

Overview of Preparation for Licensing and Commissioning

Joint ICTP-IAEA Essential Knowledge Workshop on Deterministic Safety Assessment and Engineering Aspects Important to Safety

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Ivica Basic

basic.ivica@kr.t-com.hr

APOSS d.o.o., Zabok, Croatia



IAEA

International Atomic Energy Agency



1. Definitions
2. Objectives
3. International obligations
4. IAEA Standard
5. Licensing process principles
6. Licensing stages
7. SSG Contents

1. Definitions | 1

- **Authorization**
 - The granting by a *regulatory body* or other governmental body of written permission for an *operator* to perform specified *activities*.
- **Licence**
 - A legal document issued by the regulatory body granting authorization to create a nuclear installation or perform specified activities related to a facility or activity.
 - In IAEA usage, a *licence* is a particular type of *authorization*, normally representing the primary *authorization* for the *operation* of a whole *facility* or *activity*. The conditions attached to the *licence* may require that further, more specific, *authorization* or *approval* be obtained by the *licensee* before carrying out particular *activities*.

Licence = Permit = Certificate = Authorization

1. Definitions |2

- **Licensing basis**
 - A set of **regulatory requirements** applicable to a nuclear installation. In addition to a set of regulatory requirements, licensing basis may also include **agreements and commitments** made between the regulatory body and the licensee (e.g. in the form of letters exchanged or of statements made in technical meetings).
- **Applicant**
 - person or organization who applies for authorization
- **Licensee/Operator**
 - The holder of a current *licence* is termed a *licensee*, person or organization having the overall responsibility for a nuclear installation and its activities
- **Licensing process**
 - includes all licensing and/or authorization required throughout the lifetime of a nuclear installation from siting to delicensing

2. Objectives |1

1. To ensure adequate demonstration of safety and compliance with legal and regulatory requirements
 - Authorization is issued when the RB is satisfied there is adequate protection of the people and the environment
 - At any stage of the lifetime of a nuclear installations, from siting to delicensing

2. To establish regulatory control over all activities and facilities where safety is concerned
 - A license or other prior authorization shall be in force covering, as appropriate, safety related aspects

3. International obligations | 1

- Convention on Nuclear Safety

- ARTICLE 8. REGULATORY BODY

- Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7

- ARTICLE 9. RESPONSIBILITY OF THE LICENCE HOLDER

- Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant licence and shall take **the appropriate steps to ensure that each such licence holder meets its responsibility.**

4. IAEA Standard |1

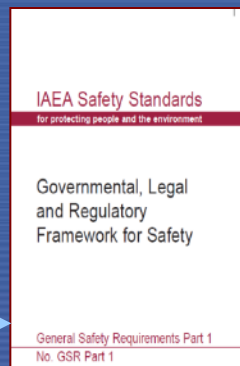
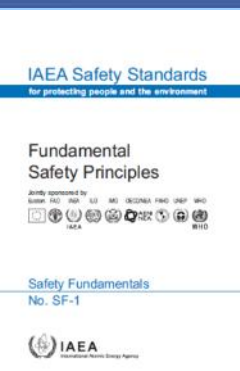
SF-1: Fundamental Safety Principles

- **Principle 1: Responsibility for safety**
 - The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risks.

- **3.4. Authorization to operate a facility or conduct an activity may be granted to an operating organization or to an individual, known as the licensee.**

GSR part 1: Governmental, Legal and Regulatory Framework for Safety

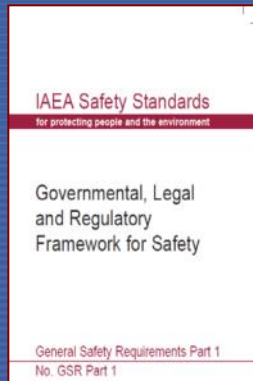
- **Requirement 23: Authorization by the (RB)**
 - **Authorization** by the RB, including specification of the conditions necessary for safety, **shall be a prerequisite** for those facilities and activities that are not explicitly exempted or approved by a notification process.



4. IAEA Standard |2

GSR part 1: Governmental, Legal and Regulatory Framework for Safety

- **Requirement 24: Demonstration of Safety for authorization**
 - The applicant shall be required to submit an adequate demonstration of safety in support of an application for authorization.
- **Requirement 7: Coordination of different authorities with responsibilities for safety within the regulatory framework.**
 - Where different authorities have responsibilities in the regulatory framework for safety, the government shall provide for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties



