FUNDAMENTAL ASPECTS REGARDING NATIONAL CRITICAL INFRASTRUCTURE

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Abstract: *The security environment, both at the regional and global levels, is characterized by a high degree of dynamism, the existence of major risks particularly in the economic and social spheres as well as direct military threats, whether conventional or hybrid in nature. In this context, it can be said that all nations of the world are, or will be, affected, particularly in the areas of military, economic-financial, and social security. The resources available to nations at any given time namely human, material, informational, and infrastructural resources play a very important role in ensuring individual, group, or state-level security. Infrastructural resources consist of all the structures, works, facilities, and installations that, by their nature, have a permanent military use in wartime or can be adapted for such use, and which can contribute to maintaining the viability and reliability of the defence system and of Romania's entire economic and military potential.*

Keywords: *critical infrastructure, resources, national security, protection.*

1. INTRODUCTION

The war between Russia and Ukraine, tensions between NATO and Russia, joint attacks by the United States and Israel on Iran, as well as the civil war in Sudan and the crisis in the Democratic Republic of the Congo, are realities that confirm the existence of major risks of a global conflict breaking out.

At the same time, the new economic and financial crisis has led the international community to realize that resources are extremely important and vital, particularly energy, food, and water.

I believe that critical national infrastructure falls within the realm of strategic resources, being of particular importance for maintaining the viability of the components of the National Defense System; at the same time, it will contribute to the realization and support of the strategic components of national security.

Currently, both at the regional and global levels, risks and threats of a military, diplomatic, or political nature are emerging.

Our membership in the North Atlantic Alliance and the European Union grants us the status of beneficiaries of certain guarantees and opportunities regarding the security of the state and its citizens.

Romania will need to focus on at least three areas of action: ensuring adequate economic potential, securing the resources strictly necessary to defend the national territory, and developing new military capabilities.

2. CRITICAL INFRASTRUCTURE, CONCEPTUAL DEFINITIONS

Etymologically, the term *"infrastructure"* derives from the combination of the latin prefix *"infra"*, meaning *"below, under, further"* and the suffix *"structure"*, which in latin denotes *"construction, orderly arrangement"*

Specifically, it can be said that infrastructure is a component of the basic and supporting structure of any system or element, ensuring that it is functional and stable.

At the same time, the etymology of the word *"critical"* comes from ancient greek, having been adopted into latin as *"kritikos"*, representing a point or moment of crisis that can bring about a decisive change in a negative sense thus leading to major losses, destruction, or damage.

The concept of critical infrastructure has been and continues to be addressed by experts and specialists, as well as by national and international organizations and bodies, and is utilized in most fields of activity, including economic, social, military, political, and diplomatic spheres.

Thus, critical infrastructure represents the material foundation of society, consisting of the means of production and circulation, as well as the systems and mechanisms upon which the state's economic, social, and administrative entities operate.

At the national level, critical infrastructure refers to an element, system, or component of the national infrastructure that serves to ensure and maintain the vital functions of society, public health, safety, and the economic and social well-being of citizens, and whose disruption, impairment, or destruction would have a negative impact.

From a military perspective, critical infrastructure will address at least the following aspects:

- it represents an area of major interest in national military policy and strategy;
- it ensures the fulfillment of political-military goals and objectives, as well as doctrinal guidelines regarding how to conduct a potential armed conflict;
- the development and maintenance of superior military and economic capabilities, under conditions far more advantageous than those of the enemy;
- the maximization of results from various fields of activity, as well as the natural features of the terrain.

The first studies and research on critical infrastructure were conducted in the early 1980, identifying certain critical elements and systems as a result of the emergence of risks, dangers, or threats to objectives belonging to states or national and international organizations.

The concept was first used in the United States of America in july 1996, when the Clinton administration issued the executive order on critical infrastructure protection, in which *"critical infrastructure is that part of the national infrastructure that is so vital that its destruction or incapacitation could seriously impair U.S.A. national defense or the U.S.A. economy"* [1].

