

# **INPRO Dialogue Forum 8. Towards Nuclear Energy System Sustainability: Economics. Resources Availability and Institutional Arrangements**

**“Implementation of the INPRO  
Infrastructure Evaluation to Assess Nuclear  
Sustainability - Argentine Experience”.**



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*Eng. Valeria Cañadas*

*Strategic Planning Management -  
National Atomic Energy Commission - CNEA*

# INPRO INFRASTRUCTURE ARGENTINE CASE



**INFRASTRUCTURE BASIC PRINCIPLE (BP):** *A country shall be able to adopt, maintain or enlarge a NES for the supply of energy and related products **without making an excessive investment in national infrastructure***

**USER REQUIREMENT UR1: LEGAL AND INSTITUTIONAL FRAMEWORK:** *An adequate legal framework should be established to cover the issues of nuclear liability, safety and radiation protection, environmental protection, control of operation, waste management and decommissioning, security, and non proliferation.*

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CRITERIA 1.1 LEGAL ASPECTS</b>				
<b>IN1.1:</b> Status of legal framework	3.2.3			
<b>EP1.1.1:</b> Scope of nuclear law (NL)	3.2.3.1	<b>AL1.1:</b> Legal framework has been established in accordance with international standards.	YES	Management of Legal Affairs in CNEA covers all these topics, continually updating them.
<b>EP1.1.2:</b> Adequacy of NL	3.2.3.2		YES	
<b>EP1.1.3:</b> International legal arrangements	3.2.3.3		YES	
<b>EP1.1.4:</b> Completeness and adequacy of regulations and guidelines	3.2.3.4		YES	
<b>Final assessment of CR1.1</b>	<b>3.2.3.5</b>		<b>YES</b>	

# INPRO INFRASTRUCTURE ARGENTINE CASE



## USER REQUIREMENT UR1: LEGAL AND INSTITUTIONAL FRAMEWORK

Indicator (IN) By INPRO or by MS	IN or EP section	Acceptance Limit (AL)	Result	Basis for Judgment	
<b>CRITERIA 1.2 INSTITUTIONS</b>					
<b>IN1.2:</b> Status of State organizations with responsibilities for safety and radiation protection, environmental protection, control of operation, waste management and decommissioning, emergency preparedness and response, security and non- proliferation	3.2.4	<b>AL1.2:</b> State organizations have been established, in accordance with international standards	YES	Managements of Institutional Relationships and Nuclear Safety and Environment of CNEA covers all these topics, continually updating them.	
<b>EP1.2.1:</b> Independence of Regulatory Body	3.2.4.1		YES		
<b>EP1.2.2:</b> General Functions of Regulatory Body	3.2.4.2		YES	The independent ARN serves as the control and regulation.	
<b>EP1.2.3:</b> Review of safety regime	3.2.4.3		YES		
<b>EP1.2.4:</b> Review of Emergency Preparedness	3.2.4.4		YES		
<b>EP1.2.5:</b> Review of Nuclear Security Regime	3.2.4.5		YES		The operator NASA assume the operation responsibilities.
<b>EP1.2.6:</b> Review of Safeguards Regime	3.2.4.6		YES		
<b>EP1.2.7:</b> Management System	3.2.4.7		YES		
<b>Final assessment of CR1.2</b>	<b>3.2.4.8</b>	<b>YES</b>			



**USER REQUIREMENT UR2: INDUSTRIAL AND ECONOMIC INFRASTRUCTURE.** *The industrial and economic infrastructure of a country with a NES should be adequate to support the project throughout the complete lifetime of the nuclear power program, including planning, construction, operation, decommissioning and related waste management activities.*

