TERRORIST ATTACKS ON ENERGY INFRASTRUCTURE

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Abstract: This paper focuses on terrorist attacks targeting energy infrastructure. Energy infrastructure is much more important nowadays than in the past. Terrorist attacks on this infrastructure could have enormous consequences for a large number of people, their activities, and, of course, the impact on the environment. The threat of terrorist attacks is growing worldwide. In the modern world, it is imperative to concentrate on protecting energy infrastructure against terrorist attacks. The regular supply of energy at affordable prices with environmental protection is an important activity of states and their security forces.

Keywords: assassination, bomb attack, energy infrastructure, guerrilla, infrastructure, critical infrastructure, terrorism.

Introduction

Energy security is currently the subject of intense debate. Energy is an important part of every society, every individual. In this article, I will discuss terrorism and examine the differences between terrorism and guerrilla. I will give a basic overview of the types of terrorist attacks.

Terrorist attacks can involve explosive devices, arson, various forms of threats, and other attacks on energy infrastructure. I will also analyse both energy and critical infrastructure. In the last part, I will provide a brief overview of past terrorist attacks and incidents targeting energy infrastructure.

1 Terrorism

When people talk about terrorism in general, it is assumed that the meaning of this word is clear. In reality, however, there is still no universally accepted definition. Countries refuse to sign global agreements on anti-terrorism cooperation, either due to disagreement or reluctance to define which actions, individuals, or organisations should be categorized as terrorist (5). The greatest challenge remains at the global level. The attempt to develop a single, universally acceptable legal definition of terrorism is nothing new. Throughout history, such efforts have emerged repeatedly, often in response to major terrorist acts that, at the time, shook the 'conscience of humanity', stunned the public and political circles. These events have consistently sparked discussions on the necessity of coordinated anti-terrorism efforts (1).

The Latin word terrere means 'to frighten,' while terrore translates as 'in horror' or 'with fear'. Thus, the term terrorism is derived from the Latin root terror, which originally signified extreme fear or anxiety arising from an obscure and unpredictable danger (11).

The term terrorism encompasses those actions and methods that evoke feelings of fear and terror (4). This word was first used in France in the years 1793 to 1974 in connection with the Jacobin terror. It characterised the actions of the government against the population (9). The first official definition of terrorism of international importance was formulated in 1937 during the League of Nations' talks on the Convention for the Prevention and Suppression of International Terrorism. Twenty-four states signed the Convention, and only India ratified it (13).

In 1980, a definition of terrorism was published in the United States, which has become the basic standard for evaluating and analysing terrorist acts. It states: ‘Terrorism is the calculated use of violence or the threat of violence, usually directed against uninvolved people, to create fear by which political, religious or ideological objectives are achieved. Terrorism also includes symbolic criminal acts that are a means of achieving objectives other than those to which the criminal act is directed’ (4). Luis de la Corte defined terrorism in The Logic of Terrorism: 'It is a deliberate series of violent and intimidating acts directed against an uninvolved people and planned in such a way as to psychologically influence many more people than the immediate victims and thus serve a specific, almost always political, purpose’ (5). In the most general terms, terrorism (as noted above) is understood as a form of organised violence, usually directed against uninvolved people to achieve political, criminal, or other objectives. Terrorist methods are characterised by high danger, ruthlessness, and brutality. Their choice and use are driven by the desire to maximise psychological impact. The violence used by terrorists is not the result of circumstances, but is designed to induce a sense of fear and threat in the widest possible range of people. The more brutal, the scale of the attack, and its consequences, the more likely it is to achieve the intended goal (12).

1.1 Differences between terrorism and partisanship

For many people, the concept of ‘terrorism’ is identical to the concept of ‘guerrilla’. In the following section, I will attempt to clarify the differences using available information. It is also important to realise that often what some interpret as terrorism is defined by others as guerrilla or conventional armed conflict. In other words, terrorism is a type of political violence that we often confuse with other forms, especially guerrilla or conventional armed conflict (5). Guerrilla warfare and insurgency are good to start with. Terrorism is often confused with guerrilla and insurgency or treated as a synonym. This is not entirely surprising as guerrillas and insurgents often use the same tactics (assassination, kidnapping, hostage-taking, etc.) for the same purposes (intimidation or coercion, thereby influencing behaviour through fear arousal) as terrorists. Like guerrillas, terrorists do not wear uniforms or identifying marks, making them difficult to distinguish from uninvolved people. However, despite the tendency to put terrorists, guerrillas, and insurgents into one category of 'irregulars', there are fundamental differences between them (3).

