# OPTIMIZATION ANALYSIS OF THE NUCLEAR FUEL CYCLE TRANSITION TO THE LAST CORE

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## ABSTRACT

The Zorita NPP was the first Spanish commercial nuclear reactor connected to the grid. It is a 160 MWe one loop PWR, Westinghouse design, owned by UFG, in operation since 1968. The configuration of the reactor core is based on 69 fuel elements type 14x14, the standard reload of the present equilibrium cycle being based on 16 fuel elements with 3.6% enrichment in $^{235}U$.

In order to properly plan the nuclear fuel management of the transition cycles to its end of life, presently foreseen by 2008, an based on the non-reprocessing option required by the policy of the Spanish Administration, a technical-economical optimization analysis has been performed. As a result, a fuel management strategy has been defined looking for getting simultaneously the minimum integral fuel cost of the transition from the present equilibrium cycle to the last core, as well as the minimum residual worth of the fuel remaining in the core after the final outage.

Based on the 'lessons learned' derived from the study, the time margin for the decision making has been determined, and a planning of the nuclear fuel supply for the transition reloads, specifying both the number of fuel elements and their enrichment in $^{235}U$, as been prepared.

Finally, based on the calculated economical worth of the partially burned fuel of the last core, after the end of its operation cycle, a financial cover for yearly compensation from now on of the foreseen final lost has been elaborated.

Most of the conceptual conclusions obtained are applicable to the other commercial nuclear reactors in operation owned by UFG, so that they are understood to be of general interest and broad application to commercial PWR.