

# Current Status on Decommissioning Plan of Nuclear Facilities in Korea

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# Permanent Shutdown of Kori unit 1



## 고리1호기 영구정지 선포식

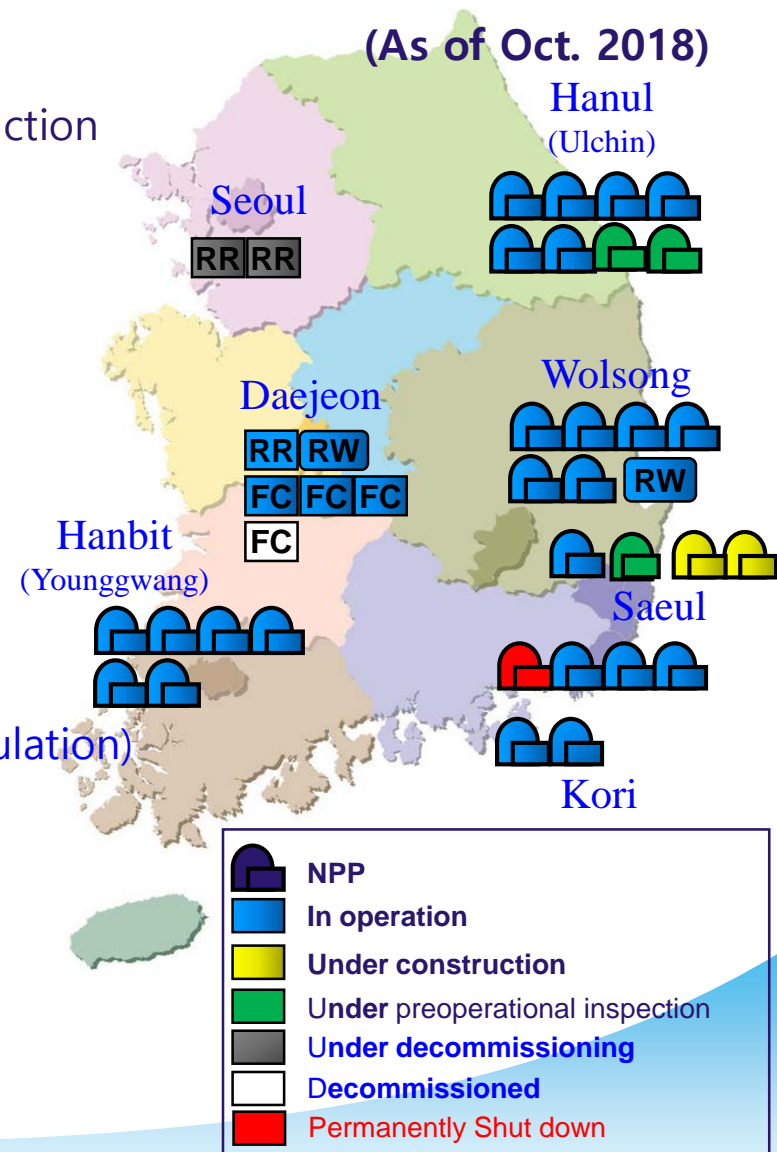
*Moon addresses the Kori 1 closure ceremony... 19 June 2017 (image: presidential website)*

# Nuclear Energy Phase-Out Policy

- ✦ New Government of President Moon declare the Gradual Phase-Out of Nuclear Power in 2017
  - Plans for New NPP will be canceled
    - Shin-Kori 5,6 will be constructed in accordance with the outcome of the public debate
  - Operating Periods of existing units will not be extended
  - Kori unit 1 has been permanently shutdown(June 2017)
  - Early Closure of Wolsung 1
    - Prior to the Expiration of Its Operating Licence in 2022
  - Existing plants close at a 40~60 years end-of-life
    - Last NPP may close at the middle of 2080's

# Major Nuclear Facilities in Korea

- ❑ Nuclear Power Plants (NPPs)
  - ◆ 24 units in operation and 2 units under construction
  - ◆ 3 units under preoperational inspection
  - ◆ 1 units in permanently shut down
- ❑ Research Reactors (RRs)
  - ◆ HANARO (RR)
  - ◆ KRR 1 and 2 (RR, under decommissioning)
- ❑ Nuclear Fuel Cycle Facilities (FCs)
  - ◆ Fuel Fabrication Plant for NPP
  - ◆ Fuel Fabrication Facility for RR
  - ◆ Post-Irradiation Examination Facility (PIEF)
  - ◆ Uranium Conversion Facility (released from regulation)
- ❑ Radioactive Waste Management Facilities (RW)
  - ◆ RI Waste Management Facility
  - ◆ Wolsong LILW Disposal Center (WLDC)
    - in operation since 2015