Subsequently, this new concept was adopted by most countries and international organizations, leading to the development of policies, strategies, and concepts embodied in a specific regulatory framework and followed by the establishment of specialized agencies.

On december 8, 2008, the Council of Europe issued Directive 114, a document presenting the european perspective on critical infrastructure, stating that *"the criteria for identifying components are the scope and scale of the critical sector, the magnitude and intensity of the effects, the probability of being affected by a threat, and the duration of the effects"* [2].

According to the North Atlantic Treaty Organization (NATO), critical infrastructure refers to facilities, services, and information systems that are so vital to nations that their disruption or destruction could have destabilizing effects on national security, the national economy, public health, and the effective functioning of the government.

At the European Union (EU) level, the development and promotion of this concept began in 2004 and gained momentum starting in 2009, the main stages are presented in the following table:

Table 1

Date	Areas of action
October 20, 2004	Communications to the Council and the European Parliament on the protection of critical infrastructure in the fight against terrorism [3].
November 17, 2005	The development of a program addressing the need to protect critical infrastructure, as well as the proposal to establish the *"Critical Infrastructure Warning Network"* [4].
December 12, 2006	A package of measures designed to improve the protection of critical infrastructure in Europe, as well as the measures required to enhance their protection [5].
April 14, 2007	The requirement to develop and implement a Europe-wide procedure for identifying and designating European Critical Infrastructure [6].
December 08, 2008	The identification, designation, and assessment of European Critical Infrastructure, as well as the development of measures to protect it [7].
March 30, 2009	Implementation of specific measures for the protection of critical information infrastructure, namely the protection of Member States against cyberattacks and the improvement of their preparedness, security, and resilience [8].
December 14, 2022	Aspects regarding the resilience of European critical entities [9].

The development of these regulations has focused on ensuring the resilience of European Union member states in critical and vital sectors, namely energy, transportation, healthcare, the financial market, food, drinking water, and cyber infrastructure.

Thus, the concept of european critical infrastructure emerges, defined as that critical structure located in member states whose malfunction or destruction would have a major effect on at least two member states.

In Europe, the first incidents affecting critical infrastructure were terrorist attacks, similar to those of september 11, 2001, namely:

- march 11, 2004, in Madrid, the deadliest islamist attack to occur on European Union territory, involving the use of bombs during rush hour on commuter trains;
- july 7, 2025, terrorist attacks on London's transportation system.

All of these attacks led to the destruction of specific critical infrastructure systems, damage to property, and, most seriously, deaths or harm to the health of the civilian population, as shown in FIG.1.

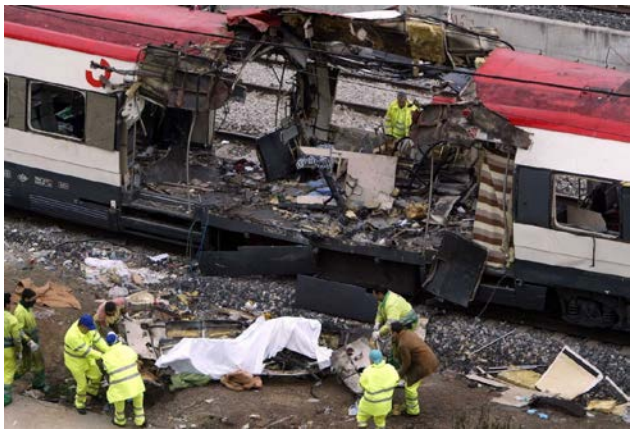

FIG. 1 Madrid - the terrorist attack on April 11, 2005 (source: https://agerpres.ro/documentare)

In addition, as a result of Russia's aggression against Ukraine, there has been significant damage to critical infrastructure, particularly energy, transportation, and supply networks, as well as storage facilities, and loss of life due to the impact on these systems.

