Introduction to SMART-ITL

(SMART Integral-effect Test Loop)

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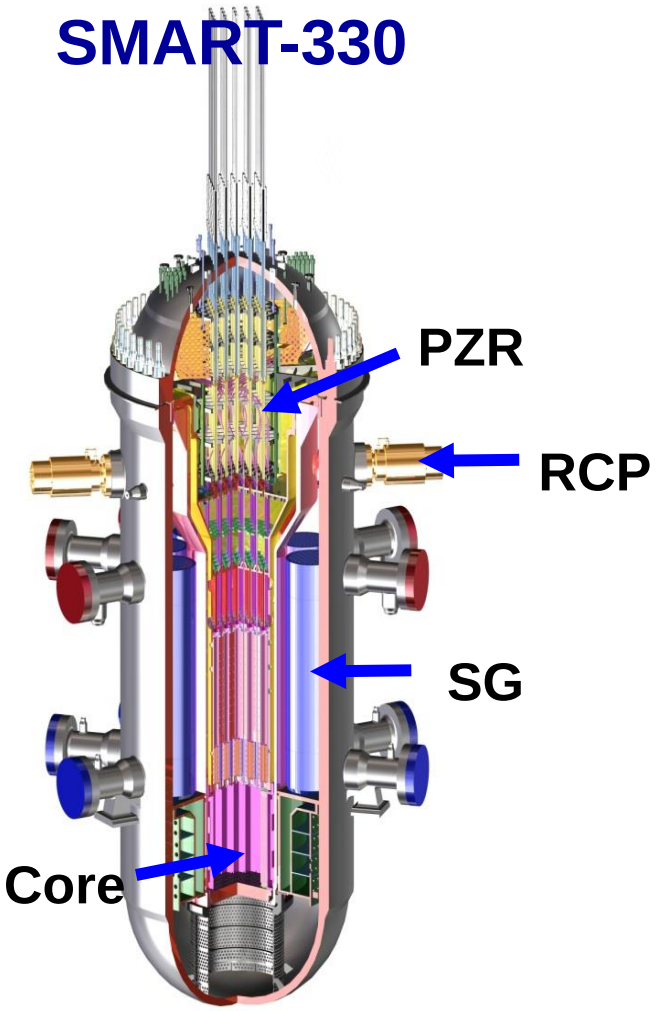
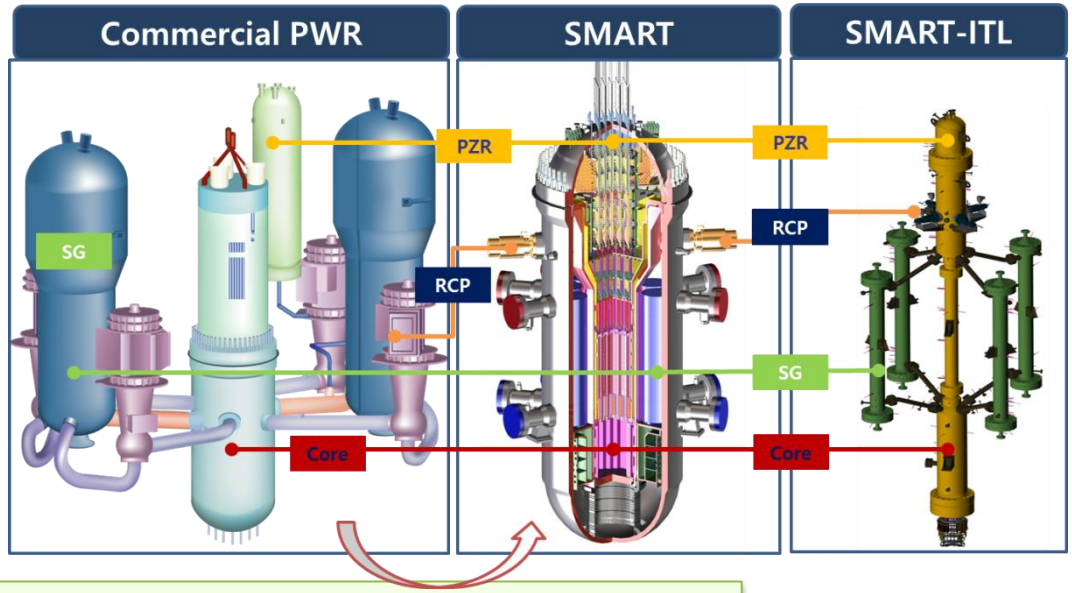


