

Forum: Environmental Commission (EC)

Issue: Mitigating conflict-related damage to energy infrastructure and its impact on sustainable development

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TOPIC INTRODUCTION

Energy Infrastructure is of utmost importance when it comes to the functioning and development of modern societies. It provides the necessary fuel and the electricity for economic activities, industrial development, healthcare, transportation, education, communication and for other daily life activities.¹ When energy systems are reliable and resilient, they support employment, sustainable development, productivity and economic growth.

However, the disruption and destruction of energy infrastructure during conflict leads to instability, not only within a nation but also globally, and pauses the process of sustainable development since it's slowing the economic growth. For example, the destruction of oil pipelines and power grids can cause power outages, disrupt supply chains and access to supply chains. As a result, efforts to reduce poverty and improve living standards are undermined.² At the same time, economic recovery is slow since most energy systems are interconnected thus a single attack can result in broader infrastructural failures that affect industries, healthcare and water supply. Less Economically Developed Countries (LEDCs) and regions affected by conflict are more vulnerable because of their limited resources for infrastructure protection and recovery.

Nowadays, the targeting of energy infrastructure becomes more common since armed conflicts are larger and more frequent. They are now a part of the strategic military objectives of nations.³ At the same time it is more dangerous because of the fact that most energy systems are interconnected.

¹ "Energy | World Bank Group." *Worldbank.Org*, 2025, <https://www.worldbank.org/ext/en/topic/energy>

² Khalid, Usman, et al. "Does Conflict Aggravate Energy Poverty?" *Energy Policy*, vol. 194, Nov. 2024, p. 114317, 10.1016/j.enpol.2024.114317.

<https://www.sciencedirect.com/science/article/pii/S0301421524003379?via%3Dihub>

³ T. M. Aljohani, "Cyberattacks on Energy Infrastructures as Modern War Weapons-Part II: Gaps, Standardization, and Mitigation," in *IEEE Technology and Society Magazine*, vol. 43, no. 2, pp. 70-77, June 2024, doi: 10.1109/MTS.2024.3395697.

<https://ieeexplore.ieee.org/document/10530859>

Understanding the relationship between conflict, energy infrastructure and sustainable development is essential for designing effective policies and long term resilience strategies . This will help at addressing the issue, something that is now urgent as many lives are being threatened. Without energy infrastructure modern society will not be able to function properly, thus it's necessary for international and national organisations to step up in order to find applicable solutions.

DEFINITION OF KEY-TERMS

Energy Infrastructure⁴

“Energy infrastructure is defined as the systems and facilities that enable the extraction, production, transportation, and management of energy from producers to consumers, encompassing both small- and large-scale utilities and technologies, such as electricity transmission lines, oil and gas pipelines, and smart grid systems.”

Sustainable Development⁵

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Sustainable Development Goals (SDGs)⁶

“The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

The 17 SDGs are integrated—they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability.”

Power Plants⁷

“Power plants are facilities that convert various forms of energy into electricity, a crucial resource that powers many aspects of modern life. The primary fuels used include coal, natural gas, nuclear energy, and hydropower, each employing specific methods to generate power.”

Pollution⁸

⁴ “Energy Infrastructure - an Overview | ScienceDirect Topics.” *Www.sciencedirect.com*, www.sciencedirect.com/topics/economics-econometrics-and-finance/energy-infrastructure.

⁵ *Sustainable development | International Institute for Sustainable Development*. Available at: <https://www.iisd.org/mission-and-goals/sustainable-development>

⁶ *Sustainable development goals UNDP*. Available at: <https://www.undp.org/sustainable-development-goals>

⁷ *Power and Power Plants | Power and Energy | Research Starters | Ebsco Research n.d*. Available at: <https://www.ebsco.com/research-starters/power-and-energy/power-and-power-plants>

⁸ *Pollution | Definition, History, Types, & Facts | Britannica n.d*. Available at: <https://www.britannica.com/science/pollution-environment>

“Pollution, the addition of any substance (solid, liquid, or gas) or any form of energy (such as heat, sound, or radioactivity) to the environment at a rate faster than it can be dispersed, diluted, decomposed, recycled, or stored in some harmless form.”

