Education & Training: a success story, always going forward!

Dr. Stéphane SARRADE, GIF Chair
Director of Energy Programs Divisions – CEA

GIF WS ETWG
15 October 2025, Busan, South Korea

Education & Training: one of the GIF Policy Priority

From a Task Force to a WG that has delivered #106 Webinars

- In 2015, from a US initiative, the idea emerge amongst GIF Members to have a E&T Task Force.
- In 2016, the PG approved The Task Force Terms of Reference
- 29 Sept 2016: John E. Kelly is making the very first GIF Webinar
- 2019 the Task Force becomes a Working Group

- In 2022, GIF decided to have a **Vice Chair dedicated** to Education & Training.

The Vice Chair :

- Provide leadership, updates & progress
- Engage with the GIF Policy Secretariat
- Develop and Engage a strategic roadmap approved by the GIF Policy Secretariat and the GIF PG

The pioneers:

Patricia Paviet
(E&T Task Force Chair)

Konstantin Mikityuk
(E&T Vice-Chair)

John Kelly (GIF CHAIR)

GIF Vice Chair on Education & Training 2025-2027:
Dr. Jin-Young CHO

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Education & Training: during 10 years a brief history

Important dates:

- 2015-2025: Following that first attempts there is now an impressive number of Webinars
- 2020-2022: During COVID many Organisations used the webinar mode. GIF was a precursor but we did not change our way to make our webinars because it becomes a part of the ETWG Trademark with very few similarities worldwide: **the GIF DNA.**
- November 2025: Webinar E&T Series #106
- October 2025: GIF Talks with industry series #6

➢ A significant list of **regular and efficient** transmission of Knowledge all over the world

➢ Around 7 full days of pure GIF Knowledge Transmission

➢ A significant material to make IA tests and innovate again

WEBINARS SFR

05 November 2025 - 14:30 CEST

Education and Training Series #106: Severe Accidents in SFRs: Safety Study Approach, Prevention and Mitigation by Design

Dr Nathalie SEILER, French Atomic Energy Commission (CEA), France

Find out more →

WEBINARS LFR

23 October 2025, 14:30 CEST (UTC+2)

GIF talks with industry series #6 - EAGLES-300: European Advanced Gen-IV Lead-cooled Energy System

Dr Michele Frignani, Ansaldo Nucleare, Italy

Find out more →

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Education & Training: during 10 years a brief history

Young Generation on Board !

- 2021: 1st Pitch your GENIV Competition
- 2023: 2nd Pitch your GENIV Competition
- 2025: 3rd Pitch your GENIV Competition

Encourage young researchers to join a new network: the GIF community.

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Flore Villaret, 2021 ETWG Pitch 1st Place winner

Victor Viallon: Pitch Your Generation IV Research Competition 2023

Hannah Patenaude, 2025 ETWG Pitch 1st Place winner

Education & Training: from a Policy point of view

This history, these actions, and this growth demonstrate GIF's strong commitment to Education and Training.

1. **Ensuring open access** to high-quality educational content is crucial to disseminate knowledge, build capacity, and foster transparency.
   - **Monthly webinar series**

2. **Encourage early-career engagement** and creating platforms to showcase talent helps with capacity development, attracting new researchers, and reinforcing the pipeline of expertise.
   - **Pitch your GENIV Competition**

3. **Support inter-institution collaboration** is key for harmonization of curricula, avoidance of redundancy, and pooling of resources for training and research.
   - **Working groups and virtual meetings**.

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Education & Training: from a Policy point of view

4. **Formalizing standards or guidelines** for knowledge management, building interoperability, and ensuring retention of critical expertise are important for long-term sustainability.
   - The ETWG **identifies and promotes best practices** in knowledge management and knowledge preservation.

5. **Encouraging novel education technologies** (e-learning, virtual labs)
   - The ETWG organised a **webinar** on **new methods of training** using virtual labs, to supplement hands-on experience.

6. **Ensuring training includes regulatory, safety, and standards perspectives** is essential to ensure that technical personnel understand policy, compliance, licensing.
   - The series includes webinars focused on **regulatory activities** for SMRs and advanced reactor systems, **safety design** guidelines and **severe accident** prevention/mitigation

Education & Training: and now ?

Celebrate, Continue, Innovate:

- **Celebrate**: Busan is the Milestone for a great ETWG Celebration. ETWG deserve a nice celebration for their significant contribution to GIF.

- **Continue**: Your involvement and enthusiasm is inspiring beyond the GIF Community. Just continue as you are.

- (Continue to) **Innovate** (*Proposed not imposed !!!*):
  - IA can make an efficient increase in value of the whole ETWG GIF Video database
  - Think about an additional competition celebrating the Lab team effort beyond the young researcher.
  - Think about celebrating technicians & operators who are making essential works in the shadow of the GIF researchers.

GIF Education & Training Roadmap: Priorities identified

➢ By the end of 2025:

- **Upgrade Existing learning content** for **1 system**

➢ By the end of 2026:

- Establish **YG Networks** in GIF members countries
- Upgrade **Existing learning** content **for Additional** system
- GIF Session at **IYNC**

➢ By the end of 2027:

- Increase by 30% participants in Webinars
- Involve 10 new participating countries
- Upgrade **Existing learning** content **for ALL** GIF system

Thank you for your attention

Follow GIF's activities

www.linkedin.com/company/gen-4

www.gen-4.org

https://www.youtube.com/@Gen.IV_International_Forum

gif.secretariat@oecd-nea.org

Innovation & Convergence Education Center for Advanced High-Temperature Nuclear Systems

"Bridging Innovation and Deployment, Bridging Classroom and Field"

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1. OVERVIEW
   OF EDUCATION CENTER

2. KEY ACTIVITIES
   OF EDUCATION PROGRAM

Background of Next-Generation Nuclear Human Resource Development Center Initiative in South Korea

What prompted South Korea to start this initiative?

Ministry of Science and ICT

NRF 한국연구재단

The Next-Generation Nuclear Human Resource Development Center Initiative was launched in South Korea in 2024 with government support.

"Empowering future leaders for advanced nuclear systems"

- **Climate & Energy Security**
  - Nuclear power re-emerging as key to carbon neutrality and stable supply
  - COP28 pledge: triple nuclear capacity by 2050
- **National Strategy**
  - Nuclear share in Korea's electricity → 32.4% by 2030
  - Strong government support for Gen IV & SMR development
- **Global Competition**
  - 80+ SMR designs in 17 countries
  - Urgent need for technological leadership
- **Human Resource Gap**
  - Nuclear enrollment down ~20% (vs. peak)
  - Industry demand: ~3,000 professionals (2022–26)

Innovation & Convergence Education Center for Advanced High-Temperature Nuclear Systems

What does our Human Resource Education Program aim to achieve?

Project Overview

- Funded by Mistry of Science & ICT (2024-2028)
- **Total budget:** ~4.6 million USD
- **Lead Institution:** Seoul National University (with KAIST, Pusan National University, KIRD, industry partners)
- **Scope:** focus on high-temperature reactors (>600°C)

Mission & Objectives

Mission:

Cultivating experts for next-generation nuclear systems delivering heat over 600 °C, and fostering multidisciplinary talents to address real-world challenges

Objectives:

I. Strengthen multidisciplinary curriculum for advanced reactors
II. Develop industry-academia network through hackathons
III. Engage student participation in integrated design & R&D
IV. Establish digital platform for education/research outputs

Why are HTGR and Heat Pipe Reactors at the center of this initiative?

Target Reactor Types and Selection Background

High Domestic Technical Expertise

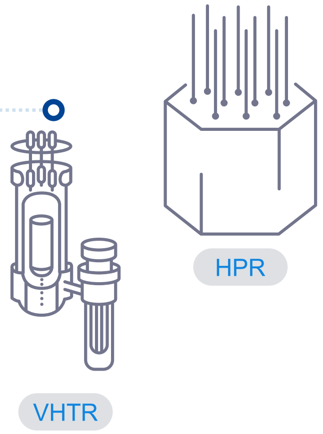
- Higher technical capability than peers

High Safety & Energy Efficiency

- Higher power conversion efficiency than LWRs
- Foundation for superior economic performance

High Industrial Applicability

- Power, Hydrogen, Chemicals, High-T Synthesis, Heat Treatment, Recycling, Metals, Ammonia, Shale Gas etc.



High Temperature Reactor System (>600℃)

High Technical Readiness

- Highest commercialization level among non-LWRs
- China: HTR-10/HTR-PM built & operated
- USA: Heat Pipe reactor demo, ARDP support, military reactor R&D
- Japan: HTTR built & operated

High Demonstraterbility

- Simplified licensing through high safety
- Referenceable international demonstrations
- Qualified nuclear fuel available

Synergy: Selection of two high-temperature reactors sharing multiple core technologies

Scalability: Considering market expansion for hydrogen production and process heat supply

Industry support: Considering demand for new technologies through integration and expansion with non-nuclear systems

Who are the key players of this initiative?

Organization of Education Center for Advanced High-Temperature Nuclear System

SNU (Lead)

Lead: Next-Gen Nuclear Convergence Curriculum

- HT nuclear curricula (advanced, applied, colloquium)
- Integrated design courses (market & societal acceptance)
- Training with simulation codes
- Experimental programs for next-gen HT systems
- Education & research sharing platform

KAIST(Partner)

Lead: System Design and R&D Program

- Searching HT system research topics
- Education on risk-informed performance-based regulation
- Education on comprehensive evaluation (economics & technology)

PNU (Partner)

Lead: Industry-Academia Collaboration & Hackathon

- HT system industry-focused hackathons
- Cross-disciplinary education & research programs
- Think-tank on nuclear hydrogen & HT systems

Who are the key players of this initiative?

Academia–Industry–Research Collaboration Partnership

Academia

- Seoul National University
- KAIST
- Pusan National University

Industry

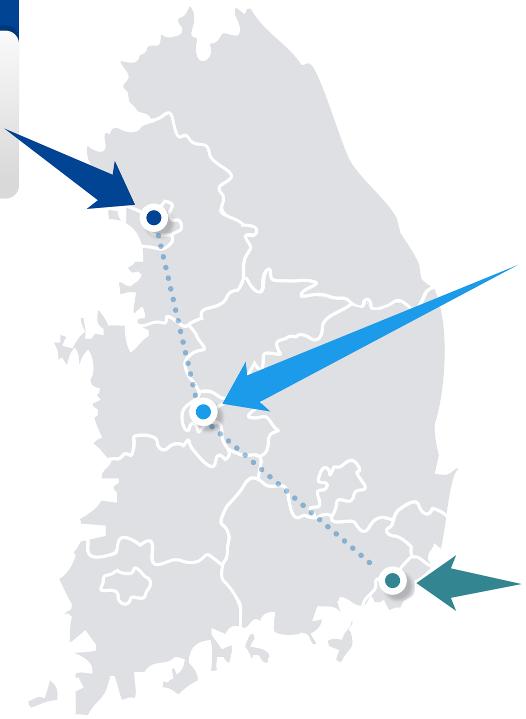
- Posco E&C
- Hyundae E&C
- Dusan Enerbility

Research & Regulation

- KAERI
- KIMM
- KINS

- Advanced HT Nuclear Curriculum
- Industrial Applications
- Simulation & Experiment Training

Education Center for Advanced HT Nuclear Systems



- Hackathon Project
- Basic Nuclear Edu. For Industry
- Joint Supervision of Thesis
- Internship

- Technology/Economics Evaluation
- Joint Research Projects
- Licensing & Regulations

- Power Conversion System
- High Temperature Materials
- High Temperature Heat Exchanger

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1. OVERVIEW
OF EDUCATION CENTER

