

Good afternoon, everyone! Let me introduce myself. My name is Bashir and I'm a third year student at MIT. Today I'm going to give a talk on the article entitled "This grid moves energy, but not always reliably". The article dealing with electric grids was published in "Scientific American". In my talk I would like to give a general overview of the complicated system that brings electricity from where it's made to homes and businesses. I believe that this topic is interesting for you because all of us use electricity in our houses. I've divided my presentation into three main parts. I'll start with reasons, that can cause failure of electric grid. Then I would like to tell you about distributed generation and "smart grid". Lastly, I'm going to say some words about microgrids and batteries.

The presentation should last about seven minutes. If you have any questions, I'd be grateful if you could leave them until the end.

To start with just imagine: more than three million people in Puerto Rico lost electricity in September 2017. Hurricanes had just slammed into the island. Floods from Maria, the more powerful of them, knocked out many power plants. Winds toppled towers and the power lines they carried. It is obvious that losing power is not merely inconvenient, but life-threatening. For instance, with no electricity, hospitals had to delay surgeries.

Now let us turn to reasons, that can cause failure of electric grid. The grid has many thousands of pieces and parts. Power engineers find it a challenge to keep such a complex system running smoothly. It doesn't take much to throw the system out of whack. Too many people using too many air conditioners, computers, ovens and other appliances at the same time can disrupt the grid. Winds, falling trees and a build-up of ice can all bring down power lines. In fact, bad weather and other routine problems cause most U.S. power outages.

Let's now consider the method of protection of electric grid called “smart grid” and distributed generation. Make sure each local area in the grid can get power from at least two sources. Then if a flood hits one substation, some other source could still supply power. So-called “smart grid” technologies could use sensors and computers to do the re-routing. Wind turbines and solar power also can be spread throughout a region. This is known as distributed generation. If a large power plant goes down or a storm crops up at one spot, unaffected generators could still provide power.

Finally, I'd like to move on to the end of my talk which is about microgrids and batteries. As strange as it might sound, one way to make the electric grid stronger is to break it up into tiny pieces. A microgrid can add protection. These are systems that can make and distribute electricity to a small area. It's a type of distributed power generation. Under normal conditions, a microgrid connects to the full grid. But in an emergency, it can break that link and power some small region on its own. Also homeowners or companies that own solar panels or a wind turbine would rather feed their energy into the grid during peak times to earn more money. But much of their power may have been generated at non-peak times. Storing that power for sale later at peak periods takes good batteries.

That brings me to the end of my talk. Let me go over the key points again. We have talked about reasons, that can cause failure of electric grid, then about distributed generation and “smart grid”, and, lastly, about microgrids and batteries. To conclude I'd like to leave you with the following thought: electric grid is very complicated and important system, that spread energy all over the world. Thus we should develop energy technologies, to make grid more reliable and effective.

Thank you for your attention. If you have any questions, I'll be happy to answer them.