BACKGROUND INFORMATION

Energy Infrastructure

The components of energy infrastructure

As reported in articles, energy infrastructures are systems, structures and facilities that are designed to produce, transmit and distribute energy.⁹ These systems include power plants which convert various forms of energy into electricity and are a crucial resource that powers many aspects of modern life, pipelines and transmission lines that deliver electricity across vast distances. Without reliable energy infrastructure, everyday activities like heating, cooling, and lighting would not be possible.¹⁰ Energy infrastructures include a few interconnected components that ensure energy is produced, transported, and delivered efficiently. This includes the systems that generate electricity, the high-voltage transmission lines that carry it over long distances and the distribution networks that bring it directly to buildings. Each part of the system plays a vital role in ensuring a consistent and reliable energy supply for multifamily properties.¹¹



⁹ Mdpi.Com, 2026, <https://www.mdpi.com/1996-1073/17/16/4157#b1-energies-17-04157>.

¹⁰ MRI. “Lead Your Team into Tomorrow with MRI Cloud.” *MRI Software*, 15 Aug. 2024, <https://www.mrisoftware.com/blog/what-is-energy-infrastructure/>.

¹¹ MRI. “Lead Your Team into Tomorrow with MRI Cloud.” *MRI Software*, 15 Aug. 2024, <https://www.mrisoftware.com/blog/what-is-energy-infrastructure/>.

Figure 1: Energy Infrastructure¹²

Electricity generation, transmission, and distribution

According to Eunice Arcilla Caburao, “electricity generation is the process of converting primary energy sources such as coal, wind, solar, and water into electrical energy for homes, businesses, industries, and technology. An essential foundation of modern life, this requires balancing operational efficiency for energy security while ensuring regulatory compliance to meet decarbonization and sustainability goals.”¹³ The generation of electricity is of utmost importance in today’s world since it supports everyday life. It is really important for economic development and it is highly influential when it comes to the quality of life. Daily life is based on the constant electricity supply and without it a big amount of the progress that has been made in that sector would disappear.¹⁴

According to Oyeranmi S., “electricity energy transmission refers to the process of transporting electrical energy from power generation sites to consumers through a network of transmission lines. As electricity is not a primary energy source but rather a means of transferring energy, effective transmission systems are essential for delivering power where it is needed”¹⁵. These transmission lines extend across long distances and are created in order to carry big amounts of high-voltage energy. However, the energy in the transmission lines flows at a voltage that is too high to be delivered to consumers for direct use. Therefore, companies reduce the voltage levels before its delivery to homes and businesses. Transmission lines are easily recognised by their size and structure. These lines are typically tall, around 30 feet or more and they carry multiple wires that cover long distances.¹⁶

The energy distribution is the last part of the delivery of energy to the consumers. It refers to the way that electricity is delivered. This happens with the aid of power lines, transformers and substations. When this process starts, the voltage is high but it gets delivered to households and industries at a range of voltages, depending on its use.¹⁷

¹² GeeksforGeeks. “Energy Infrastructure.” 20 Apr. 2023.

<https://www.geeksforgeeks.org/macroeconomics/energy-infrastructure/>

¹³ Arcilla Caburao, Eunice. “Electricity Generation and How It Powers the World.” *SafetyCulture*, 10 Oct. 2025, <https://safetyculture.com/topics/electricity-generation>.

¹⁴ “How Is the Electricity We Use Generated? | Repsol.” 11 Sept. 2023.

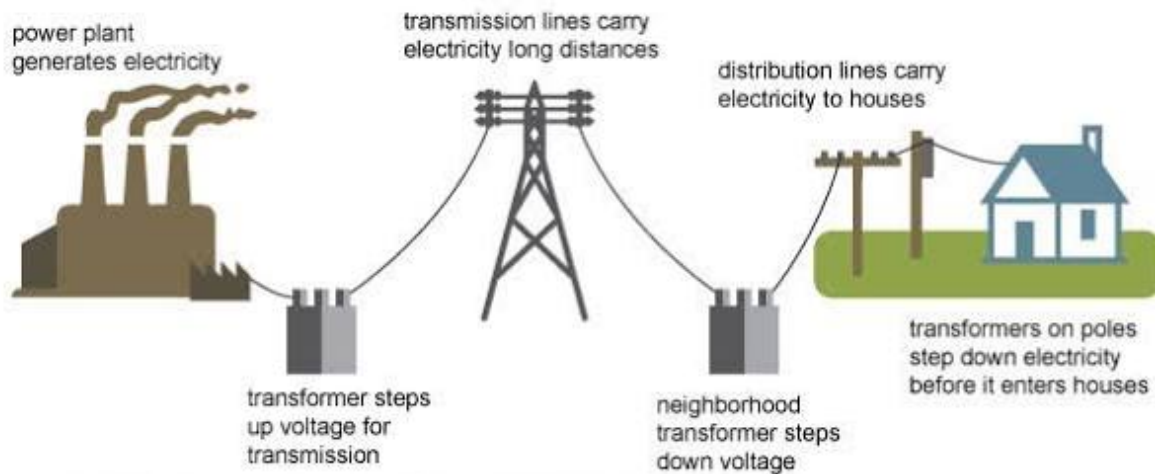
<https://www.repsol.com/en/energy-move-forward/energy/power-generation/index.cshtml>