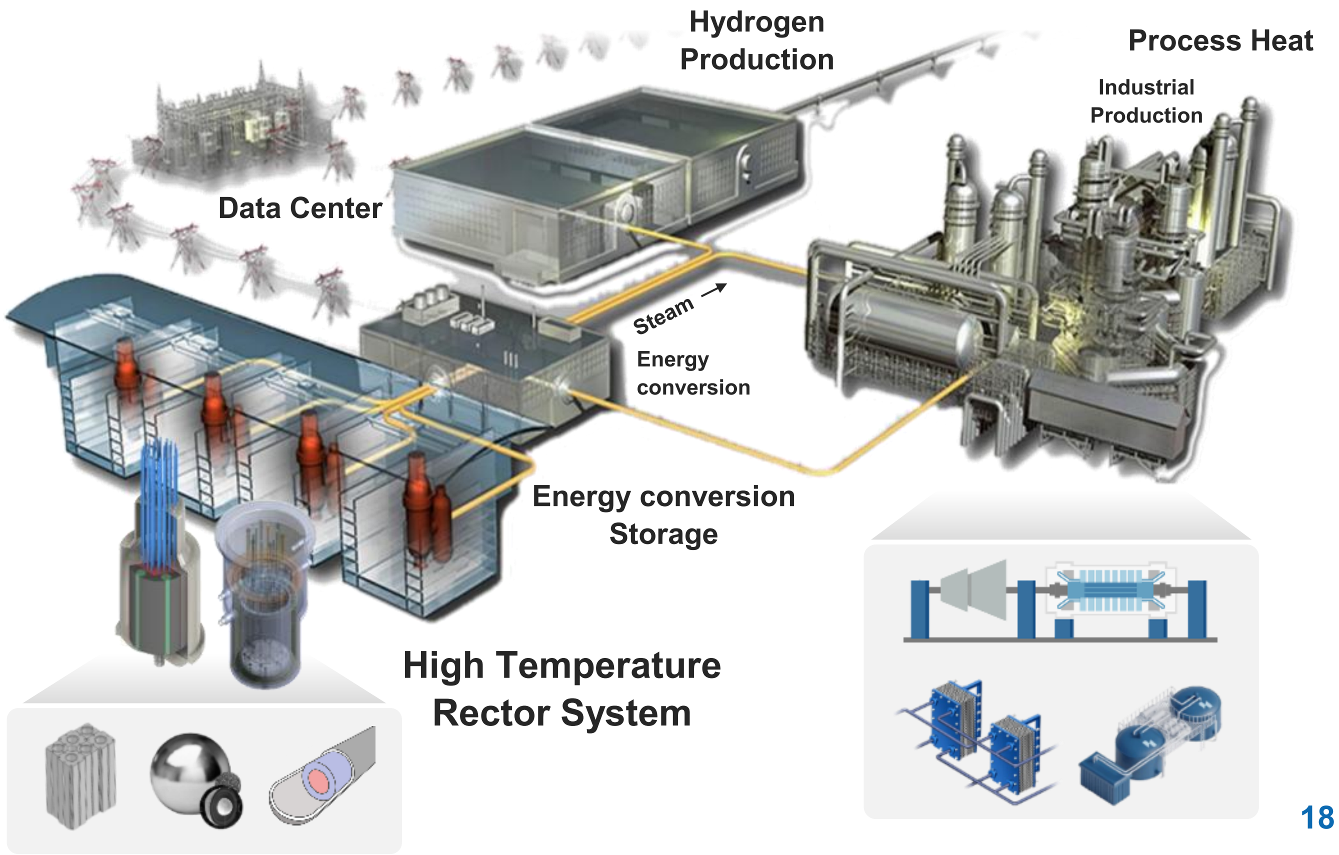
2. KEY ACTIVITIES
OF EDUCATION PROGRAM

Curriculum Development

Standardized Curriculum for High-Temperature Nuclear Systems

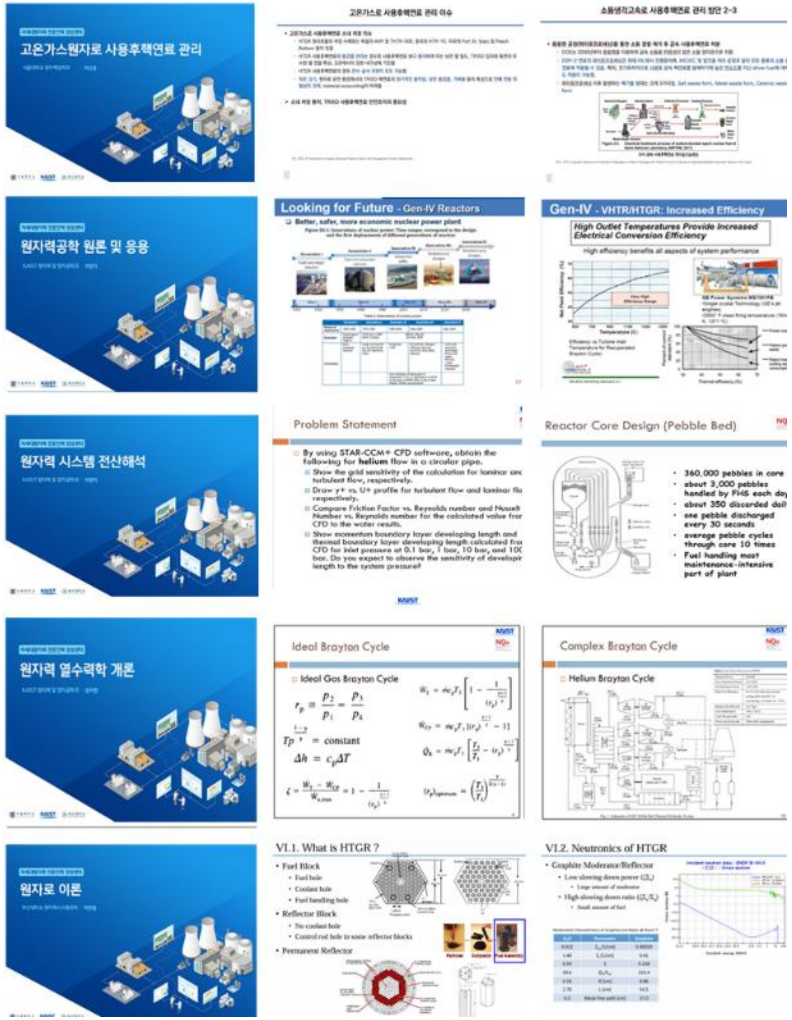
System	Characteristics of each reactor system - Energy Systems Engineering, Next-Generation Nuclear System Design, etc.
Safety	Risk-informed regulation, accident analysis - Reactor safety analysis, risk and reliability engineering, etc.
Reactor Physics	Reactor core analysis - Reactor dynamics and control, reactor analysis and design, etc.
Fuel/ Materials	TRISO fuel, high-temperature materials - Nuclear fuel engineering, energy system materials engineering, etc.
Fuel Cycle	Fuel conversion, reactor-specific waste management - Gas-cooled reactor fuel cycle, etc.
Thermal Hydraulics	Heat exchangers, high temperature heat transfer, heat pipe operation - Nuclear system heat transfer engineering, etc.

Interdisciplinary	Integrated Design, HTGR & Hydrogen Production, etc.
Applications	- Seminar on High Temperature System Application, etc.



Curriculum Development

10+ revised & new courses have been developed since 2024.



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2024 Curriculum Development & Implementation

Total: 10 courses opened (SNU, KAIST, PNU)
Total students enrolled: **224**

By Institution
Seoul National Univ.: 5 courses, 143 students
KAIST: 4 courses, 47 students
Pusan Nat'l Univ.: 1 course, 34 students

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Curriculum Development

Integrated design course was newly developed and implemented.

- Teams of 4–6 students select a reactor type, conduct a conceptual design, and present results throughout the course.
- Each week, the professor gives a 1–2 hour lecture, followed by 1–2 hours of project work.

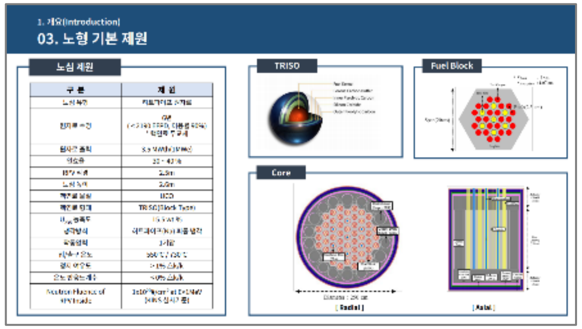
Step 1 – 3 weeks
Define Requirement
Top-level requirements
Detailed requirements

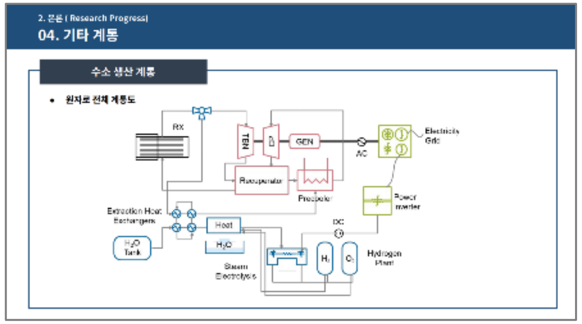
Step 2 – 2 weeks
Select reactor type
Select materials
Select systems

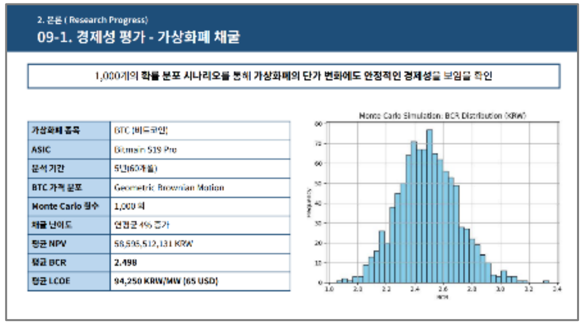
Step 3 – 4 weeks
Conceptual design of
Core, Systems, and
Components

Step 4 – 3 weeks
Design integration
System analysis
Safety analysis

Step 5 – 3 weeks
Design modification
Design verification
Final design proposal







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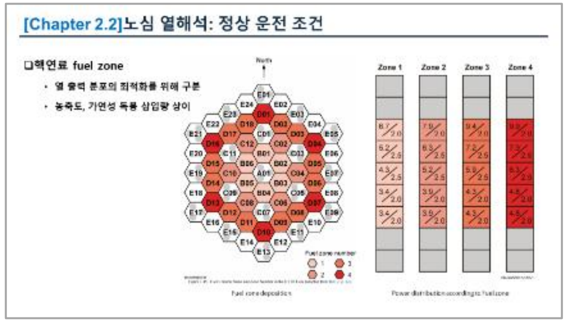
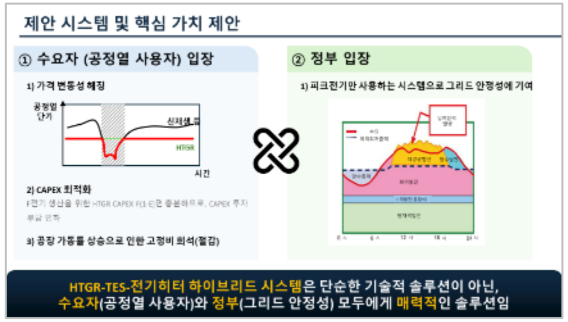
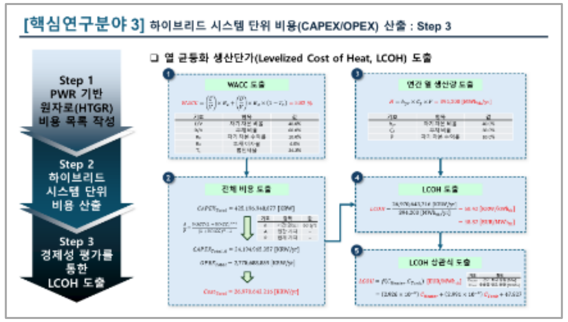
Curriculum Development

Integrated design course incudes lecture, team project, mentoring..







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Textbook Development

An 8-volume textbook series is planned, with the first two volumes expected by 2025.

Textbook Table of Contents: High-Temperature Gas-Cooled Reactor (HTGR) Series


제 1 장 고온가스로의 개념

Volume 1. Introduction to HTGR
1.What is an HTGR?
2.History of HTGR development
3.Advantages of HTGR
4.Future outlook of HTGR

Volume 2. HTGR Nuclear Fuel
1.Overview of HTGR fuel
2.Structure of TRISO fuel
3.Fabrication of TRISO fuel
4.Failure mechanisms
5.Performance of TRISO fuel

Volume 3. HTGR Core Characteristics
1.Overview of HTGR cores
2.Prismatic vs. pebble-bed
3.Neutronic characteristics
4.Heat transfer characteristics

Volume 4. HTGR Systems and Components
1.Overview of HTGR systems
Reactor system
1.Heat transport system
2.Power conversion system
3.Reactor shutdown cooling system
4.Reactor control system
5.Fuel reloading system
6.Other systems

Volume 5. HTGR Materials and Equipment
1.Overview of HTGR materials and structures
2.Metallic materials
3.Graphite and ceramic materials
4.High-temperature equipment

Volume 6. HTGR Safety
1.Safety characteristics of HTGR
2.Safety systems in HTGR
3.Design basis accidents
4.Safety analysis of HTGR

Volume 7. HTGR Fuel Cycle and Radioactive Waste
1.Characteristics of HTGR fuel cycle
2.Generation and management of radioactive waste in HTGR
3.HTGR and non-proliferation

Volume 8. Applications of HTGR
1.Electricity generation
2.Process heat utilization
3.Hydrogen production
4.Seawater desalination

Colloquia and Invited Expert Seminars

10+ invited seminars held with experts from 4 countries over the years.

