



Nuclear Energy in an Era of "Total Uncertainty": The Global Market Crisis and Serbia's Strategy

The global economy has entered a period of tectonic shifts, characterized by a state that can be defined as **"total uncertainty"**. This state differs from classic economic cycles in that it undermines the very foundations on which long-term forecasts, investment models, and geopolitical strategies have been built for decades.

In nuclear energy—the industry with the longest investment cycles (centuries pass from conception to decommissioning)—this crisis of uncertainty is felt most acutely. Not only the technical and economic indicators and political implications of developing nuclear energy for peaceful purposes are being categorically reexamined, but also the very foundations for its existence in the energy security framework of states.

Until February 2022, there was an unspoken but strict taboo in international law and military strategy: operating nuclear power plants should not become active combat zones. Events in Ukraine, and especially the new conflict in the Persian Gulf in 2026, have definitively shattered this postulate, setting a precedent that radically changes the assessment of the political and technological risks of nuclear energy worldwide.

The second blow to the foundations of nuclear energy is being dealt by the economic model. The world has entered an era of high inflation, volatile resource prices, and disrupted supply chains.

1. Budget chaos and the end of "investment valuation"

In conditions of "total uncertainty," any investment estimates before construction begins and even during construction are no longer reliable or even approximate .

The construction period for a nuclear power plant ranges from 7 to 15 years. It is impossible to predict the cost of steel, cement, zirconium, or specialized labor during this period, nor the cost of capital (bank interest rates). Traditional "cost calculations" must be replaced by "revising the project costing"—a nuclear power plant is becoming not a commercial project, but a state instrument for strategic survivability, the price of which cannot be determined by market methods.

Rating agencies found that cost estimates for new nuclear units are often **"only marginally better than a guess ."**

In a situation where election periods, potential candidates, and their positions on nuclear energy, as well as decisions in favor of European, American, or Russian technologies (VVER, PWR, APR) during the construction period, are impossible to predict, traditional methods for evaluating vendor proposals are in crisis.



2. Uneven impact of uncertainties on projects

The rise in energy prices in 2026, caused by the military conflict in the Persian Gulf, will have a profound and uneven impact on the world's three largest economies: Europe, the United States, and China. This event will exacerbate the state of "**total uncertainty**" we discussed earlier and force a drastic reconsideration of energy security strategies.

Below is a detailed analysis of the impacts for each region.

2. 1. Europe: Crisis of survival and acceleration of transition

Europe will be in the most vulnerable position, as it is most dependent on hydrocarbon imports and its energy system is already in a state of fragile equilibrium.

- **Economic shock and deindustrialization:** Record oil prices (we estimate up to \$250 per barrel) and, consequently, gas prices, will lead to a sharp rise in production costs. This will trigger a wave of bankruptcies in energy-intensive industries (chemicals, metallurgy, cement production). Stagflation (a combination of high inflation and stagnant economic growth) will become the dominant economic scenario.
- **Social pressure and energy poverty:** Sharp increases in heating and electricity bills will push millions of households to the brink of survival. This could lead to social unrest and the collapse of governments, posing **political risks** to long-term infrastructure projects.
- **Incentive for Nuclear Power Development:** High fossil fuel prices are pushing Europe to develop nuclear power as the only source of stable baseload generation. However, as AFRY research has shown, the construction of large nuclear power plants (as exemplified by Finland) requires multibillion-dollar government guarantees. The crisis will force Europe to reconsider **SMRs** (small modular reactors), particularly in the heat supply sector, as a more flexible and less financially risky solution.

2. 2. USA: Price Shock, Inflation, and Political Volatility

The US, as the largest producer of oil and gas, is in theory more protected, but its economy is extremely sensitive to gasoline prices, and its political system is sensitive to inflation.