¹⁵ Oyeranmi, Soji. “Electricity Energy Transmission | Research Starters | Ebsco Research.” *Ebsco*, 2024, <https://www.ebsco.com/research-starters/power-and-energy/electricity-energy-transmission>.

¹⁶ “The Generation, Transmission and Distribution of Electricity.” *Electric Power Engineers (EPE) - Energy Engineering Consultants*, 16 Aug. 2024, <https://epeconsulting.com/epe-intelligence/publications/the-generation-transmission-and-distribution-of-electricity>.

¹⁷ “What Is Energy Distribution? Learn About the Energy Distribution System.” 10 Jan. 2023. <https://powerzone.clarkpublicutilities.com/learn-about-electricity-energy/energy-distribution/>

Electricity generation, transmission, and distribution



Source: Adapted from National Energy Education Development Project (public domain)

Figure 2¹⁸: Electricity generation, transmission and distribution

The role of Energy Infrastructure to modern society

Energy Infrastructure is considered critical infrastructure since it is foundational for all economic and daily life activities. Moreover, it plays a central role to modern society, to specify:

Healthcare

Energy and healthcare systems are interlinked. This is evident in homes and healthcare facilities such as hospitals. When it comes to households, the access to clean and sustainable energy allows people to avoid using polluting stoves and fuels such as coal and biomass in order to do daily activities. In that way the household air pollution is minimised to a big extent.¹⁹ At the same time, access to clean energy in healthcare facilities helps at ensuring that the essential treatment for disease prevention is delivered to patients. Without energy life support systems, operating theaters and diagnostic tools such as the MRI scanners would not be able to function. Furthermore, energy powers the refrigerators that are necessary for preserving pharmaceuticals and vaccines. Finally, according to the United Nations' World Health Organization, "electricity is needed in order to power medical devices and is crucial for the availability and reliability of essential health services, as well as, for bettering health, with outcomes such as safe childbirth, vaccination, diagnostic capacity and emergency response."²⁰

¹⁸ U.S. Energy Information Administration. "Delivery to Consumers - U.S. Energy Information Administration (EIA)." 2016.

<https://www.eia.gov/energyexplained/electricity/delivery-to-consumers.php>

¹⁹ World Health Organisation . *Energy and Health*.

https://www.who.int/health-topics/energy-and-health#tab=tab_1.

²⁰ World Health Organization. *Electricity in Health-Care Facilities*. 31 Aug. 2023, <https://www.who.int/news-room/fact-sheets/detail/electricity-in-health-care-facilities>.

Education, Transportation and Communication

Energy infrastructure is very important as it generates, transmits and distributes the power that is needed in order for essential educational, transportation and communication systems to properly function.²¹ Energy plays a central role in education as it powers the physical infrastructure of schools such as lighting, heating, cooling and the internet technology that is necessary in modern classrooms. When it comes to transportation, energy powers the movement of people and goods. Since the major technological changes on the transportation systems, infrastructure includes electrical grids to support the charging stations and alternative fuels for vehicles, trains and maritime ports.²² Finally, when it comes to communications it is obvious that data centers, cell towers and satellites rely fully on energy. Without energy infrastructures, these systems would not be able to operate.

Economic growth

Energy is of utmost importance when it comes to economic growth. As a matter of fact, according to Moss T. and Kincer J., “the positive relationship between energy and economic growth is clear: income and energy consumption are tightly correlated on every continent and across every time period for which data exists. Nowhere in the world is there a wealthy country that consumes only a little energy, nor a poor country that consumes a lot.”²³

The targeting of conflict to energy infrastructure throughout history

The targeting of energy infrastructure has been a very common strategy when it comes to conflict because of the fact that energy is necessary for most military operations, industrial production and the daily life of civilians. These attacks usually have a negative impact for civilian populations and long term sustainable development.²⁴

During World War 2, the Allies conducted excessive bombing against Nazi Germany’s oil facilities. The most notable one was the Operation Tidal Wave that took place on the 1st of August 1943 during which American bombers attacked the oil refineries of Romania, one of the

²¹ “Module 64. Energy, Infrastructure and Transport – GKToday.” *Gktoday.In*, 2019, <https://www.gktoday.in/energy-infrastructure-and-transport/>.