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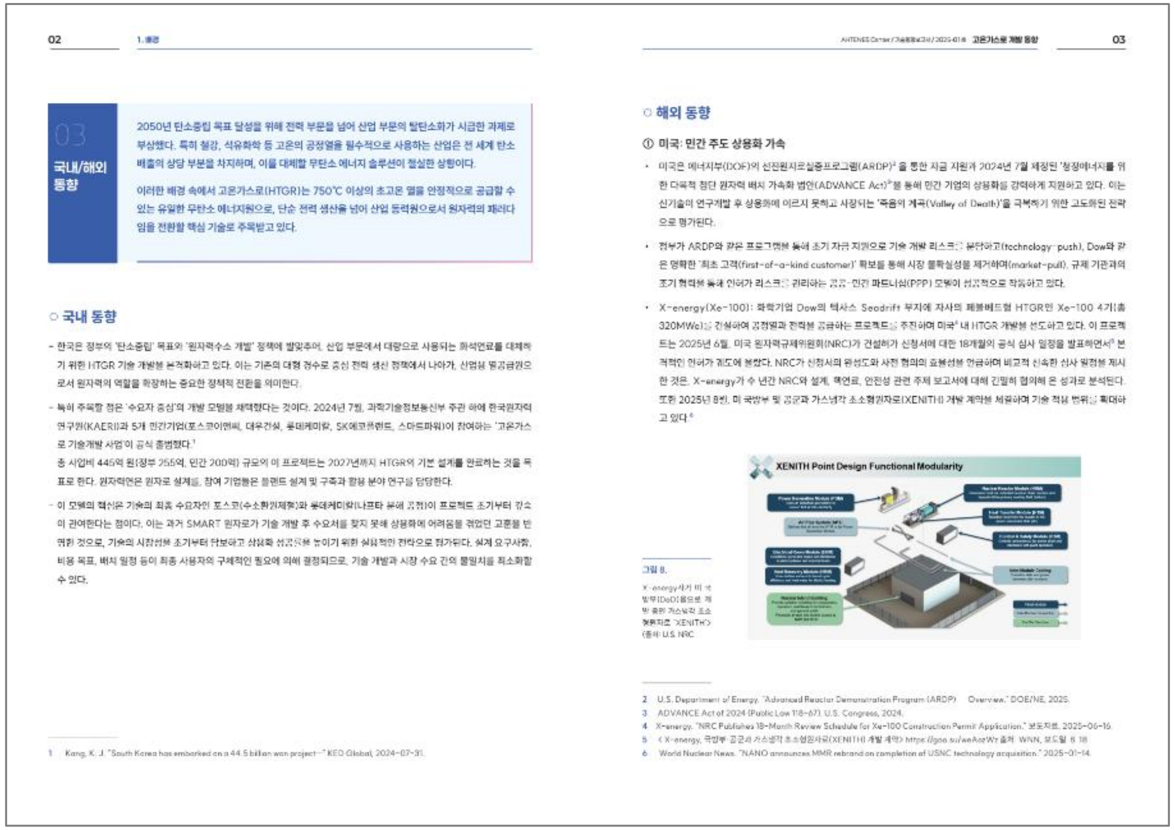
Publication of Technology Trend Report

Four technical trend reports were issued per year.



Publication of Technology Trend Report in 2025

Vo1. HTGR Development Trend Report

Vo2. Nuclear Hydrogen Production Development Trend Report

Vo3. Heat Pipe Reactor Development Trend Report

Vo4. Thermal Energy Storage Development Trend Report

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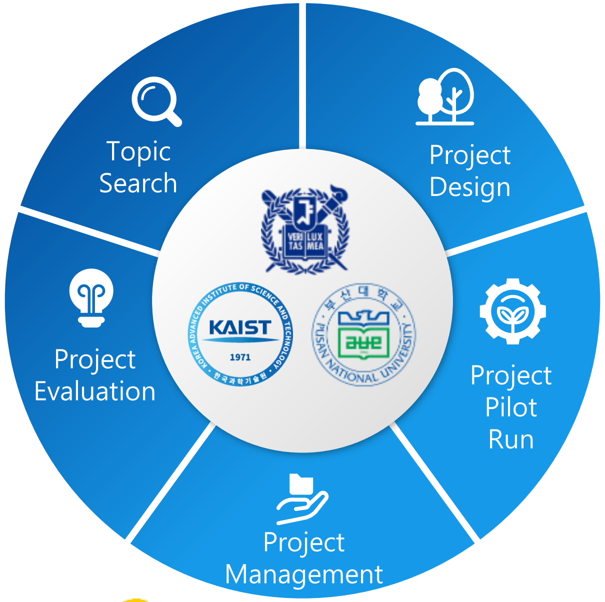
Hackathon Program

A Hackathon program was planned to strengthen academia-industry collaboration.

Goal : Seeking solutions for technical challenges through academia–industry collaboration

Discovery of creative and innovative ideas and technical solutions	Strengthening collaboration between industry and academic experts	Improving public awareness in next-generation nuclear reactors



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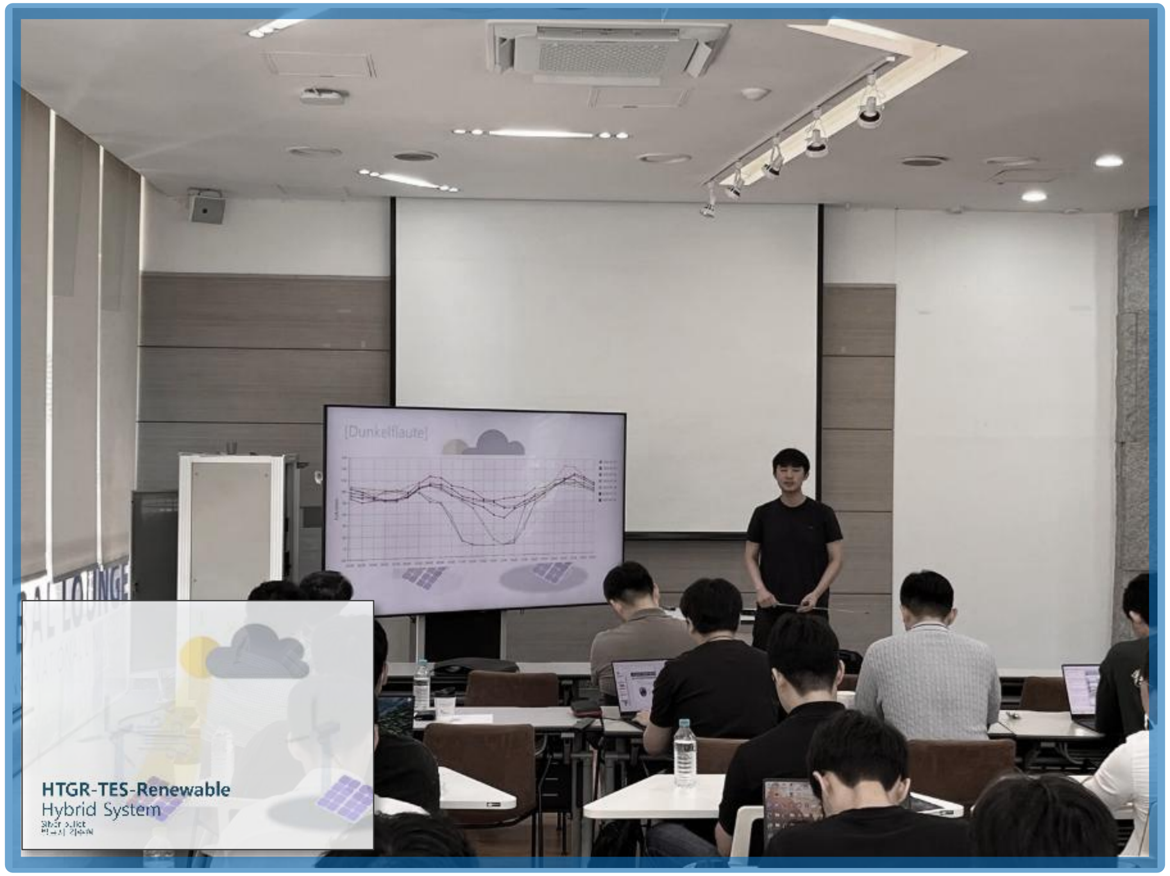
Hackathon Program

A pilot with 8 university teams explored business models for high temperature reactors.

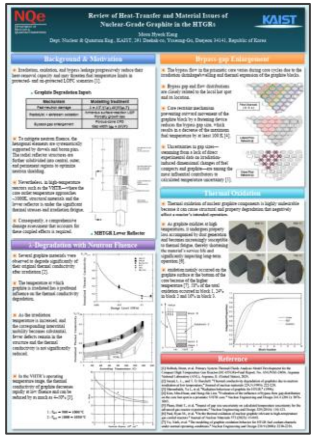
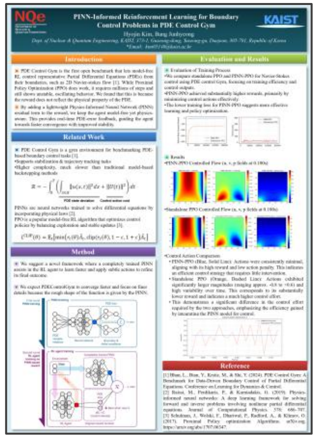
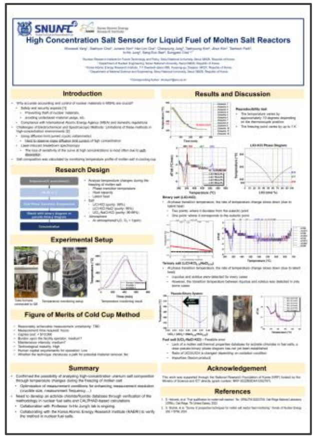
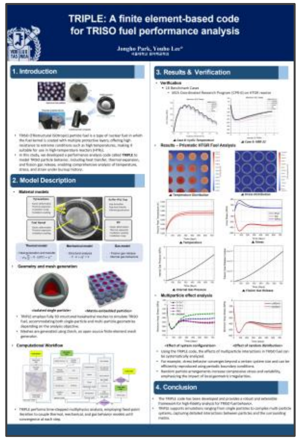
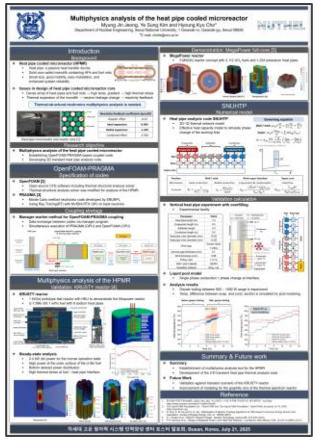


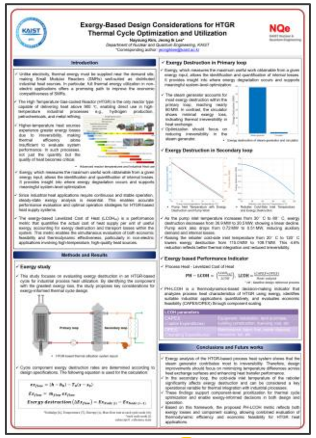
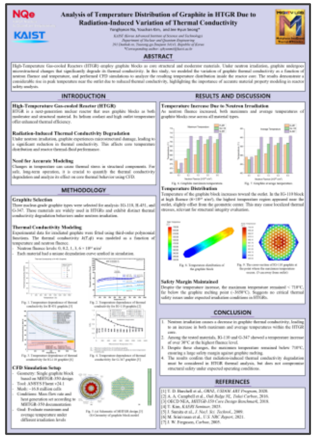
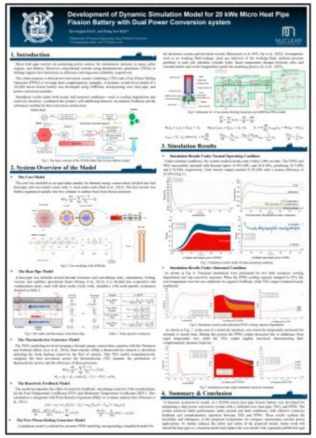
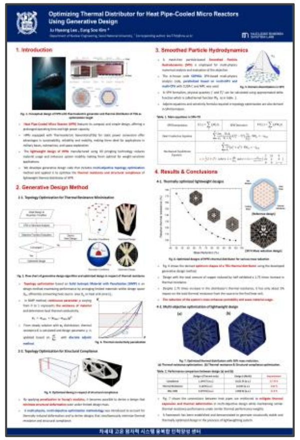
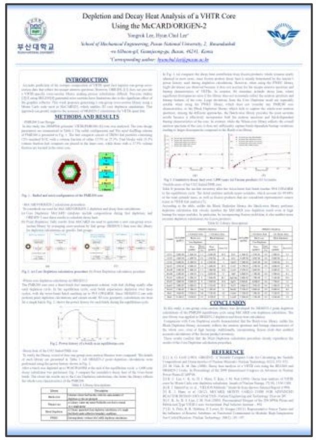
Winner

A total of eight teams participated in the hackathon project, and three of them received awards

Student Poster Session

27 Students presented and shared their research through the poster competition.

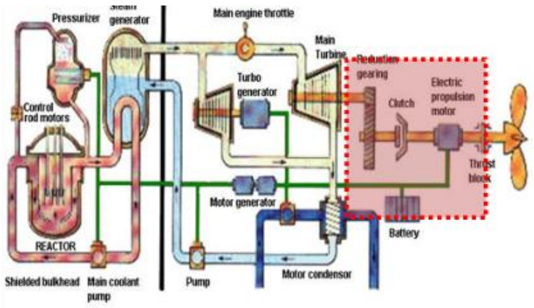






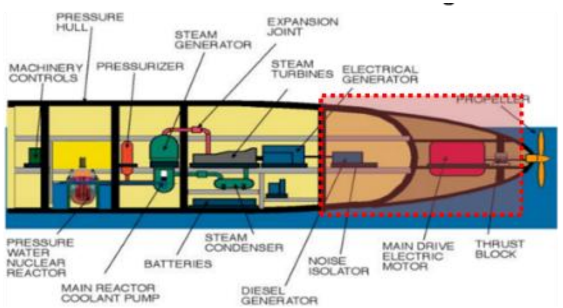







Academia-Industry-Research Collaboration

Various joint research topics have been conducted or are under planning.

