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BULLETIN

The Future of French Nuclear Energy

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Although nuclear energy is one of the leading branches of French industry, its development prospects remain unclear. This is due to divergences in opinion about the shape of the French energy sector after the energy transition, technical problems of the European Pressurised Reactor (EPR), and difficulties in adjusting to EU competition rules. Failure to address these issues could adversely affect the credibility of France's offer for exports of civil nuclear technology.

The French nuclear sector has been developing since the 1950s, but the decision to base France's energy security on nuclear power was made in the 1970s as a result of the 1973 oil crisis. Currently, 56 reactors cover about 70% of French electricity production. The nuclear industry employs about 220,000 people.

Despite its advantages, the French nuclear sector is facing difficult challenges. The nuclear disaster in Fukushima, Japan, shook public support for this energy source: just over 50% of French people want this energy to continue to be used. The demonopolisation of the European energy market makes the future of French nuclear a political problem that also affects the decisions of potential foreign buyers of French technologies.

Advantages of French Nuclear. The defenders of nuclear energy in France refer to the resulting low price of electricity (€48/MWh). It translates into lower energy costs than the European average: a French private customer pays about €0.18 per kWh, and industrial ones about €0.11. For comparison, in Germany, the price is €0.30 and €0.20, respectively.

These lower costs are possible through the scale effect resulting from the state monopoly on supplying energy from reactors and the domination of this energy source. Nuclear lobbyists, trade unions and some political forces—the Communists, Republicans (LR), and National Rally (RN)—point in this context to the high cost of the French government's planned reduction of the share of nuclear energy in electricity production to 50%.

Another argument in favour of maintaining nuclear energy is the control by French companies of the entire technological cycle, from raw material extraction to waste management. Orano, responsible for these two specific processes, has technologies that reduce consumption and partially process the raw material used. The link between the civilian nuclear and military sectors plays an important role: a move away from nuclear energy would make it difficult for France to maintain its status as a nuclear power. Another advantage of nuclear energy is its zero emissions, which is important in view of France's commitment to net carbon neutrality by 2050.

The nuclear industry shows about €2 billion in positive trade balance annually. The export of civilian nuclear technology is a way of increasing French influence abroad as it entails constant scientific and technical cooperation. Central European markets (Czechia, Poland, Romania, Ukraine), China and India seem to be the most prospective. These countries are committed to rapidly decarbonising their economies, while their energy needs are increasing.

Challenges and Threats. The lower price of energy in France has led to the belief that public services based on a network distribution scheme should operate under the state monopoly. Hence, the reluctant adjustment of the French market to the pro-competitive EU legislation. In France, the European Commission (EC) is accused of wanting to destroy the state-owned group EDF, which is dominant on the market, because of an aversion to nuclear energy dictated by Germany. Critics of the Commission

draw attention to the fact that the European Investment Bank will not finance investments in nuclear power. There is also uncertainty regarding the recognition of nuclear energy as a "sustainable energy source" in the EU's green taxonomy.

The plan to divide the EDF group, negotiated between the French government and the EC, is intended to facilitate market entry for private competitors. At the same time, it should provide the EDF with public aid for the modernisation of reactors, the cost of which is estimated at €50 billion. EDF has found itself in a bad financial situation, with debt amounting to €42 billion: the loss of customers to competitors is accompanied by the necessity to "give up" energy to competitors due to its still dominant position on the market.

The EC does not agree to state aid without dividing the EDF into independent units that obtain energy from individual sources (nuclear, hydropower, renewables). The plan presented by the French government provides for the establishment of enterprises under one holding. Only the renewable energy sector could be financed through the stock exchange. Negotiations reached an impasse due to resistance from the EC, but also because of the reluctance of the French authorities to make unpopular decisions ahead of elections.

The future of the French nuclear sector is also threatened by foreign competition and the technical problems of the third-generation EPR reactor. Of the four EPR investments—Taishan (China), Olkiluoto (Finland), Flamanville (France), Hinkley Point (UK)—only the Chinese contract was completed, mainly due to Chinese engineering solutions and the tolerance of the local regulator. Apart from the technical flaws, the withdrawal of Siemens from the project as a result of Germany's planned withdrawal from nuclear energy was a blow to the French company Areva, who was implementing the investment. The Olkiluoto investment is overdue by 12 years, and the associated costs triggered the restructuring of Areva (renamed Framatome and taken over by the EDF). The shortcomings of the EPR have delayed work on the French small modular reactor (SMR), which could become a competitor to EPR. It is also estimated that energy obtained from an EPR will be more expensive (up to €120/MWh) than from older-generation reactors.

A long delay is also noted in the first French EPR investment in Flamanville, a fact that raises political dilemmas for the authorities. Given the growing importance of the Green Party (EELV), Macron appointed former Green politician Barbara Pompilli as minister of the Ecological Transition. While Pompilli is no longer openly criticising nuclear energy, trade unionists and opposition politicians believe that she is in fact seeking its elimination in France, hence the protests against the shutdown of two reactors in Fessenheim in June 2020 and the planned withdrawal of four more from circulation. If they are not accompanied by a decision to build new EPRs, France may face the need to import energy. However, the government does not want to make a decision on the reactors before the presidential and parliamentary elections scheduled for 2022. The EDF authorities are expected to complete the construction in Flamanville first.

Meanwhile, the unstable situation in the Sahel could threaten uranium supplies from Niger, where Orano's mines are located. There is dissatisfaction in Niger about unfavourable conditions under which the raw material is extracted. There are also growing concerns about the environmental and health effects of the exploitation of deposits on the people of Niger. The mines are located in an area threatened by terrorists, which weakens the very argument of nuclear advocates in France: security of supply.

Conclusions and Prospects. Although the role of nuclear energy in the French energy mix will decrease, France's departure from nuclear energy is unlikely, despite the ambiguous attitude of the government. "Saving" French nuclear from the demands of the Greens and EU policy is already becoming an election slogan among some of the opposition. Problems resulting from adjusting the shape of the French energy market to EU requirements may increase the Eurosceptic mood in France in the coming years.

Macron, despite his support for nuclear energy, must also factor in the votes of its sceptics, hence the postponement of the decision to build new EPRs. This delay reduces the EDF group's credibility among potential foreign partners, including in Poland, and raises doubts as to the quality of the French offer, especially after the delays in the investments in Flamanville, Hinkley Point, and Olkiluoto. Steps taken by the French government to support the industry's export ambitions may turn out to be ineffective, as the decisions taken at home show a lack of trust in it.

The construction of reactors in France is also delayed by the uncertainty in the French government's negotiations with the EC on the future of the EDF group. The EU's requirement to demonopolise the energy market jeopardises the profitability of French nuclear energy. It will be difficult for the government to reconcile the requirements of the EC with the expectations of trade unionists and industry lobbyists. The EDF group may be saved by public aid, obtained thanks to a compromise with the EC, new export contracts and the recognition of nuclear energy as a "sustainable source" within the EU's green taxonomy.