²² dev-team. “How Energy Infrastructure Is Powering the Future.” *Tortoise Capital*, 21 Oct. 2024, <https://tortoisecapital.com/how-energy-infrastructure-is-powering-the-future/>.

²³ Moss, Todd, and Jacob Kincer. “How Does Energy Impact Economic Growth? An Overview of the Evidence.” 7 Mar. 2023. <https://energyforgrowth.org/article/how-does-energy-impact-economic-growth-an-overview-of-the-evidence/>

²⁴ Rushing, Elizabeth . “When the Lights Go out: The Protection of Energy Infrastructure in Armed Conflict.” *Humanitarian Law & Policy Blog*, 20 Apr. 2023. <https://blogs.icrc.org/law-and-policy/2023/04/20/protection-energy-infrastructure-armed-conflict/>

biggest suppliers of fuel to Nazi Germany. These attacks reduced the fuel production and military mobility of Germany.²⁵



Figure 2²⁶: “*The Sandman*, a B-24 Liberator, emerges from smoke over the Astra Română refinery, Ploiești, during Operation Tidal Wave”

Moreover, during the Gulf War which lasted from the 17th of January to the 28th of February 1991 coalition forces targeted the electricity generation systems of Iraq. These attacks damaged the country’s power grid which contributed to long term distribution of water treatment, sanitation and healthcare services.²⁷ This attack proved that targeted attacks on energy infrastructure can have severe humanitarian consequences beyond military objectives.

Another important example of energy infrastructure being targeted during armed conflict occurred on the 14th of September 2019 when drones and missiles struck the Abqaiq and Khurais oil facilities that are located in Saudi Arabia. The attack disrupted approximately 5.7 million barrels of oil production per day temporarily, this is equivalent to 5% of the global oil supply.²⁸ For this reason, the cost of oil rose dramatically.

²⁵ “Oil Campaign of World War II.” *Wikipedia*,
https://en.wikipedia.org/wiki/Oil_campaign_of_World_War_II?

²⁶ “Oil Campaign of World War II.” *Wikipedia*,
https://en.wikipedia.org/wiki/Oil_campaign_of_World_War_II.

²⁷ “Water Under Siege in Iraq: Us/Uk Military Forces Risk Committing War Crimes by Depriving Civilians of Safe Water - Iraq | ReliefWeb.”
<https://reliefweb.int/report/iraq/water-under-siege-iraq-usuk-military-forces-risk-committing-war-crimes-depriving>

²⁸ “Attacks on Saudi Oil Facilities: Effects and Responses.” *EveryCRSReport.Com*, 27 Sept. 2019,
<https://www.everycrsreport.com/reports/IN11173.html>.

Moreover, during the war between the Russian Federation and Ukraine there have been repeated attacks on energy infrastructure. Russia targets Ukrainian power plants, substations and transmission networks frequently. One of the largest attacks occurred on the 26th of August 2024 when more than 200 missiles and drones targeted the energy system of Ukraine leaving almost 8 million houses without power.²⁹

These are just some examples of attacks on energy infrastructure. Such attacks still take place, even in current conflicts like the one between Israel and Hamas and the United States of America and Iran. As modern energy systems become more interconnected and attacks become more precise, the impact of such practices has an even bigger impact on economic stability, humanitarian welfare and sustainable development worldwide.

Impact of Conflict-Related Damage on Sustainable Development

Economic Impact

The damage to energy infrastructure weakens economic development since it disrupts the electricity supply and fuel availability. Generally, industries depend on reliable energy to maintain production. This means that power outages lead to less productivity and more economic losses. Such attacks also result in the increase of energy prices due to the shortages of supply and the uncertainty of the market, having a negative effect on businesses and consumers.³⁰ Moreover, investors usually hesitate to invest in countries where such infrastructure is at risk which means that there is little to no foreign investment. Finally, the reconstruction of these infrastructures require billions of dollars.³¹ This makes it difficult for countries to financially recover.