Feasibility study on S-CO_2 cycle integration with HTGR





KAIST HD HYUNDAI

Simulation on TRISO Coating Process

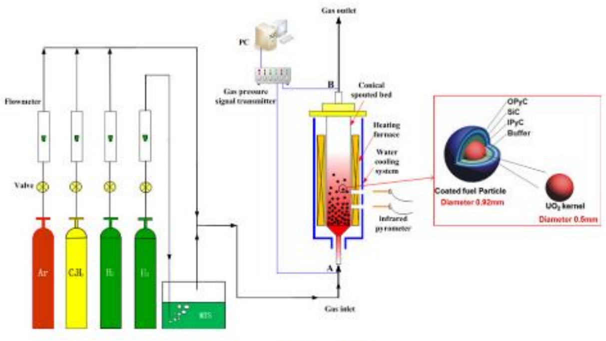
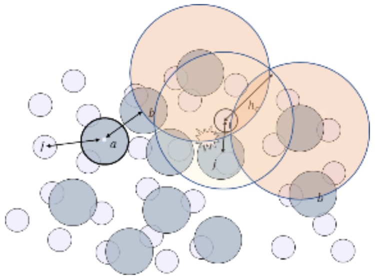
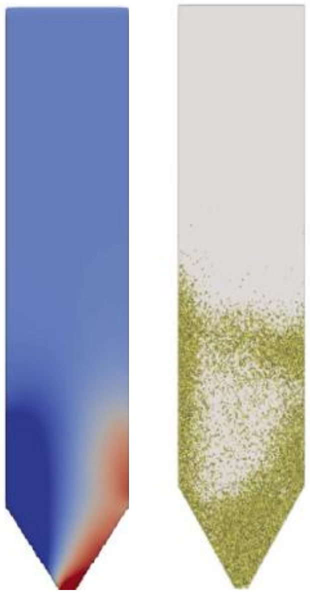


Fig. 1 The schematic diagram of the spouted bed coating system

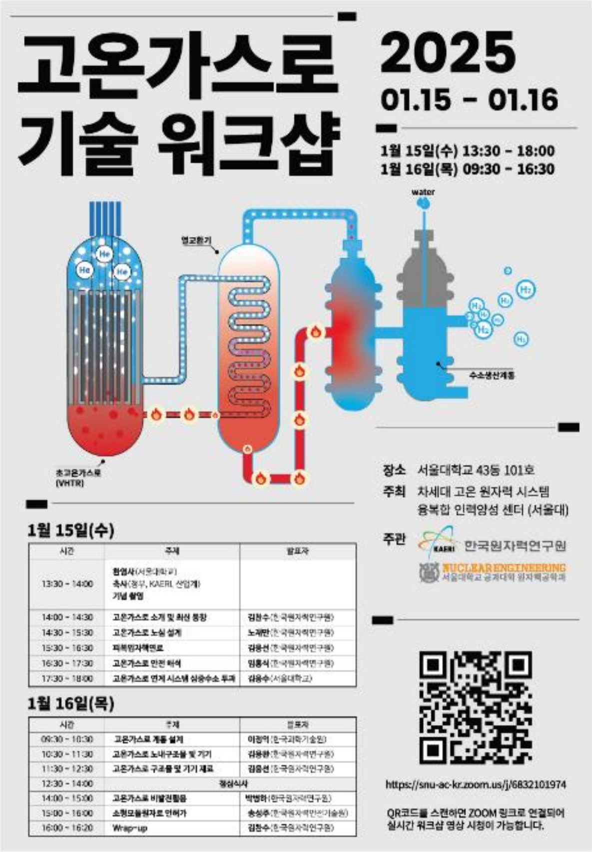




KAERI

Academia-Industry-Research Joint Workshop

The academia–industry–research workshop was conducted with great success.



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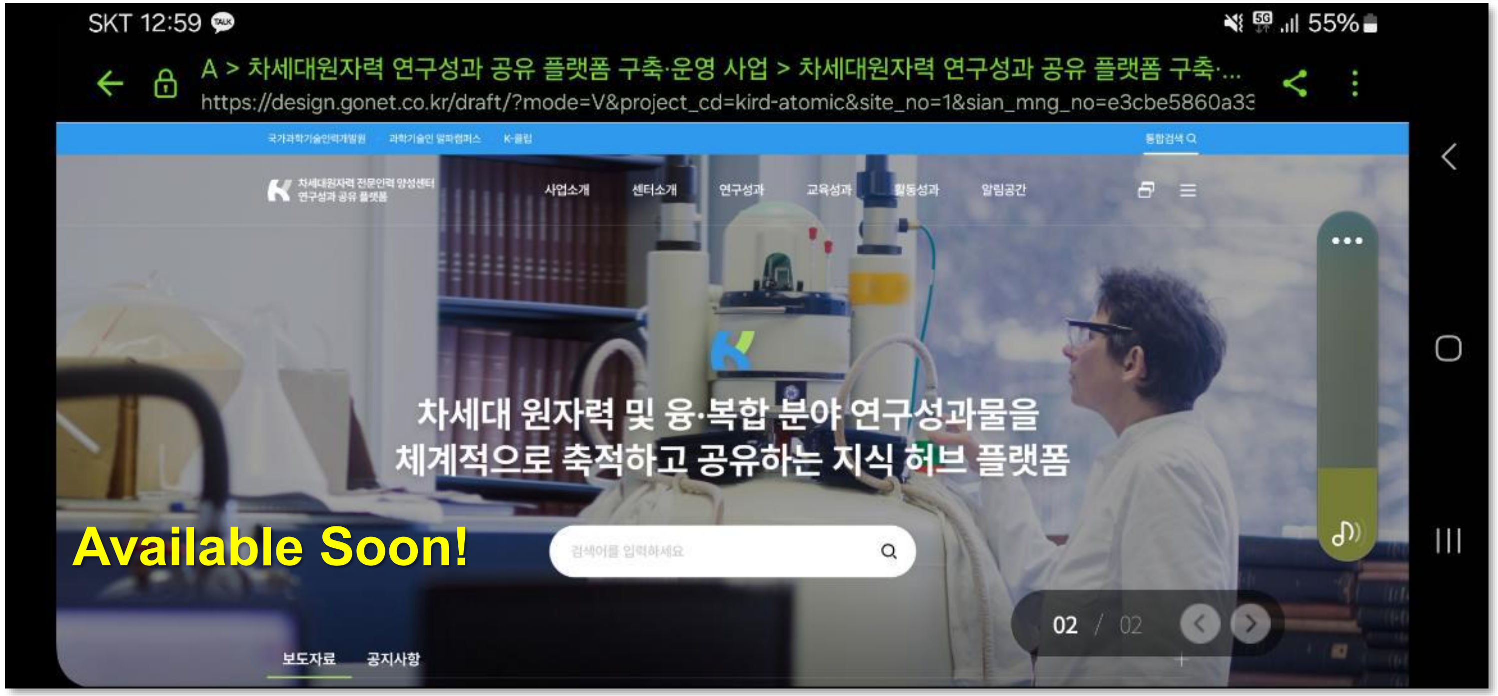
Development of a Digital Platform

A digital platform was developed for outcome dissemination.

Goal: to widely share the center's educational and research content through diverse digital channels.



01. Establishment of a Digital Hub

02. Social Media Network

03. Education and Research Promotion

04. Dissemination of Academic Resources

SUMMARY

- The Innovation & Convergence Education Center for Advanced High-Temperature Nuclear Systems was established in 2024 in South Korea to cultivate future experts who will lead next-generation nuclear innovation.
- This center aims to integrate education, research, and industry collaboration to connect classroom with real-world applications.
- A multidisciplinary curriculum and hands-on training were designed to foster creativity and problem-solving skills to students.
- Joint research and hackathon programs were designed to strengthen connection among academia, industry, and research institutes.
- Digital platforms were established to expand access to educational and research outcomes.
- The center envisions becoming a national hub that bridges innovation and deployment, classroom and field — empowering the next generation of nuclear leaders.

Thank You!

(kes7741@snu.ac.kr)

Neutronic Feasibility Study of a Breakeven Molten Salt Fast Reactor Using Chloride Salts

Presenter's information

- Name: Eunhyug Lee
- Affiliation: KAIST
- Department: Nuclear and Quantum Engineering
- Position: Ph.D candidate
- Research:
  - Reactor physics, molten salt reactors (MSRs)
  - Developing advanced modeling and simulation tools for MSR systems
  - Contributing to the design and analysis of next-generation nuclear reactors

Contents

Introduction

Introduction

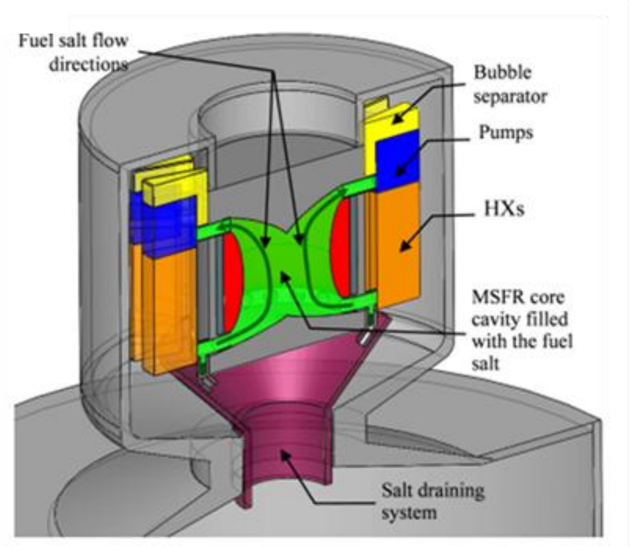
- Nuclear trilemma
  - Enhancing the safety → Adopting the concept of MSFR
  - Preventing accumulation of spent fuel → Reutilizing the spent fuel
  - Securing uranium resources → Reutilizing the spent fuel
    - Spent fuel in Korea: ~9,000 tons from LWR & ~9,400 tons from HWR → **Equivalent to total electricity in Korea over 300 years**
    - Spent fuel in U.S.: ~90,000 tons from PWR and BWR → **Equivalent to total electricity in USA over several hundreds years as well!**

Accumulated amount of SNF and Saturation point of storage tank

Power plant	Expected SNF accumulation	Storage tank saturation point
Kori	12,290 FA	2032
Hanbit	13,051 FA	2030
Hanul	27,401 FA	2031
Saeul	15,660 FA	2066
Shin Wolsong	3,633 FA	2042
Wolsong	721,920 FA	2037

<Reference: Ministry of Trade, Industry and Energy>

- Breakeven Molten salt Fast Reactor (BeMFR)
  - MSFR (molten salt fast reactor) concept
    - Passive safety, convenient decay heat removal, Atmospheric pressure operation
    - Reduced spent fuel buildup, proliferation resistance
  - Reutilizing the spent fuel as a energy resource
    - Requiring U and TRU from spent fuel at the startup
    - During operation, spent fuel is consumed as make-up fuel

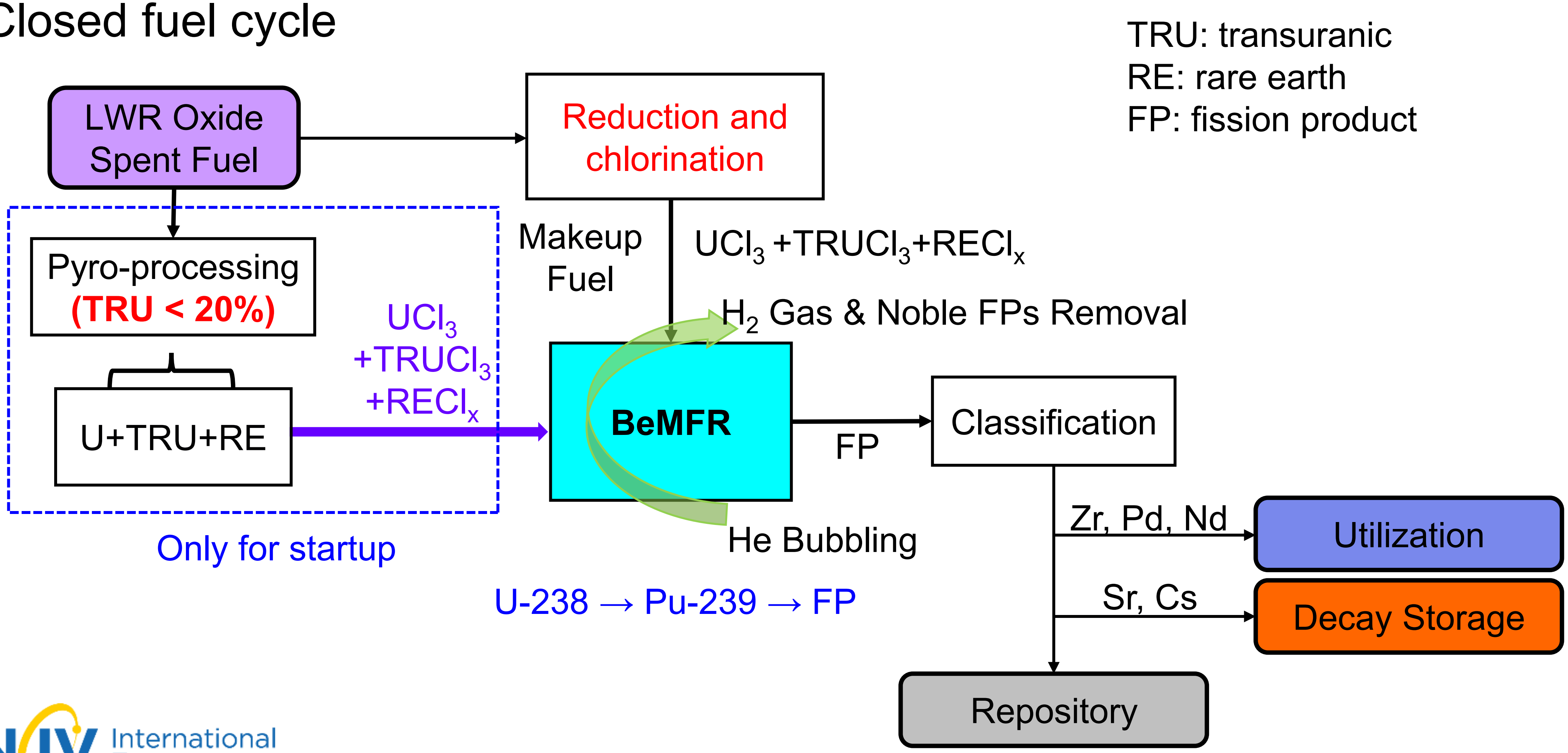


European MSFR

BeMFR pursues addressing nuclear trilemma though adopting MSFR concept and reutilizing spent fuel.

