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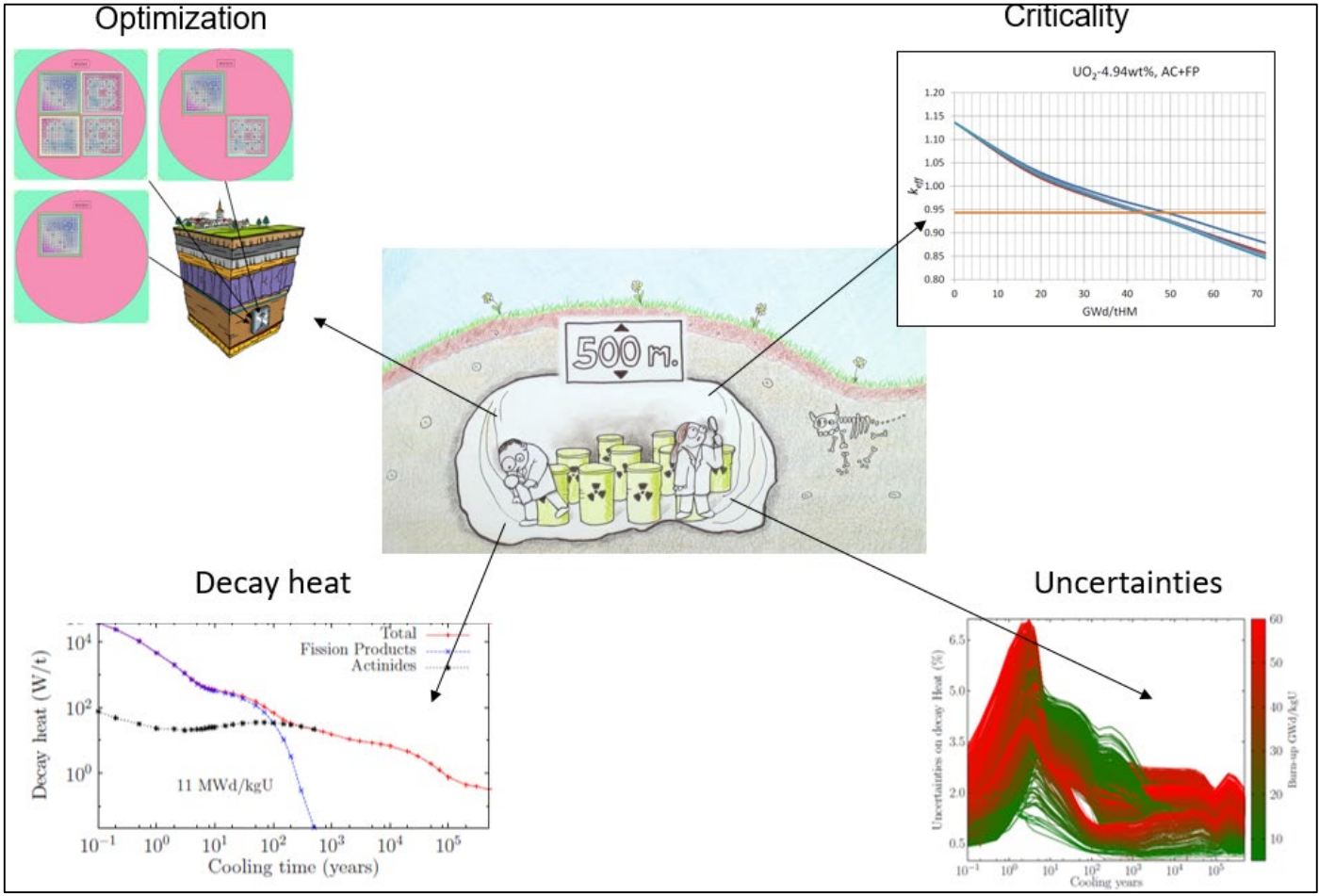
D. Rochman, on behalf of SG12