Social Impact

Energy is essential for the provision of basic services. This means that the damage to energy infrastructure can disrupt the operation of hospitals, limit the access to medical care and such equipment. At the same time schools might be forced to remain closed due to power shortages. This disruption can heavily affect the long term humanitarian development. Energy insecurity might also contribute to the displacement of populations since people tend to leave areas where they can't have access to basic human services. All these, in combination with all the lost employment opportunities, often increase poverty levels, especially in Less Economically Developed Countries (LEDCs).³²

²⁹ The International Energy Agency. *Ukraine's Energy System under Attack*.
<https://www.iea.org/reports/ukraines-energy-security-and-the-coming-winter/ukraines-energy-system-under-attack/>.

³⁰ Reuters, Price pressures may linger due to damaged energy assets .
<https://www.reuters.com/business/energy/price-pressures-may-linger-due-damaged-energy-assets-ecbs-makhlouf-says-2026-06-16>.

³¹ Anadolu Agency, War-linked damage to Middle East energy infrastructure may cost up to \$58 billion.
<https://www.aa.com.tr/en/economy/war-linked-damage-to-middle-east-energy-infrastructure-may-cost-up-to-58b-rystad-energy/3906919>.

³² ScienceDirect, Impacts of energy infrastructure disruption on communities and public services .
<https://www.sciencedirect.com/science/article/abs/pii/S221462962200408X>.

Environmental Impact

When energy infrastructure is targeted during conflict, severe environmental damage is caused. The attacks on oil facilities and pipelines often result in oil spills that contaminate soil and water. Moreover, damage to power plants and fuel facilities increases the pollution of the air through fires, explosions and the release of hazardous substances. When it comes to regions that experience electricity shortages, people need to rely on diesel generators which produce additional greenhouse gas emissions and air pollutants. To conclude, the resources that could have been invested in renewable energy are needed in order for these infrastructures to get repaired. This leads to a huge delay when it comes to the transition to sustainable energy.³³

MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED

Germany

It has been one of the largest contributors to energy reconstruction in conflict affected regions, particularly Ukraine where Germany promised 100 million euros in order for them to repair their energy infrastructure.³⁴ Furthermore, they have supported modernisation of electrical substations and assisted in strengthening grid interconnections and energy security.

Germany has contributed through development banks and EU initiatives other than Ukraine, providing financial support for repairing energy infrastructure in several regions that were affected by conflict in the Middle East as a part of a European initiative.³⁵

South Sudan

South Sudan faces persistent challenges related to conflict, weak infrastructure, and limited electricity access combined with some of the world's worst energy and internet access due to a history of conflicts and civil wars. They are currently exploring conflict-sensitive energy planning with public works, ensuring equitable access for all citizens and avoiding overarching energy used to concentrate wealth. Furthermore, they are testing the use of solar energy to

³³ Newshub, Pollution After Conflict: Why Strikes on Energy Infrastructure Matter .
<https://www.newshub.co.uk/science-technology/2026/05/23/pollution-after-conflict-why-strikes-on-energy-infrastructure-matter>.

³⁴ “Germany Promises About 100 Million Euros to Protect and Rebuild Energy Infrastructure in Ukraine | Clean Energy Wire.” Clean Energy Wire, 25 Oct. 2023,
<https://www.cleanenergywire.org/news/germany-promises-about-100-million-euros-protect-and-rebuild-energy-infrastructure-ukraine>. Accessed 20 July 2026.

³⁵ “Electricity, Drinking Water and Bridges for Northern Iraq: KfW Provides Support to Restore Necessary Infrastructure | KfW.” *Www.Kfw.De*, 2018,
https://www.kfw.de/about-kfw/newsroom/latest-news/pressemitteilungen-details_477440.html.

improve resilience against trade imbalances and sensitive gas and oil prices by investigating renewable public energy.³⁶ Finally, South Sudan considers decentralised, spread out energy systems that are conflict resilient in order to make sure that any damage or negative impact to coherent electrical infrastructure is limited to a specific region and does not affect the entire nation.³⁷

Ukraine

Ukraine is one of the biggest examples of conflict-related damage to energy infrastructure due to the repeated attacks on its electricity generation and transmission systems. The country's condition has forced them to accept rapid foreign aid with the means to implement emergency repairs to damaged energy infrastructure caused by shrapnel and drone attacks.