- **Inflationary spiral:** Rising gasoline prices (to \$10–12 per gallon) will immediately impact the cost of logistics and all goods, driving up inflation. The Federal Reserve will be forced to aggressively raise interest rates, which will increase the cost of capital for all projects, including nuclear power plants.
- **Political Volatility:** High inflation and gas station prices traditionally lead to defeat for the ruling party in elections. In the context of **the political and energy forecast**, this signifies the risk of a sharp shift in energy policy: from support for "green" generation and SMR to demands for an immediate increase in domestic oil and gas production ("Drill, baby, drill!"). This will create uncertainty for long-term nuclear projects (such as NuScale).



- **Nuclear Renaissance (Geopolitical):** The US will use the crisis to promote its technologies (e.g., Westinghouse AP1000 and SMRs) as a tool of **geopolitical influence**, offering allies an alternative to Russian and Chinese supplies, even as its own FOAK SMR projects remain remarkably chaotic.

2. 3. China: A blow to exports and an acceleration of the “nuclear march”

China is the world's largest oil importer. Rising prices will hit its production model.

- **Rising export costs:** Higher energy and logistics prices will increase the cost of Chinese goods. This will reduce their competitiveness in a global market already in recession. China's economic growth will slow, creating domestic social risks.
- **Pressure on energy security:** The disruption of logistics in the Persian Gulf will threaten physical oil supplies. This will force Beijing **to accelerate its** domestic nuclear program to reduce its dependence on imports.
- **Aggressive Nuclear Power Plant Exports:** China is using the crisis as an opportunity to aggressively promote its reference and production-scale Generation III reactors (Hualong One/HPR1000) abroad, offering countries a "full package" of turnkey financing. For emerging economies (including Serbia), the Chinese offer, backed by low-cost loans, will be the most attractive given the capital shortage and high risks.

The rise in energy prices in 2026 will be a catalyst for global change. The world no longer has the tools to forecast prices for nuclear projects 15 years in advance. Nuclear energy has become either a state-subsidized instrument of desperation or a geopolitical weapon of state-owned vendors (Russia, China). In this new reality, a nuclear power plant is not a commercial project, but a catastrophic chaos in a zone of total risk.

We acknowledge the current, extremely complex reality of the global nuclear market, particularly in the European region. Indeed, both Europe and Russia are currently experiencing profound institutional, economic, and geopolitical crises that directly undermine their positions as reliable suppliers of turnkey nuclear technologies.

In the context of this “total uncertainty,” Serbia’s orientation toward proposals from China and the United States appears not just “more correct,” but perhaps the only pragmatic strategy for the actual launch of a national nuclear program.

Let's analyze this situation in more detail, dividing it into crisis zones and potential zones.

3. Crisis Zone: Why Europe and Russia are losing ground

3. 1. Europe: Technological stagnation and “calculated chaos”

The European nuclear sector (primarily France's EDF) is experiencing a severe crisis of confidence. Generation III projects (EPR reactors) have become symbols of colossal cost and schedule overruns (Olkiluoto in Finland, Flamanville in France, Hinkley Point C in the UK).

- **The result for Serbia:** Relying solely on European technologies means automatically accepting years of "budget chaos," prohibitively expensive electricity (LCOE), and the



need for billions in government subsidies that the Serbian economy may not be able to afford. Europe currently cannot offer a benchmark project built on time and within budget.

3. 2. Russia: Isolation and sanctions risks

For decades, Rosatom was the world leader in nuclear power plant exports (thanks to the VVER series and government loans). However, the geopolitical crisis after February 2022 radically changed the situation.

- **Result for Serbia:** Even with political will, the construction of a Russian reactor (VVER) in Serbia today is associated with **unacceptable risks** :
 - **Sanctions:** Strict financial and technological sanctions from the EU and the US make it impossible to conduct cross-border payments and supply critical non-nuclear equipment (turbines, automation), which Rosatom often purchased from the West.
 - **Supply chains:** As rightly noted in the provided text, it's a huge question how reconfiguration or even construction of new units in Europe will be accomplished without technical assistance from Russia. The political risk of fuel or spare parts supplies being blocked by EU transit countries (Croatia, Hungary) is extremely high. Cooperation with Rosatom today is a path to isolation along with it.