# NPPs in Operation

Plant		Reactor Type	Capacity (MWe)	Commercial Operation	NSSS Supplier	Design Life Expiration
Kori (KRN)	1	PWR(WH)	587	1978. 04	Westinghouse	2017.06.18
	2		650	1983. 07	Westinghouse	2023.04.08
	3		950	1985. 09	Westinghouse	2024.09.28
	4		950	1986. 04	Westinghouse	2025.08.06
Shin-Kori (SKRN)	1	(OPR-1000)	1000	2011. 02	KHIC/KOPEC	2050.05.18
	2		1000	2012. 07	KHIC/KOPEC	2051.12.01
	3	(APR-1400)	1400	2016. 12	DHIC/KOPEC	2075.12
Wolsong (WSN)	1	PHWR	679	1983. 04	AECL	2022.11.20
	2	(CANDU)	700	1997. 07	AECL	2026.11.01
	3		700	1998. 07	AECL/KHI	2027.12.29
	4		700	1999. 10	AECL/KHI	2029.02.07
Shin-WSN (SWSN)	1	PWR	1000	2012.07	DHIC/KOPEC	2051.12.01
	2	(OPR-1000)	1000	2015.07	DHIC/KOPEC	2054.11.14
Hanbit (HBN)	1	PWR(WH)	950	1986. 08	Westinghouse	2025.12.22
	2		950	1987. 06	Westinghouse	2026.09.11
	3	PWR(CE)	1000	1995. 03	KHIC/ABB-CE	2034.09.08
	4		1000	1996. 01	KHIC/ABB-CE	2035.06.01
	5	PWR(KSNP)	1000	2002. 05	KHIC/KOPEC	2041.10.23
	6		1000	2002. 12	KHIC/KOPEC	2042.07.30
Hanul (HUN)	1	PWR(FR)	950	1988. 09	Framatome	2027.12.22
	2		950	1989. 09	Framatome	2028.12.28
	3	PWR(KSNP)	1000	1998. 08	KHIC	2037.11.07
	4		1000	1999. 12	KHIC	2038.10.28
	5		1000	2004. 07	DHIC/KOPEC	2043.10.19
	6		1000	2005. 04	DHIC/KOPEC	2044.11.11

# NPPs under Construction

We are here



Site & Unit	Type	2000	2005	2010	2015	2020
Shin-Kori 4	APR-1400		CP Application	Construction	OL Application	
Shin-Hanul 1 Shin-Hanul 2	APR-1400			CP Application	Construction	OL Application
Shin-Kori 5 Shin-Kori 6	APR-1400				CP Application	CP Application
Shin-Hanul 3 Shin-Hanul 4	Canceled					

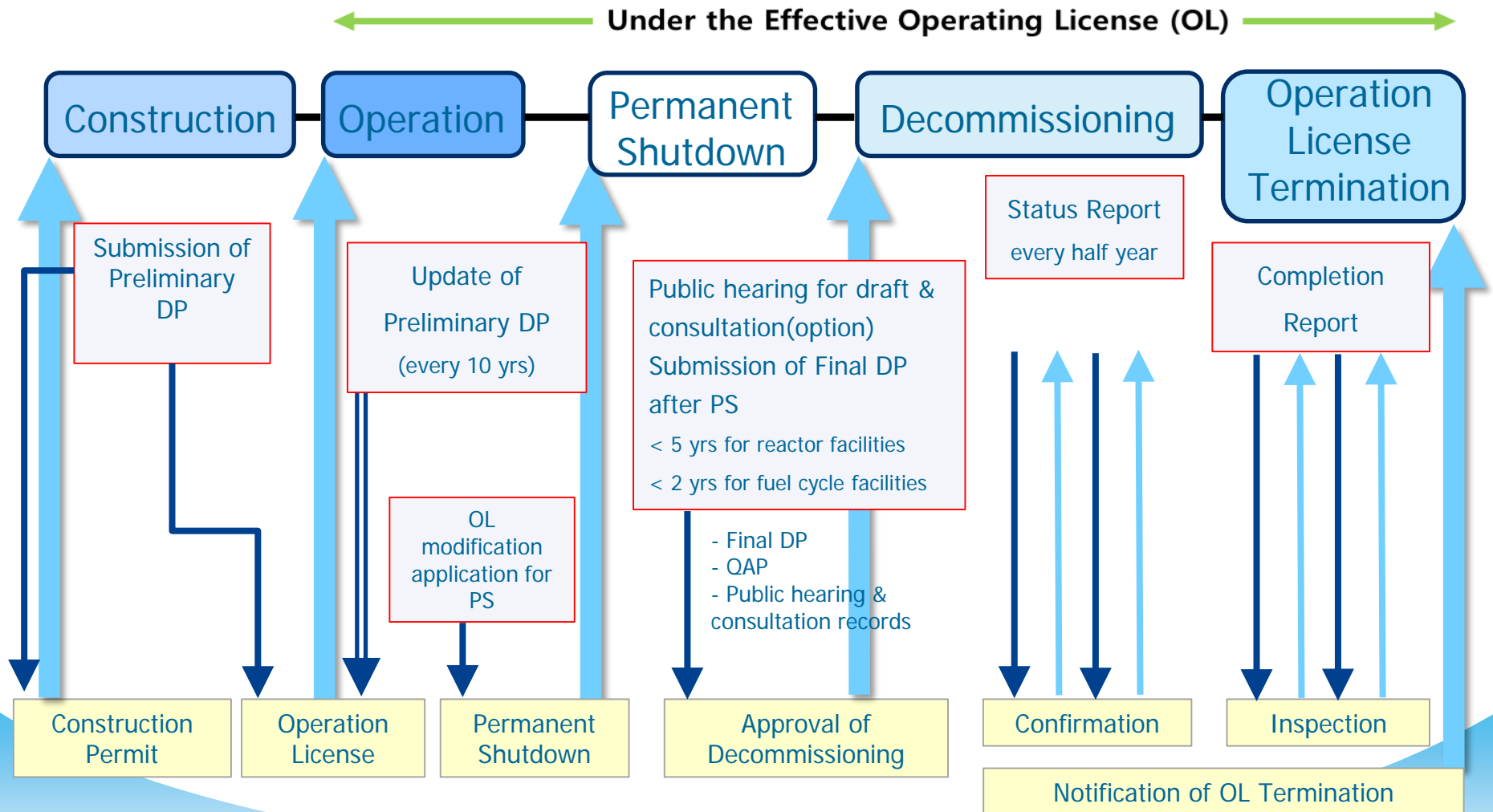
CP Application
  Construction
  OL Application

