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Energy Security as an Element of National Security

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***Abstract*—Bulgaria annually consumes about 50 Terawatt hours (TWh) of electricity. Production varies within the same limits. These are the values over the past 5 years. 30-40 years ago, production and consumption were significantly higher, for which there is a historical explanation. In the last century, production and export of electricity were significantly higher, with production significantly exceeding consumption. Bulgaria supplied European Turkey, including Istanbul and Northern Greece. The balance was entirely positive. In the 21st century, electricity production has decreased significantly and since last year a trend for a negative balance of electricity has been observed, i.e. imports exceed exports. By disrupting the balance between production and consumption, Bulgaria becomes dependent on external suppliers and this threatens the country's national security**

Keywords — electricity, production, consumption, energy security, national security.

I. INTRODUCTION

Energy security is a multi-layered concept that includes reliability of supply, economic accessibility, sustainability and protection of critical infrastructure. In the context of national security, energy security ensures the functioning of state institutions, economic processes, healthcare, transport and defense [1, 2]. Changes in the energy structure, technological transformations and geopolitical upheavals make the topic a strategic priority for state policy. Therefore, energy security is a key element of national security and great attention should be paid to the state of energy and the development trends of the energy sector should be closely monitored both in the region and globally [3], [8], [15].

The methodological approach used in conducting the study was mainly analysis, combining historical retrospection, a systematic review of energy balances (production, consumption, import/export), an assessment of infrastructure vulnerabilities and scenario planning [4], [12], [23]. The report uses available national data, general principles of energy policy and good practices for risk management [5], [30].

The scope of the study focuses on electricity as a key component of energy security, including consideration of the transmission and distribution network, energy sources (nuclear, coal, gas, renewables), energy markets and strategic reserves; political and operational measures for a 5–30 year horizon [6], [11], [29].

Historical overview of the energy system

Period of export and industrial peak (mid-20th century – late 20th century): Bulgaria developed industrial production and had surplus electricity, which allowed for export to neighboring regions. This structure was based on large base capacities (coal-fired TPPs, NPPs and other plants) and relatively stable domestic consumption [16].

Transition and restructuring (late 20th century – early 21st century): economic and regulatory changes, modernization needs and environmental requirements lead to the closure or reduction of some capacities. In parallel, renewable sources are developed and the energy structure is changing [10], [20].

Modern period (21st century): reduced generation from traditional baseload sources and increasing share of renewables and nuclear energy in the mix. Recent years show a trend towards decreasing net exports and periodic shifts to net imports, which changes energy independence.

Since the beginning of this century, the majority of countries around the world have been pursuing a policy of limiting harmful greenhouse gas emissions and replacing coal and other polluting power plants with alternative and renewable sources, as well as ecological ones that do not pollute the environment [14], [25]. Unfortunately, many of the leading economic world powers and economically developed countries refuse to comply with international treaties and norms and do not even participate in the implementation of the agreements. The European Union, as

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one of the major political players, aims to be one of the world leaders in the fight against climate change and in this regard strives to achieve the goals of the agreement of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris, while at the same time providing clean energy throughout the continent. Bulgaria, as a member of the union, adheres to the set norms and even the requirements for us are higher than for the economically more developed countries from the western part of the continent [9], [19], [21]. To fulfill this commitment, the EU has set the following binding climate and energy targets by 2030, namely:

1. Reducing greenhouse gas emissions by at least 40% compared to 1990;

2. Increasing energy efficiency to at least 32.5% , as Bulgaria has a lot to catch up on here;

3. Increasing the share of energy from renewable sources to at least 32% of gross final energy consumption in the EU . Here, an assessment of the energy efficiency of alternative sources should also be made, because a large part of them are energy intensive and the electricity consumed is commensurate with the electricity produced;

4. Ensuring a minimum 15% level of electricity interconnection between Member States. Bulgaria is energy-connected with its neighbors in terms of electricity, but the connections are not at the necessary operational level.

In order to ensure a coordinated and coherent approach across the EU and implement the Energy Union Strategy, each Member State was required to submit to the European Commission a draft of its Integrated National Energy and Climate Plan by 31 December 2018 and its final Integrated Plan by 31.12.2019. Bulgaria, as a Member State of the European Union, promptly prepared and submitted to the European Commission its Integrated National Energy and Climate Plan (INPEC) [13], [22].