Introduction

- Closed fuel cycle



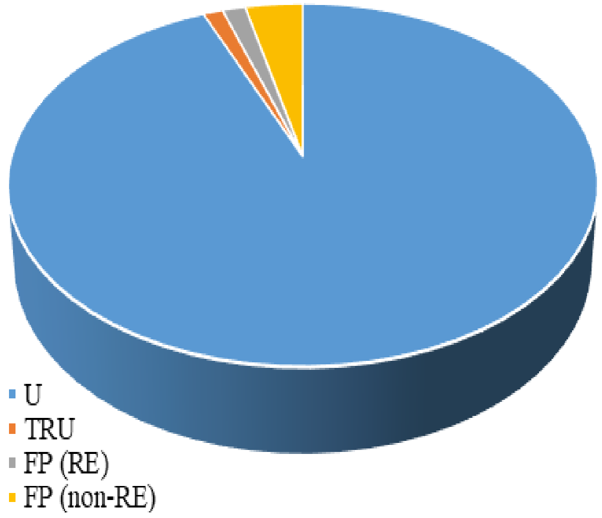
Strong Proliferation Resistance!

Core Concepts and Fuels

Core Concepts and Fuels

TRU: transuranic
RE: rare earth
FP: fission product

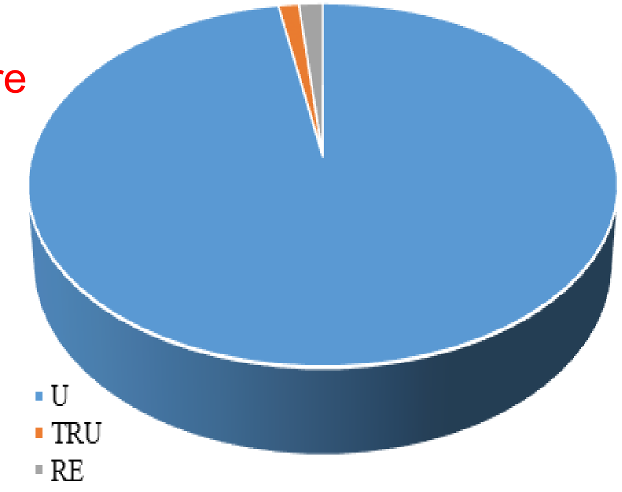
- Spent fuel composition
  - From the depletion calculation of APR1400 lattice by Serpent 2.1
  - Burnup: 50,000 MWd/MTU, Cooling period: 10 years



U : TRU : FP
= 93.60 : 1.26 : 5.14

Raw spent fuel

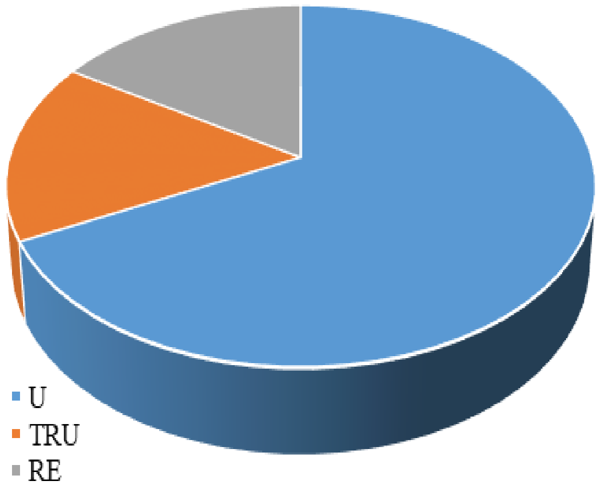
Non-RE FPs are removed from reduction and chlorination →



U : TRU : RE
= 97.17 : 1.31 : 1.52

Make-up fuel

U is removed via pyro-processing (TRU fraction < 20%) →

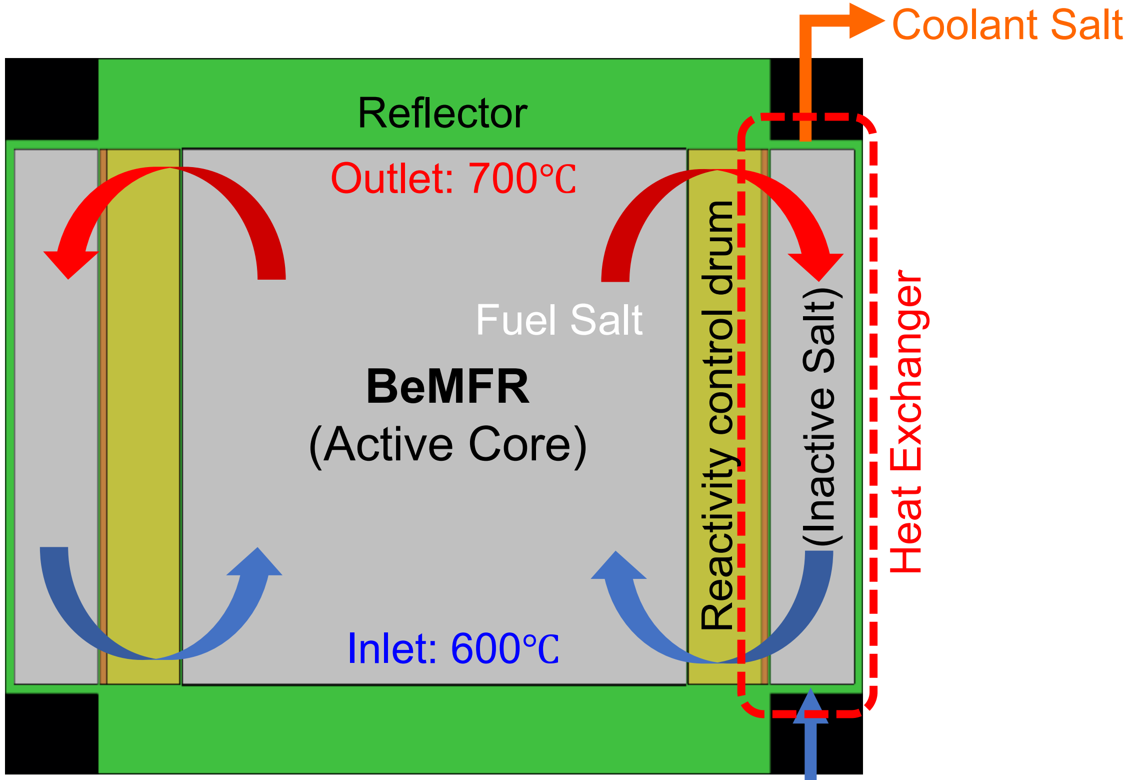


U : TRU : RE
= 67.69 : 16.16 : 16.16

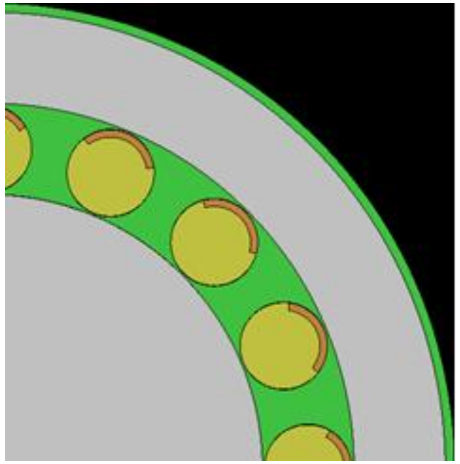
Initial fuel

Core Concepts and Fuels

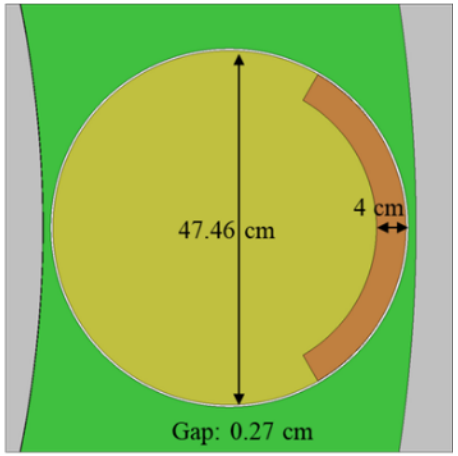
- Cylindrical Reactor Layout
  - Power: 3,000 MWth
  - Active core: cylindrical geometry
    - Diameter = Height = 330 cm
  - Reflector:
    - Stainless steel of 50 cm
    - Drum type reactivity control device
  - Inactive salt is placed around reflector
  - Operating temperature: 650℃



Side view



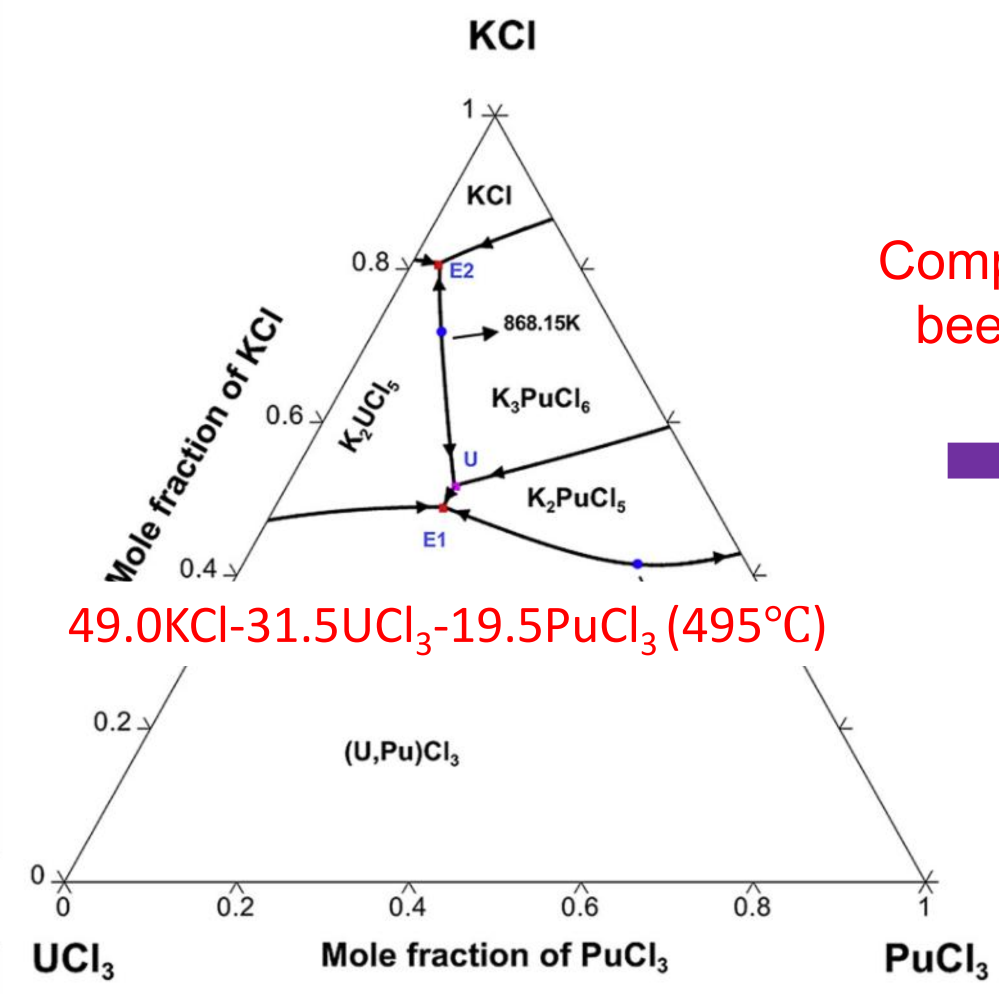
Top view (1/4)



Reactivity control device

Core Concepts and Fuels

- Selected Cl-based fuel of BeMFR: $KCl\text{-}TRUCl_3\text{-}UCl_3\text{-}RECl_3$
- Ternary eutectic data of $KCl\text{-}UCl_3\text{-}PuCl_3$

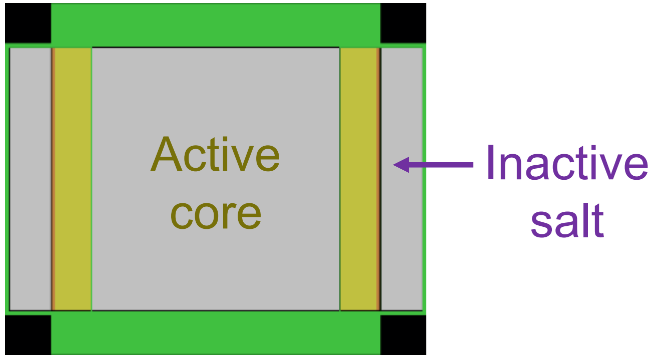


Composition of KCl has been fixed as 49.0%

Composition of $TRUCl_3\text{-}UCl_3\text{-}RECl_3$ could be changed to make initial criticality