A brief overview of the WPNCS SG12: Decay heat from existing Spent Nuclear Fuel

OECD WPRS EGPRS Meeting, February 23th, 2023, online

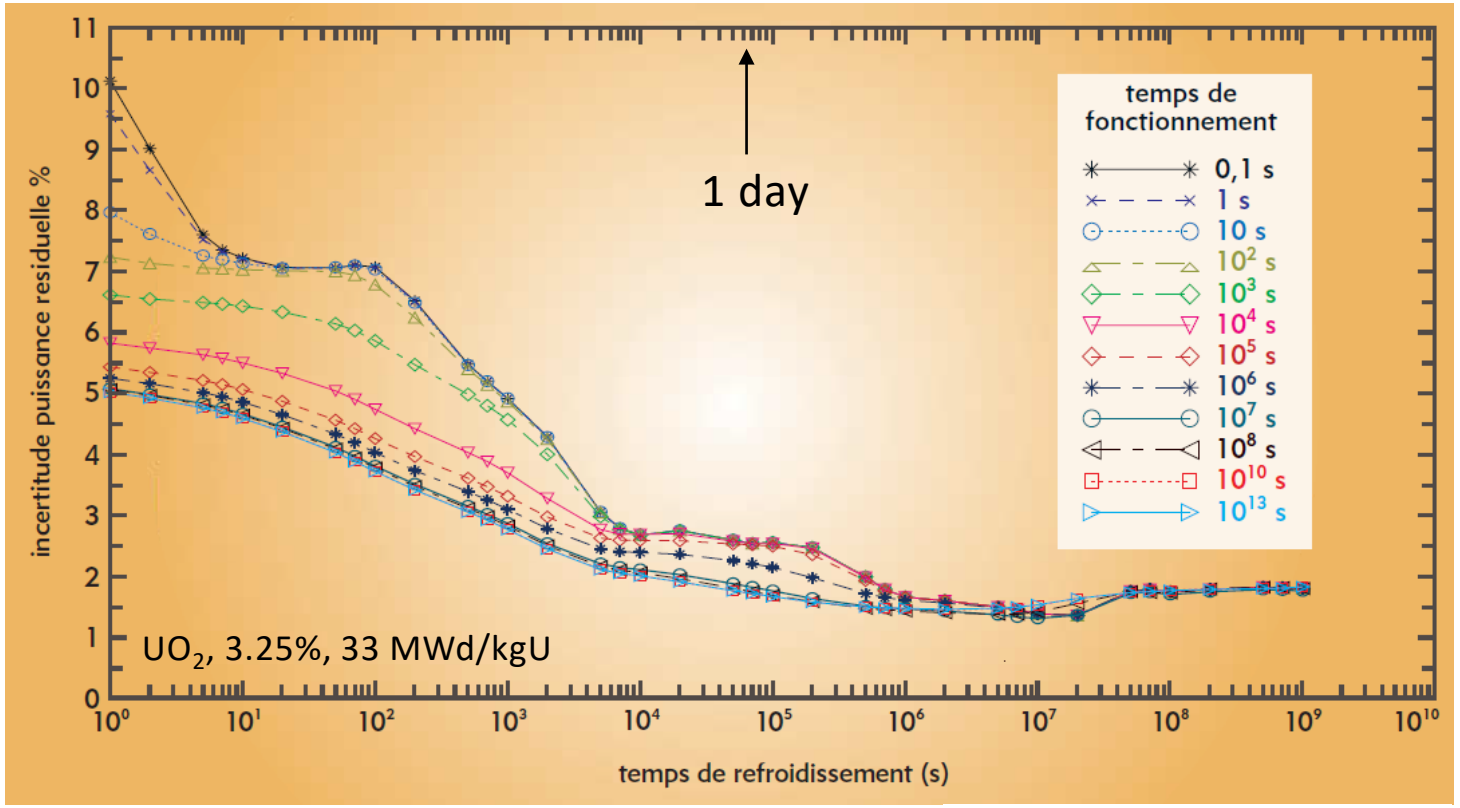
Summary

- Needs ?
- Subgroup
- Achievements



What are the needs ?