It has worked with international and European organisations, such as the UN Development Programme and the European Council, to improve energy resilience and work out a sufficient schedule to protect energy infrastructure during the struggles of conflict. This is deployed in the form of long term plans for a more secure and decentralised energy system. Finally, this translates into cooperation with international partners and pursuing an approach that combines reconstruction with energy modernisation, not just getting Ukraine back on its feet but planning growth after war.³⁸

Yemen

Yemen represents one of the clearest examples of how conflict can destroy energy infrastructure and limit access to electricity while stopping economic and technological growth. For this reason, Yemen has increased investments in solar and renewable energy. These investments are the result of the necessity to foster economic growth. Finally, the current situation has made the country expand on decentralized energy systems in areas where the national grid has collapsed and to cooperate with international donors to improve electricity access.³⁹

³⁶ Ayik, Aban, and Nelson Ijumba. "Renewable energy: A way out for South Sudan's electricity crisis." *F1000Research* vol. 13 1267. 8 Oct. 2025, doi:10.12688/f1000research.157192.3

³⁷ Patankar, Neha, et al. "Building Conflict Uncertainty into Electricity Planning: A South Sudan Case Study." *arXiv.Org*, 2019, <https://doi.org/10.1016/j.esd.2019.01.003>.

³⁸ "Green Energy Recovery Programme in Ukraine." *UNDP*, 2023, <https://www.undp.org/ukraine/projects/green-energy-recovery-programme-ukraine>.

³⁹ Salman, Fawaz, and Abdulrhman Al-Ansi. "Solar Power Offers a Ray of Hope in the Middle East's Least Electrified Country." *Reuters*, 30 Sept. 2025, <https://www.reuters.com/business/energy/solar-power-offers-ray-hope-middle-east-least-electrified-county-2025-09-30/>.

European Union (EU)

The European Union plays a crucial role when it comes to the aid of nations whose energy infrastructures have been damaged or destroyed. To specify, the EU provides significant financial assistance for reconstruction, often completely funding the processes. It also funds energy security and infrastructure protection initiatives and invests in the modernization of such systems. They often focus on the development of renewable energy deployment in order to reduce the dependence on such energy networks. Their aim is to increase the resilience of conflict affected nations in such attacks while supporting the sustainable development goals.⁴⁰

United Nations Development Programme (UNDP)

The United Nations Development Programme (UNDP) usually leads energy recovery projects in conflict affected regions. They support the reconstruction of damaged infrastructure, it promotes renewable energy and decentralized systems. It has also implemented the Green Energy Recovery Programme in Ukraine.⁴¹ The goal of this program is to help the nation restore energy access while transitioning towards sustainable and clean energy resources. They have also highlighted the importance of sustainable energy for the development of conflict affected nations.⁴²

World Bank

The World Bank is one of the largest international financiers of energy reconstruction projects in nations that have been affected by conflict. It provides loans and technical assistance for the repair of damaged energy infrastructure. As a matter of fact, it provided a grant of 200 million dollars to Ukraine in order to help them repair their energy infrastructures.⁴³ The World Bank also supports long term recovery and modernization projects that are designed in order to improve the efficiency, reliability and resilience of energy systems. These help countries rebuild critical infrastructure and at the same time economic recovery and sustainable development are promoted.

TIMELINE OF EVENTS

⁴⁰ European Council. *EU Assistance to Ukraine: Energy Security and Infrastructure*. <https://www.consilium.europa.eu/en/policies/ukraine-solidarity-energy-infrastructure>.

⁴¹ United Nations Development Program-Ukraine. *Green Energy Recovery Programme in Ukraine*. <https://www.undp.org/ukraine/projects/green-energy-recovery-programme-ukraine>.

⁴² United Nations Development Program. *Why Sustainable Energy Is a Major Opportunity in Fragile and Conflict-Affected Settings*. 31 July 2025, <https://climatepromise.undp.org/news-and-stories/why-sustainable-energy-major-opportunity-fragile-and-conflict-affected-settings>.

⁴³ World Bank Group. “\$200 Million Grant Supported by the World Bank Will Help Repair Energy Infrastructure in Ukraine.” *World Bank*, World Bank Group, 22 Nov. 2024, <https://www.worldbank.org/en/news/press-release/2023/04/12/200-million-grant-supported-by-the-world-bank-will-help-repair-energy-infrastructure-in-ukraine>.