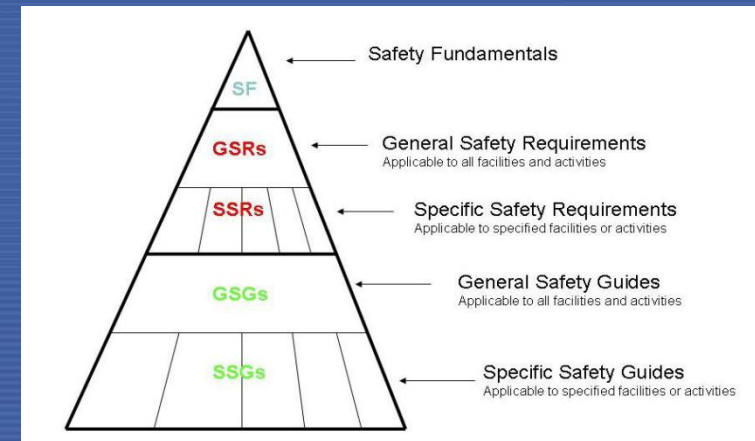
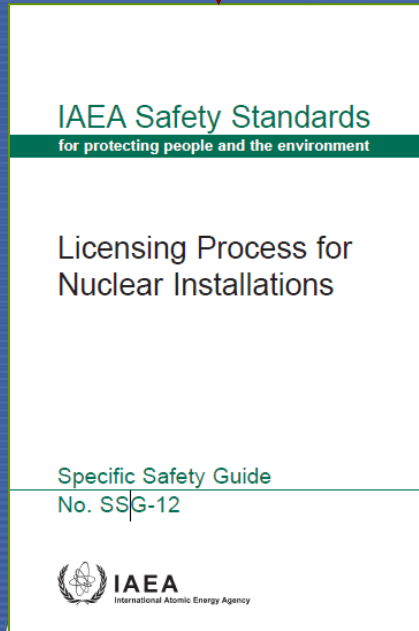
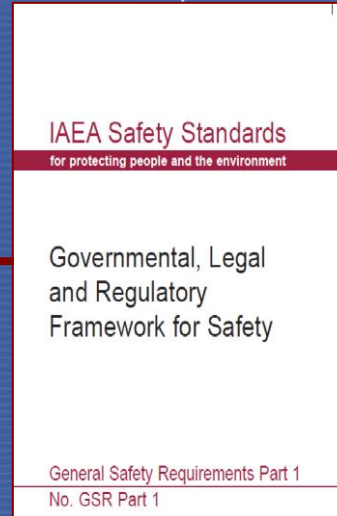
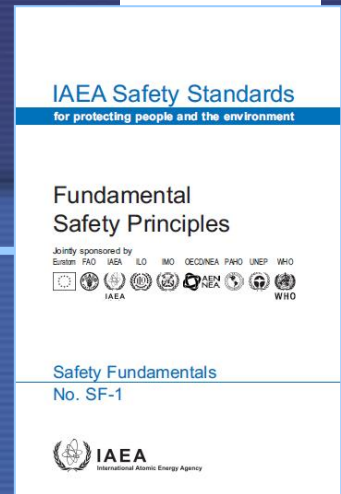
4. IAEA Standard |3

- The National Legislation should:
 - Establish a minimum **set of general requirements** to be met by applicants and licensees (both organizational and technical)
 - Outline the **licensing regime** (including conditions for amending, suspending, revoking and transferring licence, provisions for public hearings, procedures for appeal against regulatory decisions...)
 - Provide the regulatory body with adequate authority to exercise oversight of the nuclear installations (powers to issue, amend, suspend and revoke a licence; to establish licensing procedures and criteria, to have unrestricted access to any facility, any activity and any documents considered necessary for granting licence, etc.)

SSG 16 Action 21

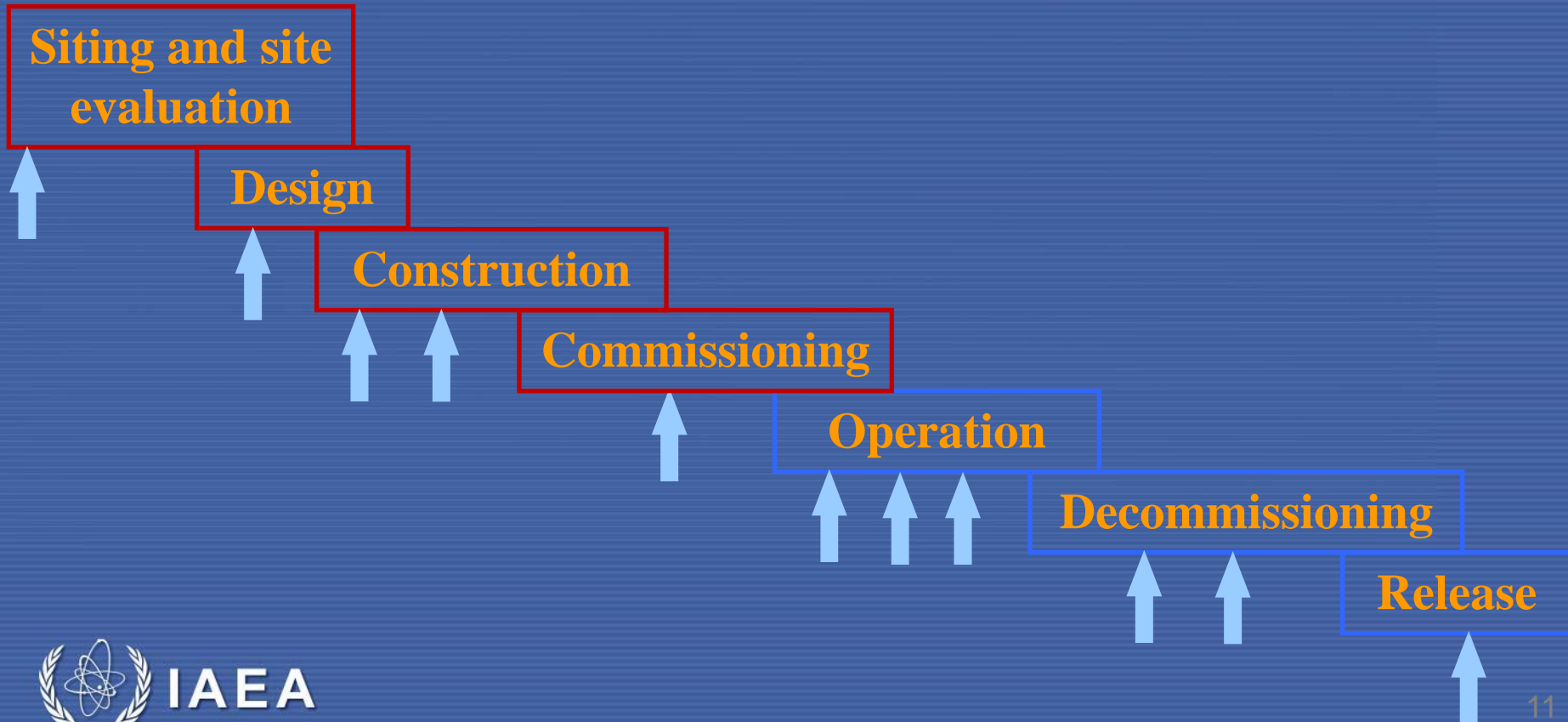
The government should consider the process that should be employed to license nuclear facilities in the later stages of the programme...