II. Research methods

Energy balance: annual consumption around 50 TWh; production in the same order, but with visible fluctuations and seasonal deficits. The latest data show periods in which imports exceed exports. This is a trend since 2025, which is deepening with the problems observed in the operation of unit 6 of the Kozloduy NPP and the Maritsa TPP - East.

Generation structure: a combination of nuclear capacity, coal-fired plants (decreasing share), gas-fired capacities and renewable sources (wind, solar, hydro). The dynamics of each component affects the flexibility and stability of the system [7], [18], [26].

Infrastructure: transmission and distribution network with sections that require modernization for the integration of decentralized sources and peak load management. The lack of sufficient energy storage limits the possibility of compensating for the variability of RES.

Risk and vulnerability analysis

1. Geopolitical and market risks

• Import dependence: increases the possibility of price shocks, disruptions and political pressure.

• Volatility of international markets: fluctuations in fuel and electricity prices affect economic stability.

2. Infrastructure vulnerabilities

• Outdated grid: risk of local and systemic failures during extreme loads.

• Insufficient storage: lack of large-scale battery or other storage solutions limits the possibility of flexibility.

3. Technological and operational risks

• Integration of renewable energy sources: without adequate management systems and reserves, the high share of renewable energy sources can lead to instability.

• Cyber risks: digitalization of networks increases exposure to cyberattacks that can paralyze critical systems.

4. Socio-economic risks

• Energy poverty: sharp price increases can affect vulnerable groups and cause social tension.

• Economic vulnerability: industrial users are sensitive to disruptions and price shocks [17].

The main objectives set out in the Bulgarian INPEC are:

• stimulating low-carbon development of the economy;

• development of competitive and secure energy;

• reducing dependence on imported fuels and energy;

• ensuring affordable energy for all consumers.

National priorities in the field of energy can be summarized as follows:

• increasing energy security and diversification of energy resource supplies;

• development of an integrated and competitive energy market;

• use and development of energy from renewable sources, in accordance with the available resources, the capacity of the networks and national specificities;

• increasing energy efficiency through the development and implementation of new technologies to achieve modern and sustainable energy;

• consumer protection by ensuring fair, transparent and non-discriminatory conditions for the use of energy services [24].

III. Results and discussion

The integrated plan is fully compliant with the legislation and the main strategic documents at the European and national level.

2 years have passed since the adoption of the plan, but in the last six months significant changes have occurred in Europe and the world. From the short-sighted policy of many political leaders and the transition from long-term

contracts for the supply of energy carriers to completely exchange supplies, where an important role is played not by producers and consumers, but very often by exchange players, intermediaries and proxies of politicians and large resellers. This led to a complete discrepancy between the set forecast prices and the current market prices and caused instability in the energy market and a significant increase in prices. In Bulgaria there are many actions that remain hidden from the public and generally accepted rules are circumvented, leaving great doubts about dirty deals [27].

The electricity market in the Republic of Bulgaria is characterized as national and is played by producers, energy companies, electricity transmission companies, consumers and clients of various caliber. Its structure and organization are regulated by the Rules for Electricity Trading in the Republic of Bulgaria. The electricity market consists of an electricity market through bilateral contracts concluded on the platform of the exchange operator, an exchange market, a balancing energy market, a reserve and additional services market, and a market for the provision of interconnection capacity.

The Bulgarian electricity transmission network is part of the unified transmission network of the countries of continental Europe and its development is closely linked to the development of the networks of neighboring countries. From the reports of the Bulgarian National Energy Exchange, we can note that the total physical imported quantity traded in Bulgaria in 2018 amounted to 2.2 million MWh, 94% of which originated in Romania. The total physical export for the same period amounted to 10 million MWh, distributed: Serbia (23%), Republic of North Macedonia (23%), Greece (21%), Turkey (21%) and Romania (12%). This shows that Bulgaria is predominantly an exporter of electricity to all neighboring Balkan countries. During different days on the exchange market, the distribution is not uniform, with the main influence being the weather conditions, the consumers and producers included in the energy system, the load on the energy system and the requests for electricity supply from neighboring countries. Bulgaria still meets the region's electricity needs, but for example, when one of the Kozloduy NPP units is shut down for recharging, its lack is immediately felt and with increased electricity consumption, the energy systems are put under serious threat. The structure of Bulgaria's electricity sector is such that the Kozloduy NPP and thermal power plants from its own energy sources ensure the balance of consumption (90% of consumption), thermal power plants with imported energy sources work for the additional load, and hydroelectric power plants with 2.7 MWh provide the peak load. In the last decade, many hydroelectric power plants were built not in the right place, and others were shut down that were necessary for our energy sector and proven over time, such as the Chaira hydroelectric power plant, the Belmeken-Sestrimo cascade and others. This was done piecemeal and was not energy-related on a national scale.