Final composition of $KCl\text{-}TRUCl_3\text{-}UCl_3\text{-}RECl_3$ has come to 49.00-8.24-34.52-8.24

Core Concepts and Fuels



- Design parameter of BeMFR for initial condition

	$KCl\text{-}TRUCl_3\text{-}UCl_3\text{-}RECl_3$
Power	3,000 MWth
Active core diameter (= height)	330 cm
Active core volume	2.822E+7 cm^3
Inactive salt volume	1.500E+7 cm^3
Initial composition	49.00-8.24-34.52-8.24
Cl-37 enrichment	99 at.%
Fuel density at 650℃	3.563 g/cm^3
U mass	61,039 kg
TRU mass	14,696 kg
RE mass	8,607 kg

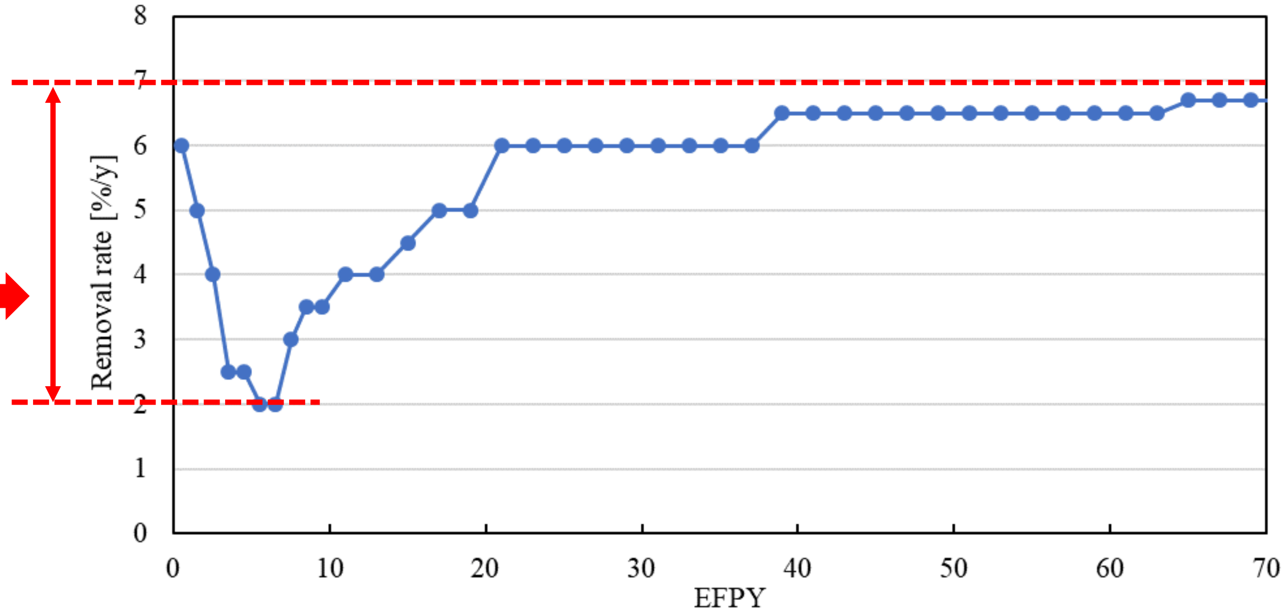
Operational Strategy and Reactor Characteristics

Operational Strategy and Reactor Characteristics

- Operation strategy
  - FP classification:

Group	Solubility	Behavior in salt	Removal rate
Noble gas	Insoluble	Escape	1 %/s
Noble metal	Insoluble	Precipitation	60 %/y
Soluble FPs	Soluble	Remain	2-7 %/y

  - Soluble FP removal rate detail:



  - Other conditions:
    - Makeup fuel feeding rate: 3.074 kg/d (same amount as consumption)
    - Hydrogen removal rate: 90%/y
    - RE feeding rate: 0.0474 kg/d
    - K feeding rate: 0.03-0.05 kg/d
    - Cl feeding rate: 0.003-0.3 kg/d
  - Calculation condition:
    - Program: Serpent 2.2.1, library: ENDF/B-VII.1
    - History: 100,000, inactive cycle: 100, active cycle: 300

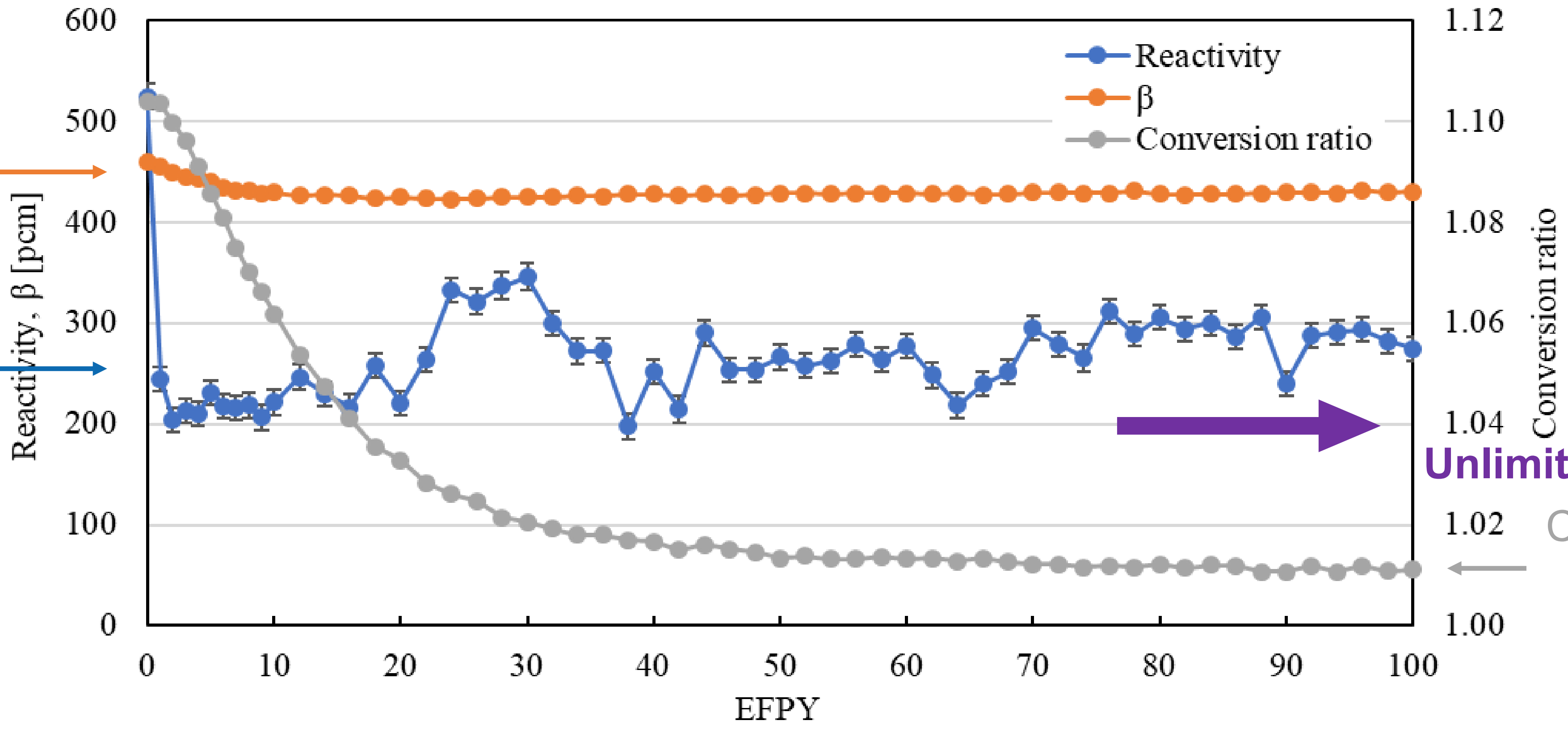
RE is automatically fed during makeup fuel feeding.
K, and Cl are to be fed to maintain salt composition and FP solubility.

Numerical Results

- Reactivity, effective delayed neutron fraction(β), and conversion ratio .vs. 3 GWth Full-power operation time
  - The effective delayed neutron fraction (β) indicates the safe reactivity range to avoid prompt criticality.

β: > 400 pcm

Reactivity: 200-300 pcm



Unlimited lifetime

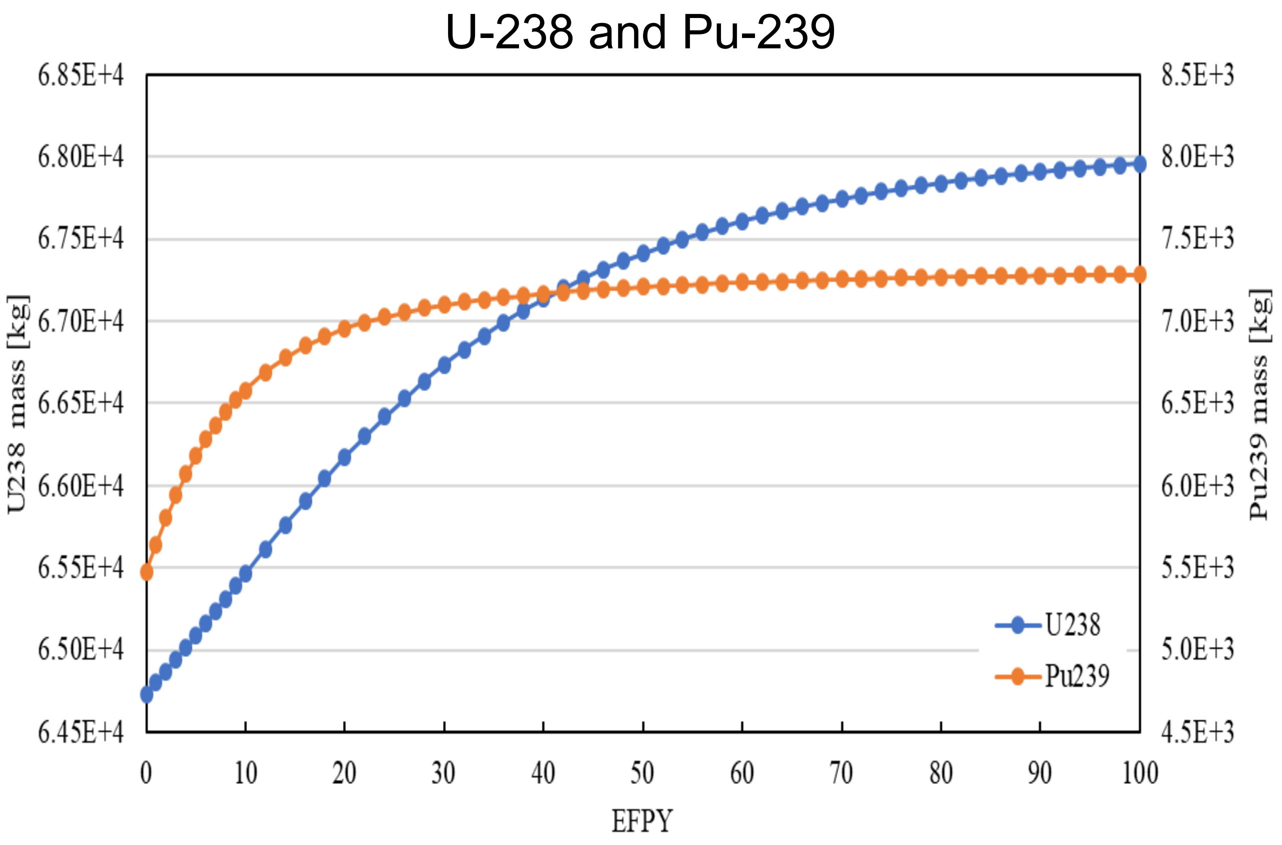
Conversion ratio: 1.01

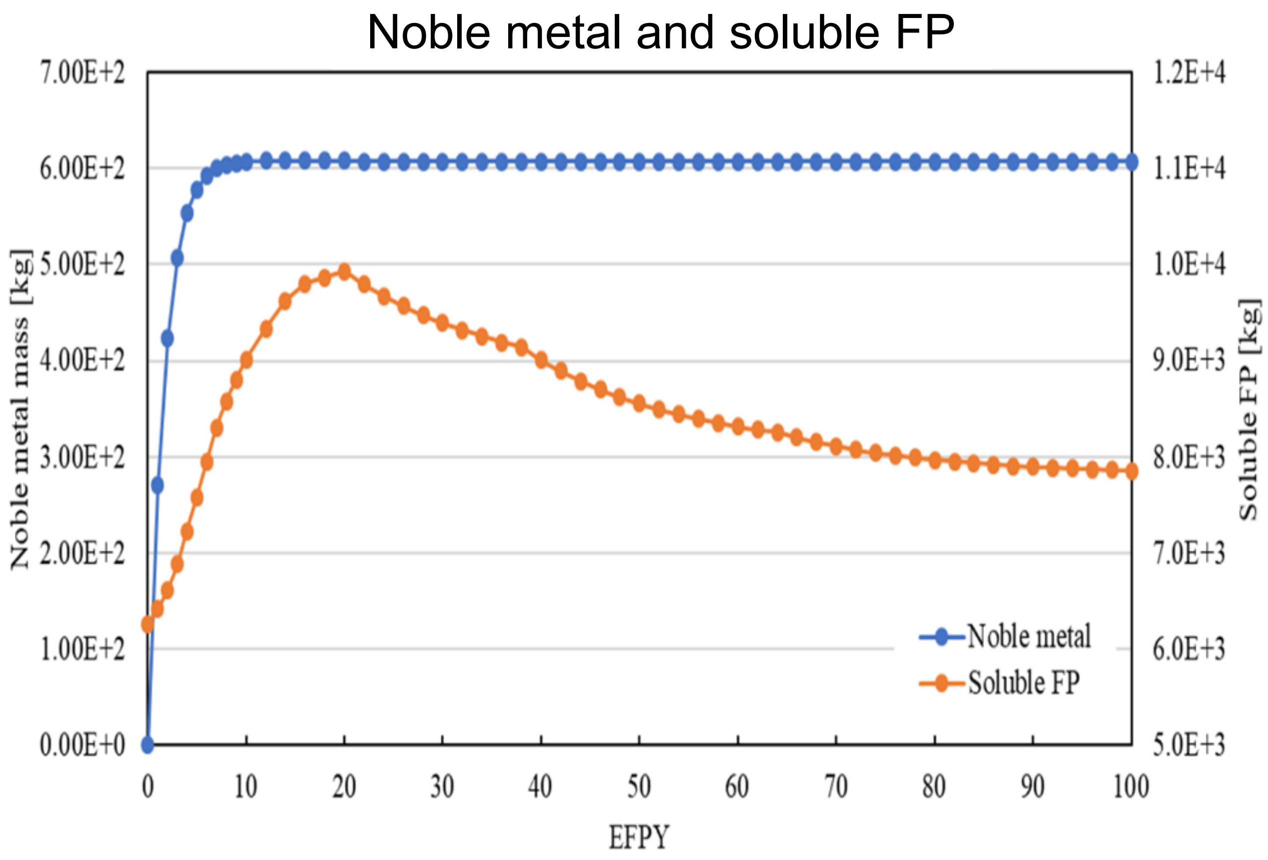
The results show the reactivity can be maintained through fuel conversion.
The excess reactivity can be maintained below prompt criticality for most of the period.