- Precise knowledge on SNF decay heat is required for
  - Core transients (short cooling time),



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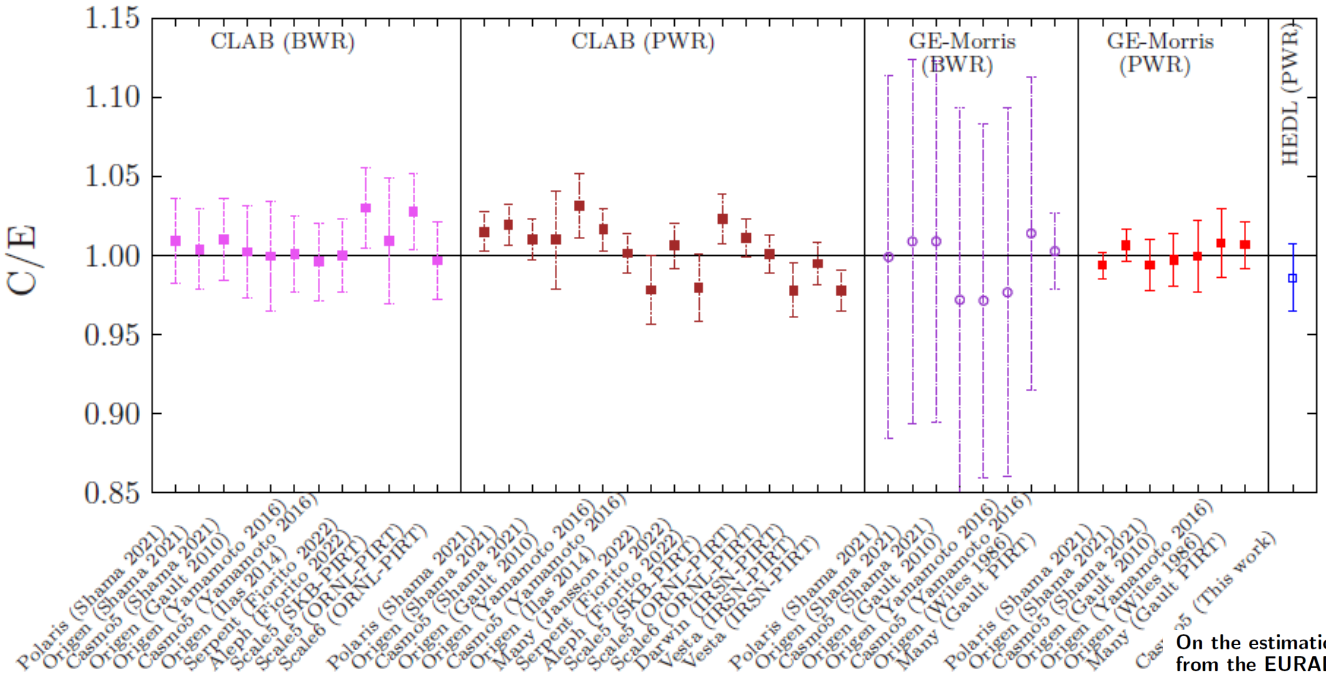
What are the needs ?

- Precise knowledge on SNF decay heat is required for
  - Core transients (short cooling time),
  - Safe and economical storage, transport and long-term repository (long cooling time)



On the estimation of nuclide inventory and decay heat: a review from the EURAD European project

D. Rochman[1], F. Álvarez-Velarde[2], R. Dagan[3], L. Fiorito[4], S. Häkkinen[5], M. Kromar[6], A. Muñoz[7], S. Panizo-Prieto[2], P. Romojaro[4], P. Schillebeeckx[8], M. Seidl[8], A. Shama[10] and G. Zerovnik[6]

Fig. 7. Plots of the average C/E values for the decay heat from various references.

A simple average of the values presented in this figure leads to an average of 1.002 ± 0.015

What are the needs ?

