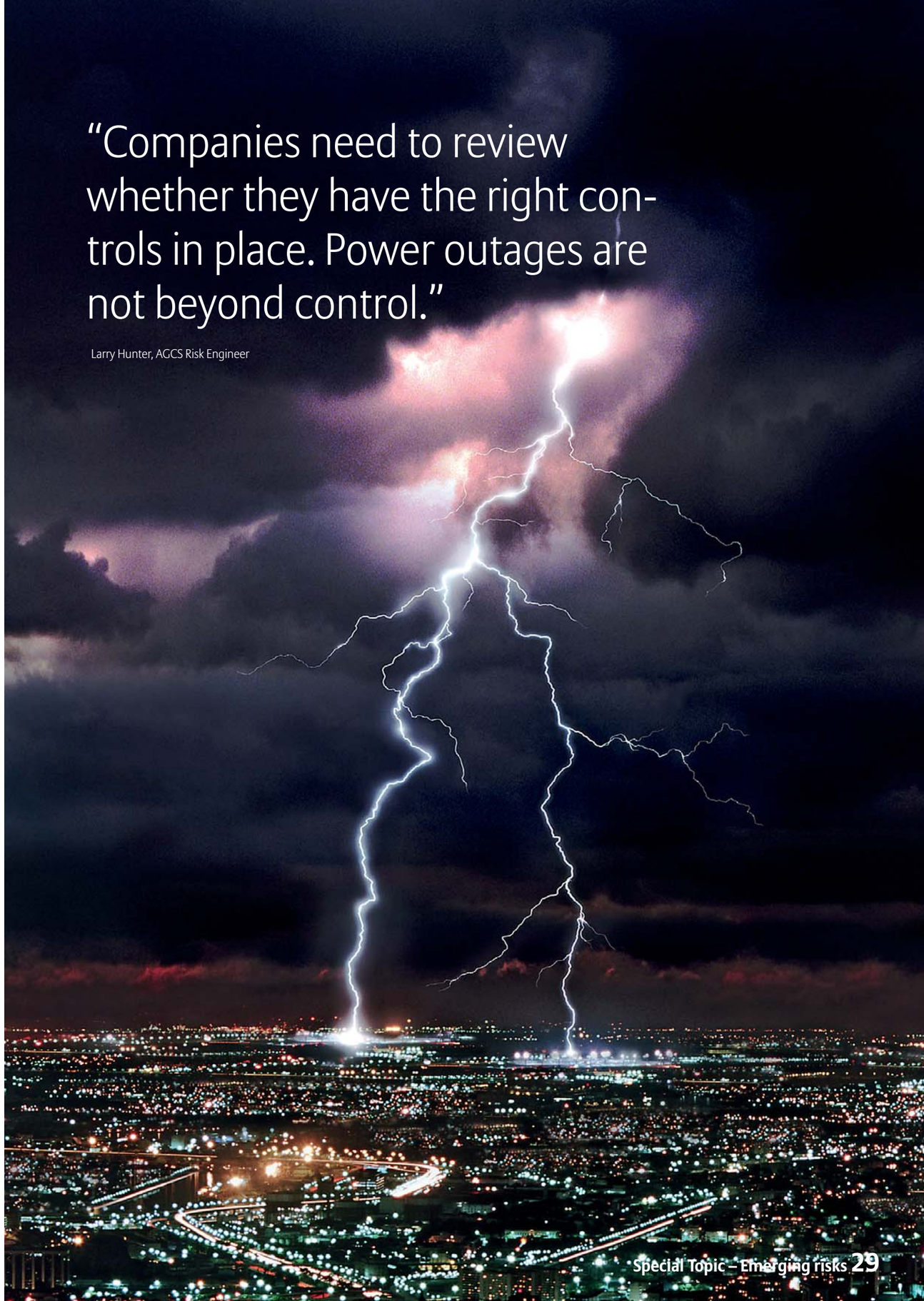
Outages frequent in emerging markets

Larry Hunter, Risk Engineer at Allianz Global Corporate & Specialty (AGCS) in Houston, says that "while organizations may feel that the likelihood of power outages is beyond their control, they should still assess the impact that an electrical blackout could have on their operations and important machinery, so that they can review and determine whether they have the right controls in place to help mitigate the risk."

The most frequent brownouts (reduction in the voltage) and blackouts occur in emerging economies which have typically underinvested in their energy infrastructures, and which are also prone to serious weather

SOLAR STORMS AS TRIGGER

A potential trigger for large-scale blackouts within the next two years may be space weather events. Geomagnetic induced solar flare storms follow an 11-year cycle and are expected to peak again in 2013. Particularly in the northern hemisphere, space weather events could severely damage high-voltage transformers whose repair can take weeks.