In Romania, the relevant regulatory framework provides for the identification, designation, and protection of critical infrastructure to ensure national security, the functioning of economic operators, and social life, as well as to guarantee the safety of citizens.

I detail the following:

- Government Emergency Ordinance No. 98/2010, which establishes the responsibilities of authorities and operators of critical infrastructure;
- Government Decision No. 718/2011, representing the strategic document on the protection of critical infrastructure at the national level.

Fortunately, Romania has not yet been the target of terrorist attacks, damage, or disasters affecting elements of its critical national infrastructure.

However, following an incident in the power transmission grid on january 8, 2021, six counties in the northwestern part of the country experienced a major power outage that lasted for one hour.

The effects of this black-out were felt both economically and financially and among the civilian population; the incident demonstrated that there can be major risks within the national energy system (FIG. 2).

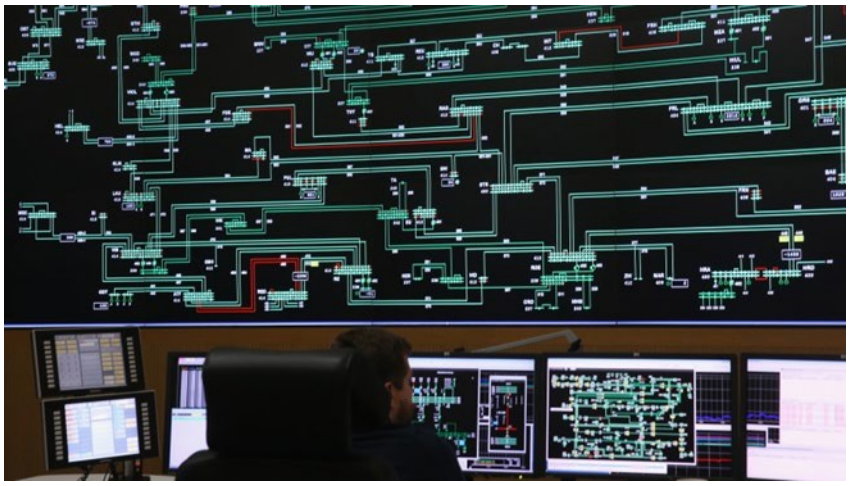

FIG. 2 Incident on the European electricity transmission grid – january 8, 2021 (source: https://www.digi24.ro/stiri/economie/energie/transelectrica)

In the current context, critical infrastructure consists of those categories of elements, systems, or locations whose operation is strictly necessary for society to ensure Romania's safety, security, and economic and social well-being.

Their exposure to risk will trigger a rapid response from both responsible entities and the civilian population, based on specific procedures and through an integrated approach.

The main characteristics of national critical infrastructures are as follows:

- they ensure the stability and functioning of various economic, social, military, informational, and other systems and processes;
- they are unique within the infrastructure of a system or process, serving as assets of value;
- they are highly vulnerable;
- they are indispensable and irreplaceable;

- they are subject to human, physical, cyber, and technical threats that will generate operational risks with a cascading effect (impacting citizens, disrupting economic and social activity).

Based on the data presented above, I believe that Romania's critical infrastructure will help support the fundamental strategic components of national security.

In this context, national critical infrastructure will make a significant contribution to:

- defending and guaranteeing national sovereignty, independence, territorial integrity, and constitutional democracy;
- achieving and protecting Romania's security objectives and interests;
- the functioning of state institutions and economic operators.

3. THE IMPORTANCE OF NATIONAL CRITICAL INFRASTRUCTURE

In general terms, critical infrastructure is inextricably linked to the concept of territoriality due to its connection with administrative-territorial units.

Therefore, it will also have a direct connection to the military domain, as territorial infrastructure namely the works, industrial facilities, and developments constructed during peacetime can be utilized for defense purposes in times of crisis or war, with the aim of amplifying the advantages and features offered by the geographical configuration, landforms, water sources, forests, etc.