Design Concept

- Integrated pressurized water reactor
- All primary components in a vessel
  - Core assembly
  - Steam generators
  - Reactor coolant pumps
  - Pressurizer
- Modularization for field installation
  - Exclusion of the occurrence of large break loss of coolant accidents (LBLOCA)
  - Major concern for safety analysis: Small Break LOCA & Steam Line Break (SLB) scenarios
- Passive residual heat removal system
- Fully digitalized control system
- Standard Design Approval(SDA) was Licensed July 4th of 2012, the first in the world

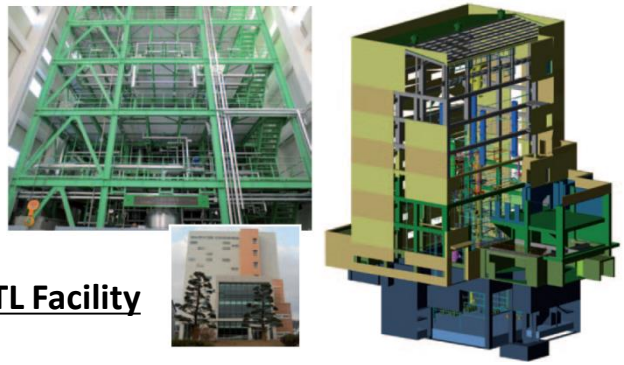
SMART-ITL (Integral-effect Test Loop)

❖ Commercial PWR vs. SMART vs. SMART-ITL



- Enhanced Reactor Safety: No LBLOCA
- Flexible Applications: Electricity, Water
- Proven Technology: Early Deployment

Validation tests!!



SMART-ITL Facility

Major Scale Parameters

Parameters		Scale Ratio	SMART-ITL
Length,	l_{0R}	l_{0R}	1/1
Diameter,	d_{0R}	d_{0R}	1/7
Area,	a_{0R}	d_{0R}^2	1/49
Volume,	V_{0R}	$d_{0R}^2 \cdot l_{0R}$	1/49
Time scale		$l_{0R}^{1/2}$	1/1
Velocity		$l_{0R}^{1/2}$	1/1
Power/Volume		$l_{0R}^{-1/2}$	1/1
Heat flux		$l_{0R}^{-1/2}$	1/1
Core power		$a_{0R} \cdot l_{0R}^{1/2}$	1/49
Flow rate		$a_{0R} \cdot l_{0R}^{1/2}$	1/49
Pump head		l_{0R}	1/1
Pressure drop		l_{0R}	1/1

