



## STRATEGIC APPROACHES BY WHICH ENERGY PRODUCERS CAN IMPROVE RESILIENCE

### Abstract

Covid-19 and the war between Russia and Ukraine have caused energy supply disruptions and crises, endangering the needs of North America and Europe. Several European nations have seen economic downturns, with the cost of electricity shooting up and disrupting industrial and household budgets.

Climate change and increasing global average temperatures will also be the key drivers for energy crises. According to the US Environmental Protection Agency, the average global temperature may rise between 0.5°F and 8.6°F by 2100. Despite the environmental challenges and geopolitical events, there will always be a need for energy and businesses to be resilient.

Here, we discuss the importance of energy resilience, challenges and roadblocks, ways to boost resilience, and adapting to climate change.



## Why is energy resilience important in the energy sector?

Energy supply is the backbone of any economy and is the first thing to get impacted due to climatic and geopolitical events. For a robust and growing economy, a nation must have a consistent energy supply. Here are several reasons why you need a [resilient energy sector](#):

### Managing risks

An energy crisis could be a result of several factors, including war, geopolitical turmoil, cyberattacks, climate change, [supply chain disruptions](#), terror attacks, and more. To safeguard the economy and the communities, businesses and governments must implement resilient models to manage risks.

Here is an example of a major energy supply disruption. In 2015, a group of hackers known as 'Sandworm' infiltrated the power grid in Ukraine using a malware called 'BlackEnergy'. They were able to shut down the power supply for 225,000 users for several hours by disabling substations and destroying IT infrastructure components.<sup>[1]</sup>

### Ensuring economic stability

For businesses to operate efficiently and smoothly, they need a consistent energy supply. Without it, the raw material can go to waste, and the business may fail to meet its supply commitments. Stalled production blocks capital investment, stunting economic growth.

An energy crisis can greatly impact business profitability due to higher costs of production and lower margins, especially in manufacturing. Higher prices plummet the end-user consumption, impacting the economy.

### Meeting community demand

Energy plays a crucial role in community well-being by running essential services such as heating, cooling, public health facilities, educational institutions, etc. Vulnerable communities that do not have surplus income and rely on government programs to meet their needs are hit the hardest during an energy crisis.

As Russia began withholding energy

supply, the cost of oil, coal, and gas soared. To counter this, the EU had to fire up its coal power plants and seek alternate gas suppliers such as Algeria, Norway, and Azerbaijan. The EU also voluntarily cut the gas and electricity demands.

### Facing climate change

The Intergovernmental Panel on Climate Change (IPCC) predicts that most of Europe will witness dire weather, extreme heat, and coastal flooding due to rising sea levels, windstorms, and flooding. The Americas, Asia, and island nations will face similar or higher risks due to climate change.

NOAA data predicts that 2024 could be the warmest year in its 175 years of climate recording history. To handle such alarming predictions, the energy sector must reduce GHG emissions as a part of boosting resilience by optimising production and consumption.<sup>[2]</sup>

## Ways for energy providers to boost resilience

Building energy resilience is a combination of strategies that individually or together handle the risk exposure. These strategies mitigate vulnerabilities and enhance responsiveness to disruptions:

### Diversify energy sources

Reliance on a single energy source puts the economy and communities at a significant risk of supply disruption. A combination of solar, hydro, nuclear, low-carbon baseload, natural gas, and wind makes the energy production and [supply resilient](#) and consistent.

### Decentralise power generation

Centralised power generation systems are prone to large-scale failure due to cyberattacks, military attacks, or natural disasters. By decentralising the power generation systems and grids, you reduce the dependency on one establishment and can quickly switch to another node in case of a failure.

### Boost energy storage technologies

Batteries and pumped hydro technologies must evolve to build energy resilience. This excess stored energy feeds the demand during a crisis, disruption, or a

sudden surge in demand, bridging the gap between demand and supply.

### Enable smart grids

Smart grids leverage advanced technologies such as communications, risk, production monitoring and control, and distribution. Such technologies may include the Internet of Things (IoT), big data analytics, [machine learning and artificial intelligence](#). This helps smart grids recover rapidly from disruptions by re-routing the supply through real-time adjustments.



## Adapting to climate change to build resilient energy systems

Dealing with climate change requires a two-pronged approach. We need to shift to carbon neutrality while building robust energy production models to handle climate hazards. Several ways to enhance the protection of energy grids are:

- Physical hardening
- Upgrading the networks
- Building water spill gates
- Protection of infrastructure
- Resizing the cooling systems
- Preparedness and backup planning
- Technology to enhance monitoring

## Conclusion

To deal with the risk factors mentioned above, energy production businesses must have several concrete solutions such as distribution reinforcement, overhauling the pole design, undergrounding of lines, and substation design.

Technology plays a crucial role in **building energy resilience** by preparing the networks for the future, automation, digitisation, remote control, and monitoring of systems. It helps businesses predict extreme weather through early

warning systems, foresee events that can disrupt or change the demand and supply, and adapt quickly to minimise the impact.

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## Reference

1. [https://en.wikipedia.org/wiki/2015\\_Ukraine\\_power\\_grid\\_hack](https://en.wikipedia.org/wiki/2015_Ukraine_power_grid_hack)
2. <https://www.climate.gov/news-features/understanding-climate/global-climate-summary-january-2024>

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