4. IAEA Standard |4



5. Licensing Process Principles |1

- 7 major steps



5. Licensing Process Principles |2

Two major player: Regulatory Body

- To define the **safety criteria** and establish the safety regulatory arrangements
 - application content, guidelines, review & assessment,

SSG 16 Action 30:

The regulatory body should issue regulations and guides specifying the documentation and procedures necessary in the various steps of the licensing process and inspections to be conducted...

- To ensure the licensee is responsible for Safety “*Compliance with regulations and requirements does not relieve the licensee of its prime responsibility for safety*”
 - inspection modification aspects
 - review and assess application for a licence
 - **authority** to approve, agree, comment on... or reject an application (independence)

SSG 16 Action 34:

The regulatory body should plan and conduct all the required licensing and oversight activities to be conducted during the licensing process, including siting, construction, commissioning and operation, consistent with the regulatory approach that was selected...

- To have enough suitable **competent** and **experienced staff** and a good TSO(s)
- To establish a **mechanism to solve safety issues** with the applicant

5. Licensing Process Principles |3

Two major player: Applicant or Licensee

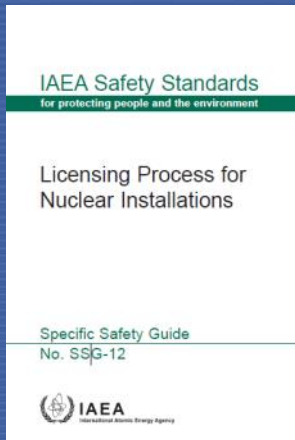
- **Prime responsible for safety**
 - To maintain safety level as high as reasonably achievable
 - To be an intelligent customer concept (design, process, contractors, assistance coordination)
 - To develop and implement modification process, management system, procedure for controlling that NPP remains within limits, for anticipated operational occurrences for emergency response, etc.
- To apply for licence:
 - Preparation and submission of the required documentation
 - Response to the requests of the RB
 - Compliance at any time to licence conditions and regulation

5. Licensing Process Principles |3

- Licensing process for Nuclear Installations
 - **Characteristics:** well-defined, clear, transparent, logical order, of combining licence possibilities, licence validity aspects, all authorisations on a site to be consistent and coherent each other
 - **authorization procedures include:** review and assessment aspects, public consultations, how to appeal against, etc.
 - **submitted documents** to be upgraded during the lifetime of the nuclear installation
 - Granting of authorizations allows **regulatory control**
 - Regulatory regime to be established and made explicit
 - **Management system** of the RB should encompass the licensing process

5. Licensing Process Principles | 4

- Licensing process for Nuclear Installations
 - **Public participation** during all NPP lifetime
 - **Higher quality in decision making:** PIP may challenge the process if it appeared to jeopardize health or safety.
 - **Stability:** strengthens the legitimacy of regulatory decisions and provides a broader responsibility for them, which also increases the regulatory control stability over time
 - **Credibility and legitimacy:** reinforce PIP awareness of the role and responsibility of the regulatory body;
 - **Independence:** being under PIP scrutiny makes any undue influences more visible and enhances the ability of regulatory body to make independent regulatory judgements and decisions

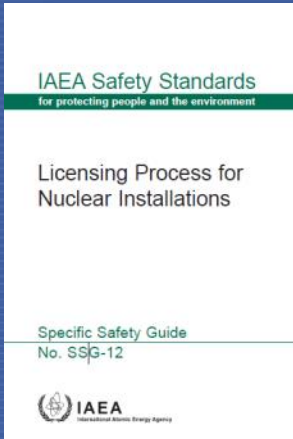


SSG 16 action 45

The regulatory body should communicate with interested parties about licensing process...

5. Licensing Process Principles |5

- Licensing process for Nuclear Installations
 - **Graded approach:** “*the resource devoted to safety... have to commensurate with the magnitude of the radiation risks*” (Fundamental Safety Principle 5)
 - Factors to be considered:
 - magnitude of the risks
 - occupational doses, radioactive discharges and generation of radioactive waste
 - potential consequences of accidents
 - licensee maturity
 - operating experience
 - ageing issues
 - complexity (to operate or to decommission, of the systems and components...)
 - Graded approach applies for licensing process including for **regulatory activities**
 - number of authorizations, level of details, review and assessment, etc.



5. Licensing Process Principles |8

- Life of a nuclear installation includes 7 major steps



5. Licensing Process Principles |9

- Licensing process usually includes the **steps** described in SSG-12
- However, **alternative approach** exist
 - Each step may be divided into several sub-authorisation steps
 - Several steps may be merged or combined under only one authorisation
 - Standard design certification can be adopted for a series of nuclear facilities