DATE	DESCRIPTION OF EVENT
1st of August 1943	Operation Tidal Wave against Nazi Germany took place
1949	The Geneva Conventions were adopted
8th of June 1977	Additional Protocols I and II are adopted, significantly improving the legal protection of civilian infrastructure
17th January-28th of February 1991	The Gulf War took place
25th of September 2015	The 2030 Agenda for Sustainable Development was adopted unanimously by the United Nations
14th of September 2019	Drones and missiles struck the Abqaiq and Khurais oil facilities in Saudi Arabia
27th of April 2021	The Security Council Resolution 2573 (2021) was adopted
26th of August 2024	More than 200 missiles and drones targeted Ukraine's energy system, leaving approximately 8 million households without power

TREATIES AND EVENTS

The Geneva Convention

The Geneva Conventions establish the legal protections of civilians and civilian infrastructure.⁴⁴ Although energy infrastructure is not directly mentioned in them, many of them

⁴⁴ International Committee of the Red Cross. *Geneva Conventions-Article 52: General Protection of Civilian Objects*. 2022, <https://ihl-databases.icrc.org/en/ihl-treaties/api-1977/article-52>.

are considered civilian infrastructures making their targeting illegal under international law.⁴⁵ Under the Fourth Geneva Convention (1949) Additional Protocol I and II (8 June 1977), parties to a conflict must distinguish between military targeting and civilian objects. These attacks must be avoided unless the infrastructure is used for military purposes, making their strategic targeting illegal. These significantly improve the legal protection covering civilians and civilian infrastructure.⁴⁶ This is of utmost importance since the targeting of energy infrastructure leads to limited access to healthcare, sanitation, communication and other essential services, creating severe humanitarian consequences for civilians even if the targeting does not directly link to their death.

Security Council Resolution 2573 (2021)

The UN Security Council Resolution 2573 is one of the most important resolutions because of the fact that it is directly related to the protection of energy infrastructure. It was adopted on the 27th of April 2021 and it focuses on the protection of civilian infrastructure and to everything that is necessary for the survival of civilians⁴⁷. Energy infrastructure such as power plants, fuel storages and oil and gas installations are considered critical civilian infrastructure since it is essential for healthcare, communication, transportation and other basic services. For this reason the strategic targeting and attack of energy infrastructure goes against the objectives of this resolution.

2030 Agenda for Sustainable Development (2015)

The 2030 Agenda for Sustainable Development was established on the 25th of September 2015 when all the Member States adopted it. With Agenda 17 Sustainable Development Goals (SDGs) were established. Energy infrastructure is necessary for achieving many of them and Particularly SDG 7 (Affordable and Clean Energy).⁴⁸ Armed conflicts damage power plants, electricity grids, fuel facilities and other types of energy infrastructure that are necessary for achieving SDG 7. Without energy, countries face challenges when it comes to providing healthcare, education and other services that are objectives of the 2030 Agenda for Sustainable Development. For this reason, protecting this type of infrastructure is necessary for achieving these goals.

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

UNDP Energy Recovery Programs

⁴⁵ International Committee of The Red Cross. *ICRC President: War on Essential Infrastructure Is War on Civilians; Every Effort to De-Escalate Is Critical*. 26 Mar. 2026,.

<https://www.icrc.org/en/statement/icrc-president-war-on-essential-infrastructure-is-war-on-civilians>.

⁴⁶ International Committee of the Red Cross. *Protocols I and II Additional to the Geneva Conventions*.

<https://www.icrc.org/en/article/protocols-i-ii-geneva-conventions>.

⁴⁷ United Nations. "Security Council Strongly Condemns Attacks Against Critical Civilian Infrastructure, Unanimously Adopting Resolution 2573 (2021) | UN Press."

<https://press.un.org/en/2021/sc14506.doc.htm>

⁴⁸ The United Nations. *Sustainable Development Goals*. <https://sdgs.un.org/goals>

The UNDP has promoted solar energy projects in many countries affected by conflict such as Ukraine, Yemen and Syria to restore access to electricity where energy infrastructure has been damaged. The programme expands the UNDP's engagement in supporting the energy system's reconstruction and recovery, building on partnerships, results and lessons learned under the "Winterization project".⁴⁹ Solar systems can be deployed quickly and reduce dependence on fuel that is being imported. In that way, these projects have improved energy access for hospitals, schools and local communities and at the same time they helped in moving towards long-term sustainability goals but challenges about the funding, maintenance and the global implementation still exist.⁵⁰

World Bank Infrastructure Financing

The World Bank has given financial assistance to countries affected by conflict in order to help them repair and rebuild critical energy infrastructure. For example, the World Bank granted 200 Million dollars to Ukraine so they can repair their energy infrastructure.⁵¹ This funding has helped restore electricity services, support economic recovery and reduce humanitarian impacts. Reconstruction financing is often essential because governments that are affected by conflict usually lack the resources and the funds that are necessary for these repairs.⁵² However, this reconstruction efforts can be slowed by political instability, security concerns and administrative challenges.

