



ROSATOM

STATE NUCLEAR ENERGY CORPORATION ROSATOM

Russian approach to organization of international cooperation in the field of nuclear infrastructure (NI)

A. E. Sitnikov

Rosatom/ Rosenergoatom

Russia

**Atomex-Asia 2014
19-20 November
Ho Chi Minh City
Vietnam**

The concept of sustainable development

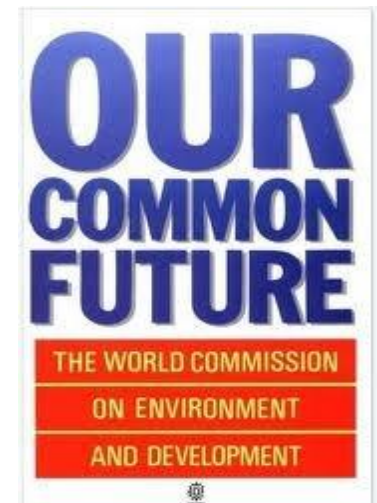


Gro Harlem Brundtland,
norwegian social and political
activist,

Director-General of the World
Health Organization 1998-2003

"**Sustainable development**» has been well defined by the Brundtland Commission as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

Adequate and affordable energy supply is a key factor for economic development and the transition from an economy based on subsistence agriculture to modern industrial and service-oriented companies.



Support by IAEA

If a country has decided to include nuclear power in Power balance, then the task of the IAEA is to help her do it reliably, safely and sustainably. We help both experienced countries and of newcomers at each stage of the nuclear power program.

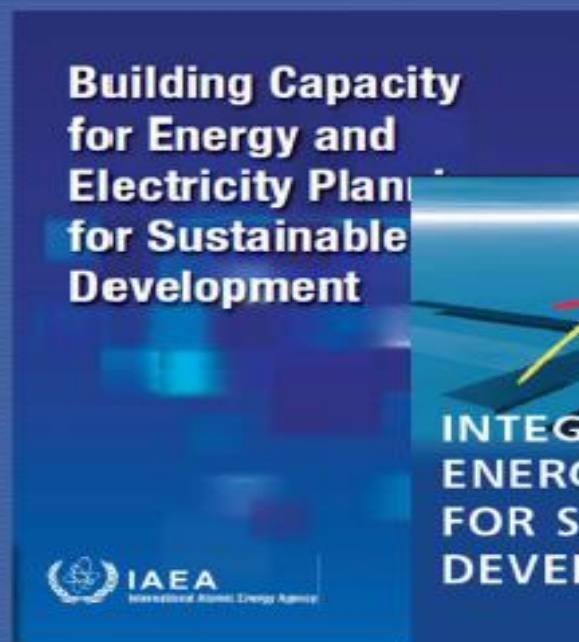
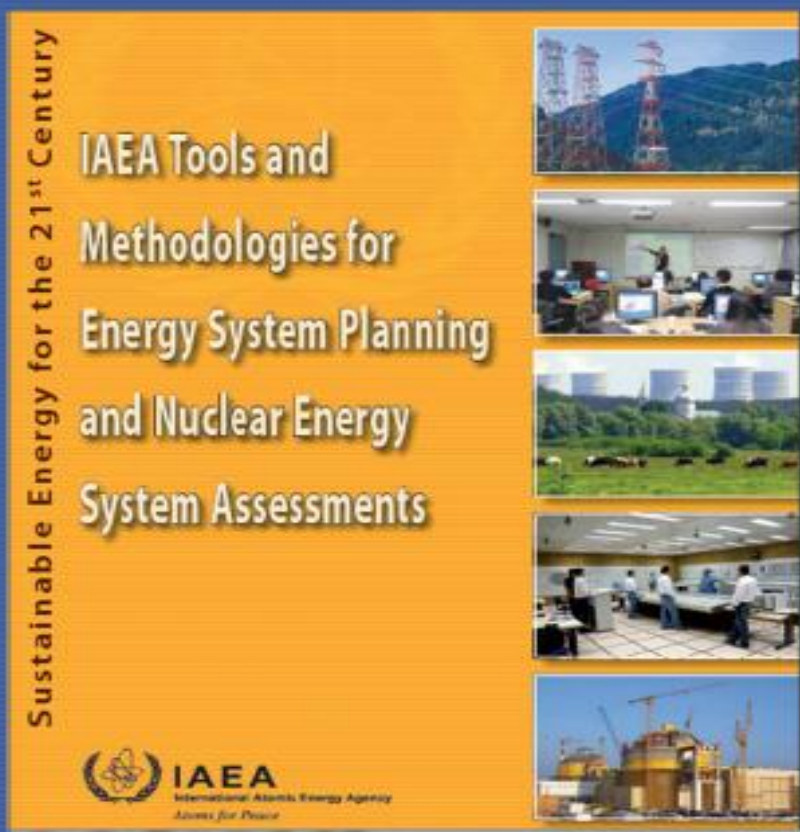
Director General

Yukiya Amano



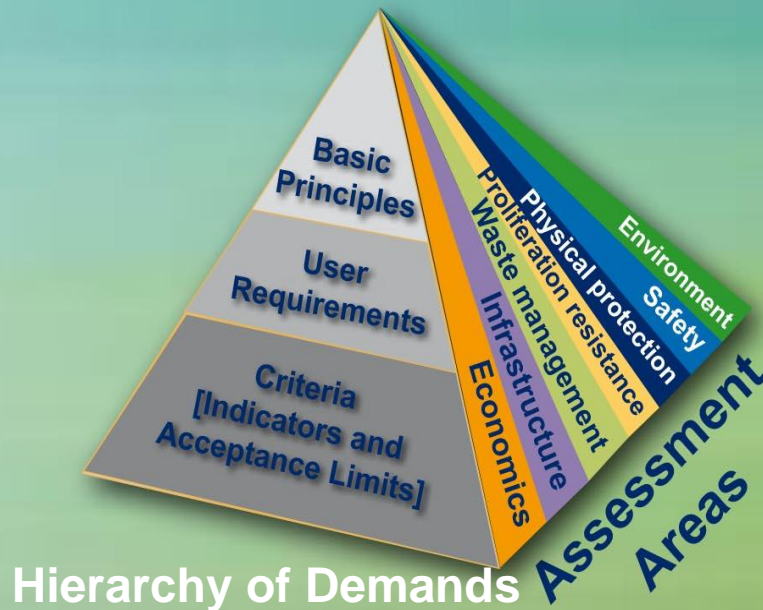
IAEA documents for Energy Systems planning

Energy Tools and Methodologies for ES Planning



Overview on INPRO methodology

INPRO Methodology



Basic principles (BP):
goals for development of sustainable NES.