Site and design

Construction

Commissioning 1

Commissioning 2

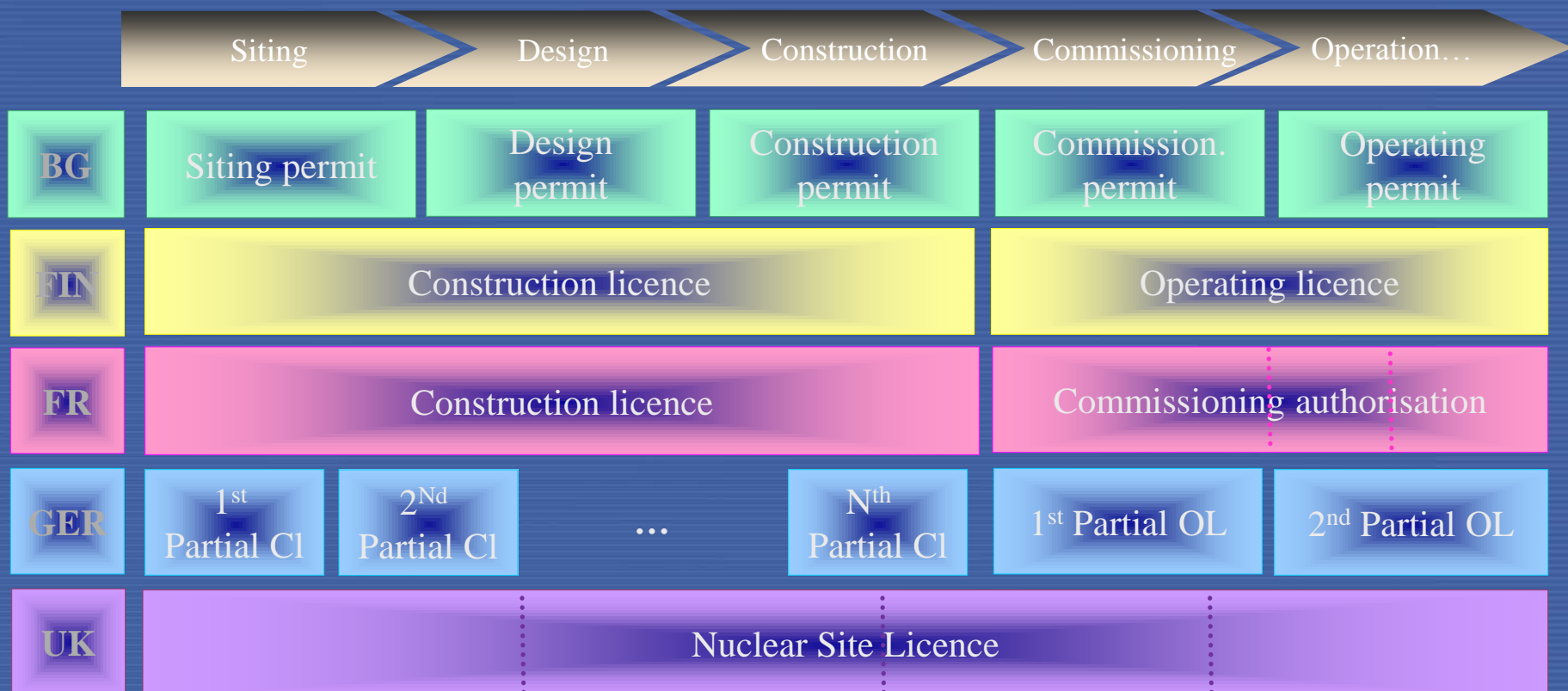
Operation

Decommissioning

Release

1. Definitions
2. Objectives
3. International obligations
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6. Licensing stages
7. SSG Contents

6. Licensing stages |1



6. Licensing stages |2

- National licensing process should be tailored, considering
 - SSG-12 guidance and other relevant IAEA Safety Standards
 - National experience and background (newcomer or not)
 - Intention or not to build a series of similar installations
 - National arrangements, including legal and regulatory
 - International cooperation on design...

Site

Design & construction

Commissioning

Operation

Decommissioning

Release

6. Licensing stages |3

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- Selection of one or more candidate sites
 - For site close to border, neighbouring countries to be consulted
- Site evaluation
 - To verify the **acceptability of the site**, whether the selected site is suitable to host a nuclear installation
 - Conditions dealing with the use of the site and which could affect safety
 - Safety impact (NS-R-3): initial conditions, range of natural hazards, man-made hazards, emergency situation, site security, control over new building / construction, interactions...
 - Environmental impact: flora, fauna, air, soil, discharges, heat dissipation, health, socio-economics, etc.
 - Impact to be reviewed on periodic basis
 - To determine **site characteristics** necessary for analysis and installation design to ensure final design is fit for safety purpose
- Before construction begins a formal decision should be issued
 - The RB should have the authority to accept or reject a proposed site on safety basis

SSG 16 actions

Phase 1: 160
Phase 2: 161, 163
164
Phase 3: 167...

• *More detailed aspects within IAEA NS-R-3*

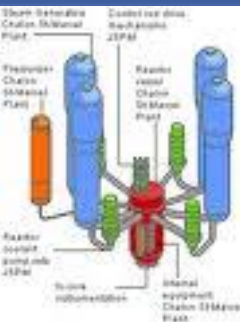
6. Licensing stages |4

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- Objective: to ensure the selected design of the proposed nuclear installation is acceptable considering the site evaluation results

- Design should:

- be developed according to the **defence in depth** approach
- be in accordance with the **design basis** (conditions, events 'manageable' by the installation)
- be in compliance with relevant **standards, codes and regulatory requirements**
- consider the replacement of **heavy and large components** during its life (steam generator, reactor pressure vessel heads, etc.) by taking into account: buried pipes and conduits, openings in structures for equipment access, obstructions
- consider the **access of components important to safety** for Maintenance, inspection and testing, replacement occupational exposure
- Consider the decommissioning
- consider **transport** of radioactive materials
- be based on **site characteristics**



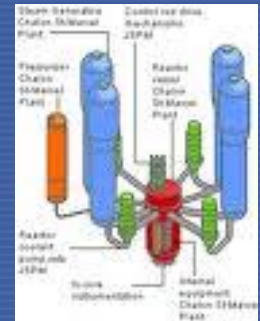
- Turnkey NPP does not exist, licence applicant must be an **intelligent customer...**
 - Be able to review and/or to perform safety analysis of the design
- Design stage may include feasibility study or pre-licensing step, standard certification approach may be adopted for series