TABLE 1 COMPARISON OF THREATS AND MEASURES

Threat	Impact	Likelihood	Priority mitigation
Import dependence	Energy and economic shocks	High	Supply diversification
Reduced production	Loss of energy sovereignty	Medium	Investments in renewable energy and storage
Outdated network	Local and systemic accidents	High	Modernization and digitalization
Regulatory uncertainty	Delayed investments	Medium	National strategy and incentives

Impact on national security

Functional impact: energy supply disruptions affect critical state functions — communications, healthcare, transportation, water supply, and defense capabilities. Political impact: energy dependence can limit foreign policy autonomy and increase vulnerability to external pressures. Economic impact: unstable energy markets and high prices reduce competitiveness and investment attractiveness [28].

Need for a national strategy: a clear, long-term energy strategy with a horizon of 2030–2050, defining priorities, investment mechanisms and regulatory incentives. Market regulation: mechanisms to protect against speculative price shocks, incentives for long-term contracts and mechanisms for strategic reserves. Compatibility with European policies: coordination with regional initiatives, participation in common markets and use of European funds for modernization.

Strategic goals and priorities

1. Restoring energy autonomy by increasing domestic production and diversifying sources.

2. Increasing system flexibility through energy storage, backup capacity and smart grids.

3. Strengthening sustainability through energy efficiency, decarbonization and the development of low-carbon technologies.

4. Protecting critical infrastructure and enhancing cybersecurity.

5. Social justice through measures to protect vulnerable consumers from price shocks.

Operational measures and recommendations

Short-term (1–3 years)

- Adoption of a national energy strategy with specific goals and indicators.
- Creating strategic reserves for critical periods and rapid activation mechanisms.
- Improving energy efficiency in the public sector and key industries.
- Strengthening the cyber defense of energy operators.

Medium-term (3–10 years)

- Investments in energy storage (batteries, hydrogen solutions, compressed air) to compensate for the variability of renewable energy sources.
- Modernization of the transmission and distribution network and implementation of demand management systems.
- Diversification of supplies through regional contracts and interconnections.

Long-term (10–30 years)

- Development of low-carbon baseload capacities and technological solutions for sustainable production.
- Integration of hydrogen technologies and other forms of energy transfer and storage.
- Complete digitalization and automation of network management with a high level of cyber protection.

Implementation plan and institutional coordination

Coordination structure: creation of an inter-sectoral body for energy security, including representatives of ministries (energy, economy, internal affairs, defense), regulator, operators and scientific institutes. Implementation phases: planning and regulatory framework (0–1 year); pilot projects and initial investments (1–3 years); large-scale investments and integration (3–10 years); full transformation and sustainable management (10+ years). Responsibilities: clear division of roles between state authorities, operators and private investors; accountability and control mechanisms.

Expansion of operational measures: I propose a detailed plan in three stages — short-term, medium-term and long-term — with specific actions, responsibilities, indicators and budgetary guidelines for implementation.

Operational stages

Short-term measures 0–18 months

Objective: rapidly strengthen resilience and crisis preparedness. Key actions: adopt a national energy strategy and operational protocols; create strategic reserves and mechanisms for their activation; conduct a national audit of critical energy infrastructure; introduce temporary measures to protect vulnerable consumers; strengthen cyber protection of operators. Responsibilities: Ministry of Energy, State Energy and Water Regulatory Commission, transmission and distribution operators. Key indicators: adopted strategic document; available reserve capacities (MW); priority supply plan. The national strategy and integrated plan documents have already been developed in a framework and serve as a basis for action.

Medium-term measures 1.5–7 years

Objective: increasing flexibility and reducing import dependency. Key actions: large-scale investments in energy storage (batteries, hydrogen solutions); modernization of the transmission and distribution network; deployment of demand management systems and smart grids; incentives for local production and energy efficiency in industry. Responsibilities: state funds, public-private partnerships, EU funds and banks. Key indicators: installed storage capacity (MWh); percentage of routes with smart devices; reduction of net imports. National plans foresee these priorities as part of the integrated approach.