**OPR-1000 : Improved KSNP (Korea Standard NPP, 1000MW PWR Type)**

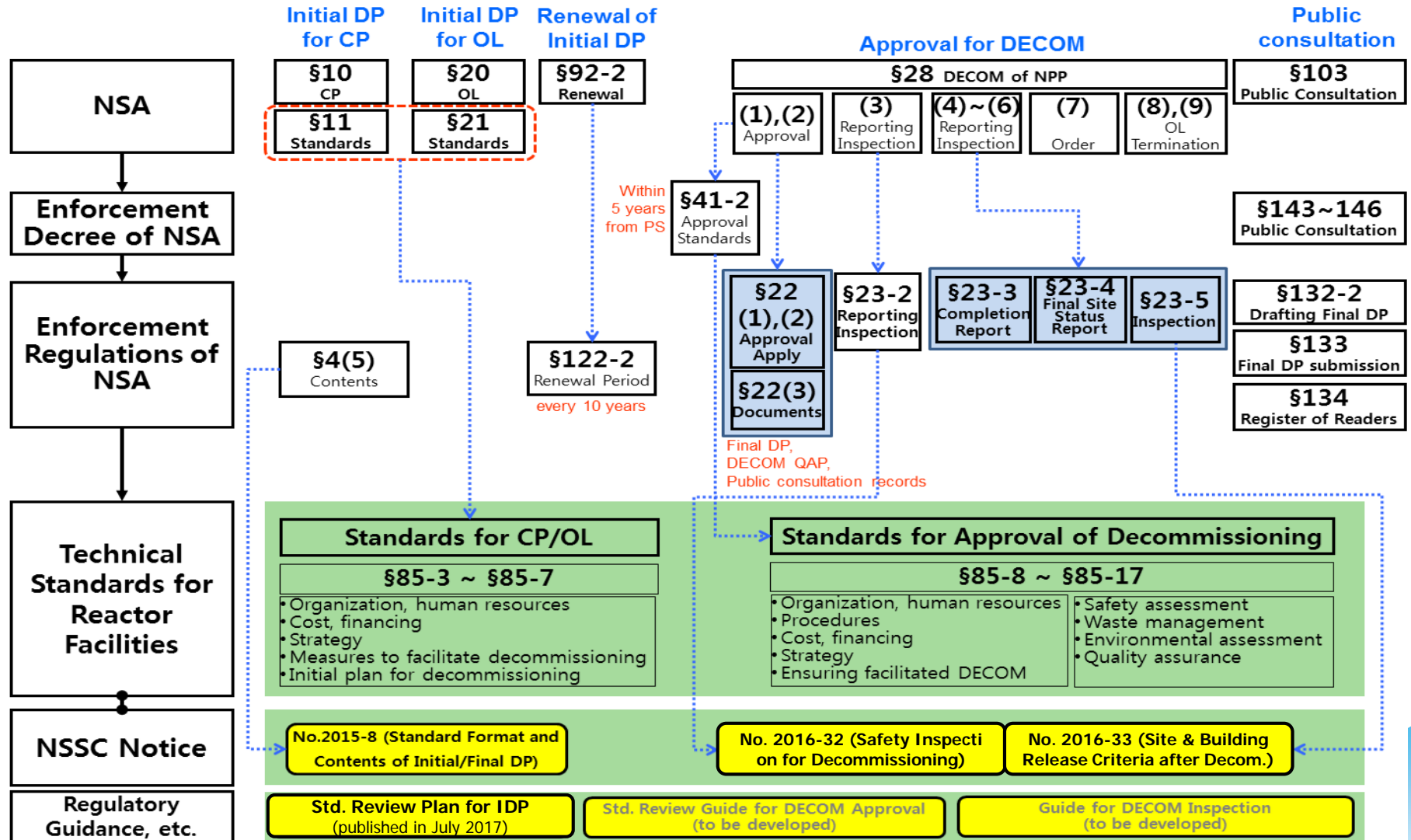
**APR-1400 : Advanced Pressurized Reactor (1400MW PWR Type)**