User requirements (UR):
what should be done by designer, operator, industry and/or State to meet goal defined in BP.

Criterion (CR): Tools to check whether a UR has been fulfilled .

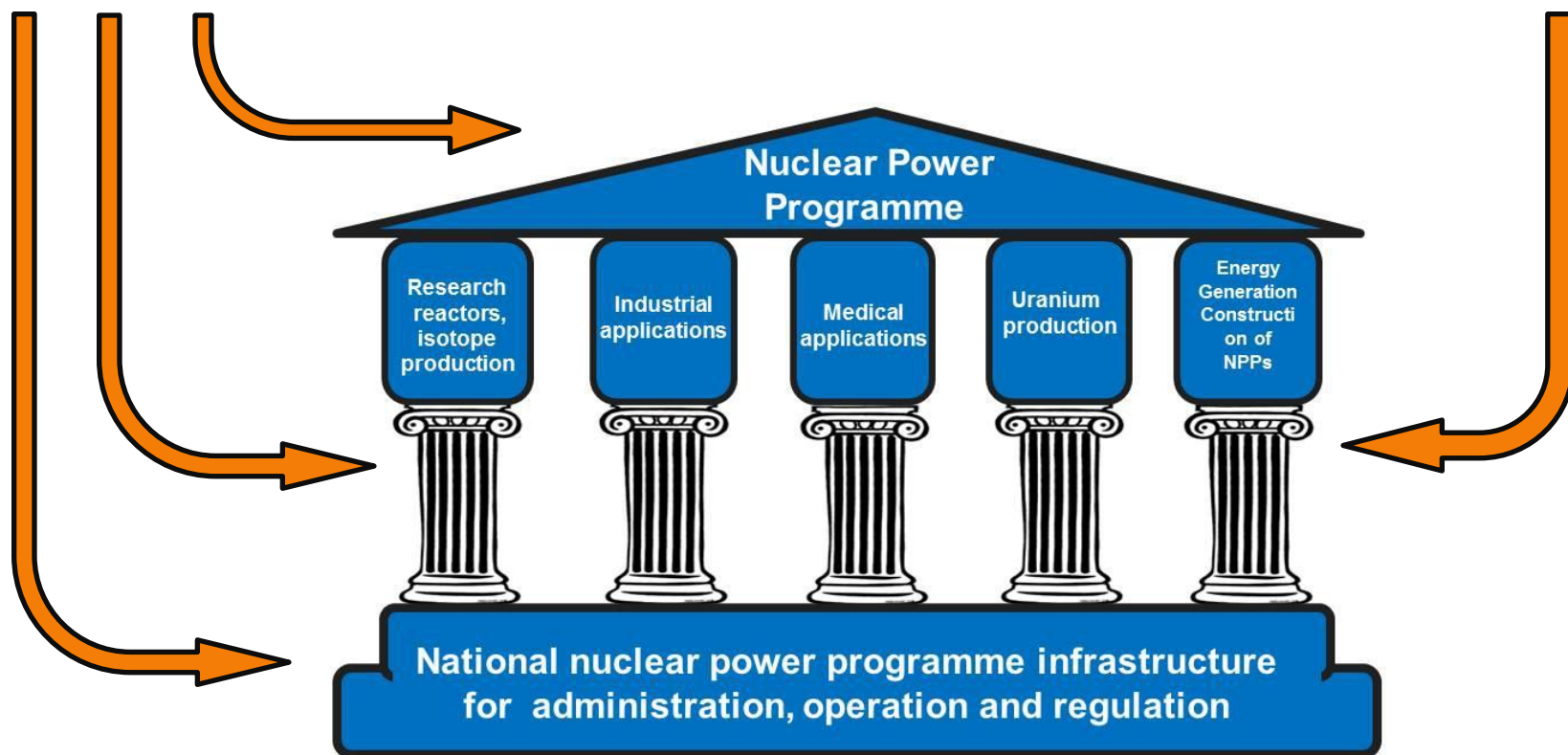


*If all Criteria (124) are met in all 7 areas
the assessed nuclear energy system is **sustainable**.*

“Programme” vs “Project”

“State” responsibility
- programme

“Vendor” responsibility
- project



Infrastructure Milestones

Milestones

Milestone 1: **Understanding** the commitment (pre-project)

Milestone 2: Ready to **request bid** for the first NPP

Milestone 3: Ready to **commission and operate** the first NPP

Nuclear Infrastructure Elements

National Position

Regulatory Framework

Financing

Safeguards

Emergency Planning

Nuclear Waste

Nuclear Safety

Stakeholder Involvement

Management

Legal Framework

Radiation Protection

Human Resource

Security

Nuclear Fuel Cycle

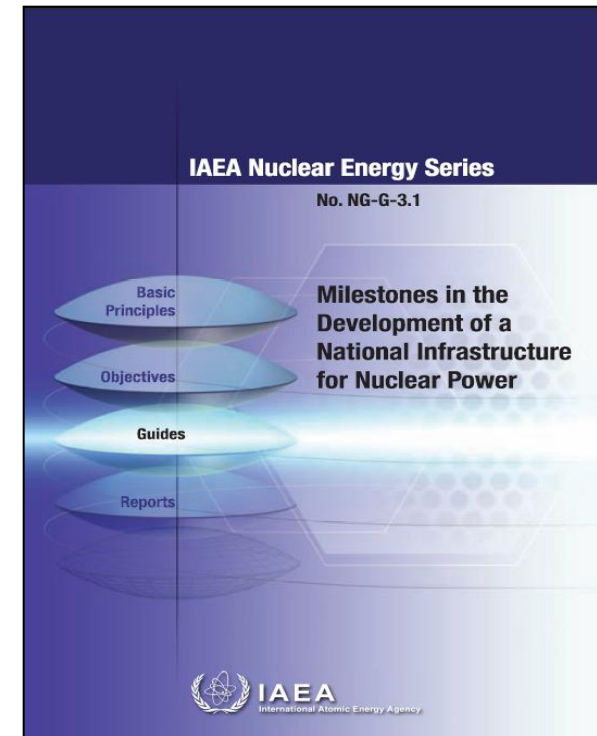
Environmental Protection

Sites selection

Electrical Grid

Industrial Involvement

Procurement



To identify additional elements e.g, Metrology, Certification, etc.

