

From the Introduction to 'Electric Universe':

When my father was a little boy, in a village in Poland before the First World War, an electricity blackout wouldn't have been especially important. There were no cars, which meant there were no traffic lights to fail, and there were no refrigerators – just blocks of ice or cool rooms – so food wouldn't suddenly spoil either. A very few rich people would find their electric lights going off if the generators stopped working in their homes, and the single telegraph line that passed through the town might stop operating, but by and large daily life would continue as it had before.

By the time his family had migrated to Canada, and then to Chicago in the early 1920s, a big power outage would have been different. People would still have been able to buy things – there were no credit cards that depended on computers to verify them – but the streetcars that workers used to get to factories wouldn't run. The telephones that offices depended on wouldn't work either, and the skyscrapers that the city was so proud of would quickly have become inaccessible, or at least their upper floors would, as their elevators failed too. It still wouldn't be a complete catastrophe. Farm crops could still be raised – there weren't many tractors – and coal-fired trains and steam-driven ships would have kept the city pretty well supplied.

Today though? I live in London, where people can be pretty phlegmatic, but I wouldn't want to be around for a complete blackout. Your cell phone might still operate, but with no way of recharging your battery, you'd be pretty careful about using it. Driving the kids to school on the off chance it was open would be too much of a gamble, for gas stations depend on underground storage tanks, and until the blackout ended, stations wouldn't be able to use their electrically operated pumps to bring up more fuel. You couldn't stock up on groceries – no credit cards working – nor could you get more cash, for ATMs depend on electrically-run computers too.

Within a week the city would have broken down. Police stations would be isolated with their phones not working, and pretty soon their radio batteries would lose their charge as well. No one could call ambulances, for their radios or phone links would be out too. A few people might try walking to hospitals, but there wouldn't be much there: no X-rays, no refrigerated vaccines, no refrigerated blood, no ventilation, no lighting.

Going to the airport to try to escape wouldn't help, for with backup generators not working, the airport's radars would have shut. Nor could planes take off on manual control, for any fuel that remained in underground tanks would be impossible to pump up. Ports would have closed, with no electricity to run the cranes that moved their large containers and no way to check electronic inventories. The military might try to guard fuel convoys, but with their own vehicles running low on fuel, that wouldn't last long. If the blackout was

worldwide, isolation would intensify. The internet and all email would have gone down very quickly; next the phone lines; finally, the last television and radio broadcasts would end.

Starvation would probably begin in the dense cities of Asia, especially with no air conditioning at food warehouses. Within a few weeks of a complete blackout almost all the world's cities and suburbs would be unlivable. There would be fighting, pretty desperate, for food and fuel. With a population of six billion, few people would have a chance of surviving.

But what if it were not only our supply of electricity that stopped, but the very existence of electrical forces as well? All the Earth's oceans would gush upwards and evaporate as the electrical bond between water molecules broke apart. DNA strands within our body would no longer hold together. Any air-breathing organism that was still intact would begin to suffocate, for without electrical attraction the oxygen molecules in air would bounce uselessly off the hemoglobin molecules in blood.

The ground itself would open and begin to melt as the electrical forces that hold the silicates and other substances of our planet together let go. Mountains would collapse into the voids left where the continental plates had torn apart. In the last moments, a few living beings might see the sun itself switch off, as our star's electrically-carried light abruptly stopped and the world's very last day turned to night.

((The book then goes into why that doesn't happen, how our hi-tech devices work, and how they've shaped society. As with $E=mc^2$, I carry the science through a number of personal stories.))