# Regulation Stages & Process



# Provisions for Decommissioning Regulation





# Decommissioning Regulations

## Revision of NSAct

### ◆ Definition “Decommissioning” : Article 2 (24)

- ☞ The term “decommission” means **all actions or measures** taken to **exclude any facilities** licensed or designated pursuant to this Act **from the scope of application of this Act**, through removal of the facility and the site or through decontamination thereof after **permanent cessation** of the operation of the facilities by those who have been granted permit
- ☞ Target facilities : Article 20 (1) **power reactor**, 30-2 (1) **research & education reactor**, Article 35 (1) or (2) **nuclear fuel cycle business(refining, fabricating, reprocessing)**

# Decommissioning Regulations

## Initial Decommissioning Plan

### ◆ Target Facilities for IDP

- Legal based documents at construction permit, operating or designating license:

- ☞ **Power & Research/Education Reactor** :

- (Construction Permit) NSAct article 10(2) & 30(2)

- (Operating License) NSAct article 20(2), 30(2)

- ☞ **Nuclear Fuel Cycle Business** : (Permit) NSAct article 35(3)

### ◆ Description in IDP

- Enforcement regulation article 4(5) & Notice of NSSC “format & contents on DP”

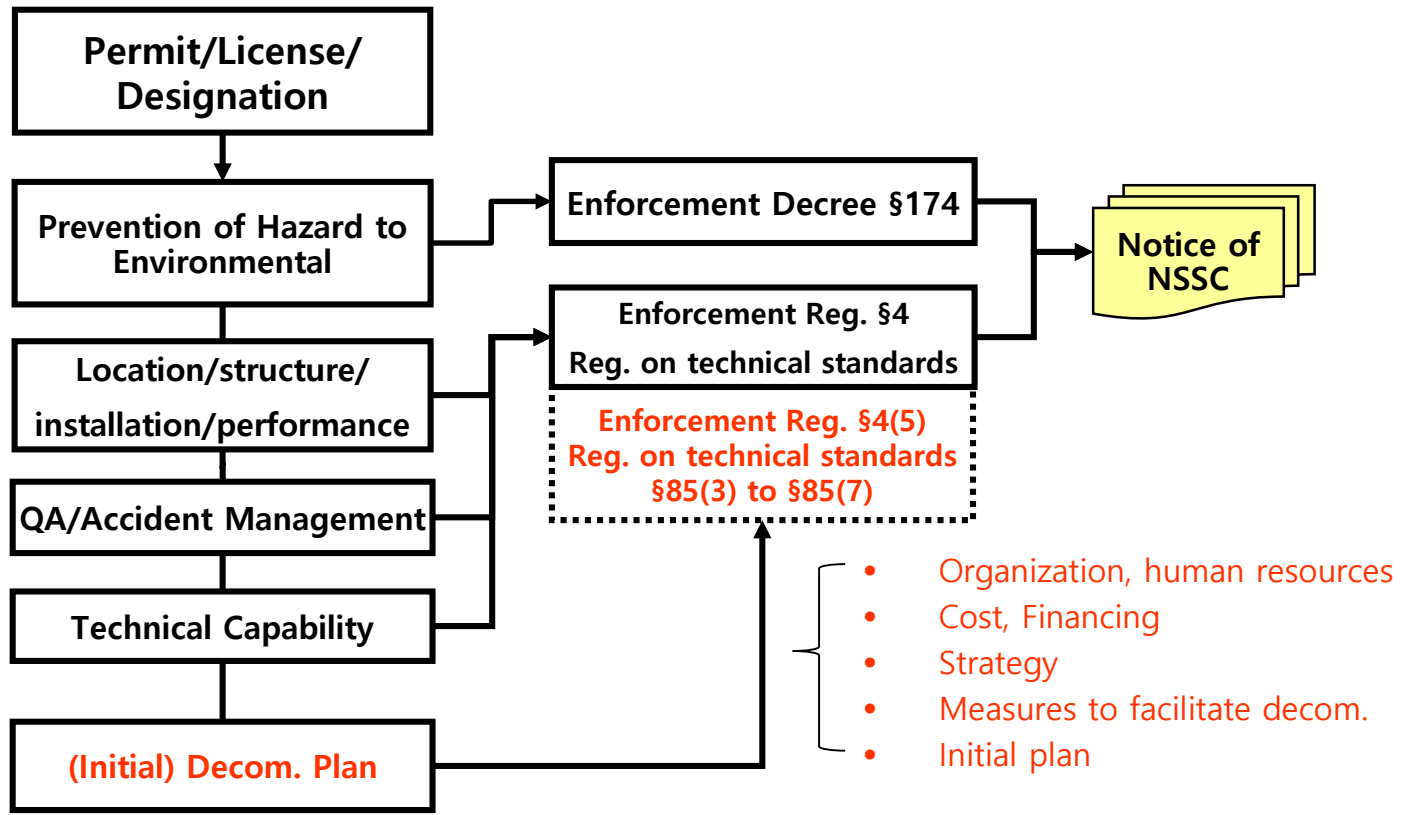
- ☞ Decom. strategy, schedule, measures to protect radiation hazard, decontamination