Five Years of INIR Missions

1. Jordan	2009
2. Indonesia	2009
3. Vietnam (phase 1)	2009
4. Thailand	2010
5. UAE	2011
6. Bangladesh	2011
7. Jordan (follow-up)	2012
8. Belarus	2012
9. Vietnam (phase 2)	2012
10. South Africa	2013
11. Poland	2013
12. Turkey	2013
13. Jordan (phase 2)	2014
14. Nigeria	2014
15. Morocco	2014



Integrated Work Plan for Bangladesh

Meeting in November 2014

Integrated Work Plan for Bangladesh Infrastructure Building | 2012-2015

2012-2013 IAEA TC project “BGD2012 Establishing Infrastructure for the introduction of a Nuclear Power Plant”

- To develop necessary infrastructure to introduce the first Nuclear Power Plant Project as well as to participate actively in the construction activities

2014-2015 BGD****

IAEA Core Team	
NENP/INIG	: Yagi
NSNI	: Jubin
NENP/NPES	: Kang
NEFW	:
OLA	:
NE/PESS	:
IEC	:
NSNS	:
SG	:
TCAP	: Wolde

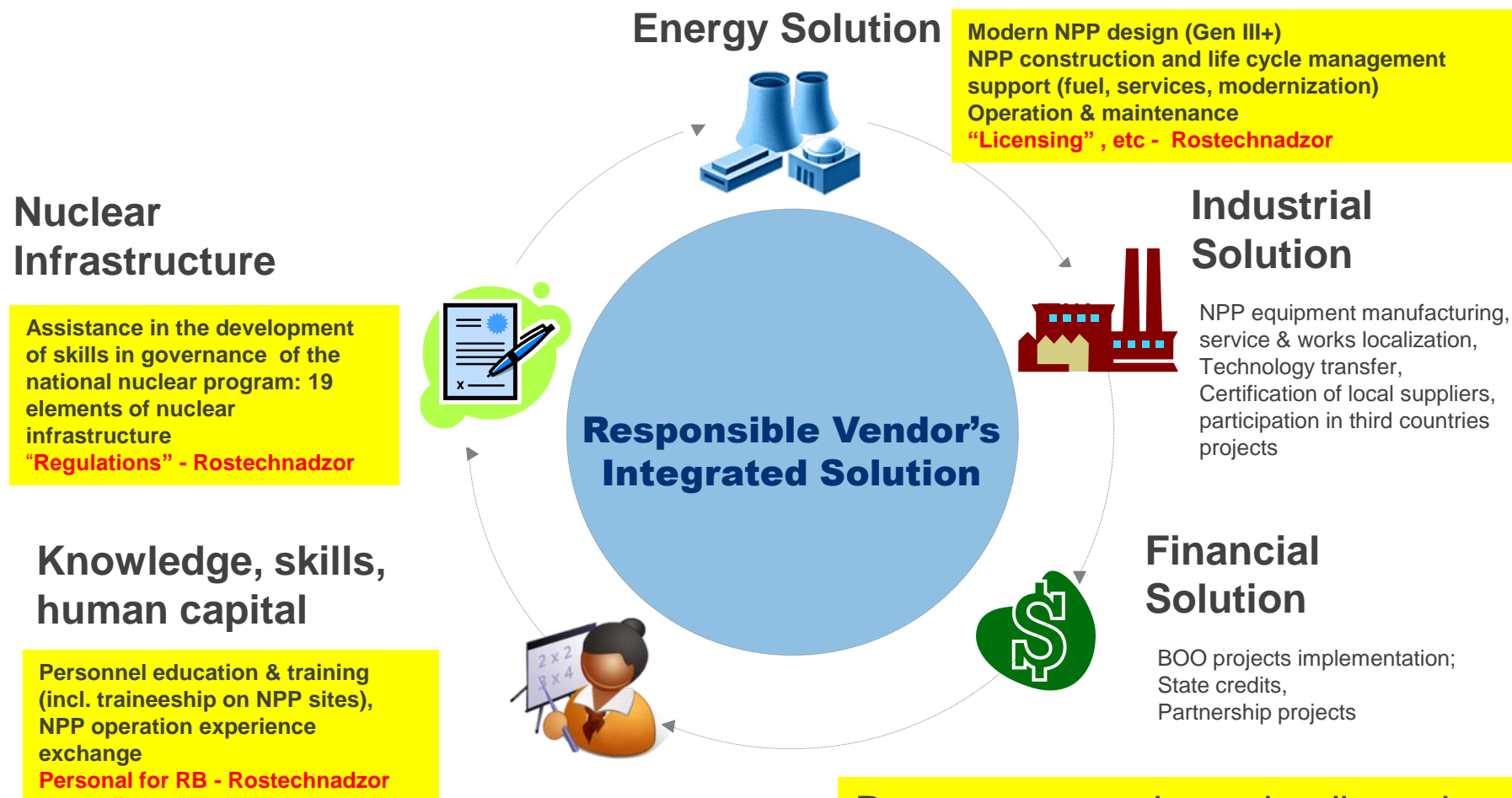
	Possible IAEA Assistance in 2012
	Possible IAEA Assistance in 2013
	Possible IAEA Assistance in 2014
	Possible IAEA Assistance in 2015

Action Plans by Bangladesh - Milestones

2009-2012	Finalization of Site evaluation, Feasibility Evaluation for Roopur Nuclear Power Project
2010-2012	Preparation of EIA report
	Establishment of Independent Regulatory Body
2010-2012	Signing of Essential Agreement/ Contracts
2012	Completion of 2 remaining conditions of phase 1
2013	Achievement of Milestone 2, Approval of Construction License
2013-2020	Construction, commissioning and test operation and acceptance of the plant
2020	Commercial Operation (Government-owned utility – Turnkey - approach)