- Precise knowledge on SNF decay heat is required for
  - Core transients (short cooling time),
  - Safe and economical storage, transport and long-term repository (long cooling time)

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Blind Benchmark Exercise for Spent Nuclear Fuel Decay Heat

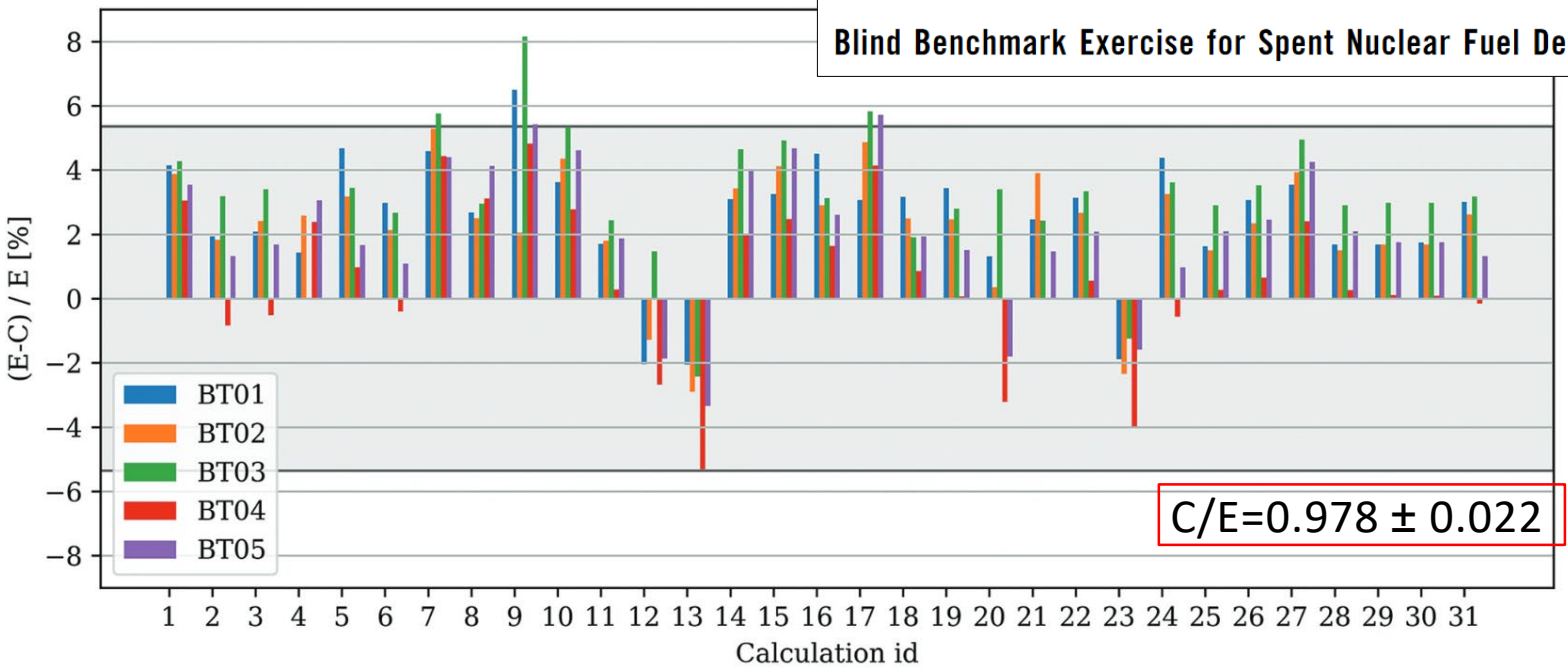
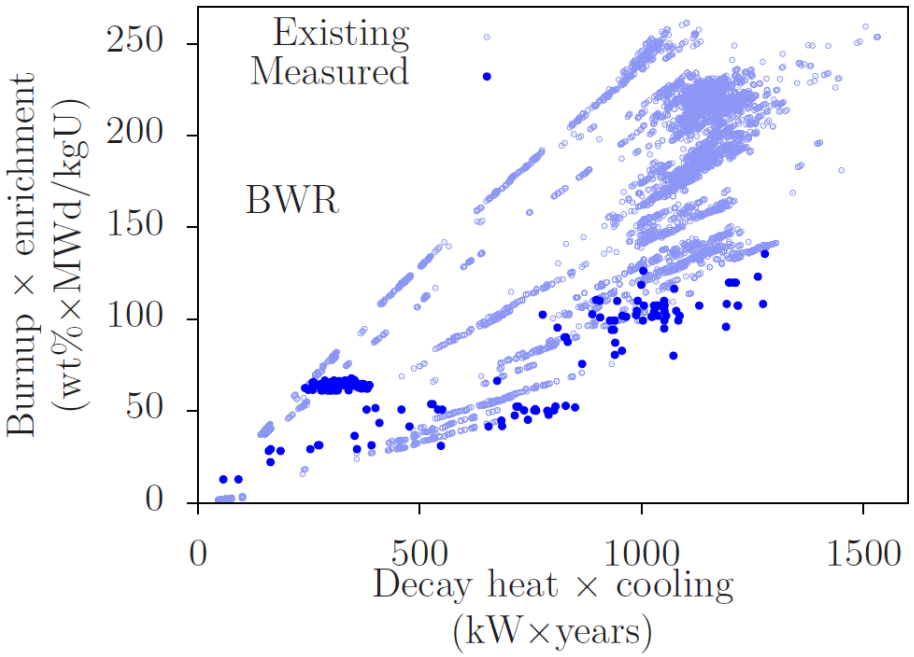