Long-term measures 7–30 years

Goal: full transformation towards a sustainable, low-carbon and resilient energy sector. Key actions: development of low-carbon baseload capacities; integration of hydrogen economy; regional energy integration and diversification of supplies; full digitalization and automation of management with a high level of cyber protection. Responsibilities: national and regional institutions, industry, research centers. Key indicators: share of low-carbon sources; hydrogen storage capacity; recovery time after an incident.

TABLE 2: COMPARISON OF STAGES

Stage	Time horizon	Basic measures	Key indicator	Priority
Short-term	0–18 months	Strategy; reserves; cyber defense	Plan adopted; reserve capacity	Very high
Medium-term	1.5–7 years	Storage; network modernization	MWh storage; smart routes	High
Long-term	7–30 years	Hydrogen; low carbon bases	Share of low-carbon sources	Medium/High

Most of the transactions are carried out on the "Centralized Market for Bilateral Contracts" segment, which has significantly increased since 2018. The volumes of the "Day Ahead" segment also increased by 43% year-on-year. Also, trading on the "In-Day" segment started in April 2018. Not all neighboring countries have such segments yet. In my opinion, the elimination of medium-term and long-term contracts is a mistake, which does not allow planning the operation of energy capacities and their load and achieving predictable prices, rather than spontaneous price changes caused by stock market speculators.

The price of electricity has also changed significantly in the last few months and instead of the values set in the integrated plan, they now significantly exceed even those set for 2030. The set values were up to 95 €/MWh by 2030 and 106 €/MWh by 2040, however, in October of this year, the exchange prices exceeded 300 €/MWh. This will lead to the need for a complete revision of short-term and long-term programs and has already led to chaos in consumption and large overspending by producers. These high prices, in my opinion, are also the result of the short-sighted policy pursued by the European Union and the leaders of many of the major economic and political countries and unions. This is due to the fact that the market and prices in Europe are unified and the burden on households is different and their economic status is very different in different parts of the European continent. Rich countries, which also have higher incomes, have even lower energy prices than Eastern European countries, which have lower incomes for their

residents. This leads to impoverishment of the population and difficulties in servicing payments for consumed electricity by both household subscribers and industrial enterprises.

This is a problem not only for Bulgaria, but also for many countries in Europe and the world. Even China is currently experiencing a shortage of electricity and some industrial enterprises are operating on a significantly reduced production schedule.

The electricity produced in Bulgaria can be grouped into several main groups: from hydroelectric power plants, thermal power plants, nuclear power, wind generators and photovoltaics. Bulgaria has been and still is a gross exporter of electricity, but the conditions set by the European Commission and the actions of our politicians may soon turn Bulgaria into an importer and thus the national and energy security of the country will depend on other countries.

Bulgaria uses the existing potential of local resources to the maximum extent while complying with environmental requirements. The main energy carriers for energy production are solid fuels in the Maritsa Basin and the nuclear power plant.

Power plants using local coal currently provide about 48% of electricity production and are a guarantor of Bulgaria's energy security and the competitiveness of the Bulgarian economy. Bulgaria will use to the maximum extent the existing potential of local coal in the country while complying with environmental requirements, as they can provide a resource for electricity production for the next 60 years. Here it is planned to reduce the relative share by 2040 to about 3-4% of total electricity production.

Nuclear energy is an important energy carrier that guarantees basic electricity production with predictable and competitive prices. Kozloduy NPP EAD provides over 33% of electricity production in the country and is a guarantor of Bulgaria's energy security. According to the plan, the share of energy from nuclear power plants is expected to increase to almost 60% by 2040, with the net value doubling from 15 GWh to almost 31 GWh.

The use of energy from renewable sources is the third most important local energy resource, which has been increasing in recent years. The main contribution to this is the increased consumption of biomass, as well as the use of solar and wind energy for the production of electricity. The integrated plan provides for an increase in the share of electricity production from wind generators, biomass and solar panels. Over the past 4-5 years, numerous scandals have arisen in Bulgaria related to the unregulated import, storage and incineration of waste from Western European countries, and most of all from Italy. Among the waste there was also very dangerous and toxic waste, which significantly pollutes the environment.

When Bulgaria joined the European Union, we were forced to close the first 4 units of the Kozloduy NPP, each with a capacity of 440 MWh. At this stage, these power units are irretrievably destroyed and cannot be restored. Over the years, we purchased and subsequently resold 2 VVER 1000 units for the Belene NPP. After arbitration, we purchased another 2 similar third-generation units, which have been unpacked for 3 years now, instead of being used. There is talk of building new capacities at the Kozloduy NPP, fuel diversification, and others, but this is in the realm of talk and political pressure and lobbying for certain companies that do not have the necessary experience and are compromised in the Czech Republic, Ukraine, the Philippines, and other countries.