Thus, I believe that the elements comprising territorial infrastructure will provide the capacities and capabilities strictly necessary for national defense, thereby contributing to the development of adequate military potential.

We observe a direct correlation between the effects of critical infrastructure and economic entities that produce material goods or provide public utility services; their destruction or failure to function will cause economic and social disruptions.

Thus, it is possible to identify elements that, if damaged or rendered inoperable, would have a major impact on the economy and the population, such as:

- physical elements related to buildings, equipment, facilities, and means of transportation;
- informational elements, namely databases, circuits, flows, techniques, and industrial procedures;
- organizational elements, transportation and telecommunications networks and systems, energy systems, supply systems, and management systems.

At the same time, we note the existence at the national level of vital structures which, due to the inability of the economic agent to perform its functions, cause disruptions, namely:

- energy systems for production, transmission, and distribution;
- major water supply systems;
- systems for the extraction, processing, and storage of oil, gas, and other energy sources;
- nuclear facilities and installations;
- information technology and telecommunications systems;
- public utilities and assets that contribute to supporting national security components.

The occurrence of damage or emergencies resulting from the actions of internal or external entities affecting the aforementioned elements will lead to major malfunctions, vulnerabilities, incidents, hazardous conditions, or acts of aggression.

A distinct segment of the economy's critical infrastructure is the defense industry, whose main components are:

- production lines and storage facilities for propellants and explosives, weapons, ammunition, and military equipment;
- testing ranges for ammunition, weapons, and military equipment;
- production facilities for propellants and pyrotechnic substances used in ammunition components.

Energy resources are considered strategic resources, comprising the following critical infrastructure elements:

- energy facilities such as power plants, transmission lines, or ports, the unavailability of which would lead to system failures throughout Romania;
- transformer stations and substations that supply national consumers, as well as equipment or facilities where a power outage could lead to explosions, fires, destruction, or major accidents resulting in human casualties or property damage;
- transformer stations or substations supplying units of the National Defense System or headquarters of central and local public administration;
- corridors for the passage or operation of power transmission lines;
- power stations and lines supplying urban centers;
- natural gas regulation and metering stations of local, regional, or national importance;
- nuclear power plants;
- overhead and underground crossings of transmission pipelines;
- reservoir dams with water storage capacity;
- river navigation locks;
- high-capacity hydroelectric power plants;
- drilling and production platforms, offshore and subsea pipelines for the transport of crude oil and natural gas.

This range of energy resources plays a decisive role in realizing the economic potential necessary to prepare the national economy and the territory for defense.

Listing these elements highlights both the role and importance of national critical infrastructure capabilities and the need to implement timely and effective protective measures.

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CONCLUSIONS

In light of the points discussed above, it can be stated that national critical infrastructure plays a major and strategic role in ensuring national security, particularly in the military, economic and social spheres.

The changing security environment, existing military conflicts, and current threats necessitate the implementation of viable, cross-sectoral measures to protect critical infrastructure in Romania.

These should be implemented through the construction of new infrastructure (highways, transportation networks, land development, etc.), as well as through the maintenance or modernization of existing infrastructure (county/national roads, ports, airports, the energy sector, etc.).

This will increase the level of protection for economic targets (both state-owned and private), military targets, corporate headquarters, and public institutions, thereby ensuring the protection of the population and territorial integrity.

In practical terms, it is nearly impossible to ensure complete protection for any type of critical infrastructure. I base this argument on the fact that, currently, military conflicts, terrorist attacks, or other forms of aggression can manifest in conventional, hybrid, or asymmetric ways, as a result of technological advancements in the fields of weaponry, military technology, and equipment (autonomous weapons, hypersonic weapons, robots, drones, etc.).

Approaches to critical infrastructure protection vary from country to country and from organization to organization; however, the development and implementation of a standardized regulatory framework at the level of NATO or EU member states will result in a significant increase in the level of protection for national or european critical infrastructure.

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