6. Licensing stages |5

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- The Applicant should perform and review Safety and Design Analyses and uses the results to specify and to improve:
 - Construction and Commissioning Aspects
 - Safety-related classification of structures, systems and components
 - Operating limits, conditions, rules and operating procedures
 - In-service inspection and maintenance
 - Radiation protection
 - Waste management
 - Emergency preparedness arrangements
 - Physical protection
 - Training and/or certification
 - Verification and validation activities in design, construction, commissioning, maintenance, ageing, etc.
- Applicant's **management system** should cover the review of the detail design

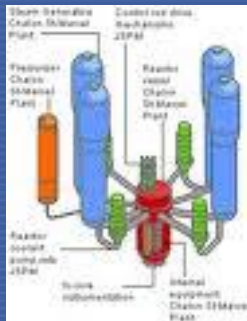


6. Licensing stages |6

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- The Regulatory Body should review and assess the applicant's safety case, including:

- Safety analyses and assumptions
- Structures, systems and components important to safety (SSCs)
- Limits, conditions and permitted operational states
- Anticipated operational occurrences
- Postulated initiating events for the safety analyses
- List of features, barriers, design requirements, analytical methods and computer codes used in the safety analysis
- Radioactive releases and radiation exposures in normal operation and fault conditions
- Safety criteria for analyses of operator actions, common cause events, cross-link effects, single failure criterion, redundancy, diversity and separation
- Adequacy of design parameters and site characteristics



SSG 16 Action 182...

The regulatory body should review and assess the safety documentation such as the safety analysis reports, and should verify the compliance of the design with regulatory requirements

More detailed aspects within IAEA NS-R-1

6. Licensing stages |7

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- **Objective**
 - Appropriate organization and resource for construction:
 - Control mechanisms of vendor, cascades of contractors and suppliers
 - Manufacturing of important safety related structures, systems and components important to safety (SSCs) under control of the licensee
 - Appropriate organizational and financial arrangements for mid/long-term issues (decommissioning, radioactive waste and spent fuel management)
 - Management system of licensee and vendors as necessary in place covering all aspect of construction
- Before granting an authorization for the construction, followings should be **reviewed, assessed and inspected** by the Regulatory Body:
 - Site evaluation
 - Demonstration of the selected design meets safety objectives and criteria



6. Licensing stages |8

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- The Regulatory Body should review, assess and inspect following conditions to ensure the **quality and safe operation of the nuclear installation**:
 - Framework and schedule for construction and acquisition of structures, systems and components
 - Adequate financial capabilities of the applicant or licensee
 - Construction and design of nuclear installation in accordance with the relevant site parameters
 - ⇒ Planned deviations from the approved design should be fully analyzed in relation to the original design intentions
 - Physical protection measures and fire protection in place
 - Radiological monitoring equipment and devices operational prior to radioactive material being brought onto the site



6. Licensing stages |9

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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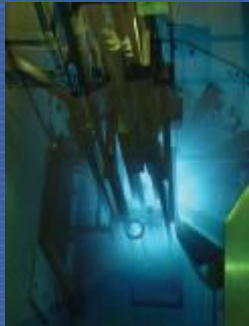
- The RB should review, assess and inspect following conditions to ensure the **quality and safe operation of the nuclear installation**
 - Local radiological study performed of the region and all the material used in the construction, including samples of construction concrete, prior to the radioactive material being brought onto the site
 - Industrial codes, standards, rules (including health and safety regulations) in place before starting the construction
 - Control in place over the licensee's contractors and subcontractors performing tasks relevant to structures, systems and components important to safety



6. Licensing stages |10

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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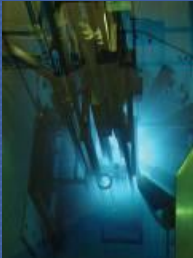
- Objective: commissioning properly design and will be implemented safely
 - Commissioning can be divided into main stages, regarding:
 - **Non nuclear testing**, before introducing nuclear/radioactive material
 - To ensure, to the extent possible, the installation has been constructed and equipment manufactured and installed properly
 - To prove the design performance
 - **SSCs** should be put into service only **when being inspected, tested and approved by the licensee** in accordance with the requirements set out in the design as agreed by the RB
 - **Nuclear testing** after introducing of nuclear or radioactive material
 - To confirm the nuclear installation is safe before proceeding to routine operation, may require an authorization from the RB
- Stages for which approvals is requested should be part of the commissioning programme.



6. Licensing stages |11

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- Before starting a commissioning programme, the Regulatory Body should conduct reviews, assessments or/and inspections to determine whether:



The **commissioning test** programme is **complete** and contains a set of well defined operational limits, test acceptance criteria, conditions and procedures

- The commissioning tests can be **safely conducted** as proposed by the licensee or applicant and their justification is appropriate

SSG 16 Actions 186, 188

The operating organization should establish a comprehensive commissioning programme...

The regulatory body should review and assess the commissioning programme, should verify compliance with requirements...