Upon entering the EU, Slovakia, for example, was also forced to close some of its units, but after 2-3 months it reopened them and did not agree to the conditions set for closure .

In the last 10 days, the European Commission has changed its position on nuclear energy and its chairman, Jan Timmerman, personally said that if we want, we can develop our nuclear energy with new units in Kozloduy, and why not the construction of the power plant in Belene. 10 EU countries, including France, Bulgaria and others, have submitted a document for the continuation of the development of nuclear energy in the European Community. Nuclear energy does not produce greenhouse gases and does not pollute the environment, and with the development of technologies, it is much safer and does not generate waste, unlike some of the green energies.

The US has an appetite for supplying mobile nuclear power plants with small and medium capacity to the countries of Eastern Europe, but this is not a good solution, firstly because these plants have not yet been constructed and secondly, it is not a good solution to deploy numerous small nuclear power plants, which are a potential risk and target of the numerous terrorist attacks that are taking place around the world. It was precisely to lobby for such plants that the US Secretary of Energy visited Central and Eastern Europe in early October.

Bulgaria failed in the years of transition to sufficiently protect its energy and national security with the closure of units 1-4 of the Kozloduy NPP, the agreement on the premature closure of the TPP in the coming years, instead of the conditions achieved by Poland for the operation and subsidization of these plants. After numerous unsuccessful negotiations and the lack of negotiations, the Belene project did not move forward, despite the presence of 2 modern 3+ generation power units at the plant. At the same time, Romania and Turkey are building new nuclear power plants and will thus fill the niche in the energy market in the region. Omissions were made and it is time for politicians to stop serving foreign interests and to protect Bulgarian interests for the development of Bulgarian society.

Risk management and budget guidelines

- Risks: delays in regulatory decisions, lack of funding, technological barriers, social resistance.
- Mitigating measures: phased financing through EU funds and PPPs; pilot projects; communication campaigns for public support.

• Budgetary guidelines: short-term measures - state and operational costs; medium-term - investments in storage and network (hundreds of millions of euros); long-term - billions of euros, distributed in phases and with European co-financing. National documents outline funding opportunities and priorities.

Well make a detailed operational plan

Detailed operational plan for the first 24 months to strengthen energy security

This operational plan describes specific actions, responsibilities, timelines, expected results, indicative budgets and key performance indicators (KPIs) for the first 24 months of the launch of a national program to enhance energy security.

Summary of goals for 24 months

• Ensuring operational strategic reserves and rapid activation mechanisms.

• Launching pilot projects for energy storage and demand management.

• Accelerated modernization of critical sections of the network and increased cyber defense.

• Establishing institutional coordination and a regulatory framework for long-term investments.

• Communication and social protection for vulnerable consumers.

Organizational structure and responsibilities

• National Energy Security Coordination Council — leading coordination and decision-making body.

• Ministry of Energy — operational manager of the program.

• Transmission System Operator (ESO) — technical implementation of network measures.

• Regulator (SEWR or relevant authority) — regulatory changes and monitoring.

• Crisis Management Agency — integration of emergency supply plans.

• Public-private partnerships and financial institutions — financing and implementation of investments.

• Scientific institutes and universities — technical expertise and evaluation of pilot projects.

TABLE 3: SCHEDULE AND KEY ACTIVITIES BY PHASE

Period	Main activities	Responsible	Key result	Indicative budget
Month 0–3	Establishment of a coordination council; adoption of an operational plan; national infrastructure audit	Ministry of Energy; operators	Founding Board; audit report	€0.5–1M
Month 3–6	Creation of strategic reserves; development of crisis protocols; cybersecurity assessment	Crisis Management Agency; operators	Backup plan; cyber assessment	€5–15M
Month 6–12	Launch of 2 pilot battery storage projects; modernization of 2 critical grid sections; energy efficiency program	PPP; ESO; municipalities	50–100 MWh storage; modern routes	€50–150M
Month 12–18	Deployment of demand management systems; training and simulations for crisis scenarios; social measures	Operators; ministries; NGOs	DSR system; exercises conducted	€10–30M
Month 18–24	Evaluation of pilots; scaling up successful solutions; preparation of investment packages for 3–7 years	Ministry; financial partners	Scaling plan; investment proposals	€20–100M

IV. CONCLUSIONS

Here I develop the four conclusions you have indicated, providing for each justification, risks, specific recommendations for action, key responsible institutions, indicative time horizon and indicators of success.