Terrorists are distinguished from guerrilla groups by two main features. Firstly, they live openly within the society they later target with their attacks. Secondly, they ‘blindly and ruthlessly attack the civilian population’ (8). A small group of terrorists or even an individual carries out an attack. In such attacks, a small group or individual uses minimal forces against significantly larger ones. Using limited personnel and minimal costs, they achieve devastating effects with a huge psychological impact (7). Terrorists do not wear uniforms or live in the forests; instead, they operate in the society that they later attack. Terrorism never acts directly. The attack serves as a tool of coercion, influencing decisions on how to respond after the terrorist act. (7). Guerrillas or guerrilla groups have the name guerrilla, which means a small war that takes place on the periphery. Unlike terrorists, guerrillas usually live in the forests, hidden by the terrain, they are paramilitary organisations, they have a pyramidal command and control system, and they do not live dispersed in society, which is the main distinguishing feature from terrorists.

1.2 Types of terrorist attacks

Terrorists use various types of terrorist attacks to realise their intentions. These include all kinds of attacks, from bomb attacks, kidnappings, assassinations, and all sorts of possible and impossible actions.

Bomb attack

An attack using explosive devices is the most common form of terrorist action. The use of such a device allows for a successful attack while significantly lowering the chances of the perpetrator being identified. From a tactical perspective, bomb attacks can be classified into four categories:

1. Attacks targeting people. Explosive devices are placed in crowded areas, ensuring that an explosion results in mass casualties. Such devices are hidden in parked cars, trash bins, etc.
2. Attacks on symbolic targets. This type of attack is generally directed against targets that represent symbols of one country or another.
3. Attacks on significant targets. These attacks are based on a careful selection of targets. Typically, important industrial centres, power plants, government buildings, or individuals in key leadership positions are chosen. The main objective in such cases is to cause damage and losses that are difficult to compensate for in the long term.
4. A series of attacks (campaigns). Terrorists use a series of bomb attacks to draw attention to some of their special goals and demands, such as the release of imprisoned perpetrators of terrorist acts (4).

A bomb comprises an explosive object, an explosive or incendiary substance or pyrotechnic devices, and functional initiating elements (12). These attacks have been carried out in various ways in the past: dropping a bomb on a vehicle of an important person or directly on the person being attacked, or placing a bomb in luggage to be sent by plane, train, bus, etc.

Hostage-taking, kidnapping

Kidnapping and hostage-taking are not new phenomena. They have been used for centuries as an effective means of achieving strategic or tactical objectives (14). Hostage-taking can be used by terrorists to put pressure on a government to negotiate or provoke negotiations on certain issues or topics. Terrorists use kidnapping in a political context as a way to influence government behaviour or to put pressure on the public or private sector. Very often, it is used to get financial resources that are extorted as ransom payments. These funds are then used to finance other operations. Aircraft hijackings are frequently conducted to achieve political goals (4).

Assassinations of prominent figures, assassination attempts

Assassination is a distinct form of violence and an effective weapon used by terrorists. The victims are usually people of significant social position, representing a political current, government policy, public authority, or certain industries and economies. The key condition is that the potential victims must be well known enough to ensure widespread publicity and attention in case they are attacked (4). Assassins use a wide range of weapons: explosives, firearms, knives, sniper rifles, etc. (14). From a technical perspective, two main categories of attacks are considered. The key distinguishing factor between them is the distance from which the attack is conducted (4). Depending on the distance, knives, machetes, axes, i.e. bladed weapons, can be used at short personal distances. Terrorists also use handguns and grenades for short-distance attacks. At longer distances, they use rifles, automatic weapons, anti-tank weapons, rockets, etc. Typically, all types of attacks are usually preceded by intensive reconnaissance activities focused on pre-selected targets. Its quality and effectiveness are the main conditions for the success of a prepared attack (4).