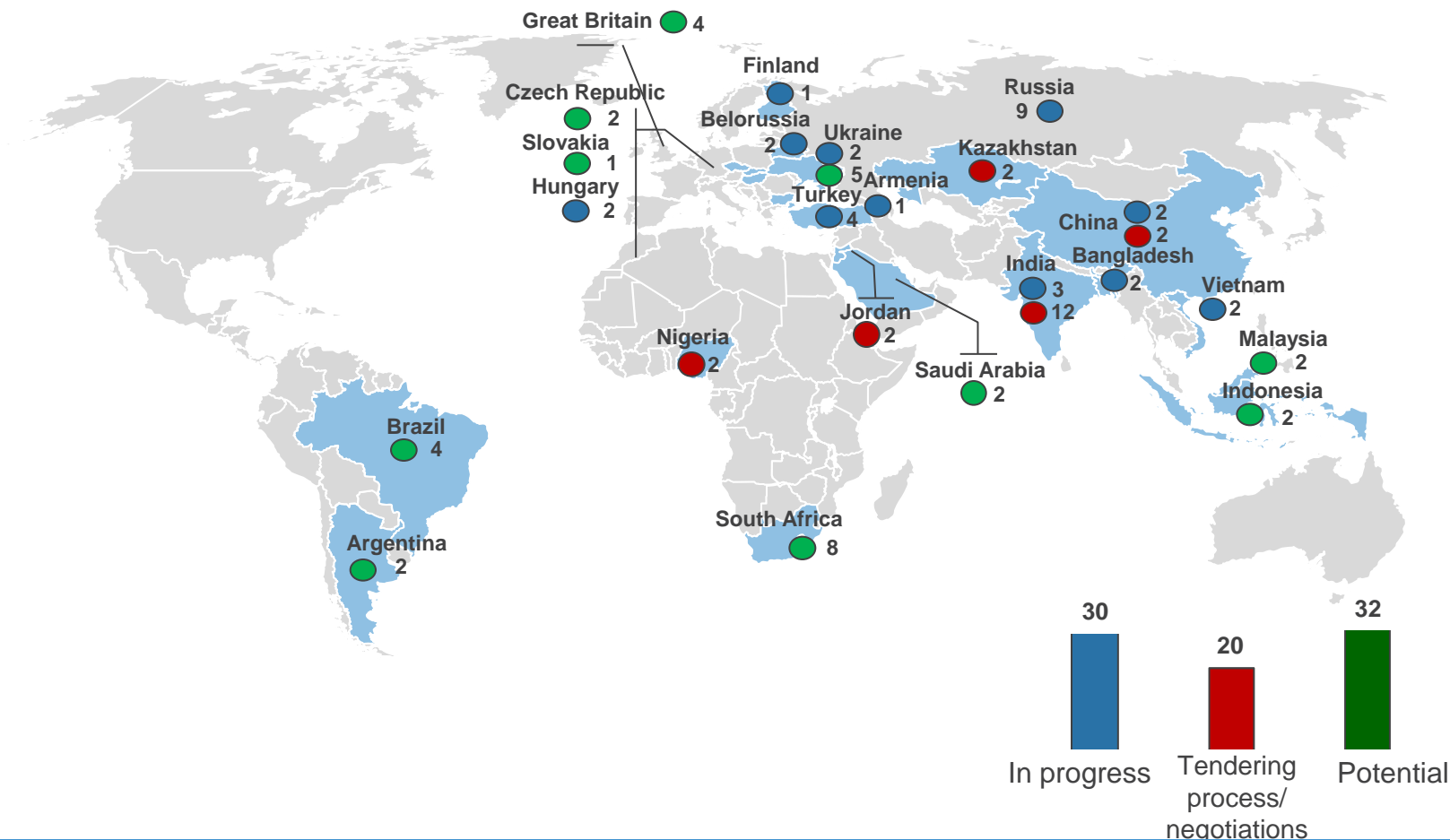
Discussed in May
2012

Russian integrated offer: Rosenergoatom and Rostechnadzor roles



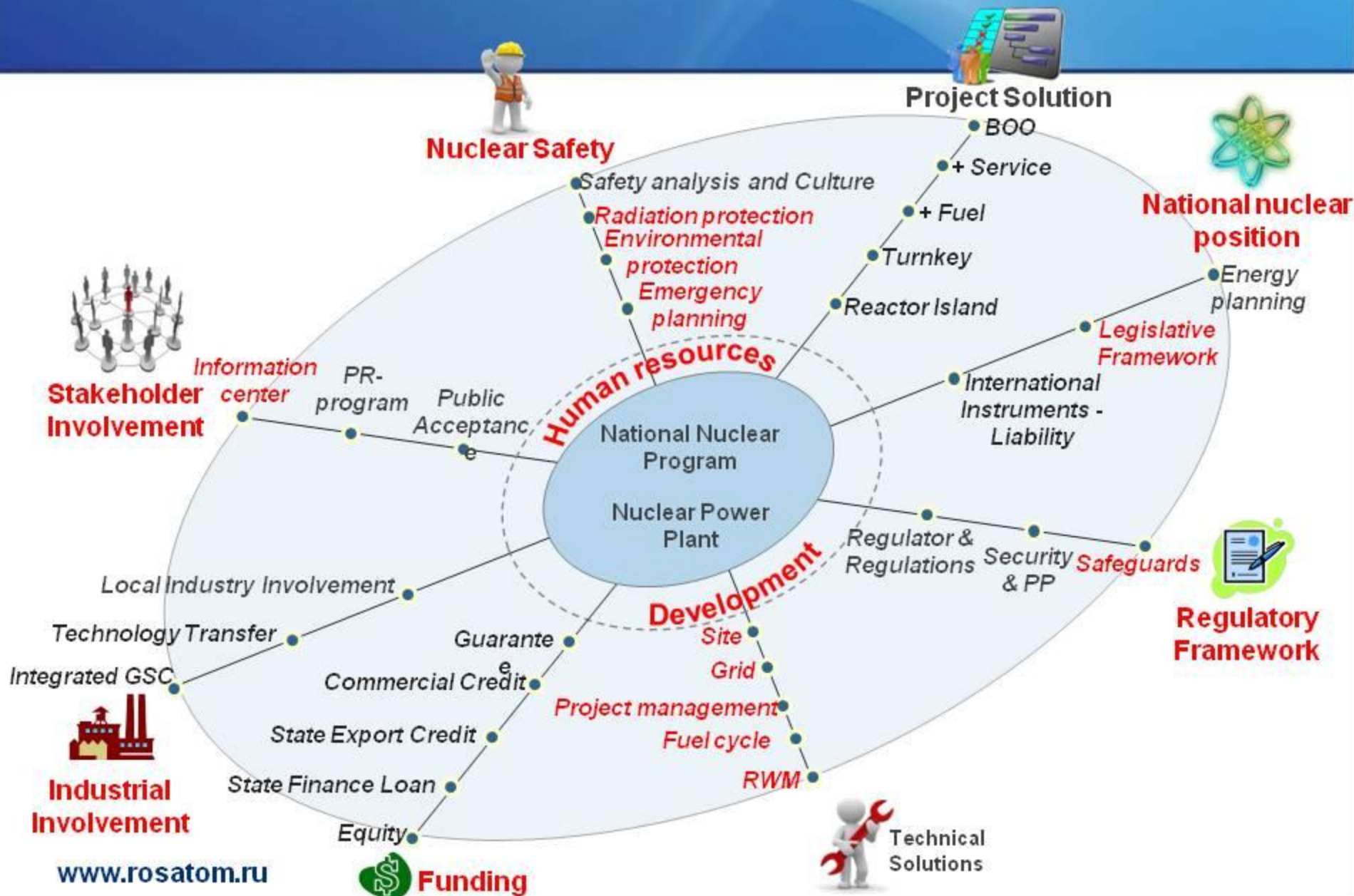
Rosenergoatom has a leading role

Rosatom NPP construction perspective backlog

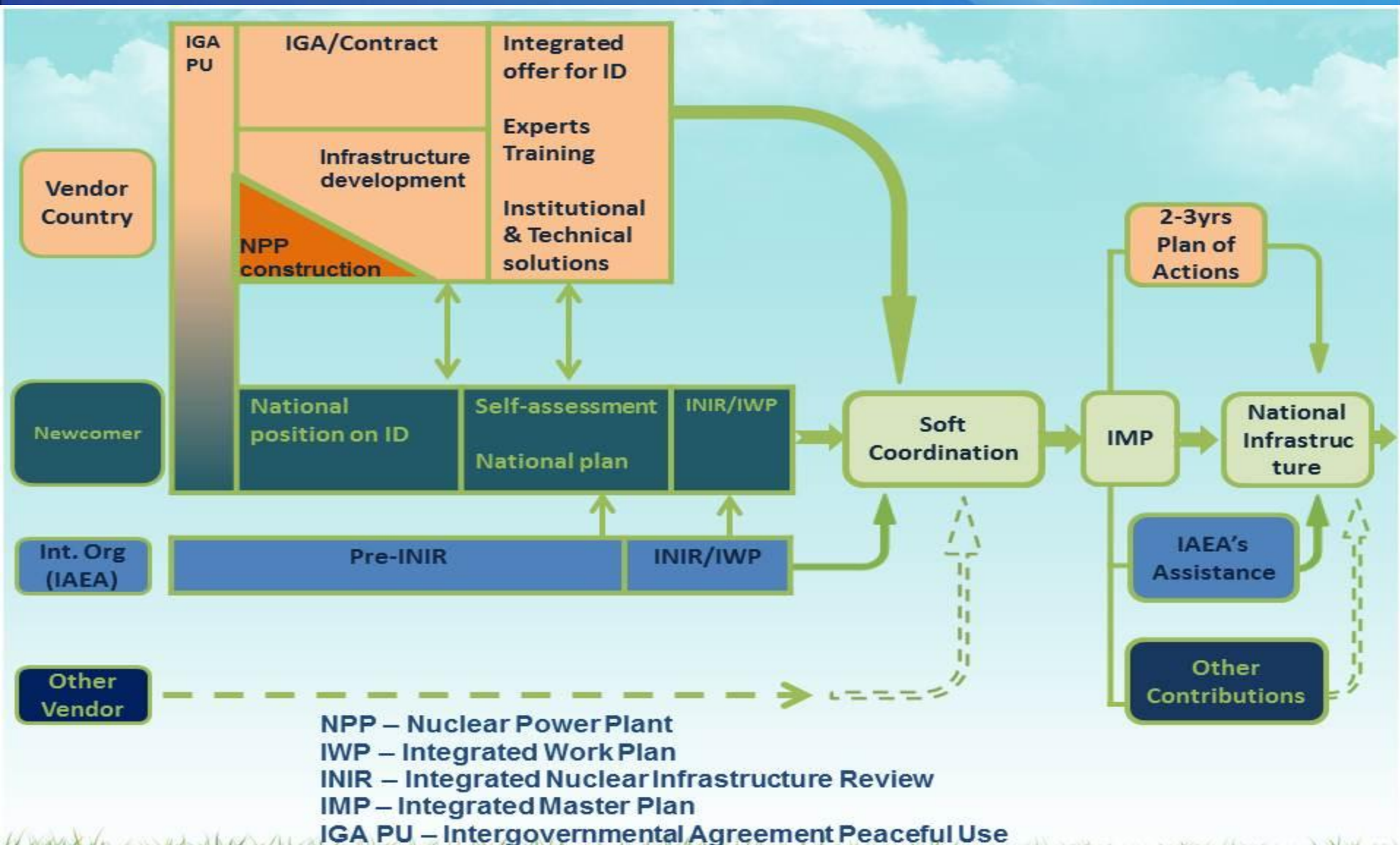


More than 80 units

INTEGRATED OFFER - Russian proposal



Conceptual approach to the nuclear infrastructure development



Russian Experts ready to assist in Nuclear Infrastructure

December 2012

A group of Russian Experts for providing assistance to embarking countries

To work out the guidelines for each infrastructure element



With the knowledge of the IAEA approach and recommendations and own experience in NI

The understanding between Russian experts and their international counterparts were established

What can be delivered:

Training materials, E& T Services, Internship, On-job-training

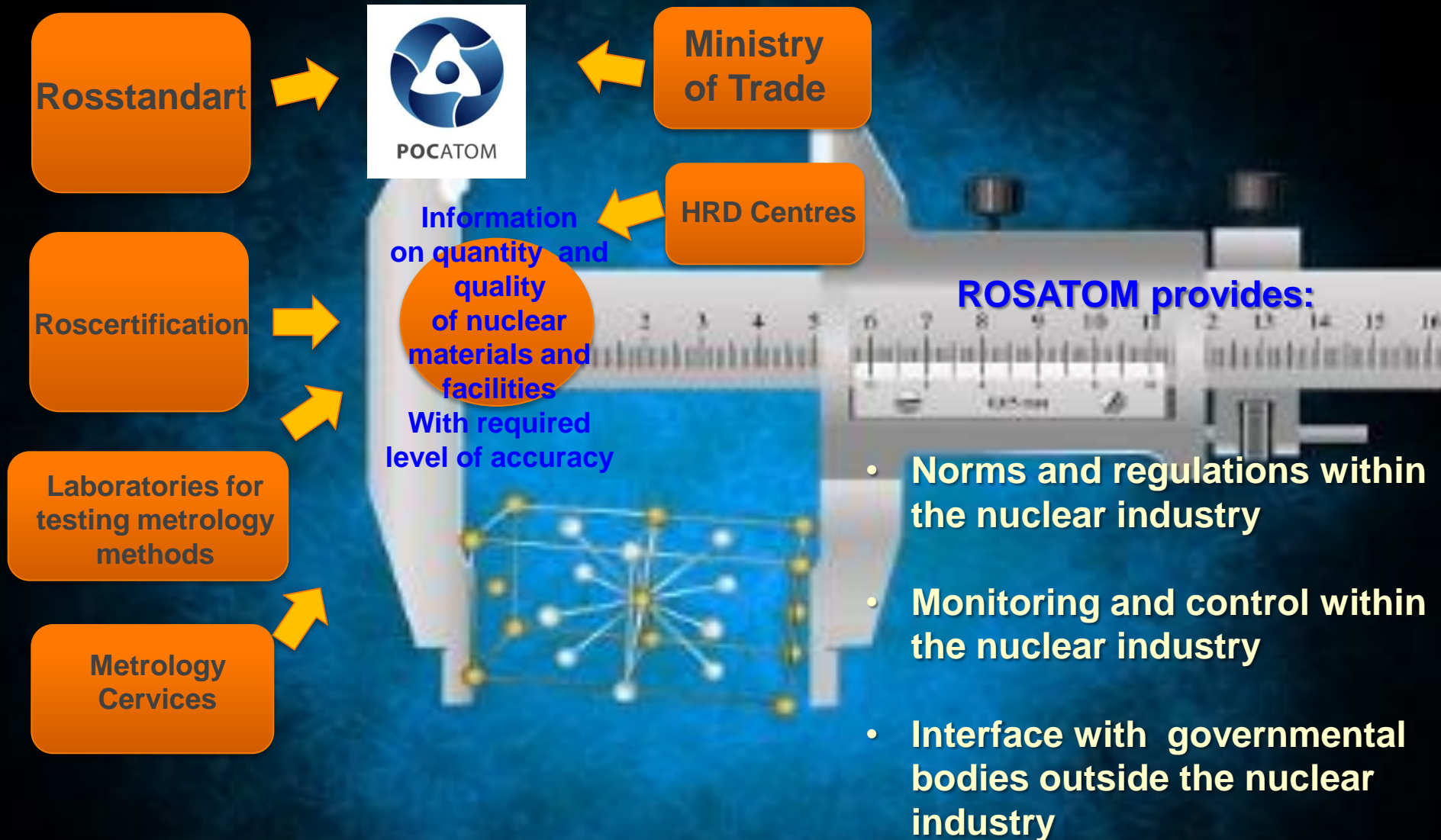
Specific solutions: "Centers" based on Russian experience

Road map for each element of NI: structure, functions, forms

Examples from Russian practice including the legal support of each elements

Assistance in development of regulations, "strategies & plans", etc.

Russian Metrology System



System for Emergency Prevention and Response



Complex of technical and organizational measures:

- **Emergency planning:** prevention and mitigation
- Risk management
- Emergency events classification
- **Levels of responsibility**
- Crisis assessment and management centers (central, regional, on facility)
- **Emergency response centers and equipment**
- Emergency communication means/tools
- **Personnel training**
- Awareness of the people
- Radiation protection, **medical care**
- **Rehabilitation and re-access planning**

WANO MC – welcome to VVER users club

2015 - WANO working with new members:

Workshops on experience in
VVER NPP commissioning
and operation

Updating WANO membership
strategy and guidelines as to
new members



Technical Support Missions on
commissioning

Pre-Startup Peer Reviews

Recent experience - NI development of Bangladesh

Minutes of the Meeting on the Cooperation in Nuclear Infrastructure Development between People's Republic of Bangladesh and Russian Federation

Date: 23, September, 2014

Place: IAEA, Vienna International Centre

The Parties agreed on the actions:

1. Bangladesh party submits to the Russian **party list of prioritized actions for developing national nuclear infrastructure** (Dr.Akbar, 1-st week of October 2014).
2. Russian party initiates the Letter from Mr. Spassky – to Minister of Science&Technology to invite the members of Infrastructure Working Group **for the meeting in November 2014** (resp. Dr.Sokolov, 1-st week of October, 2014).
3. Russian party initiates the Letter from Mr. Spassky – to Minister of Science and Technology to invite the NEPIO top managers to participate the **one week Workshop in December** (resp. Dr.Sokolov, 1-st week of October, 2014).
4. Russian Party makes the draft of the **training Programme** on the general principles of Integrated Management System applied to National Nuclear Power Programme and NPP Project (resp. Dr.Artisiuk, end of March 2015).
5. Following the request of Bangladesh side the Russian party will consider preparing relevant documents and submit to Rosatom for consideration on assigning the appropriate organization as a consultant and a **mentor** (resp. Dr.Sokolov, 2-nd week of October).

Recent experience - NI development of Bangladesh

Meeting in November 2014

Today our country is dependent on gas supplies - said during the visit to Novovoroneg NPP the director of the project implementation of the 1st phase of the construction of NPP "Ruppur" Akbar Mohammad Shoukat. - We recognize the need to move to alternative sources of electricity generation, and have opted for coal and nuclear power. We are expect that the share of nuclear generation in 2030 will be at least 19%. "



The intergovernmental agreement on the construction of nuclear power plants between the Republic of Bangladesh and Russia was signed November 2, 2011 To build two nuclear reactor installed capacity of 1,000 MW is planned for the site Ruppur, located 200 km from the capital Dhaka.