Numerical Results

- Material masses .vs. 3 GWth Full-power operation time

Noble metal: insoluble FP





These materials' evolutions show the convergence of the reactors and approach to the equilibrium

Numerical Results

- Control drum worth

	Initial core	Equilibrium core
Drum worth	3,182 ± 18 pcm	3,507 ± 18 pcm
(n-1) drum worth	2,998 ± 19 pcm	3,312 ± 18 pcm

The high reactivity worth demonstrates sufficient performance of the control devices.

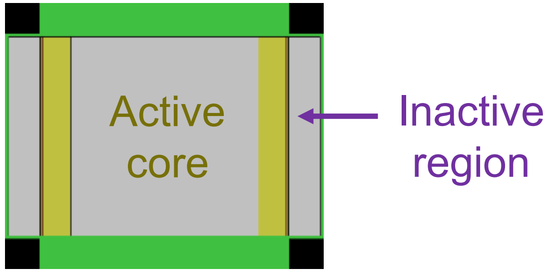
- Temperature coefficient
  - Calculation condition is changed (100,000 histories → 1,000,000 histories)

	Temperature	Initial core	Equilibrium core
FTC	550-650℃	-8.81 ± 0.08	-9.38 ± 0.07
	650-750℃	-9.25 ± 0.08	-9.82 ± 0.08
RTC	550-650℃	-0.10 ± 0.08	-0.11 ± 0.08
	650-750℃	0.05 ± 0.08	0.00 ± 0.07
ITC	550-650℃	-8.94 ± 0.08	-9.31 ± 0.08
	650-750℃	-9.23 ± 0.08	-9.75 ± 0.08

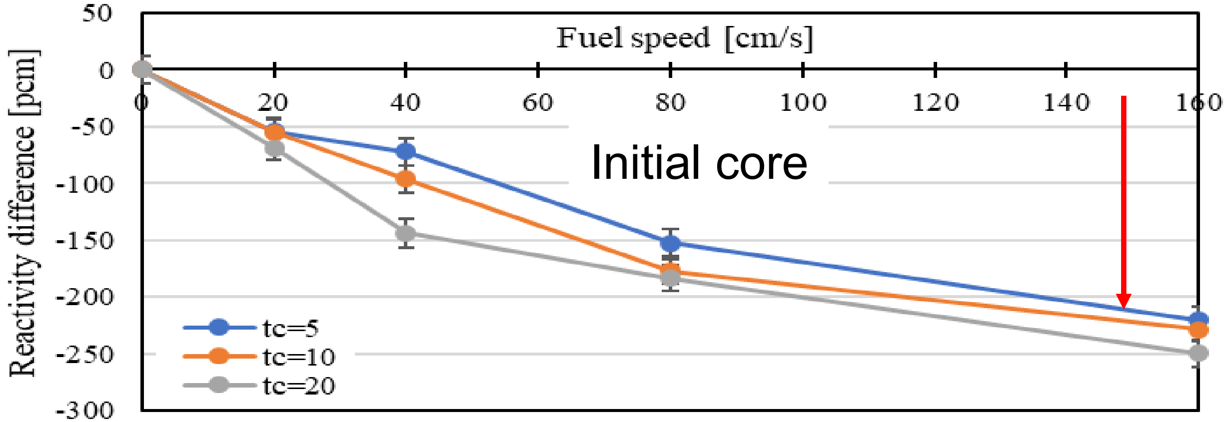
Negative temperature coefficient shows the validity of the reactor in terms of inherent safety

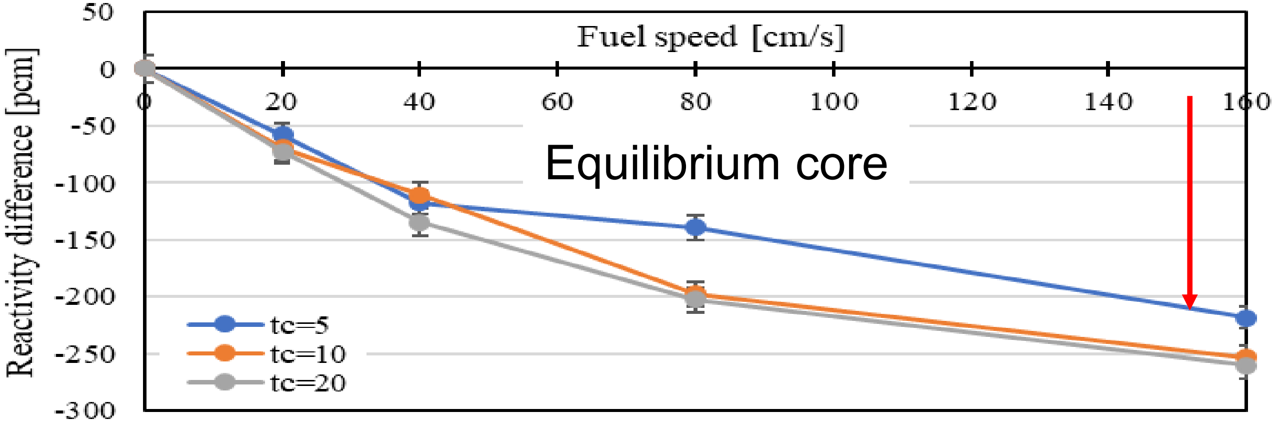
Numerical Results

Evaluations were performed for various active core flow speeds and inactive region residence times.

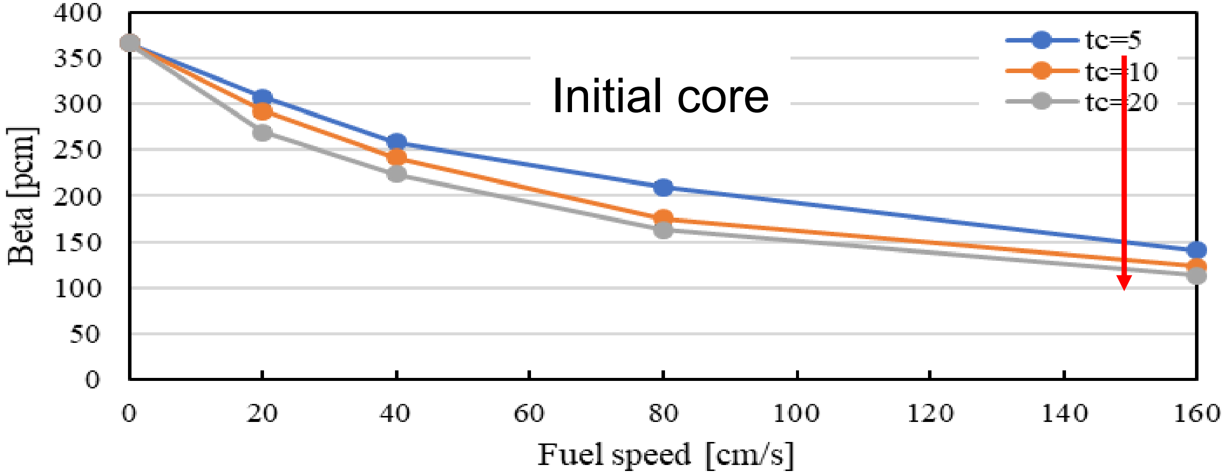


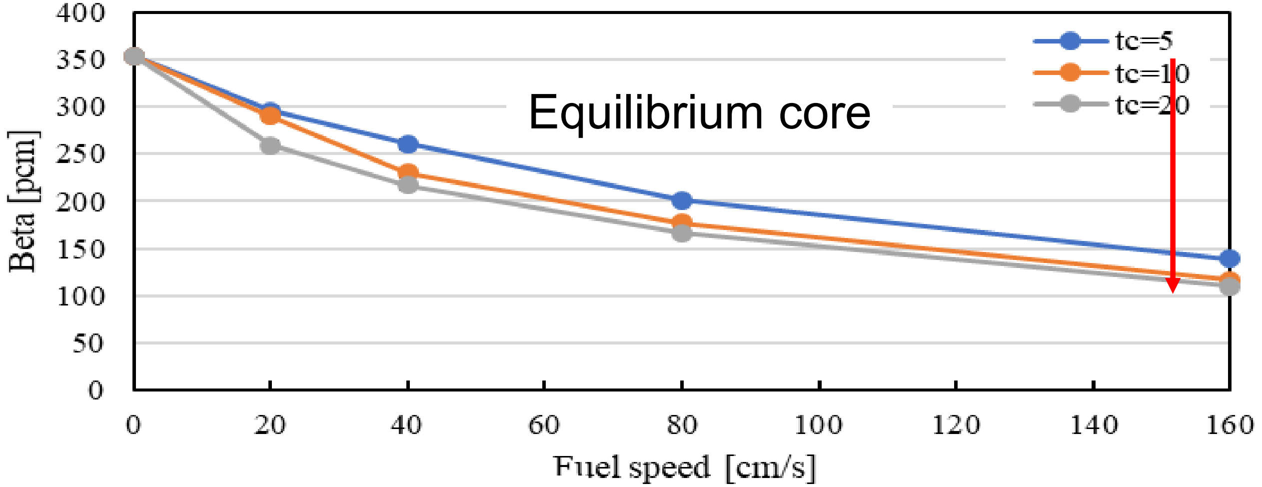
- Reduction of reactivity from the molten salt flow





- Reduction of effective delayed neutron fraction from the molten salt flow





About 150-200 pcm of reduction can be observed

The results show why the system require minimal reactivity of ~200 pcm.