The costs of power failure

The past decade has seen two of the costliest power blackouts and business interruption events. On August 14, 2003 large portions of the Midwest and northeast US and Ontario, Canada, experienced an electric power blackout that lasted for up to four days in some areas when a power line hit trees.

The US Department of Energy puts the cost at US$6 billion – the majority of which were business losses. Canada is estimated to have seen its gross domestic product reduced by 0.7 percent for the month of August as a direct result of the blackout, with a net loss of 18.9 million working hours.

Manufacturing industries were particularly hard hit. Car manufacturer DaimlerChrysler lost production at 14 of its 31 plants and had to scrap 10,000 vehicles because there was no power to dry the cars going through the paint shops. At Ford Motor Company's casting plant in Brook Park, Ohio, the outage caused molten metal to cool and solidify inside one of the plant's furnaces, which delayed production by one week.

The earthquake and tsunami in Japan in March 2011 forced many companies to relocate operations and to source materials from other suppliers. Sony was forced to shut down five of its six laptop battery factories, while Hitachi closed its LCD Tokyo factory because of damage and power cuts.

Not only industrial but also financial businesses are severely affected in cases of blackouts.

and natural hazards. For example, Latin America has one of the lowest number of power outages, but they last the longest on average. South Asia, on the other hand, has the highest number of power outages per year, although they usually last only a few hours, the effects are sharply felt. For example, a 12-hour power cut in India in 2001 cut off electricity to 226 million people, caused chaos on the rail system and paralyzed major utilities and hospitals.

Some countries are trying to address the immediate failings in their national grids by asking consumers to use less electricity. Following a series of power blackouts in September 2011 due to a heat wave, South Korea's government unveiled a set of measures aimed at alleviating pressure on the national grid, including a 10 percent demand cut for large manufacturers and caps on maximum temperatures for commercial buildings and on the use of neon signs.

Other countries are facing the problem of trying to meet energy demands while changing their fuel source. In the US, for instance, a proposal to force California's two nuclear power plants – which generate 16 percent of the state's electricity – to shut down immediately when the Nuclear Waste Act of 2012 becomes law, would cause rolling blackouts, spikes in electricity rates and billions of dollars in economic losses each year, according to the state's nonpartisan analyst, the Legislative Analyst's Office, in November.

Germany is planning to close down all its nuclear reactors by 2022. At present, atomic energy accounts for around a quarter of the country's power supply, but the government hopes that renewable energies will account for 35 percent of national power by 2020. However, the transition is unlikely to be smooth: Germany's network regulator, known as the Bundesnetzagentur, believes that the exit from nuclear power will increase blackout risk, particularly in Southern Germany which relies heavily on nuclear power, has comparatively high industrial energy demand and is already prone to grid instability.

Drawbacks of renewable energy

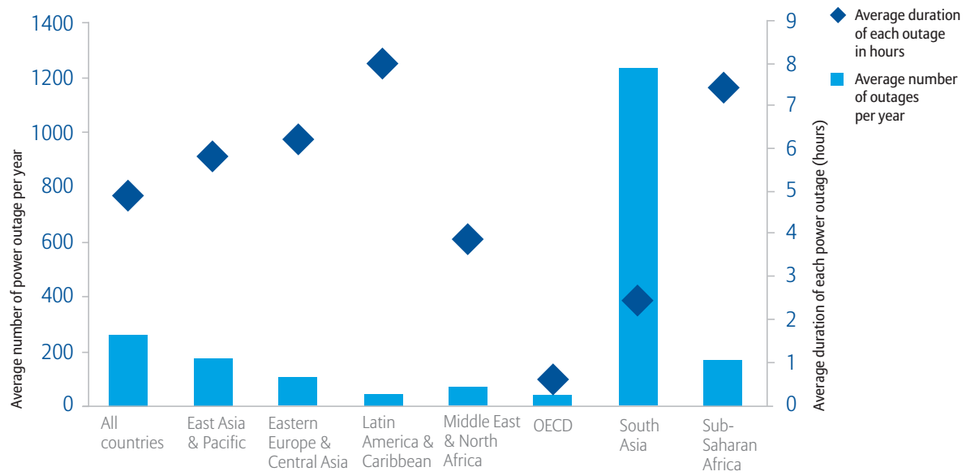
While renewable energy is on the rise in many countries, a major drawback is the "volatility" of supply. This leads to several challenges. The unsteady production of energy, especially from wind or solar power, strains the stability of the network. Further, if wind turbines need to be stopped for safety reasons in extreme weather conditions, this can cause power gaps equal to the loss of two nuclear power plants within just one hour. In such cases, conventional reserve power plants would need to step in instantly. Last but not least, renewable energy has to be transmitted from sparsely populated areas to the metropolitan centers of demand.