### ◆ Periodic revision for IDP

- **10 ys renewal** - NSAct 92(2) & enforcement regulation 122(2)

# Decommissioning Regulations

## Summary for IDP



# Decommissioning Regulations

## Final Decommissioning Plan

### ◆ Decommissioning Approval

- **Application(licensee):** as to decommission the utilization facilities, submit the application of decom. approval with FDP + doc.\*

\* QAM on decom., resident opinion & public hearing results

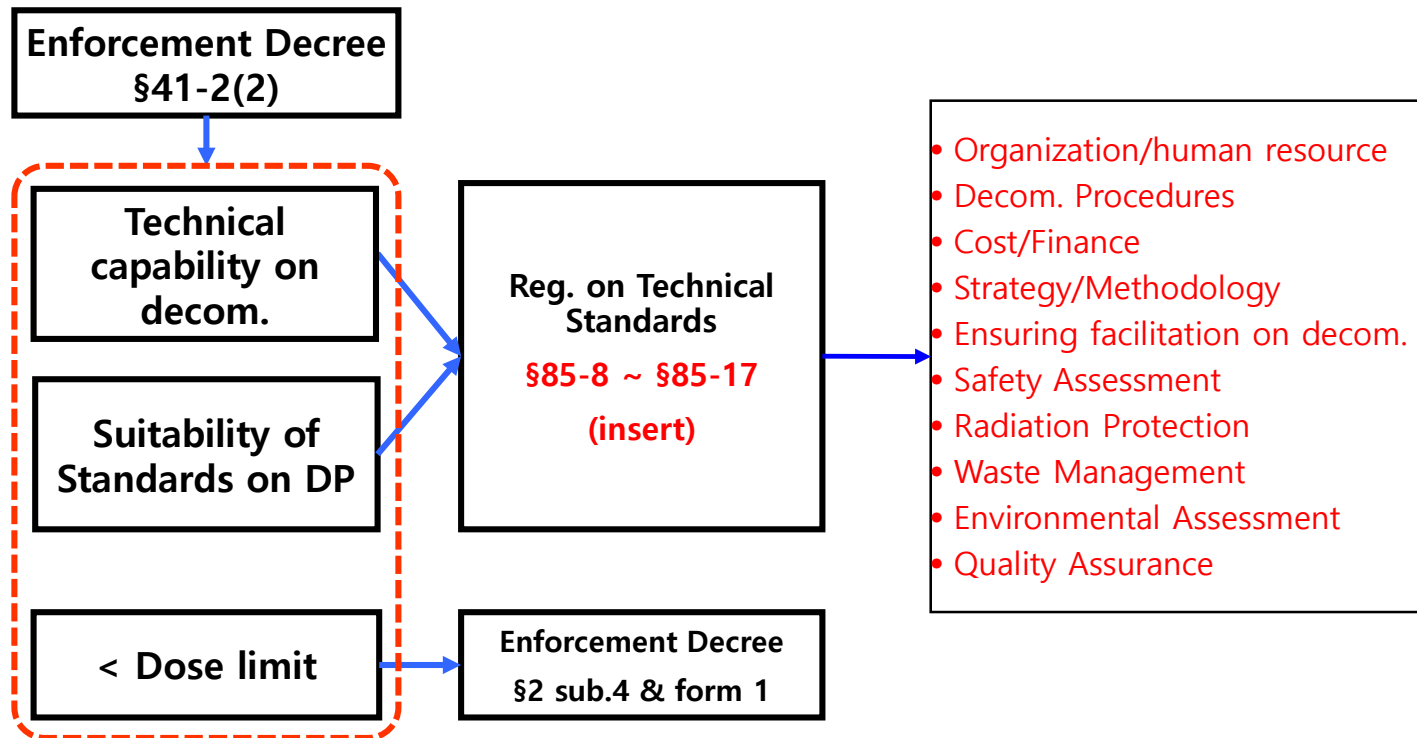
- ☞ should apply the decom. approval within 5 ys after permanently shutdown (enforcement decree §41-2)