Indicator (IN) By INPRO or by MS	IN or EP section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR2.1: FUNDING OF INFRASTRUCTURE</b>				
<b>IN2.1:</b> Funding needed for the infrastructure of a nuclear power programme.	3.3.3	<b>AL2.1:</b> Sufficiently available to cover the nuclear power programme		Different suppliers of NPP offering enough financing.
<b>EP2.1.1:</b> Funding of support infrastructure provided by national industry	3.3.3.1		YES	Commitment of State with the strategic Nuclear Plan for the country.
<b>EP2.1.2:</b> Funding of infrastructure provided by government	3.3.3.2		YES	
<b>Final Assessment CR2.1</b>	<b>3.3.3.3</b>		<b>YES</b>	
<b>CR2.2: SIZE OF NUCLEAR FACILITY</b>				
<b>IN2.4:</b> Availability of infrastructure to support owner/operator	3.3.6	<b>AL2.4:</b> Matches local needs		CNEA and NASA jointly with the Ministry of Planning and the Energy Secretariat, define the size of the facility according to local needs.
<b>EP2.4.1:</b> Survey of the existing capabilities of the national industry	3.3.6.1		YES	
<b>EP2.4.2:</b> Plan for participation of national industry in nuclear power programme.	3.3.6.2		YES	
<b>EP2.4.3:</b> Infrastructure by the government	3.3.6.3		YES	
<b>Final Assessment of CR2.4</b>	<b>3.3.6.4</b>		<b>YES</b>	

## User Requirement UR2: Industrial And Economic Infrastructure



Indicator (IN) By INPRO or by MS	IN or EP section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR2.3: SITING</b>				
<b>IN2.3:</b> Process of Siting a Nuclear Facility  <b>Final assessment CR2.3</b>	3.3.5  <b>3.3.5.1</b>	<b>AL2.3:</b> Siting process has taken safety, security, and environmental requirements into account in accordance with international standards.	<b>YES</b>	CNEA and its associated Enterprises & NASA, make their own siting studies. Then ARN approves the PSAR.
<b>CR2.4: SUPPORT INFRASTRUCTURE</b>				
<b>IN2.4:</b> Availability of infrastructure to support owner/operator  <b>EP2.4.1:</b> Survey of the existing capabilities of the national industry  <b>EP2.4.2:</b> Plan for participation of national industry in nuclear power programme.  <b>EP2.4.3:</b> Infrastructure by the government  <b>Final assessment of CR2.4</b>	3.3.6 3.3.6.1 3.3.6.2 3.3.6.3 <b>3.3.6.4</b>	<b>AL2.4:</b> Internally or externally available	YES  YES  YES  <b>YES</b>	There is in the country a pool of companies which give industrial support to the nuclear sector development.

# INPRO INFRASTRUCTURE ARGENTINE CASE



## User Requirement UR2: Industrial And Economic Infrastructure.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR2.5: ADDED VALUE</b>				
<p><b>IN2.5:</b> Added value of a nuclear power programme to society.</p>	<p>3.3.7</p>	<p><b>AL2.5:</b> Added value &gt; infrastructure investment by government necessary to support nuclear power programme..</p>		<p>State acknowledges the positive impact of nuclear programs.</p> <p>Since the beginning of its activities CNEA studies materials development, produces radioisotopes for medical and industrial uses, trains human resource in the different nuclear applications and develops private companies as suppliers of different components.</p>
<p><b>Final assessment of CR2.5</b></p>	<p><b>3.3.7.1</b></p>		<p><b>YES</b></p>	

# INPRO INFRASTRUCTURE ARGENTINE CASE



## USER REQUIREMENT UR3: POLITICAL SUPPORT AND PUBLIC ACCEPTANCE.

Adequate measures should be taken to **achieve public acceptance of a nuclear energy system** being planned or in operation to enable a government policy commitment to support the deployment and operation of the system.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR3.1 PUBLIC INFORMATION</b>				
<b>IN3.1:</b> Information on nuclear power programme provided to public.	3.4.3	<b>AL3.1:</b> Sufficient according to national requirements, taking into account international practice.	YES	A new Management of Public Communications at CNEA was created to cover all these topics.
<b>EP3.1.1:</b> Communication of benefits of NP to the public.	3.4.3.1			Moreover, the government has installed several stands for nuclear disclosure in different Science Centers, the most famous called TECNOPOLIS.
<b>Final assessment of CR3.1</b>	<b>3.4.3.2</b>		<b>YES</b>	

# INPRO INFRASTRUCTURE ARGENTINE CASE



## USER REQUIREMENT UR3: POLITICAL SUPPORT AND PUBLIC ACCEPTANCE.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment	
<b>CR3.2 PUBLIC PARTICIPATION</b>					
<b>IN3.2:</b> Participation of public in decision making process on a nuclear power programme.	3.4.2	<b>AL3.2:</b> Sufficient according to national requirements, taking into account international practice.	YES	Previous to construction of every nuclear installation, public audiences are carried out.	
<b>EP3.2.1:</b> Appropriateness of participation process.	3.4.2.1			YES	Besides, several workshops and conferences are presented for the different social and cultural groups of inhabitants located in surrounding areas to the work, to gain their trust and to solve their fears and doubts.
<b>EP3.2.2:</b> Acceptability of participation process	3.4.2.2			YES	
<b>Final assessment of CR3.2</b>	3.4.2.3			YES	