New threats of terrorism

Terrorists are seriously concerned about the possibility of acquiring knowledge and then actually producing weapons of mass destruction or their destructive components, most notably chemical, biological and toxin weapons. These weapons are significantly cheaper than nuclear weapons, and their production is not accompanied by the technical and technological difficulties that characterise nuclear weapons (12). For multiple reasons, terrorists may consider detonating a bomb with a conventional non-nuclear filling that is designed to spread radioactive material. For example, a Semtex bomb designed to scatter a container carrying radioactive material that the terrorists have managed to steal or buy somewhere. This would be the so-called dirty bomb (6).

During the 1993 World Trade Centre attack, Islamist terrorists planned to use hydrogen cyanide alongside explosives. Sodium cyanide was added to the explosives to generate hydrogen cyanide. The intent was to use hydrogen cyanide to kill both survivors of the explosion and rescue workers who arrived on the scene (16). The unexpected rise of Aum Shinrikyo as the only known ultra-terrorist group in the world is a phenomenon that most Japanese have difficulty understanding. The words 'ultra-terrorism' and 'ultra-terrorist' refer to a terrorist group that possesses or uses chemical, biological, or nuclear weapons – classified as weapons of mass destruction - for political objectives (2).

Cyber terrorism

Potential cyberattacks on computers and network systems are very destructive for developed societies. Advanced societies are increasingly dependent on computer networks. Cyber operations at a computer can remotely cause enormous damage and infrastructure problems. Examples include disabling water, electricity, or gas distribution systems. Chaos can be easily caused in air, rail and bus transportation, as well as in fully automated financial transactions (12). Moreover, terrorist organizations widely use the Internet as a popular information platform for posting their agendas and proclamations there (12).

2 Energy infrastructure

Disabling critical infrastructure is the first method of terrorism. It is a non-lethal method that has become increasingly serious in recent years due to scientific advancements and growing automation. This is because the risk of catastrophic terrorist attacks targeting critical infrastructure is significantly increasing. An attack on the control systems of chemical plants or liquefied natural gas infrastructure could lead to great loss of life and extensive damage. Critical infrastructures exist in a wide variety of economic sectors, including banking and finance, transportation and distribution, energy, utilities, healthcare, food supply chains, communications, and key government services (13).

2.1 Infrastructure

Infrastructure is, in the most general sense, the set of interconnected structural elements that hold the whole structure together. It typically refers to artificial structures. The term 'infrastructure' is used in different senses in several fields, though it is most commonly associated with economics, to describe physical infrastructure such as buildings or roads. Infrastructure can be built and maintained by either the private sector or government (15). In terms of focus and internal characteristics, infrastructure can be classified into several categories, including economic (energy, water, etc.), research and development, administration and management, information and socio-cultural. As economic and social development progress and integration trends deepen, the importance of infrastructure increases. Infrastructure performs multiple functions: production-supporting or social-supporting, agglomeration and urbanisation, integration, homogenisation, enhancement of socio-economic efficiency, innovation, and rationalisation.

Infrastructure, as a framework, is a system of long-term foundational facilities (human, material, and institutional) that support the efficient division of tasks within a national economy. In this context, the term ‘public infrastructure’ is frequently used, which is further divided into technical and social infrastructure (15). Due to the interconnected nature of infrastructure sectors, a failure in one area can trigger a cascading effect, sometimes referred to as the domino effect, where the collapse in one system leads to the failure in others. For instance, an attack on a power company that results in an interruption of the electricity supply could lead to the failure of wastewater treatment plants because the turbines and other electrical systems stop working (13).

2.2 Critical infrastructure

Every society has a part of its infrastructure that is important for functioning. This infrastructure is known as vital or critical infrastructure. The task of society is to protect such infrastructure and ensure its functionality in all situations - whether normal, emergency, or critical (15). Critical infrastructure has become a modern phenomenon. Governments and their executive branches have recognized their importance during a period marked by the increasing intensity and aggression of terrorism. National infrastructure facilities - crucial for political, economic, social, and cultural development - have also become targets of international terrorism (17).

Network structure of critical infrastructure.

