



# **CONNECTION**

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## **BLACKOUT.** WHAT HAPPENS WHEN THE POWER GOES OFF?

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# BLACKOUT.

## WHAT HAPPENS WHEN THE POWER GOES OFF?

*By Dr Steve Matthewman, Department of Sociology, University of Auckland,  
New Zealand, and Hugh Byrd, School of Architecture, University of Lincoln,  
United Kingdom.*

# ELECTRICITY FUELS OUR EXISTENCE.

It powers water purification, waste, food, transportation, security and communication systems. Life in modern society is impossible to imagine without it. This article looks at what happens when the power goes off, scrutinizing the social consequences of electrical power cuts.

Power generation systems are undoubtedly critical infrastructures. But they are more fragile than is commonly supposed, and there is plenty of evidence they are getting frailer. Recent blackouts are dress rehearsals for a future in which they will appear with greater frequency and greater severity, due to growing uncertainties in supply and growing certainties in demand.

Supply is generally taken for granted in western societies. Such is our dependence that our comfort, security, communication systems, transport, health, food supply, businesses and social equity systems struggle when electricity supplies are interrupted. Continuing sophistication and prevalence of electrical appliances only serves to increase our dependence. In the digital world, interruptions and disturbances less than 1 cycle (1/60th second) can have catastrophic effects.

We now face a significant social problem. Increasing numbers of people are living longer and enjoying rising living standards. In 2008, the world's population was

6,700,000,000, predicted to rise to 8,500,000,000 by 2035 with demand for electricity estimated to grow in that time by a staggering 80%.

This will require an additional 5,900 gigawatts of capacity, according to the IEA. No one knows how this will be generated.

Irrespective of their cause, research has shown that social impact patterns emerge when blackouts occur.

## ECONOMIC COSTS

This is generally measured by loss of sales or production. Losses can vary considerably from minor inconvenience when the ATM system fails (UK 2009) to major economic failure.

- The Venezuelan government extended the Easter Holiday period in 2010 to reduce critical electricity demand. Rolling blackouts resulted in loss of production and food supply shortages.
- In January 2008 South Africa's three largest gold mines and two largest platinum mines were shut



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down by a blackout. Within minutes, the world price of these commodities rose by 5%.

- Power cuts in Iran in September 2008 shut down production and made working in the scorching heat without air conditioning impossible. As a result, the country was forced to open up to Chinese imported goods, further increasing the economic impact.
- As energy demand soared in Beijing in July 2004, rolling blackouts occurred. To compensate, factories were forced to operate at night to save on air conditioning. Meanwhile state governments introduced rationing – turning lights off in one place to keep them on in another.
- Blackouts in the US and Canada in August 2003 reduced trading on the stock exchange, workers struggled to get to work, 36 car manufacturers were closed while airports reported 500 flight cancellations, estimated at tens of millions of dollars lost.



## FOOD SAFETY

Blackouts obviously severely impact on food production and storage. Inability to safely store food has a number of consequences, including the economic impact.

- In May 2008, traders in Zanzibar found meat perishing in a blackout. To claw back profits, they bought fresh meat at reduced prices, only to find there was no market for it, because customers had no means of cooking it.
- In Kenya during 2010, Nairobi's restaurants planned menus to accommodate blackouts. Staff scrambled to

get generators running to avoid food spoilage. Hosts were forced to serve restricted offerings to customers, while potentially poisoning them.

- Imposed rationing to meet efficiency targets in China's Hebei province in 2010 left tens of thousands of homes without electricity for 22 hours over three days. Curdled milk and rotten vegetables at the domestic level were the social consequences of local industries having exceeded their energy consumption targets.

- Blackouts in Pakistan during a heat wave in June 2010 resulted in numerous deaths from food poisoning, as people ate spoiled food from freezers.

## CRIME

When the lights go out, crime rates increase, and security systems fail without electricity. Blackouts provide opportunity for fraud, theft and exploitation.

- A five week blackout in central Auckland, New Zealand, actually resulted in a reduction in

crime, but at a cost of saturated policing, doubling of patrols and employing private security guards to prevent looting.