SMART
System integrated Modular Advanced ReacTor

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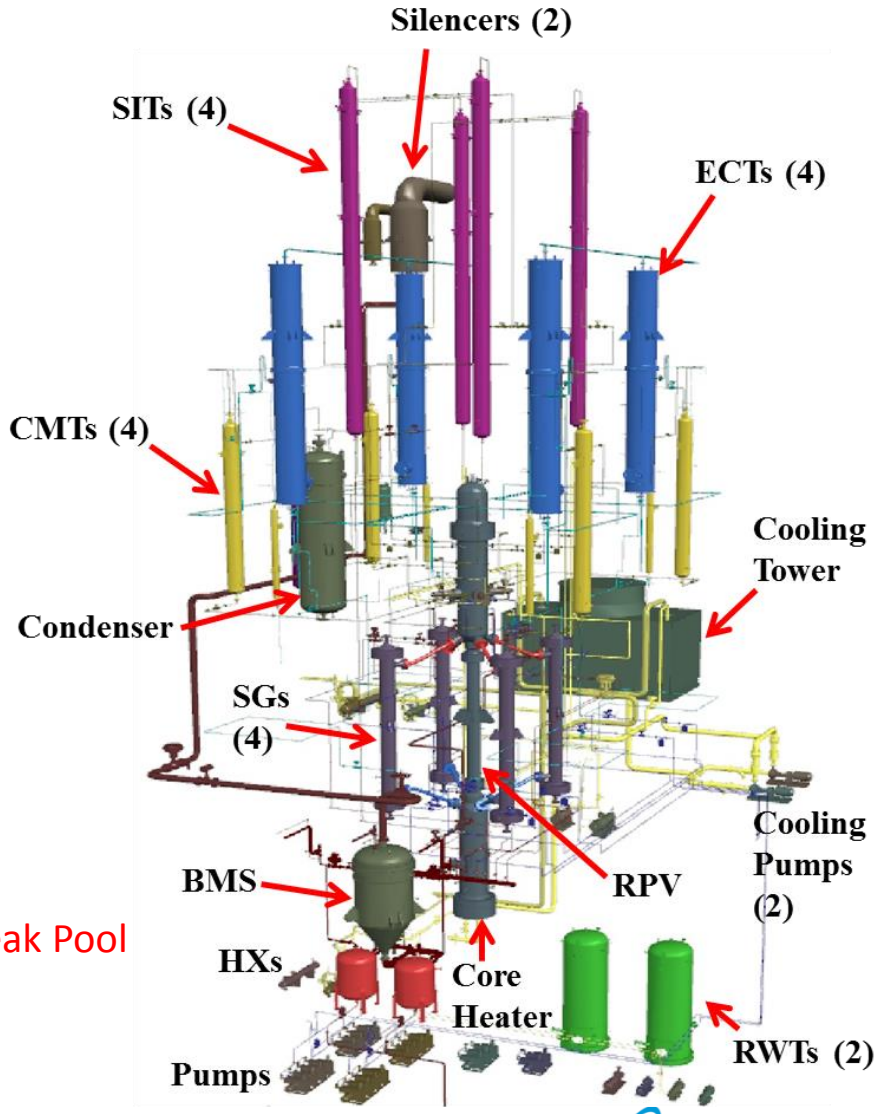
SMART-ITL (Integral Test Loop)

Design Figures

- Design pressure & temp.:
  - 180 bar, 370°C
- Maximum core heater power:
  - 2.0 MW (30% of scaled full power)
- External SGs
  - Proper instr. and easy maintenance
- SG & PRHRS: 4 Trains
- PSIS (CMT & SIT): 4 Trains
- ADS: 2 Trains
- Major components
  - Reactor Coolant/Secondary systems
  - PRHRS, ASIS/PSIS, PCCS
  - Auxiliary systems
  - Break system, Break meas. System, Break Pool
- Instruments : ~ 1,344
  - P, T, flow rates, mass, power, etc.



Previous and Ongoing Work

VSITA Experiments

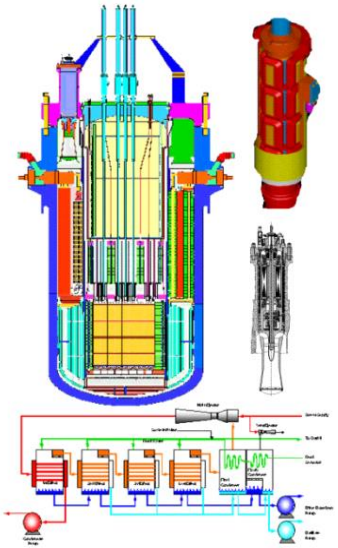
VSITA-ITL Experiments

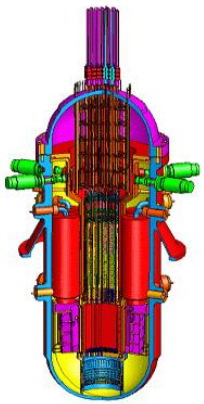
SMART-ITL Construction

Validation Tests for Passive Safety System (PSS)

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015~

Conceptual design | **Basic design** | **SMART-P (65MWt) Design and licensing** | Pre-liminary projects | Design Optimi zation | **SMART Standard Design Approval** | SMART Safety Enhancement

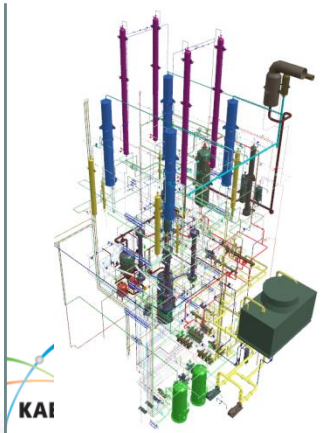




Construction in domestic and abroad (Project)

Partnerships
: Saudi Arabia, UK, Moldova, Malaysia, and etc.
SPC: SMART export

Total 1500MY and ~300M$ are invested.



SMART Standard Design Approval (4th July, 2012)

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