6. Licensing stages |12

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- The results of commissioning tests should be subject to:



- **Self-assessment and internal audits of the licensee.** Appropriate actions and measures should be taken whenever deviations from design parameters are identified. These should be analyzed by the licensee and reported to the RB;
- **Review, assessment and inspection by the regulatory body.** The aim of these regulatory controls is to assess whether the test results are adequate for confirming the adequacy of all safety related features of the nuclear installation.
 - **More detailed aspects within IAEA NS-G-2.9 & NS-G-4.1**

6. Licensing stages |13

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- Before authorizing significant steps, the regulatory body should review (e.g., fuel loading, initial criticality raising)

a) Status of the nuclear installation

- The as-built design of the nuclear installation
- The results of non-nuclear commissioning tests, including SSCs
- Storage facilities for nuclear materials



b) Management aspects

- Organizational structure, including arrangements for training and qualification of personnel, staffing levels, fitness for duty and licensing of staff for certain positions as specified in the regulations
- Arrangements for periodic testing, maintenance and inspection
- Organization and procedures for dealing with modifications
- Recording and reporting systems including for operational data, test results, deviations reports, and reporting of incidents and events

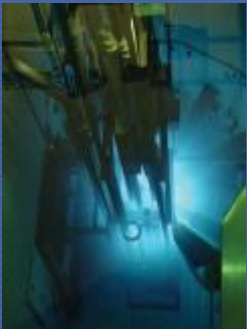
6. Licensing stages |14

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- and

c) Operational provisions

- Management system and programme for operation
- Operational limits and conditions applicable during nuclear commissioning
- Commissioning programme and its progress
- Discharge conditions, including radioactive, chemical and thermal
- Radiation protection
- Adequacy of operating instructions and procedures, especially:
 - Main administrative procedures
 - Operating procedures for normal operation and anticipated operational occurrences
 - Emergency operating procedures
- Arrangements for on-site emergency preparedness and off-site liaison
- Physical protection arrangements important for safety
- Measures for accounting and control of nuclear and radioactive material



6. Licensing stages |15

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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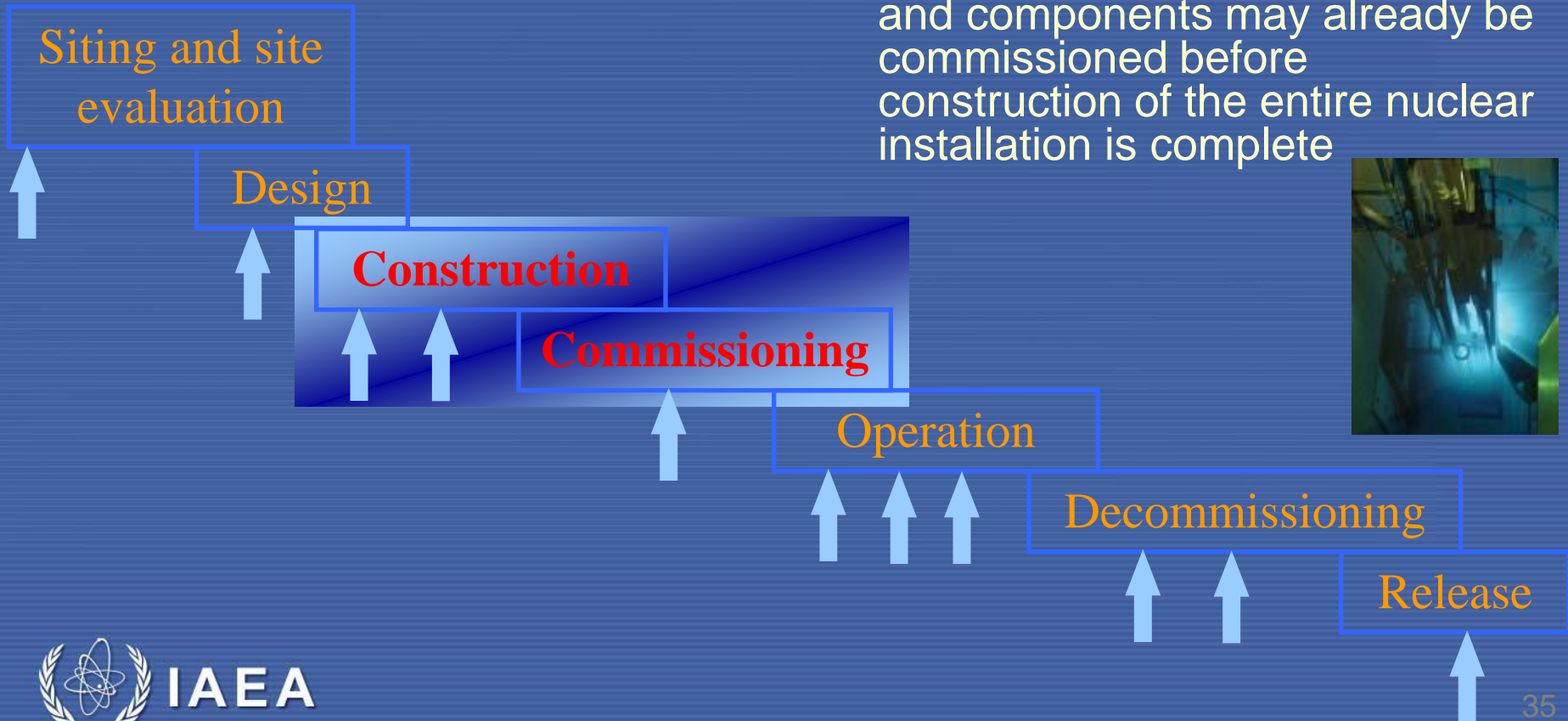
- Before allowing nuclear and/or radioactive materials to be brought onto the site, an adequate decommissioning and final disposal plan should be submitted to the RB and should include:
 - **Sufficient funds** to be available at the end of operation, including incidental costs such as spent fuel and waste management and disposal
 - Funds based on reasonable cost estimates
 - Fund estimates should be upgraded and reviewed periodically
 - Mechanisms to be in place for accumulating funds through the anticipated lifetime of the installation
 - Provisions to ensure appropriate funds could be made available in the event that installation shuts down prior to the end of its planned life
 - A legal framework should secure and protect the decommissioning funds from being depleted for other purposes
- **> 15 % K. cost**



6. Licensing stages |16

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- There is some overlap between the construction and commissioning stages in that individual structures, systems and components may already be commissioned before construction of the entire nuclear installation is complete