IEA Energy Security Recommendations

The IEA encourages governments and energy providers to develop plans for energy emergencies that include conflict related disruptions. Emergency planning includes backup generation capacity, fuel reserves, rapid repair strategies and crisis coordination mechanisms. These measures can reduce the duration and the severity of power outages during emergencies. Although emergency planning cannot prevent attacks, it can significantly improve response and recovery capabilities.⁵³

⁴⁹ "Green Energy Recovery Programme in Ukraine." *UNDP*, 2023, <https://www.undp.org/ukraine/projects/green-energy-recovery-programme-ukraine>.

⁵⁰ UNDP. "Sustainable Energy Hub | United Nations Development Programme." *UNDP*, <https://www.undp.org/energy>

⁵¹ World Bank Group. "\$200 Million Grant Supported by the World Bank Will Help Repair Energy Infrastructure in Ukraine." *World Bank*, 22 Nov. 2024, <https://www.worldbank.org/en/news/press-release/2023/04/12/200-million-grant-supported-by-the-world-bank-will-help-repair-energy-infrastructure-in-ukraine>.

⁵² "Public-Private-Partnership Legal Resource Center." *Public-Private-Partnership Legal Resource Center*, 2022, <https://ppp.worldbank.org/infrastructure-fragile-and-conflict-affected-states>.

⁵³ International Energy Agency. "Energy Security." *IEA*, 2023, <https://www.iea.org/topics/energy-security>.

POSSIBLE SOLUTIONS

The Development of Decentralized Energy Systems

Nations can invest in decentralized energy systems such as solar mini-grids, local wind farms, battery storage facilities, and community-based energy networks. In that way, electricity will be generated near the place that it is going to be consumed. As a result, the system can continue operating even if some components are damaged or destroyed.⁵⁴ This makes energy harder to disable at the time of conflict, restoration easier after attacks and it reduces the dependence of nations on big transmission networks that are vulnerable at the time of conflict.⁵⁵ However, the initial cost is really high and there is a need for technical expertise in order for this solution to be effective. For this reason it will be difficult for Less Economically Developed Nations (LEDs) to implement it.

Strengthening the protection of infrastructure

Conflict and other such events expose energy systems to failures, so governments need measures that increase resistance and recoverability and not only post-attack repair. In order to achieve that they could invest in protective barriers and advanced monitoring systems. They could also build underground infrastructure.⁵⁶ This will help at reducing the damage to infrastructure at the time of conflict, protect the facilities and at minimizing the time that is needed for recovery of these infrastructure. This, however, needs a significant amount of funding in order to take place.

Promoting Renewable Energy in Post-Conflict Recovery

It is really important that renewable energy technologies such as solar power are prioritised during post-conflict reconstruction programs. These types of systems can be deployed faster and they can help countries to be autonomous since they do not need to rely on fuels that are imported from other nations.⁵⁷ This is crucial since it helps when it comes to expanding energy access while supporting climate goals.⁵⁸ However the need for batteries or backup systems and initial funding that are needed when it comes to renewable energy technologies are two of the challenges that nations are going to be facing when trying to implement this solution.

⁵⁴ Renée Müller. "Decentralized Energy Systems: The Network of the Future?" *Tibo Energy Software*, 13 Aug. 2024, <https://tibo.energy/blog/decentralized-energy-systems/>.

⁵⁵ Executive summary – Energy System Resilience – Analysis - IEA. "Executive Summary – Energy System Resilience – Analysis - IEA." *IEA*, 2026, <https://www.iea.org/reports/energy-system-resilience/executive-summary>.

⁵⁶ "How Power Utilities Can Defend Critical Infrastructure." *Eurelectric - Powering People*, 17 Mar. 2026, <https://www.eurelectric.org/in-detail/how-power-utilities-can-defend-critical-infrastructure/>.

⁵⁷ "The Role of Renewable Energy in Enhancing Disaster Resilience and Recovery." *Greenworld-Energy.Com*, 2017, <https://www.greenworld-energy.com/dev/blog/the-role-of-renewable-energy-in-disaster-resilience-and-recovery>.

⁵⁸ *Preprints.Org*, 2026, <https://www.preprints.org/manuscript/202509.1884>.

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