"We are working on the implementation of the project - said the head of the Department of Planning and Development, a member of the Atomic Energy Commission of Bangladesh Zulkarnain Ali. - We have already signed three commercial contracts and are preparing to sign a fourth, which will determine the order of pre-work and site preparation construction of NPP "Ruppur" to begin construction. A joint bilateral working group over the last several years is working on all elements of the project. "

NI of Bangladesh : development of the Plan

Meeting in November 2014

Preliminary plan

Bilateral cooperation of the Russian Federation and the People's Republic of Bangladesh to establish and improve the national infrastructure nuclear power program , 2014-2017

Note: The project plan should be discussed with the Bangladesh side. Numbering corresponds to the numbering of infrastructure elements as described in the IAEA

Abbreviation:

AECD (TSO) - Atomic Energy Centre Dhaka (Technical support organizations)

ASE - CJSC "Atomstroyexport- NIAEP" JV – Russian Contractor of the Project

BAEC - Atomic Energy Commission of Bangladesh

BAERA - Bangladesh Atomic Energy Regulatory Authority

CICE&T - ROSATOM central institute for continuing education and training

DOE - Department of Environment of the Bangladesh Ministry of Environment

ERD - Economic Relations division of the Bangladesh Ministry of Finance

INST - Bangladesh TSO for waste management

KREA - JSC "Concern Rosenergoatom"

MOF - Bangladesh Ministry of Finance

MOE - Bangladesh Ministry of Education

MOST – Bangladesh Ministry of Science and Technology

NPED - Nuclear Power & Energy Division of Atomic Energy Commission of Bangladesh

NSRCD - Nuclear Safety and Radiation Control Division of Atomic Energy Commission of Bangladesh

OP - Operator

PONI – Project Office of ROSATOM in KREA for supporting newcomers in Nuclear Power Programme and Nuclear Infrastructure

PTN - Rostehnadzor

VNIIAES - All-Russian Research Institute for Nuclear Power Plants Operation

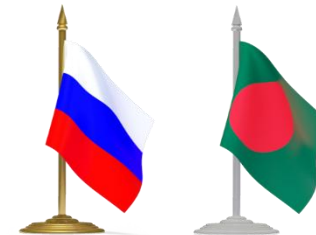
WANO – World Association of Nuclear Operators

No	Tasks and stages of Services/ INFRASTRUCTURE ELEMENT	Responsible agencies of the Russian side	Responsible agencies of the Bangladesh side	Result of service (Phase Services Phase)	Start	END	The format of results
1	Infrastructure element - National Position	KREA	BAEC		2014		
2.1	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA	BAERA		2014		
2.2	Assessment of regulatory framework	KREA	BAERA		2014		
2.3	Follow-up on design-related safety / R.2.1 No 1	KREA	BAERA		2014		
2.4	National in-house group training on PSM / R.2.1 No 2	KREA	BAERA		2014		
3	Establishment and improvement of the national emergency response system	KREA	BAERA		2014		
4	Consulting services for the development of a national plan for the planning operations and emergency response	KREA	BAERA		2014		
5	Training course on Emergency planning and Emergency systems	KREA	BAERA		2014		
6	Infrastructure element - Nuclear safety	KREA	BAERA		2014		
7	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA	BAERA		2014		
8	Training course on Physical protection and security	KREA	BAERA		2014		
9	Infrastructure element - Nuclear fuel cycle	KREA	BAERA		2014		
10	Assisting in the development of a national policy on the nuclear fuel cycle	KREA	BAERA		2014		
11	Infrastructure element - Nuclear power	KREA	BAERA		2014		
11.1	Organization of the Working Group on PR / R.11.1 No 1	KREA	BAERA		2014		
11.2	Organization of the Working Group on PR / R.11.1 No 2	KREA	BAERA		2014		
11.3	Organization of the Working Group on PR / R.11.1 No 3	KREA	BAERA		2014		
11.4	Organization of the Working Group on PR / R.11.1 No 4	KREA	BAERA		2014		
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12.32	Training course on Physical protection and security	KREA	BAERA		2014		
12.33	Infrastructure element - Nuclear fuel cycle	KREA	BAERA		2014		
12.34	Assisting in the development of a national policy on the nuclear fuel cycle	KREA	BAERA		2014		
12.35	Infrastructure element - Nuclear power	KREA	BAERA		2014		
12.36	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA	BAERA		2014		
12.37	Training course on Physical protection and security	KREA	BAERA		2014		
12.38	Infrastructure element - Nuclear fuel cycle	KREA	BAERA		2014		
12.39	Assisting in the development of a national policy on the nuclear fuel cycle	KREA	BAERA		2014		
12.40	Infrastructure element - Nuclear power	KREA	BAERA		2014		
12.41	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA	BAERA		2014		
12.42	Training course on Physical protection and security	KREA	BAERA		2014		
12.43	Infrastructure element - Nuclear fuel cycle	KREA	BAERA		2014		
12.44	Assisting in the development of a national policy on the nuclear fuel cycle	KREA	BAERA		2014		
12.45	Infrastructure element - Nuclear power	KREA	BAERA		2014		
12.46	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA	BAERA		2014		
12.47	Training course on Physical protection and security	KREA	BAERA		2014		
12.48	Infrastructure element - Nuclear fuel cycle	KREA	BAERA		2014		
12.49	Assisting in the development of a national policy on the nuclear fuel cycle	KREA	BAERA		2014		
12.50	Infrastructure element - Nuclear power	KREA	BAERA		2014		
12.51	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA	BAERA		2014		
12.52	Training course on Physical protection and security	KREA	BAERA		2014		
12.53	Infrastructure element - Nuclear fuel cycle	KREA	BAERA		2014		
12.54	Assisting in the development of a national policy on the nuclear fuel cycle	KREA	BAERA		2014		
12.55	Infrastructure element - Nuclear power	KREA	BAERA		2014		
12.56	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA	BAERA		2014		
12.57	Training course on Physical protection and security	KREA	BAERA		2014		
12.58	Infrastructure element - Nuclear fuel cycle	KREA	BAERA		2014		
12.59	Assisting in the development of a national policy on the nuclear fuel cycle	KREA	BAERA		2014		
12.60	Infrastructure element - Nuclear power	KREA	BAERA		2014		
12.61	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA	BAERA		2014		
12.6							

NI of Bangladesh : development of the Plan

December 2014:

the Plan will be finalized



In 2015:

The Plan will be submitted for approval.