Conclusions

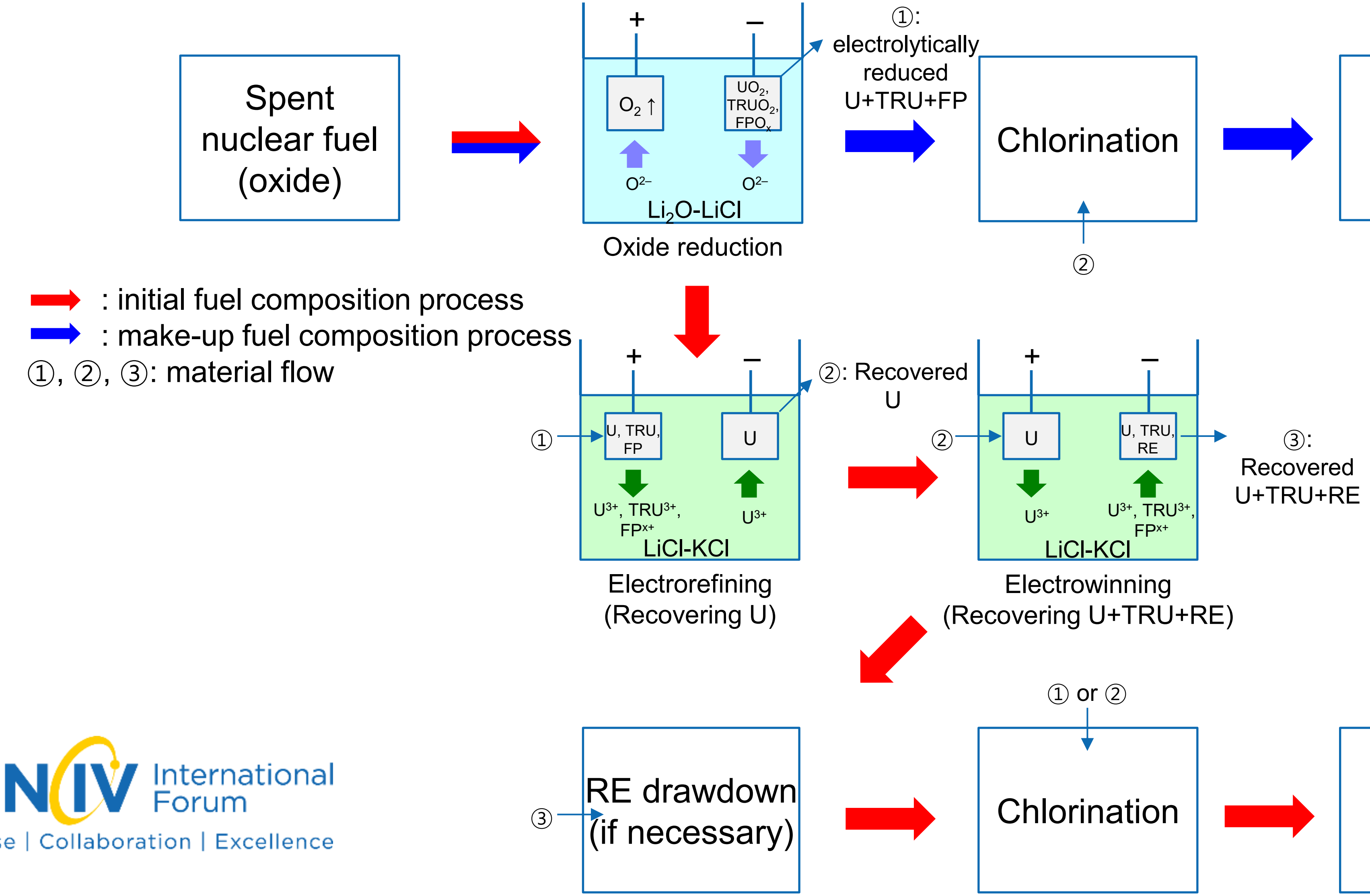
Conclusions

- **Long-term operation** with a closed fuel cycle using spent fuel has been demonstrated, ensuring **strong proliferation resistance** through minimal pyro-processing.
- **Reactivity can be maintained** through continuous make-up fuel feeding and FP removal
- The evolution of core materials demonstrates convergence toward **equilibrium**.
- The evaluated parameters including control drum worth and temperature coefficients confirm the reactor's **validity** in terms of **normal operation**.
- By utilizing spent fuel exclusively, it has the **potential to provide clean energy** for centuries in nuclear-advanced countries, such as the United States or Korea.

Backup Slides

Backup Sildes

- Pyro-processing



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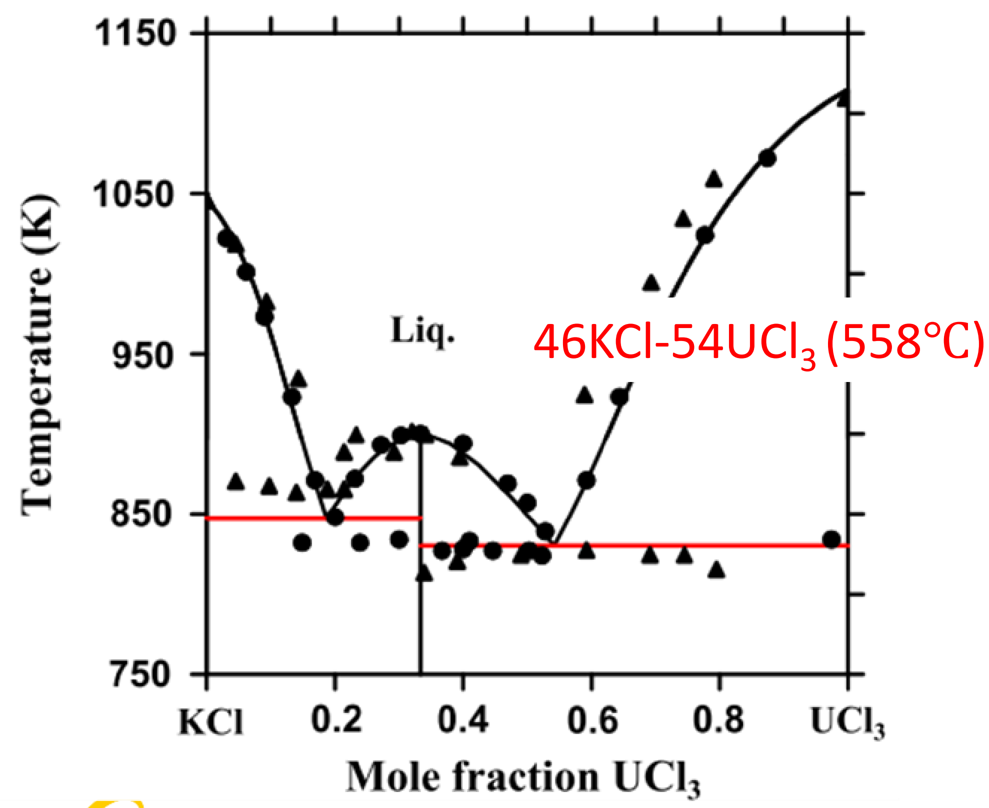
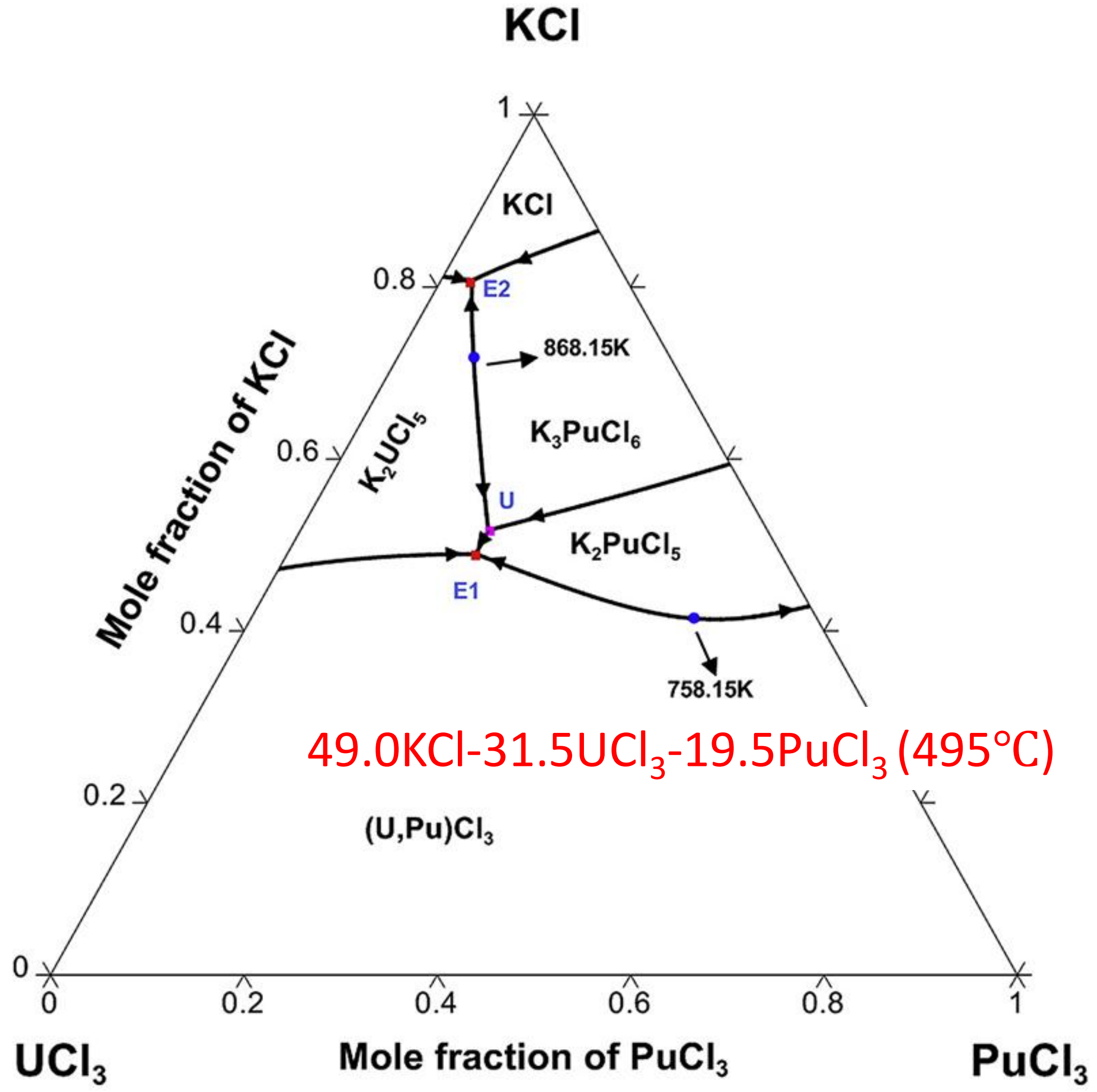
Backup Sildes

- Two molten salt eutectic data





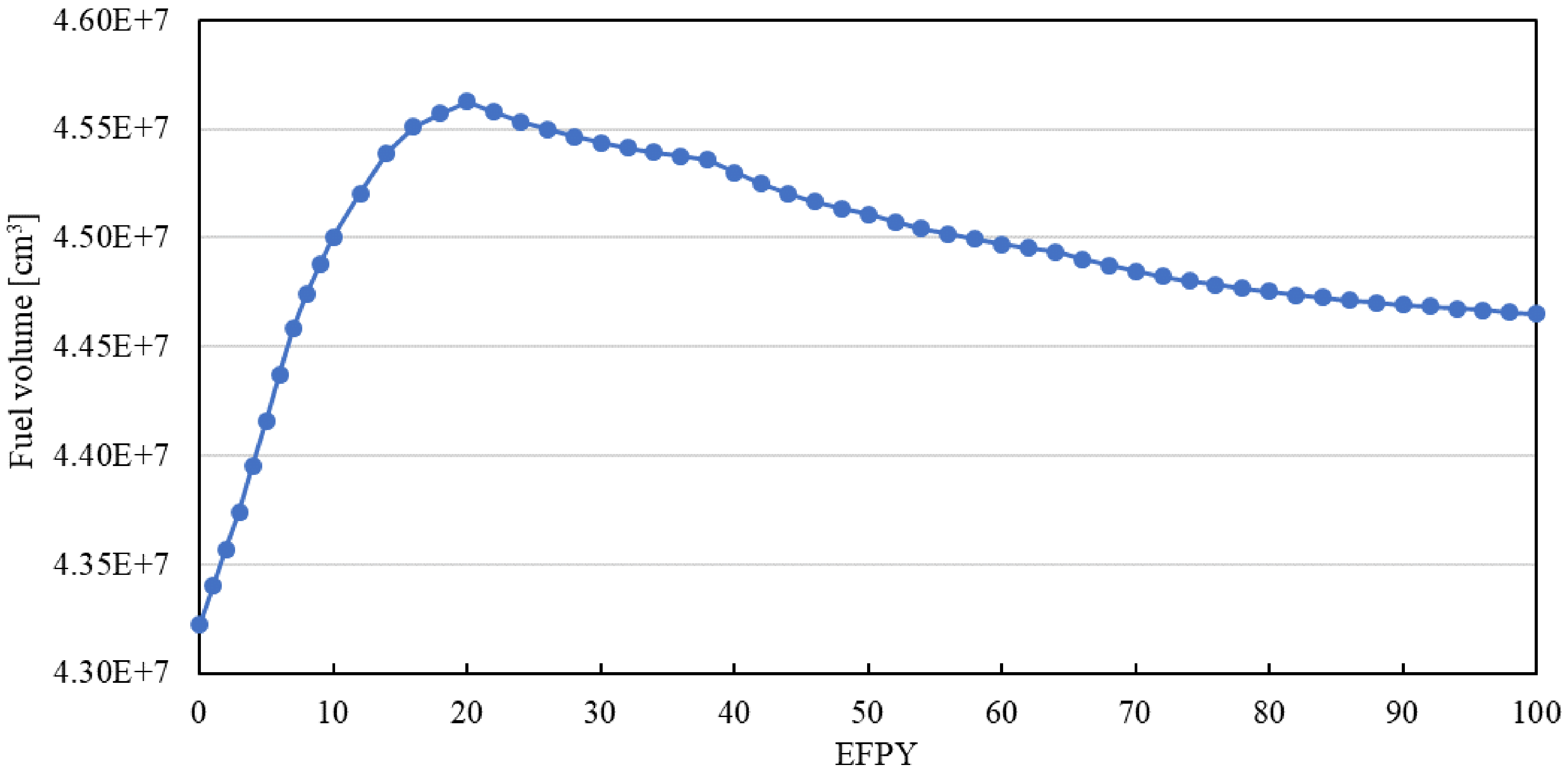
Backup Sildes

- Design parameters of BeMFR of two models

	Alternative	This work
Power	3,000 MWth	3,000 MWth
Active core diameter (= height)	330 cm	330 cm
Active core volume	2.822E+7 cm^3	2.822E+7 cm^3
Inactive salt volume at initial	1.500E+7 cm^3	1.500E+7 cm^3
Initial composition of KCl-$TRUCl_3$-UCl_3-$RECl_3$	46.00-8.48-38.22-7.30	49.00-8.24-34.52-8.24
Cl-37 enrichment	99 at.%	99 at.%
Fuel density at 650℃	3.676 g/cm^3	3.563 g/cm^3
U mass	66,791 kg	61,039 kg
TRU mass	14,947 kg	14,696 kg
RE mass	7,536 kg	8,607 kg

Backup Sildes

- Fuel volume .vs. 3 GWth Full-power operation time



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