4. Potential Zone: The USA and China as Real Alternatives

While Europe and Russia are mired in crises, the United States and China are actively competing for leadership, offering different but competitive models.

4. 1. China: State-owned turnkey consulting and serial production (The most powerful “builder” today)

China is the only country in the world that currently builds nuclear power plants in large quantities, quickly and relatively cheaply, having accumulated unique experience in overcoming FOAK risks within the country.

- **Benefits for Serbia:**
 - **Reference availability:** China can show actually working third-generation units (Hualong One / HPR1000) that have been put into operation.
 - **Financing:** Beijing offers a full turnkey public financing package (preferential Eximbank loans), which is critical for Serbia.
 - **BRI Integration:** Nuclear project could be linked to other Chinese infrastructure investments in Serbia.
 - **Target Price Readiness:** China, with its NOAK (Nth of its kind) experience, is more likely to agree to hybrid Target Price contracts, taking on some of the cost overrun risks, in order to gain a foothold in the European market.



4. 2. USA: Geopolitical prestige and technological leadership in SMR

The United States, having lost its position in the construction of large units (the Vogtle project also showed cost overruns), has placed its bets on geopolitical technology exports and leadership in small modular reactors (SMRs).

- **Benefits for Serbia:**
 - **Geopolitical Shield:** The choice of American technology is a powerful signal of loyalty to the West, which could facilitate Serbia's integration into the EU and access to Western capital markets. The US is actively promoting its technologies (Westinghouse AP1000, NuScale SMR) as a tool to curb Russian and Chinese influence.
 - **Advanced SMR technologies:** If Serbia chooses the SMR route (e.g. for district heating, similar to Finland), American projects (NuScale, GE Hitachi) are seen as the most advanced in licensing (although the FOAK (First-Of-A-Kind) risk for them is still enormous, as demonstrated by the failure of the NuScale project in Idaho).
 - **Safety Standards:** The US regulator (NRC) has a reputation for being the strictest in the world, which increases confidence in the project's safety.

5. Serbia's strategic choice: "How to count?"

Perhaps focusing on China and the US is indeed more appropriate today, as they offer **truly working mechanisms for financing and construction in conditions of high uncertainty**, while Europe and Russia offer only risks (cost or geopolitical).

However, for Serbia this creates a new challenge:

- **The Chinese route:** Provides a low-cost, turnkey nuclear power plant, mass-produced technology, and financing, but carries the risk of increasing debt dependence on Beijing and could provoke strong opposition from Brussels and Washington, complicating the path to EU membership.
- **The American Way:** Provides geopolitical prestige, advanced technology (especially SMRs), and access to Western money, but carries the risk of high FOAK estimates (since the US has no experience in serial construction of SMRs abroad) and political dependence on Washington.

6. Conclusion: The predicted right approach for Serbia

The world no longer has the tools to forecast prices for nuclear projects 15 years in advance. Nuclear energy has become either a state-subsidized instrument of desperation or a geopolitical weapon of vendor states (Russia, China). In the new reality, a nuclear power plant is not a commercial project, but a catastrophic chaos in a zone of total risk.

In the context of this "total uncertainty," Serbia must not "choose a side" prematurely.

The only correct direction is the creation of a National Center of Competence in Nuclear Engineering, which will take the position of a Vendor-Independent Integrator.

Serbia must:

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1. **Create a strong independent regulator** (institutional vacuum) capable of auditing budgets.
2. **Announce a tender, encouraging competition** between the Chinese Hualong One (for serial production and low cost) and the American SMR (for technology and prestige).
3. **Use valuation methods (RAB, Real Options)** that allow you to manage the risks of uncertainty, rather than simply relying on LCOE.

Focusing on China and the US is pragmatic, but only if Serbia acts as a qualified customer capable of forcing vendors to compete to overcome the cost chaos in its interests.