Enrichment & Core-Loading Versatility in Cyclus Reactors

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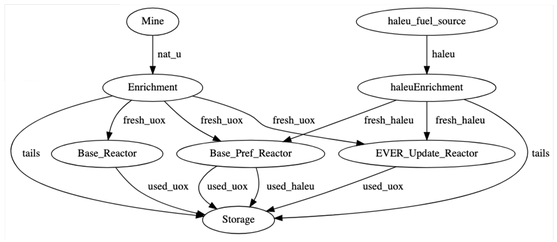
Versatility in fuel **enrichment** and **core-loading** improves fuel cycle simulations over short periods and with advanced reactor concepts [6, 5, 4, 2].

Introduction

If a fuel cycle simulator focuses exclusively on equilibrium-core conditions, it sacrifices precision in the amount of separative work units (SWU) and the composition of used fuel. Here we build alongside OpenMCyclus [1] to enhance the depletion fidelity and will introduce fuel loading capability in Cyclus [3] simulations of non-equilibrium core reactors through the creation of two generic reactors: the **E**nrichment **V**ersatile non-**E**quilibrium **R**eactor (EVER), and **C**ore **LO**ading **V**ersatile non-**E**quilibrium **R**eactor (CLOVER). We demonstrate the low-fidelity version of EVER against the generic Cyclus reactor from the Cycamore repository.



Future Work

Going forward, we will add a high-fidelity version of EVER for users to dynamically couple the archetypal reactor to a depletion code, allowing multiple energy groups or updating core-averaged cross sections. We will also deploy CLOVER in a similar low-/high-fidelity fashion, where the user will first predetermine loading patterns.

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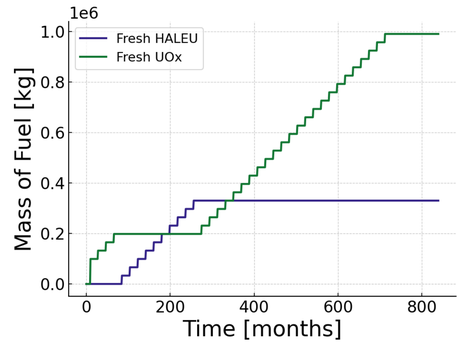
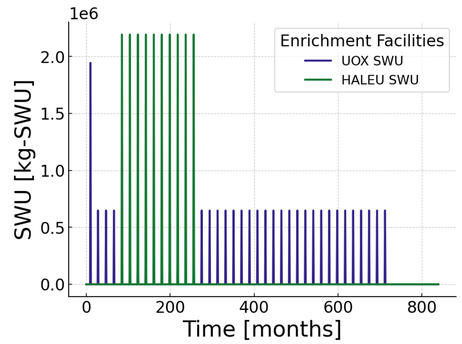
Scan for references and to learn more.

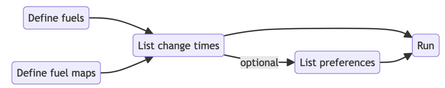
We have implemented the low fidelity version of EVER, where pre-defined isotopic compositions (called recipes) allow users to map the evolution of the fuel.



Differences appear in other metrics to the fuel cycle [5] like SWU or the isotopics; you can see the impact of the higher enriched HALEU in the SWU below.



Our core loading archetype (CLOVER) will give stakeholders assembly-level control over how the reactor's physics interact with the fuel cycle.



Acknowledgments

This research is being performed using funding received from the DOE Office of Nuclear Energy's Nuclear Energy University Program (Project 23-29656 DE-NE0009390) 'Illuminating Emerging Supply Chain and Waste Management Challenges'.

This research was supported in part by an appointment to the Oak Ridge National Laboratory Research Student Internships Program, sponsored by the U.S. Department of Energy and administered by the Oak Ridge Institute for Science and Education.