# INPRO INFRASTRUCTURE ARGENTINE CASE



## USER REQUIREMENT UR3: POLITICAL SUPPORT AND PUBLIC ACCEPTANCE.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR3.3 SURVEY OF PUBLIC ACCEPTANCE</b>				
<b>IN3.3:</b> Public acceptance of nuclear power	3.4.3			
<b>EP3.3.1:</b> Surveys to gage public acceptance are performed on a regular basis.	3.4.3.1	<b>AL3.3:</b> Sufficient to expect that the political risk of policy support for nuclear power is acceptable	YES	Mainly in every area closed to nuclear installations as a national level, several kinds of surveys are periodically carried out.
<b>EP3.3.2:</b> Adequacy of survey	3.4.3.2		YES	
<b>Ep3.3.3:</b> Acceptable result of survey	3.4.3.3		YES	
<b>Final assessment of CR3.3</b>	<b>3.4.3.4</b>		<b>YES</b>	

# INPRO INFRASTRUCTURE ARGENTINE CASE



## USER REQUIREMENT UR3: POLITICAL SUPPORT & PUBLIC ACCEPTANCE.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR3.4 POLICY SUPPORT</b>				
<b>IN3.4:</b> Government Policy regarding Nuclear Power  <b>Final assessment of CR3.4</b>	3.4.4  3.4.4.1	<b>AL3.4:</b> Policy is supportive of nuclear power	YES	Government commitment enough proved, both historical and presently.
<b>CR3.5 POLITICAL ENVIRONMENT AND INVESTOR RISK</b>				
<b>IN3.5:</b> Long Term Political Commitment to a Nuclear Option.  <b>Final assessment of CR3.5</b>	3.4.5  3.4.5.1	<b>AL3.5:</b> Commitment sufficient to enable a return of investment.	YES	Government commitment enough proved, both historical and presently.



## USER REQUIREMENT UR4: HUMAN RESOURCES.

The **necessary human resources should be available** to enable all responsible parties involved in a nuclear power program to achieve safe, secure and economical operation of the NES installations during their lifetime.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR4.1 HUMAN RESOURCES</b>				
<b>IN4.1:</b> Availability of adequate human resources to establish and operate a NES.	3.5.1			Education and training of young technicians and professionals is an ongoing activity in CNEA with over 40 years experience in the field, providing an important system of fellowships that consists of two main types: Academic Education and Development under the "training on the job" mode, in the framework of the Learning by Doing program.
<b>EP4.1.1:</b> Educational and training system for manpower needed in NP projects.	3.5.1.1	<b>AL4.1:</b> Sufficient according to international experience	YES	
<b>EP4.1.2:</b> Adequate Staff in Nuclear Institutions	3.5.1.2		YES	Education and training are adequate as well as the staff in nuclear sector, with several training programmes to incorporate skilled workforce.
<b>EP4.1.3:</b> Attractiveness of the nuclear power sector for future employees	3.5.1.3		YES	
<b>Final assessment of CR4.1</b>	<b>3.5.1.4</b>		<b>YES</b>	The attractiveness of the sector has been achieved through sustained commitment of the State.

# INPRO INFRASTRUCTURE ARGENTINE CASE



## USER REQUIREMENT UR5: MINIMIZATION OF INFRASTRUCTURE.

The nuclear energy system should be **designed to minimize the necessary infrastructure** for a nuclear power programme.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR5.1 PERSONNEL</b>				
<b>IN5.1:</b> Manpower needed for operation, maintenance and repair and decommissioning.  <b>Final Assesment CR5.1</b>	3.6.1  3.6.1.1	<b>AL5.1:</b> Amount of manpower is reduced in comparison to an existing facility	<b>YES</b>	New facilities are built more and more efficient, with modern control and automation systems.
<b>CR5.2 PREFABRICATION OF COMPONENTS</b>				
<b>IN5.2:</b> Extent of prefabrication of components  <b>Final Assesment CR5.2</b>	3.6.1  3.6.1.1	<b>AL5.2:</b> Extent is increased in comparison to an existing facility.	<b>YES</b>	Is planned than future evaluated NPP's will take into account new techniques of prefabrication of components and modularization.