- **Decom. Approval :** NSAct §28(1)/28(2)/42(1)/42(2), enforcement decree §22/48-2 (reactor + fuel cycle)
- **Public access/opinion/hearing :** NSAct §103(2), enforcement decree §143 ~ §145 (only for reactor)

# Decommissioning Regulations

## Summary for FDP

- Requirement for Decom. Approval



# Decommissioning Regulations

## Report & Inspection on Decom. Status

- **Periodic Report (decom. status)**
- **Licensee Report (NSAct article 23(3))**
  - ☞ **Semi-annual reporting on decom. status : ① facilities status, ② decontamination status, ③ radiation safety management status, ④radio-waste management status (Reg. on technical standards §23(2))**
- **Periodic Inspection (Confirmation & Check)**
- **NSSC Inspection (NSAct article 23(3))**
  - ☞ **Notice of NSSC, “Regulation on items and methods on inspection for decom. Status” article 3(3)**  
**7 areas (17 items) : decontamination activity, decom. activity, environmental radiation management, waste management, fire protection, QA activities**



# Decommissioning Regulations

## Decommissioning Completion Report & Inspection

- **Decom. Completion Report & NSSC Review**
  - Licensee Report (NSAct article 28(4)/(5))
    - ☞ **Completion Report & Final Status Survey Report**(Enforcement Reg. 23-3/4)
      - DCR : Strategy, progress, (before/after) site & facilities status, final radiation/activity status, waste management status, occupational dose status, abnormal event/accident on decom.
      - FSSR: Investigation plan/method/results for final radiation/activity on site, site reuse plan
- **Inspection for Decom. Completion**
  - NSSC Inspection (NSAct article 28(8), Enforcement Reg. article 23-5)
    - ☞ Compliance with DP, DCR, FSSR and criteria on site reuse
  - Notice of NSSC “Regulation on standards on site & building reuse

# Transitional Phase of NPP in Korea(1)

- ✦ According to Nuclear Safety Act(NSAct), the phase of NPP could be categorized with construction permit(CP), operating license(OL), license termination(LT)
- ✦ Permanently shut-down and decommissioning was considered as parts of operating license(OL)

## Construction Permit

- Act article 10 (1)  
Approval of construction

## Operating License

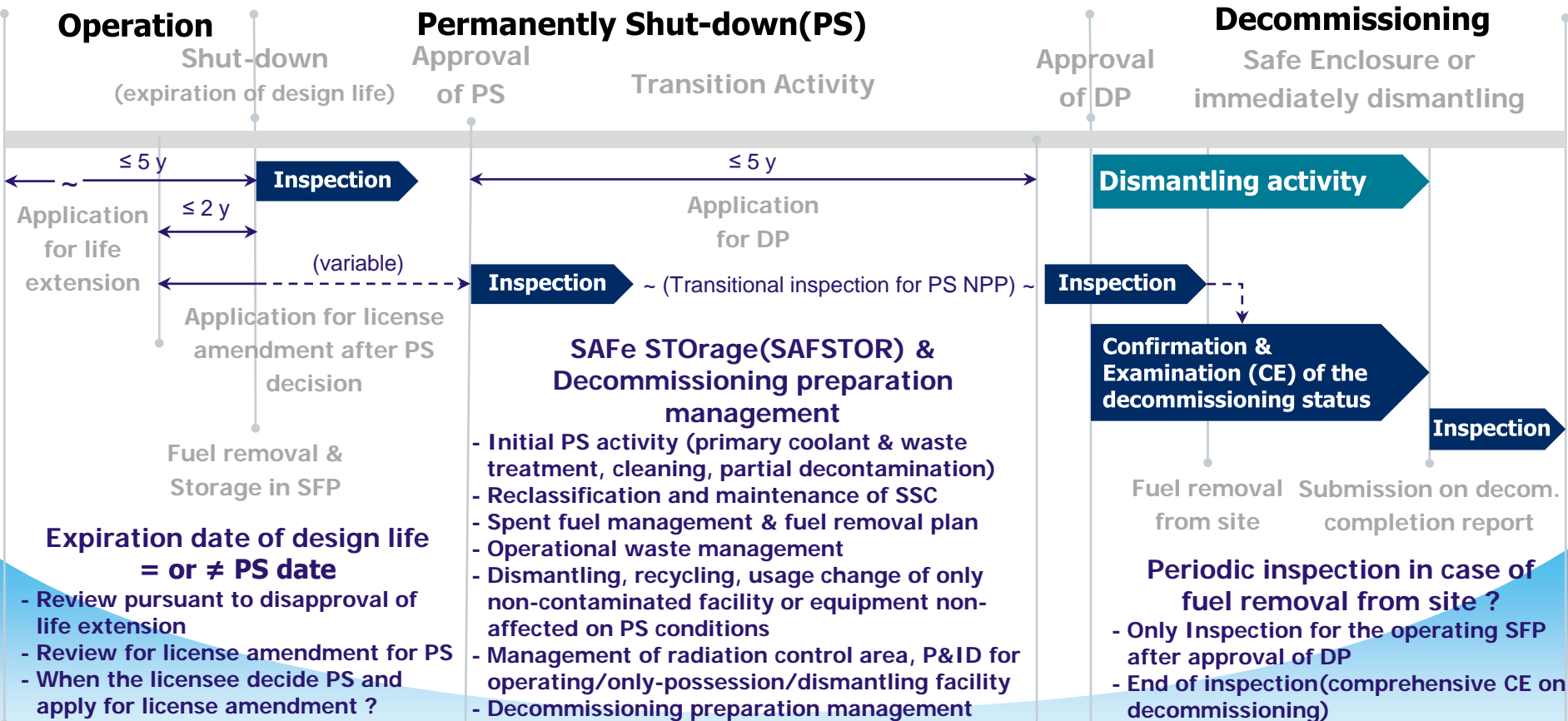
- Act article 20 (1) - Operation Approval of operation
- Act article 21 (2) - Permanently shut-down License amendment(Change Permit)
- Act article 28 (1) - Decommissioning Approval of decommissioning