To handle these enormous technical challenges, grids need to become much smarter. "Governments should develop new grids with metering, control and commu-

GROWING SHARE

In 2011, renewable energy supplied an estimated 16 percent of global final energy consumption and delivered close to 20 percent of global electricity, says the Renewables 2011 Global Status Report.

Outages per year and duration, 2009



Source: World Bank

“Controlling power blackout risks should not just be limited to having emergency back-up generators.”

Michael Bruch, AGCS Head of R&D Risk Consulting

nication functions to handle the future growth of renewable energies,” says Larry Hunter. They should also promote storage facilities for excess energy such as pumped storage hydropower plants or underground vaults for compressed air.

Overhauling national grids comes at a considerable cost. Estimates suggest that European Union (EU) member states need to invest between €23 and €28 billion over the next five years in their national grid networks, particularly as the demand for power supply is now cross-border. However, the fact that the European electricity grid consists of multiple regulatory bodies, owners and operators makes it difficult to form a consensus on prioritizing areas for investment – and responsibility.

More widely, the International Energy Agency (IEA) says that the world will need to invest US$13.6 trillion between now and 2030 to boost power supply to meet increasing demand. The IEA says that 50 percent of this amount needs to be invested in transmission and distribution and another 50 percent in the generation of electricity.

Develop and test scenarios

While energy companies and governments try to tackle the problems surrounding aging infrastructures, industrial clients also need to take steps to minimize their exposure to electricity supply failures. Michael Bruch, Risk Consultant at Allianz Global Corporate & Specialty (AGCS), says that organizations need to check their vulnerability to power blackouts and what contingencies they have in place. He also believes that companies need to make sure that the various risk scenarios of power failures are clearly included in their business continuity management (BCM) strategies and that scenarios and mitigation solutions are regularly tested.

“Controlling that risk should not just be limited to having emergency back-up generators or being able to relocate their operations and workforce – it also needs to take into account the effect that a power cut could have on their supply chains as well. Risk managers need to ensure that their suppliers have equally robust measures in place as well,” he says.

Cost analysis of historic blackout scenarios

Industry typical financial loss	per event
Semiconductor production	€ 3,800,000
Financial trading	€ 6,000,000 per hour
Computer center	€ 750,000
Telecommunications	€ 30,000 per minute
Steel works	€ 350,000
Glass industry	€ 250,000

Source: Copper Development Association

Limited coverage available

Bruch says that there is a much greater burden on companies to evaluate their exposure to power blackouts as currently there is very little available coverage in the insurance market to offset the risk. “There are policies that cover business interruption but usually they are only triggered by physical damage, such as a fire on site, which covers on average just 20 to 25 percent of the business interruption losses.”

As a result of this gap in the market, AGCS has developed a non-damage business interruption product. “Power cuts are going to become more frequent and the financial losses can be very severe. As their insurer we need to provide suitable coverage for our clients, but organizations also need to be aware that they will need to make their own contingency plans to mitigate the risks,” says Bruch.

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The five most severe blackouts

New Zealand – February 20, 1998
A chain reaction caused by a line failure resulted in a four-week power outage for 70,000 people – the longest recorded for such a fault.

Brazil – March 11, 1999
A lightning strike tripped the circuits at an electricity substation in Bauru, São Paulo State, causing a power blackout over 70 percent of the territory for five hours and affecting 97 million people.

Northeast USA and central Canada – August 14, 2003
Trees pushing power lines together triggered a shunt fault which, in combination with a series of other unfortunate circumstances and technical difficulties, caused a four-day power outage affecting 50 million people. Estimated losses totaled about US$6 billion, only half of which were insurable.

Italy – September 28, 2003
The whole of Italy suffered an 18-hour electricity cut when a technical failure separated the country from the rest of the European grid.

Indonesia (Java Island) – August 18, 2005
Around 100 million people were without electricity for seven hours when power failed along the electrical system that connects Java, Bali and Madura, causing outages in Java and Bali. This led to a cascading failure that shut down two units of the Paiton plant in East Java and six units of the Suralaya plant in West Java.