## UR6 : REGIONAL AND INTERNATIONAL ARRANGEMENTS.

Regional and international arrangements should provide options that enable a country with a NES to **minimize the infrastructure** for a nuclear power programme.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
<b>CR6.1 OPTIONS TO REDUCE INSTITUTIONAL INFRASTRUCTURE</b>				
<p><b>IN6.1:</b> Have regional and/or international arrangements to reduce the institutional infrastructure been considered?</p> <p><b>Final Assesment CR 6.1</b></p>	<p>3.7.1</p> <p><b>3.7.1.1</b></p>	<p><b>AL6.1:</b> Yes.</p>	<p><b>YES</b></p>	<p>There are cooperative agreements with Brazil to participate in different areas and seek complementarities.</p> <p>New INPRO concept in which both countries has been working to develop it. In case of the RA-10 Research Reactor of Argentinean concept, it is expected to get a supplies exchange between two countries.</p> <p>Several meetings to plan complementary cycles of the nuclear fuels were carried out.</p>
<b>CR6.2 OPTIONS TO REDUCE INDUSTRIAL INFRASTRUCTURE</b>				
<p><b>IN6.2:</b> Have regional and/or international arrangements to reduce the industrial infrastructure been considered?</p> <p><b>Final Assesment CR 6.2</b></p>	<p>3.7.2</p> <p><b>3.7.2.1</b></p>	<p><b>AL6.2:</b> Yes.</p>	<p><b>YES</b></p>	<p>Historically, the country has signed industrial agreements with its suppliers for technology transference, as is planned in the last NPP's bids.</p>

# INPRO INFRASTRUCTURE ARGENTINE CASE



## UR6: REGIONAL AND INTERNATIONAL ARRANGEMENTS.

Indicator (IN) By INPRO or by MS	IN or EP Section	Acceptance Limit (AL)	Result	Basis for Judgment
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### CR6.3 OPTIONS TO REDUCE SOCIAL POLITICAL INFRASTRUCTURE

<p><b>IN6.3:</b> Have regional and/or international arrangements to reduce the social political infrastructure been considered?</p> <p><b>Final Assesment CR 6.2</b></p>	<p>3.7.3</p> <p><b>3.7.3.1</b></p>	<p><b>AL6.4:</b> Yes.</p>	<p><b>YES</b></p>	<p>Presidents of Brazil and Argentina have continuous communications in this matter.</p>
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### CR6.4 OPTIONS TO REDUCE HUMAN RESOURCES

<p><b>IN6.4:</b> Have regional and/or international arrangements to reduce human resources been considered?</p> <p><b>Final Assesment CR 6.2</b></p>	<p>3.7.1</p> <p><b>3.7.4.1</b></p>	<p><b>AL6.4:</b> Yes.</p>	<p><b>YES</b></p>	<p>Managements of Institutional Relationships and Human Resources of CNEA covers all these topics, continually updating them.</p> <p>In case of the RA-10 Research Reactor of Argentinean concept, sharing the engineering facilitated reduction in human infrastructure.</p>
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# **COMMENTS & FINAL CONSIDERATIONS**



# ***INPRO INFRASTRUCTURE ARGENTINE CASE***



- **64 years of experience in continuous actualization shows that Argentina has the collection of necessary capabilities of national institutions to achieve long term sustainability of a Nuclear Power Programme:**
- ✓ **UR 1: The Nuclear Legal Framework in the country covers all the topics considered in the INPRO Methodology**
- ✓ **UR2: High local industry participation**
- ✓ **UR3: Sufficient Public Information, Participation, as Surveys carried out**
- ✓ **UR4: Effective education system in place at the 3 levels of training, through 3 Training Institutes and the Program Learning by Doing of CNEA. Workforce growing in last decade shows nuclear sector as attractive enough to keep trained and experienced staff**
- ✓ **UR5: NPP's in bidding process considers reducing the amount of infrastructure in labor and prefabrication components**
- ✓ **UR6: Plans for new nuclear facilities consider necessary infrastructure reduction, through options emerging from regional or international agreements**





**THANKS FOR YOUR ATTENTION**