## License Termination

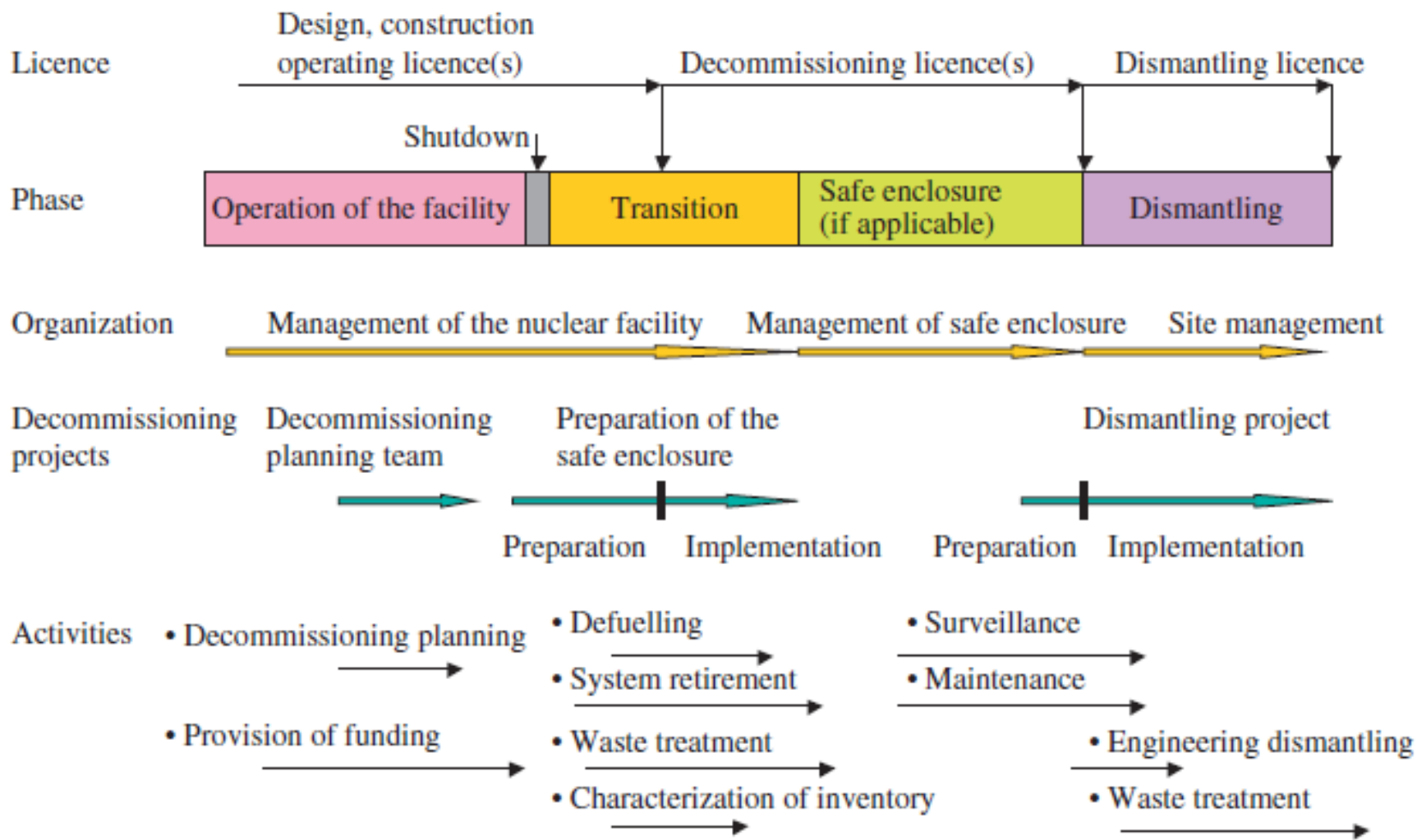
- Act article 28 (8) & (9)
- Notification of termination in written form
- Reuse of the site