A. Extending the operational life of thermal power plants and developing nuclear energy in Kozloduy and Belene

Maintaining and extending the operational capacity of existing thermal power plants provides baseload capacity and reserve capacity in the transition period to low-carbon energy.

New nuclear capacities increase energy autonomy and provide a large amount of low-carbon electricity, which is important for energy security and climate goals.

Risks:

1.Technical and environmental challenges in extending the life of old capacities.

2.High capital costs and long terms for building new nuclear units.

3.Social and political opposition, as well as regulatory requirements.

Recommendations for action

1.Conduct independent technical assessments of the condition of key TPPs and determine safe terms for extending their operation.

2.Develop an integrated nuclear development plan, including Kozloduy (new units) and Belene (reactivation/completion), with clear financial, regulatory and environmental criteria.

3.Financial planning: combining state funds, European co-financing and private investments; assess public-private partnership models.

4.Transparent public consultations and communication program on safety, economic benefits and environmental measures.

Responsible institutions: Ministry of Energy; Nuclear Regulatory Agency; plant operators; international experts.

Time horizon:

Short term: 1–3 years for assessments and planning.

Medium term: 3–10 years for life extension and initial construction activities.

Long term: 10+ years for full implementation of new nuclear capacities.

B. The European context and requirements for third generation nuclear reactors

The European institutions set high standards for safety and cost-effectiveness for new nuclear projects. Compliance with these standards is a prerequisite for access to financing, insurance and public trust.

Risks

1.Failure to comply with the requirements may lead to the rejection of European co-financing, difficulties in licensing and increased costs.

2.Choosing obsolete or incompatible technologies increases operational and environmental risks.

Recommendations for action

1.Requirement of third generation or equivalent safety technologies for all new nuclear projects.

2.Assessment of technological options through international expertise and comparative cost-benefit analyses.

3.Integration of best practices in safety, waste management and emergency procedures.

Responsible institutions: Ministry of Energy; Nuclear Regulatory Agency; international consultants; European funds.

C. Delays, administrative procedures and increasing costs for energy projects

Numerous committees, lengthy expert assessments and complex procedures increase the time for implementation and the final price of projects. This leads to a greater financial burden on the state and taxpayers.

Risks

1.Loss of investor interest; increased project costs; dependence on expensive external analyses and consultants.

2.Negative effect on competitiveness and the ability to respond quickly to energy crises.

Recommendations for action

1.Procedural reforms: optimization and digitalization of administrative processes; introduction of clear deadlines for consideration and decisions.

2.Establishing fast-tracks for strategic projects with guarantees of transparency and control.

3.Developing national expert capacity through training and cooperation with academic centers to reduce dependence on expensive foreign analyses.

4.Cost control mechanisms: standardized contracts, transparent tenders and performance monitoring.

Responsible institutions:Ministry of Energy; Council of Ministers; regulatory authorities; Public Procurement Agency.

Time horizon:

Short-term: 6–18 months for procedural changes and digitalization.

Medium-term: 1–4 years for building national expert capacity.

Success indicators

D. Need for a strategic investor in protecting national interests

Large energy projects are require significant investments and long-term partnerships. A strategic investor can provide capital, technology and operational expertise. At the same time, national interests must be protected through clear conditions and control mechanisms.

Risks: Entry of investors with interests that do not coincide with national priorities; loss of control over critical infrastructure; possible political and economic dependencies.

Recommendations for action

1.Define criteria for a strategic investor: technological capacity, financial health, experience in nuclear energy, commitment to the local economy and compliance with national regulations.

2.Mechanisms to protect the national interest: retention of a state share or special rights (golden shares) in key projects; clauses for technology transfer and localization of production; clear conditions for management and control.

3.Transparent selection procedures with international tenders, evaluation of offers according to security and public interest criteria.

4.Commitment to long-term partnership: guarantees for investments in training, infrastructure and local value chains.

Responsible institutions: Ministry of Energy; Ministry of Finance; Government Commission for the Selection of Strategic Investors; Regulator.

Time horizon:

Medium term: 1–3 years for selection and conclusion of agreements.

Long term: implementation and monitoring throughout the project life cycle.

Establish a cross-sectoral monitoring mechanism with public reports every 6 months and independent audit of progress.

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