6. Licensing stages |17

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- Based on the results of commissioning tests and arrangements
 - To operate safely
 - To face a emergency situation
 - To manage safely wastes and effluents
- During operation, considerations on
 - Management of installation modifications – Significant or not
 - Long-term shutdown
 - [Periodic] Safety Review aspects in the licensing process



6. Licensing stages |18

Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
----------------------------	--------	--------------	---------------	-----------	-----------------

- Objective: decommissioning properly design and will be implemented safely
 - Preparation and approval of an updated decommissioning plan, which may comprise several sub-stages
 - Installation remains licensed throughout the decommissioning period



6. Licensing stages |19



Siting and site evaluation	Design	Construction	Commissioning	Operation	Decommissioning
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- Release from Regulatory Control

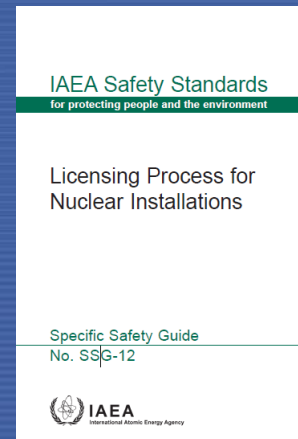
- After completion of the decontamination and dismantling and/or removal of radioactive material, including waste and contaminated components and structures
- Before delicensing the nuclear installation, a radiological survey should be carried out to guarantee regulatory criteria and decommissioning objectives have been fulfilled



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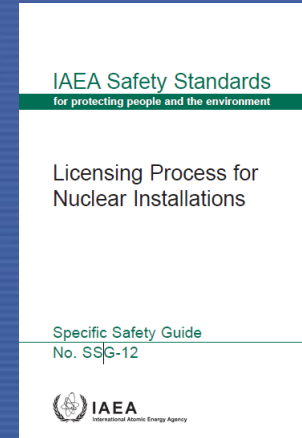
7. SSG 12 Contents |1

- Introduction
 - Background, objective, scope and structure
- General recommendations
 - Basic Licensing Principles
 - Obligations, Roles and Responsibilities of the RB
 - Obligations, Roles and Responsibilities of the Applicant or Licensee
 - Main contents of a Licence
 - Public Participation
 - Graded approach



7. SSG 12 Contents |2

- Steps of the Licensing Process
 - Siting and site evaluation
 - Design
 - Construction
 - Commissioning
 - Operation
 - Decommissioning
 - Release from Regulatory Control
- Appendix (Examples of documents to be submitted to the RB)
- References



8. Commissioning |1

- Commissioning is the process of ensuring that:
- the as-built design meets the operational safety characteristics expected in the pre-Construction Safety Case;
- the operational and management procedures required to ensure that the plant stays within the defined limits and conditions for safe operation are in place; and
- any necessary maintenance, inspection and test activities are implemented.

8. Commissioning |2

Commissioning stages

- Commissioning can be divided into two main stages: non-nuclear testing
- (before the introduction of nuclear or certain types of radioactive material) referred to as “non-active commissioning” and
- nuclear testing (after the introduction of nuclear or certain types of radioactive material) referred to as “active commissioning”

8. Commissioning |3

From Construction to Operation

At the start of commissioning, all procedures and processes should be in draft

At the end of commissioning all procedures and processes should have been validated

Commissioning overlaps with construction as much of “inactive commissioning” is verifying construction
“Active commissioning” is essentially low power operation

8. Commissioning |4

And finally to operation

Just as the as-built design may be a modification of the initial design, so the as-commissioned installation may not be the as-built design as further modifications may be required during commissioning

Hence the Pre-Operation Safety Case may be a further iteration of the Pre-Construction Safety Case.
(NB this will also apply to the USNRC COL process)

8. Commissioning |5

IAEA Safety Standards Specific
Safety Requirements

Safety of Nuclear Power Plants:
Commissioning and Operation

SSR-2/2

IAEA Safety Standards
for protecting people and the environment

Safety of
Nuclear Power Plants:
Commissioning and
Operation

Specific Safety Requirements
No. SSR-2/2



8. Commissioning |6

- Requirement 1: Responsibilities of the operating organization
- Requirement 2: Management system
- Requirement 3: Structure and functions of the operating organization
- Requirement 4: Staffing of the operating organization
- Requirement 5: Safety policy
- Requirement 6: Operational limits and conditions
- Requirement 7: Qualification and training of personnel
- Requirement 8: Performance of safety related activities
- Requirement 9: Monitoring and review of safety performance
- Requirement 10: Control of plant configuration
- Requirement 11: Management of modifications
- Requirement 12: Periodic safety review
- Requirement 13: Equipment qualification
- Requirement 14: Ageing management
- Requirement 15: Records and reports
- Requirement 16: Programme for long term operation
- Requirement 17: Consideration of objectives of nuclear security in safety programmes
- Requirement 18: Emergency preparedness
- Requirement 19: Accident management programme
- Requirement 20: Radiation protection
- Requirement 21: Management of radioactive waste
- Requirement 22: Fire safety
- Requirement 23: Non-radiation related safety
- Requirement 24: Feedback of operating experience

8. Commissioning |6

Requirement 25: Commissioning programme

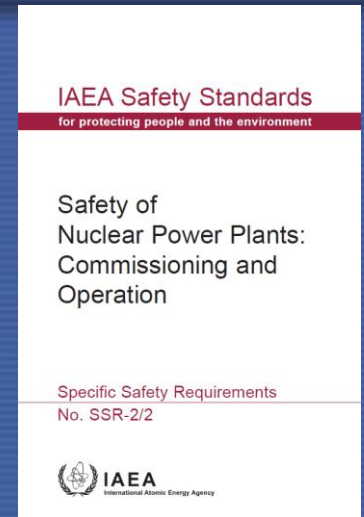
The operating organization shall ensure that a commissioning programme for the plant is established and implemented.

