

## Origins and trajectory of the nuclear fuel industry in Spain: ENUSA, 1972-2022

### *Orígenes y trayectoria de la industria de combustible nuclear en España: ENUSA, 1972-2022*

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#### ANALYTICAL SUMMARY

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The long-term and safe supply of fuel is one of the key issues of any energy program. This need becomes more pressing in nuclear programs, due to their strategic nature, the large investments associated with reactor construction, and the complexity of the fuel cycle.

This article aims to examine the deployment of the industrial fabrication of nuclear fuel in Spain, a highly specialized activity linked to the Empresa Nacional del Uranio SA (National Uranium Company, ENUSA) and the supply of foreign technology (Westinghouse and General Electric US companies). ENUSA was founded, at the initiative of the government and with the support of the private sector, to cover the fuel needs of a tremendously ambitious nuclear program, which was later reduced to a quarter of what had been foreseen. After some years of uncertainty, the state-owned company managed to successfully overcome the difficulties arising from the Spanish industrial reconversion in the 1970s and the change in the government's energy policy, arriving at the 21st century as a company that has not merely survived, but is now a sector leader. Indeed, its plant in Juzbado (Salamanca) has become a worldwide industrial and technological reference.

ENUSA benefited from the scientific and technological know-how of the Nuclear Energy Board (JEN), which had previously dealt with all the phases of the uranium cycle (with the sole exception of enrichment) and had highly specialized human capital on staff. ENUSA relieved the JEN of the industrial and commercial uranium activities, which had grown exponentially and required professional management. Its successful evolution derived largely from foreign technical assistance. The training process linked to the supply of foreign technology reached all personnel, operators, scientists, engineers and managers. These local agents did not limit themselves to receiving and replicating foreign teachings, but went further: by adapting and improving this acquired knowledge, they achieved an active role in the generation of their own R&D, with multiplier effects on numerous activities and sectors.

In the text, we first analyze the origins of ENUSA and its position in the nuclear fuel cycle. We then examine the contracts signed with the US multinational companies Westinghouse and General Electric, holders of the manufacturing licenses for the fuel which feeds or has fed most of the Spanish reactors. Finally, we study the strategies deployed by ENUSA to survive the energy crisis, to adapt to the drastic cuts in the nuclear program, to increase its presence in international markets and, in short, to be able to claim success on its 50th anniversary. Since the subject has received little attention in the literature, we will rely primarily on sources from historical archives.