# Transitional Phase of NPP in Korea(2)

- If the operator intends to permanently shut-down & decommission, the operator apply a license amendment & submit a decommissioning plan(DP) to regulatory body before the start of their activities under operating license



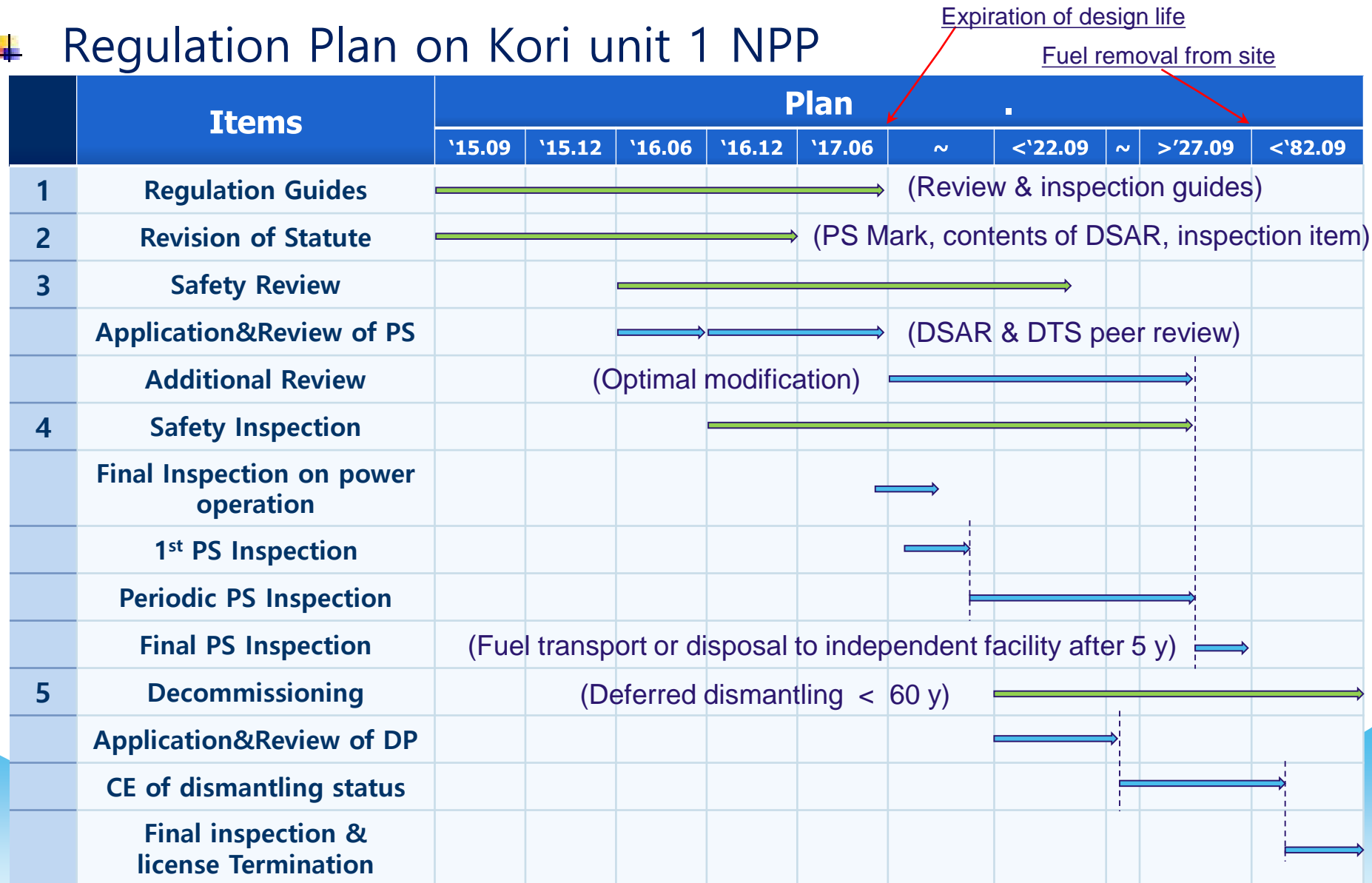
# IAEA's Safety Standards for Transitional Phase(2)



IAEA TRS No.420 Fig.1 Decommissioning related activities during the life cycle of an NPP

# Further Plan

## Regulation Plan on Kori unit 1 NPP



*Safety Together, Better Tomorrow!*

***Thank you so much for your  
attention!***