The commissioning programme for the plant shall cover the full range of plant conditions required in the design and the safety case.

The results shall be used to demonstrate that the behaviour of the plant as built is in compliance with the design assumptions and the licence conditions.

Special attention shall be paid to ensuring that no commissioning tests are performed that might place the plant in an unanalysed condition.

Commissioning stages, test objectives and acceptance criteria shall be specified in such a way that the programme is auditable.



8. Commissioning |7

The commissioning programme provides the means of identifying hold points in the commissioning process.

The commissioning programme shall be divided into stages and proceeding to the next stage is dependent on the review of the test results.

Resulting from the review succeeding stages may be modified due to the test results, because some tests had not been undertaken, or not completed.

The results for some stages may be subject to approval by the regulatory body before commissioning can proceed to the next stage.

The programme shall include all the tests necessary to demonstrate that the as-built plant meets the requirements of the safety analysis report, satisfies the design intent and, consequently, that the plant can be safely operated.

8. Commissioning |8

Operating and maintenance procedures shall be validated, with the participation of future operating personnel.

Suitably qualified operations personnel shall be directly involved in commissioning to ensure preparation for the operation.

Reference data on structures, systems and components shall be retained for ensuring the safety of the plant and safety reviews.

All the functions and procedures of the operating organization shall be performed, verified and validated during commissioning.

8. Commissioning |9

Initial fuel loading shall not be authorized until all relevant pre-operational tests have been performed and the results have been accepted by the operating organization and the regulatory body.

Reactor criticality and initial power increase shall not be authorized until all necessary tests have been performed and the results have been accepted by the operating organization and the regulatory body, as appropriate.

The tests of the commissioning programme shall be successfully completed as a necessary condition for authorization for normal operation of the plant to be commenced.

8. Commissioning |10

Requirement 26: Operating procedures

Requirement 27: Operation control rooms and control equipment

Requirement 28: Material conditions and housekeeping

Requirement 30: Core management and fuel handling

MAINTENANCE, TESTING, SURVEILLANCE AND INSPECTION

Requirement 31: Maintenance, testing, surveillance and inspection programmes

8. Post Fukushima Licensing | 1

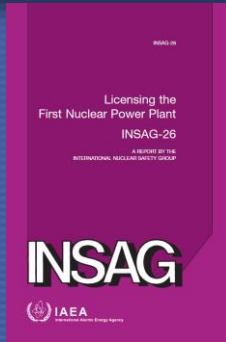
- The International Ministerial Conference on Nuclear Power in the 21st Century, organized by the Agency in Saint Petersburg, Russian Federation, in June 2013, was the first major event to address the outlook for nuclear power after the Fukushima Daiichi accident. **It concluded that, for many countries, nuclear power was a proven, clean, safe, and economical technology** that would play an increasingly important role in improving energy security, reducing the impact of volatile fossil fuel prices and mitigating climate change.
- It recognized the leading role of **the IAEA in promoting peaceful uses of nuclear technology, in establishing safety standards and security guidance, and in promoting international cooperation and efforts to strengthen global nuclear safety, security and safeguards.** It also recognized that nuclear accidents have no borders and that nuclear safety must be robust, effective and transparent.

8. Post Fukushima Licensing |2

- In some countries, policy decisions to introduce nuclear power, expand existing capacity or replace retiring capacity were delayed due to the Fukushima Daiichi accident. Hence, the results of the low projection are consistent with prolonged delays in new nuclear construction. Countries with tentative phase-out plans that are assumed to follow through would also lead to the low growth shown in the low projection

8. Post Fukushima Licensing |3

- The accident at the Fukushima Daiichi nuclear power plant (hereinafter ‘the Fukushima Daiichi accident’) has initiated an extensive re-examination of all aspects of reactor safety, including the regulatory framework.
- While the detailed lessons learned from the accident may take several years to be fully characterized and applied, it is evident that the ongoing development of an effective regulatory framework will be a key part of enhancing the global safety regime. Therefore, it is appropriate to consider on an urgent basis the early development of new entrant regulatory bodies to ensure that a solid foundation for regulatory oversight and decision making is established right from the start of a new nuclear programme.



8. Post Fukushima Licensing |4

- The nuclear safety infrastructure is defined in INSAG-22 as the set of institutional, organizational and technical elements and conditions established in a Member State to provide a sound foundation for ensuring a sustainable high level of nuclear safety. INSAG-22 identifies five main phases of safety infrastructure development for the life-cycle of a nuclear power plant:
 - Phase 1: Safety infrastructure considerations before a decision to launch a nuclear power programme is taken;
 - Phase 2: Safety infrastructure preparatory work for the construction of a nuclear power plant after a policy decision has been taken;
 - Phase 3: Safety infrastructure activities to construct a first nuclear power plant;
 - Phase 4: Safety infrastructure during the operation phase of the nuclear power plant;
 - Phase 5: Safety infrastructure during the decommissioning and waste management phase of the nuclear power plant

Questions?

- **References:**

- Jean-René JUBIN , Establishing Safety Infrastructure Licensing Process of Nuclear Installations, Vienna, Austria, October 2011
- Geoff Vaughan, University of Central Lancashire, UK, Presentation: Main Requirements on Different Stages of the Licensing Process for New Nuclear Facilities
IAEA SF-1, Safety Principles
- GSR Part 1 Governmental, Legal and Regulatory Framework for Safety
- IAEA SSG-12 Licensing Process for Nuclear Installations
- IAEA SSR-2.2 Safety of Nuclear Power Plants: Commissioning and Operation
Special Safety Requirements
- IAEA SSG-16 Establishing the Safety Infrastructure for a Nuclear Power Programme
- IAEA SSG-28 Commissioning for Nuclear Power Plants
- I. Basic various presentations at IAEA Safety Assessment Essential Knowledge Workshop