

Infrastructure Resilience

What Is It?

Infrastructure resilience is the ability of physical systems like roads, water lines, or the electricity grid to stay functional or recover quickly after disasters, wear and tear, or unexpected issues.



How to Achieve Resilience?

Infrastructure's ability to hold up under natural disasters, industrial accidents, and prolonged usage will ultimately reduce costs and delays. Higher quality materials, innovative construction methods, preventive maintenance, technological sensors, and threat detection are crucial in building more resilient infrastructure.

What Does It Cost?

Building strong and resilient infrastructure increases upfront costs, but saves money in the long term. The World Bank estimates that \$4.2 trillion dollars can be saved globally by investing in more resilient infrastructure.



How Does It Work?

1. In the planning stages of a new energy distribution center, considering technology trends can make future updates more affordable.
2. Ensuring that infrastructure can be analyzed for damage through the internet will improve communication and monitoring.
3. Protecting critical infrastructure from cyber attacks will help safeguard essential services against threats from hackers or state-sponsored actors.
4. Designing transportation infrastructure to handle heavy truck and car traffic will reduce the need for frequent repairs and make movement more efficient.
5. Including emergency backup systems in infrastructure can help reduce delays in restoring functionality after disruptions.
6. Understanding typical weather conditions and building infrastructure to withstand extreme temperatures will extend its lifespan.



What's An Example?

Resilient infrastructure is designed with the local environment taken into consideration. For example, roads in the American Southwest are designed to handle extreme heat and drought ensuring their longevity under harsh conditions.

Point

- Retrofitting aging infrastructure can help prolong its usage and reduce environmental impact.
- Making infrastructure more resilient can save millions of dollars in disaster response or lost economic output.
- Infrastructure systems can be built with projected population growth in mind to get ahead of future upgrades.
- Ensuring transportation routes have an Internet connection and can alert authorities as soon as hazards come about will save time and money.
- Upgrading water systems to be able to naturally filter out flood or stormwater will save governments money in disaster cleanup.



Counterpoint

- Replacing some older pieces of infrastructure would cost less than retrofitting them.
- Large capital outlays for resiliency projects strain budgets and may not be believed to yield returns if disasters don't materialize.
- Population fluctuations can mean wasted funds if projections do not come about and lead to overbuilding.
- Ensuring that every transportation route has a viable Internet connection is a costly and time-consuming endeavor.
- Excavating and retrofitting entire water systems runs the risk of damaging adjacent utilities and has high upfront costs.

Did You Know?

The Golden Gate Bridge is a prime example of resilient infrastructure. While there has been some maintenance, the structure has withstood strong earthquakes, heavy traffic loads, and corrosive salty ocean air for nearly 90 years.

What's Next?

Cyber "hackathons" have been organized in several countries to test for weaknesses in key energy, information, and other essential services, helping officials identify and fix those vulnerabilities. Advances in monitoring systems, such as distributed fiber optic sensing, will also help improve resilience.