- After four weeks of an electricity blackout in Zanzibar, it was announced that power had been restored. Unfortunately, the scrap metal value of the cables proved tempting to thieves during the blackout and many residents had to wait for the cables to be replaced.
- In 2009, an estimated 53% of Pakistani citizens were without power eight hours a day, during hot summers. High temperatures and hikes in energy prices meant angry mobs went on a rampage and assailed power companies in frustration at the cuts that brought life to a standstill.

## TRANSPORTATION

The loss of traffic lights is an immediate consequence of electricity blackouts, together with loss of trains below and above ground. And airports are not immune to these failures.

- Traffic jams and accidents were reported during enforced blackouts in China in 2010, Brazil in 2009, Italy in 2003, California in 2001. In South Africa in 2008, blackouts prompted the Government to consider solar-powered traffic lights.
- In 2009, during the world's largest power outage in Brazil, thousands were stranded underground in Sao Paulo's financial centre subway system.



- In Italy in 2003, passengers were trapped underground as 110 trains were halted, affecting 30,000 commuters.
- In August 2003 New York's subway stopped, trapping commuters inside, as the Mayor warned against non-essential travel. Airports experience loss of communications and lack of runway lighting. Personal transport was restricted as security gates and garage doors ceased to operate.

## DIESEL GENERATORS

Diesel fuelled generators may appear to be a lifeline to households, hospitals and businesses, offsetting the effects of electricity blackouts. However, they also become a symbol of wealth, further emphasizing the rift between rich and poor and creating social unrest.

- Baghdad in June 2010 often had electricity only two hours per day. As well as "the din of a thousand diesel engines", small business owners complained that as much as half their income went on fuel and servicing.
- In China's Gansu province, enforced rolling blackouts in 2010 led to a surge in generator use, resulting in competition for limited fuel supplies with transport, causing lengthy queues at filling stations.
- Nepal's electricity was rationed in 2009 with severe and unprecedented power cuts, disrupting schools, businesses, hospitals and households. Those who could afford it purchased a generator, while the poor resorted to replanning the pattern of their lives.

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## ADDICTIONS – PRESENT AND FUTURE

The looming threat of blackouts cannot solely be blamed on the vulnerabilities of power generation and distribution. As growing consumer demand increases our dependency, we must consider a crisis of overconsumption. While calling our relationship to air conditioning an addiction may seem an overstatement, once acclimatized to it, research shows that people are reluctant to give it up.

Like diesel generators, air conditioning offers solutions to private problems that create larger collective ones. As they cool and dehumidify domestic and commercial spaces, they heat the wider environment and are linked to ozone depletion. The US is currently the “undisputed champion” of air conditioning, accounting for 20% of all domestic consumption and 13% of commercial. (That equates to the entire African continent’s electricity demand.) And it is expected to grow a further 22% over the next two decades.

This of course adds an additional burden on utility companies that are being pressured to reduce greenhouse gas emissions.

But the real growth will occur elsewhere. Air conditioning already constitutes 20% of overall Chinese consumption, where household ownership of air conditioners tripled in the decade to 2007. India shows a similar pattern: sales are growing at 20% per annum.

Global air conditioning demand has the potential to exceed that of the US by a factor of 50.

The first planetary study of residential demand for heating and cooling paints an alarming picture. Researchers state that world demand for heating will rise until 2030, then stabilize. By contrast, demand for air conditioning will rise rapidly to 2100, mostly as a function of rising prosperity. Moreover, demographic trends suggest more people will live in the tropics, where cooling demand will increase - along with its cost. As a consequence, demand for cooling will be 40 times greater in 2100 than it was in 2000. Another study predicts between 18 and 25% less cold weather per annum in four decades, and 17-23% more hot weather. This will equate to a 65-72% increase in cooling demand.

Technical efficiency gains may partially offset this. However, between 1940 and 2001, refrigeration efficiency increased by just 10%, while refrigeration demand grew by double that amount. Similar figures apply to heating and cooling.

So serious questions have to be asked at both the individual and collective level, concerning what is wanted and what is needed, balancing what is good for individuals with what is good for others and for the environment we all share.

“As growing consumer demand increases our dependency, we must consider a crisis of overconsumption.”



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