The structure of any network consists of individual elements and the links between them. In every network, there are places where several links come together to form a single element, known as a node. While many nodes may be insignificant, some are crucial; disrupting them can lead to reduced functionality or even the collapse of the entire system. Therefore, critical infrastructure defence should prioritize protecting these essential nodes. Critical infrastructure is a term used by government leaders to refer to assets that are essential to the functioning of society and economy. Many definitions explain critical infrastructure as a system designed to protect society and its interests. Security management terminology defines critical infrastructure as '...a set of physical or virtual systems, institutions, facilities, and other services whose disruption, deficiency, or destruction could undermine the social stability and national security, cause a crisis, or seriously impact public administration at both state and local levels in times of crisis ...' (17).

The EU Commission's Communication to the Council and the European Parliament provides an overview of critical infrastructure components, including the following:

Energy infrastructures and networks (e.g., electricity generation, oil and gas extraction, storage and refineries, transmission and distribution systems);
Communications and information technology (e.g., telecommunications, broadcasting systems, software platforms, hardware systems, and the Internet);
Financial services (e.g., banking, securities and investments);
Health care (e.g., hospitals, medical facilities and blood banks, laboratories and pharmaceuticals, search-and-rescue and emergency services);
Food industry (e.g., food safety, manufacturing facilities, wholesale and food processing);
Water management (e.g., dams, water storage and treatment, networks);
Transportation infrastructure (e.g., airports, ports, railway and public transport networks, traffic management systems);
Production, storage, and transportation of hazardous products (e.g., chemical, biological, radiological, and nuclear materials);
Government infrastructure (e.g., essential services, strategic facilities, information networks, national assets, key government landmarks) (13).

2.3 Energy infrastructure

To ensure energy supply to the site, the necessary infrastructure must be established, including systems for transportation and distribution of energy resources, storage facilities, and mechanisms for converting energy sources into alternative forms. Conversion encompasses, for example, the generation of electricity in power plants as well as the refining of petrol and diesel in refineries. Energy storage is used both to balance consumption and supply and in case of supply disruptions (10).

The Annex to Directive (EU) 2022/2557, issued by the European Parliament and Council on 4 December 14, 2022, describes sectors, sub-sectors and categories of entities relevant to energy infrastructure:

In the electricity sub-sector, the following entities are categorized:
- electricity utilities,
- distribution system operators,
- transmission network operators,
- electricity producers,
- designated electricity market administrators,
- electricity market participants.

The district heating and cooling sub-sector includes the following operators:
- operators of district heating
- operators of district cooling.

The petroleum sub-sector includes the following:
- pipeline operators,
- operators of oil production, refining and processing facilities,
- operators of storage and transportation facilities,
- central reserve administrators.

In the Natural Gas sub-sector are the following organisations:
- supplier companies,
- distribution system operators,
- transmission network operators,
- storage system operators,
- LNG terminal operators,
- gas companies,
- operators of natural gas treatment and processing facilities.

The hydrogen sub-sector includes the following operators:
- operators of hydrogen production, storage and transportation.

This is an overview of the EU's energy infrastructure. This Directive replaced Directive 2008/114/EC and came into force on October 18, 2024.

3 Terrorist attacks

I analysed and documented terrorist attacks and incidents targeting energy infrastructure, categorizing them into two groups. The larger group included attacks on energy infrastructure without nuclear facilities, while the second smaller group consisted of attacks targeting energy infrastructure with nuclear facilities. This section provides an overview of terrorist attacks on energy infrastructure from 2001 to 2020. I have used two main sources Global Terrorism Database and Global Incident Map.

3.1 Terrorist attacks on non-nuclear energy infrastructure

During the reporting period, I documented more than two thousand one hundred terrorist attacks and incidents targeting non-nuclear energy infrastructure worldwide. Most of the attacks and incidents were conducted using bombs or explosives. These were bomb attacks. I recorded a total of 1815 bomb attacks. These attacks occurred continuously and throughout the reporting period. For example, on July 21, 2012, a bomb attack targeted an oil pipeline in Turkey. On July 7, 2013, Egyptian militants detonated a gas pipeline connecting Egypt and Jordan in El Arish in the Sinai Peninsula, where several other attacks took place around the same time. On July 28, 2014, a female suicide assassin attacked a fuel station in Nigeria—the third bomb attack in Kano within 24 hours. On April 12, 2015, two eight-kilogram bombs were discovered attached to an energy tower. They were remotely neutralized using water cannons before detonation. On November 8, 2016, Nigerian militants detonated an oil pipeline—the third attack on the Trans Forcados pipeline network within eight. On March 14, 2017, a 132kV power transmission pole was blown up in Pakistan. On September 2, 2019, in Libya, a fire erupted at the Gharani power plant in Ain Zara after an artillery shell hit one of its turbines. This brief overview of terrorist attacks illustrates the wide scope of bomb incidents, ranging from explosions on power grids to attacks on pipeline networks. The second most frequent type is a gunfire attack. For example, on July 25, 2010, in Yemen, al-Qaeda militants targeted oil fields and killed six Yemeni soldiers. That was the fourth attack on government targets since June. On July 13, 2013, an oil tanker came under gunfire in Pakistan.