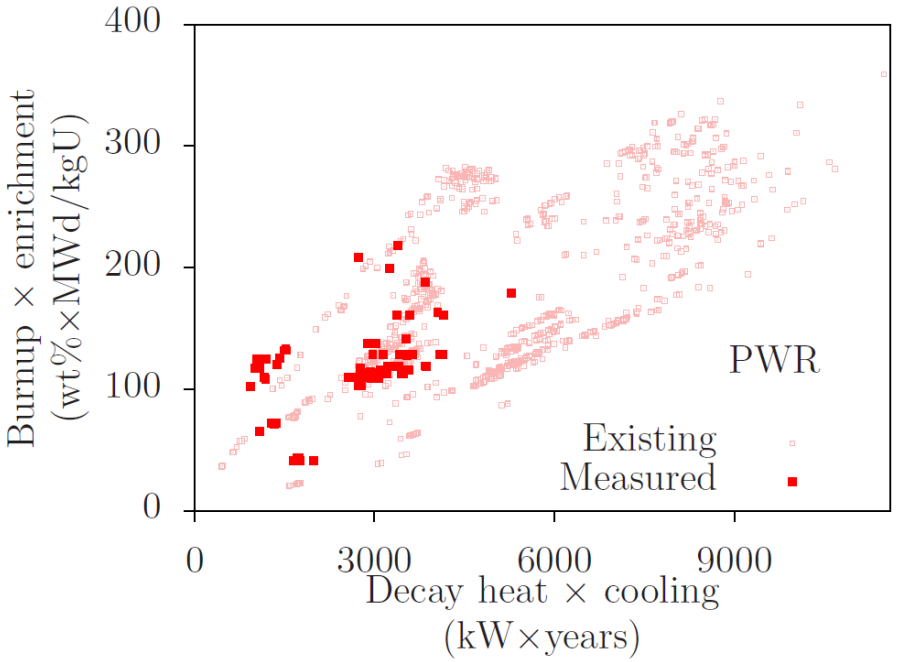
Fig. 8. Relative difference between measured (E) and calculated (C) decay heat rate values for the five different assemblies studied.

A simple average of the values presented in the previous figure leads to an average of 1.002 ± 0.015

What are the needs ?

- Poor overlap between measured SNF decay heat and existing SNF in cask
  - Only 1 device worldwide
  - Current SNF:
    - high enrichment,
    - high burnup,
    - long cooling,
    - high decay heat





General goals for the WPNCS SG12

- SG12: Decay heat from existing Spent Nuclear Fuel, ≈50 participants, 2 years, started in 2022.

- Long-term goal: provide the user community with reliable estimations of decay heat for spent nuclear fuel from existing power plants, including best estimates, as well as uncertainties (or covariances) for specific cooling times, relevant for severe accident to long-term repository

- Goal 1: Gather the international community

- Goal 2: Raise awareness for new measurements, burnup estimation and evaluations (standards)

- Goal 3: State-of-the art report, codes

- Goal 4: define a new (not blind) benchmark

General goals for the WPNCS SG12

- SG12: Decay heat from existing Spent Nuclear Fuel, 2 years, started in 2022.
- Draft report schedule for June 2023
- Code for DH standards: available in the SG
- Benchmark definition being finalized

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