Economics and Resources Analysis of the Potential Use of Reprocessing Options by a Medium Sized Nuclear Reactor Fleet

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CIEMAT

EVOLCODE/TR_EVOL codes

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- ► EVOLCODE: irradiation libraries

Introduction

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- ► TR_EVOL: simulation of the whole fuel cycle (reactors, fabrication and reprocessing plants) providing isotopic mass flows at different stages

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  - ▶ Decommissioning & Dismantling as a fraction of overnight cost
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LCOE of cycle = LCOE of each reactor weighted by his contribution to park energy

Simulation of the Spanish nuclear power fleet (PWR's & BWR's mixture)
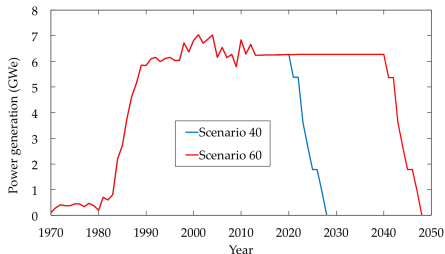
Scenario description

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- Scenarios with reprocessing cores loaded with $1/3$ of MOX
- Recovered Pu and U_{rep} in scenarios with full reprocessing strategies valued as assets (Scenarios FULL1 & FULL2)

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Results

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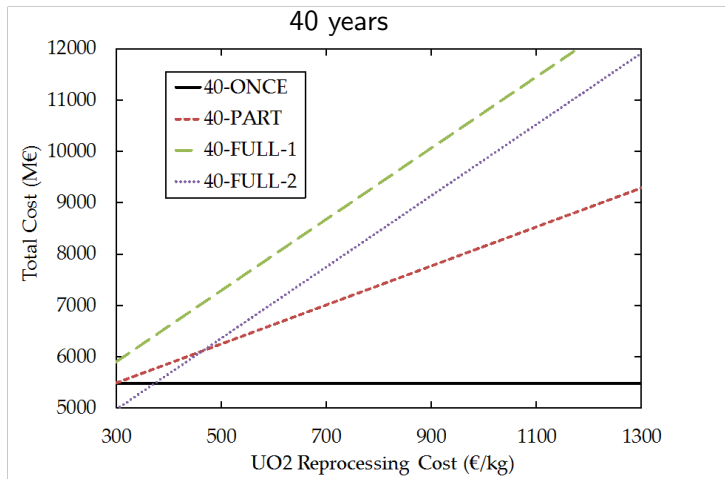- ▶ 60-PART2: UO_2-SF and MOX-SF

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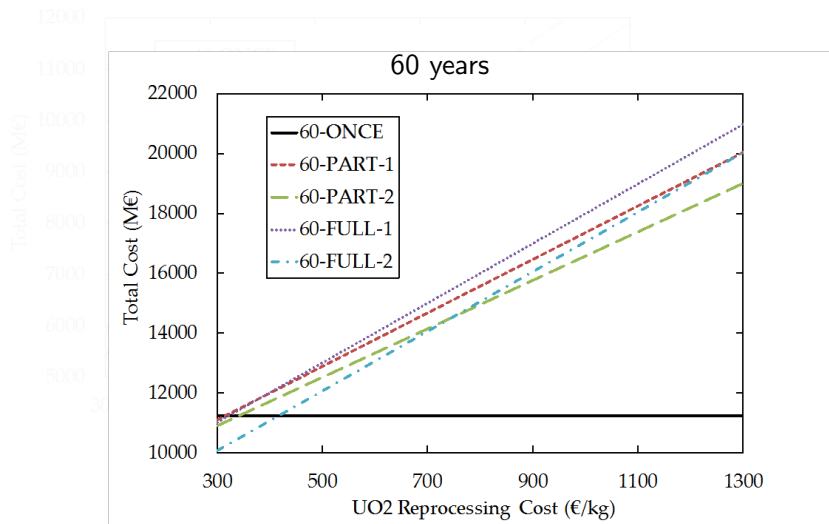
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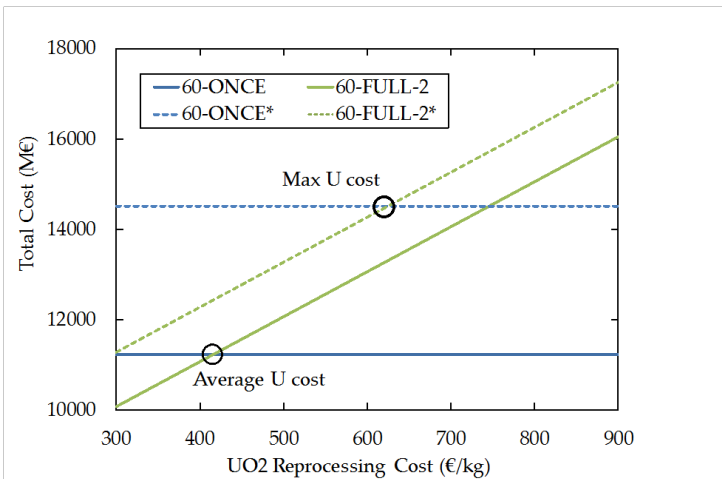- ▶ 60-PART2: UO_2-SF and MOX-SF

Scenario	UO_2-SF	UO_2-R-SF	MOX-SF	HLWr	Gallery length
40-ONCE	6742	—	—	2.5	23.9
40-PART	1919	664	447	141	22.7
40-FULL	0	0	0	254	5.7
60-ONCE	9322	—	—	2.5	33.1
60-PART1	0	0	820	329	27.8
60-PART2	0	1155	566	295	26.7
60-FULL	0	0	0	369	10.4

(HLW on open cycle arises from some reprocessed nuclear fuel in the 80's)

Results

Scenario	Pu (t)	UO_2-R	Pu Open
40-FULL	51.2	2800	68.1
60-FULL	44	2376	93.2

Results

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- Strong impact of U_{nat} and reprocessing price in fuel costs
- Fixed cost limits savings in reprocessing strategies

Thank you for your attention!

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