On October 15, 2020, a convoy of Pakistani oil and gas workers escorted by paramilitary troops was ambushed, and 15 people were killed. The third most frequent type of attack is an arson attack. On July 4, 2010, terrorists set fire to a power plant in Mukalla, Yemen. During an attack on April 2, 2013, in Pakistan, terrorists set fire to seven parked vehicles in the substation. On 10 March 2015, IS members burned down a substation in Iraq. On January 5, 2016, at least four oil storage tanks were set on fire during an IS attack in Libya. Kidnappings are another form of terrorist attacks. For example, in Nigeria, the father of an oil tycoon was kidnapped on June 12, 2008. On December 4, 2013, militants kidnapped 13 workers at a power plant in Pakistan. Assassinations are another form of terrorism. For example, on June 17, 2009, Taliban terrorists assassinated the director of the Oil and Gas Department in Afghanistan. On October 18, 2011, there was an assassination attempt on an official of Iran's Oil Ministry, who fortunately escaped the attempt. Biological attacks often involved the delivery of envelopes containing unidentified or suspected substances. For example, on September 10, 2020, a suspicious envelope was delivered to Green Mountain Power in the United States.

3.2 Terrorist attacks on nuclear energy infrastructure

During the reporting period in the second group, I recorded 107 terrorist attacks and incidents targeting nuclear facilities. Radiation incidents were the most frequently reported. I recorded a total of 66 radiation incidents. These include, for example, the arrest of two men on May 21, 2008, on suspicion of attempted sabotage, one of whom was carrying a plastic bag containing traces of explosive substances. On October 9, 2009, an engineer working at the CERN nuclear research laboratory was arrested on suspicion of being in contact with an Al-Qaida network and planning terrorist attacks. On March 11, 2010, the head of the Rawatbhata nuclear power plant was found dead in Kota, India. On September 22, 2010, a radioactive gamma projectile was reported missing in Pakistan. The projectile is used to store a dirty bomb or a nuclear bomb. On May 3, 2011, five men were arrested on suspicion of terrorist activities. Another terrorist attack happened in Brazil on March 19, 2019, when gunmen attacked members of a convoy transporting uranium to one of the nuclear power plants. On 3 May 2018, a terrorist attack took place in Pakistan on a bus carrying employees of the Pakistan Atomic Energy Commission. Three people were killed and 13 others were injured in the attack when a suicide bomber blew himself up next to the bus in the Punjab province in Pakistan. In India, on October 8, 2014, a soldier shot and killed three security personnel and wounded two others after an argument. The cyberattack between May and June 2017 was considered one of the largest. It consisted of an attack on twelve nuclear power plants in the US.

Conclusion

Terrorist attacks on energy infrastructure can threaten democratic states, so this is an area that requires attention. Bomb attacks or other possible attacks on oil pipelines, gas pipelines and power grids can have immeasurable consequences or even cause a domino effect across society.

In the first part of this paper, I have tried to offer a brief overview of terrorism. I have selected a few definitions of terrorism. I have outlined the differences between terrorism and guerrilla warfare. Terrorists use various attack methods to achieve their goals, which I also briefly described. In the next section, I have also examined the general infrastructure focusing on critical and energy infrastructures. Based on the discovery of over 2,100 terrorist attacks targeting non-nuclear energy infrastructure and more than 100 incidents involving nuclear facilities worldwide, I began to intensify my research. This article serves as an introduction to a subject I plan to analyse in more detail. Moreover, more and more attacks by aerial, ground and water drones are taking place, I intend to examine them in the context of energy infrastructure protection. These types of attacks are advancing in complexity. They can have much more serious consequences than previously thought.

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