No	Task and stages of Services/ IAEA recommendation No	Responsible agencies of the Russian side	Responsible agencies Bangladesh side	Result of service (Phase Services Phase)	Start	END	The focus of results
1.	Infrastructure element - National Position	KREA	BAEC				
2.	Infrastructure element - Nuclear Safety	KREA RTN	BAEC BAERA	Session in Dhaka, 2 persons from Russian	1Q 2015		
2.1	Assist in the creation and improvement of infrastructure nuclear safety elements	BAEC RTN	BAEC BAERA				
2.2	National training course on safety	KREA RTN	BAEC BAERA	Joint Meeting (Regulatory Body)	1Q 2015		
2.3	Assessment for operator and regulatory body / R.2.1 No 1	KREA RTN	BAEC BAERA				
2.4	Follow-up on design-related safety / R.2.1 No 1	KREA RTN CICCAT UNIAES	BAEC BAERA	To be discussed with TC IAEA in December (4 follow-up programmes as 4 scientific visits)			
2.5	National on-site group training on PSAR review for operator and regulatory / R.2.1 No 1	KREA RTN	BAEC BAERA				
2.6	Training course on design-related safety analysis report	KREA RTN	BAEC BAERA	Training in Russia 3-2 persons	2w 1Q 2015		
2.7	Training course on Calculation Code	KREA RTN	BAEC BAERA				
2.8	Training course on Instrument and control system for reactor	KREA RTN	BAEC BAERA				
2.9	Training course on building the quality management system for reactor	KREA RTN	BAEC BAERA				
14.1	Establishment and improvement of the national emergency response system	KREA RTN ASE	BAEC BAERA	Follows 14.3			
14.2	Consultancy services for the development of a national plan for the planning operations and emergency response	KREA RTN ASE	BAEC BAERA	Follows 14.3			
14.3	Training course on Emergency planning and Emergency systems	KREA RTN ASE	BAEC BAERA	Follows 14.3			
15.1	Infrastructure element - Nuclear security	KREA RTN ASE	BAEC BAERA	Training course in RF (6-8) persons	2w 1Q 2015		
15.2	Assist in the creation and improvement of infrastructure physical protection of nuclear materials and technologies	KREA RTN ASE	BAEC BAERA				
15.3	Training course on Physical security	KREA RTN ASE	BAEC BAERA	Follows 15.2			
16.1	Infrastructure element - Human Resources	KREA RTN ASE	BAEC BAERA				
16.2	Training course on Electrical grid	KREA RTN ASE	BAEC BAERA	Actions will follow after 2015			
16.3	Element of infrastructure - Human Resources	KREA RTN ASE	BAEC BAERA	General training in RF	1w 1Q 2015		
16.4	Training, retraining and skills development for the implementation of a nuclear power program based on the Russian experience and the recommendations of the IAEA	KREA RTN ASE	BAEC BAERA				
16.5	To prepare the IAEA action plan of relevant organizations and to prepare the integrated national IAEA programme	KREA RTN ASE	BAEC BAERA	Follows 16.2			
17.1	Infrastructure element - Involvement of stakeholders	KREA RTN ASE	BAEC BAERA				
17.2	Organization of the Working Group on PR adoption of the PR Working Group	KREA RTN ASE	BAEC BAERA	1st meeting of the PR Working Group, multifunctional site on establishing			
17.3	Training course for 10 Bangladesh experts	KREA RTN ASE	BAEC BAERA				
17.4	Visit of 2-3 Russian experts to Bangladesh	KREA RTN ASE	BAEC BAERA				

CIS States

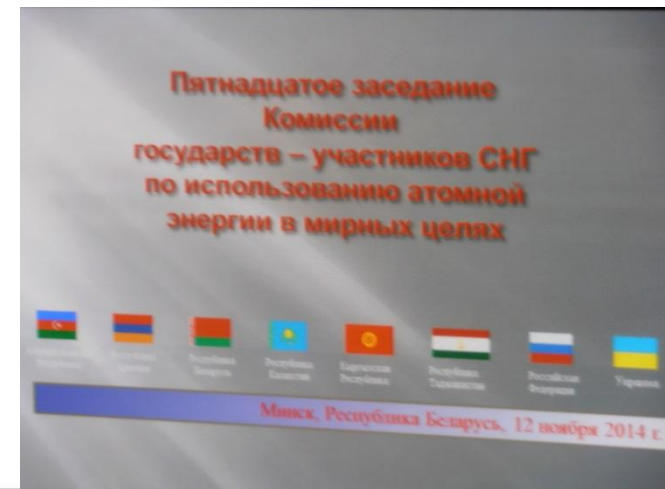
Commission on nuclear energy

(15-th Session, Minsk, Belarus, November 11-12, 2014)

Nuclear Infrastructure Joint Working Group is going to be established.

The main objectives are:

- *Harmonization of nuclear legislation among CIS states*
- *Exchange of information and best practices in nuclear power development and joint projects on NI enhancement*



Belarus NPP “Ostrovetz” under construction November 2014



Containment of the reactor



Cooling tower



Condenser cooling pipes



Core catcher

Thank you for your attention

Andrey Sitnikov
JSC “Concern Rosenergoatom”

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NI of Bangladesh : development of the competence

Meeting in November 2014

Construction of NVNPP-2 Power Units



Author: The First Deputy Chief Engineer
for units under construction
at the branch of Concern Rosenergoatom
Novovoronezh Nuclear Power Plant

B.A. Barnep

November 2014



РОСЭНЕРГОАТОМ

ОТКРЫТИЕ АБЗОНОВ: ОБЪЕКТЫ АТОМНОЙ ЭНЕРГЕТИКИ

Rosenergoatom Concern OJSC Functions and Competencies for NPPs Construction in the Russian Federation and Abroad

Presented by:
E.I. Vlasenko
Director of SEC
Rosenergoatom

Moscow

11.2014



РОСЭНЕРГОАТОМ

ОТКРЫТИЕ АБЗОНОВ: ОБЪЕКТЫ АТОМНОЙ ЭНЕРГЕТИКИ

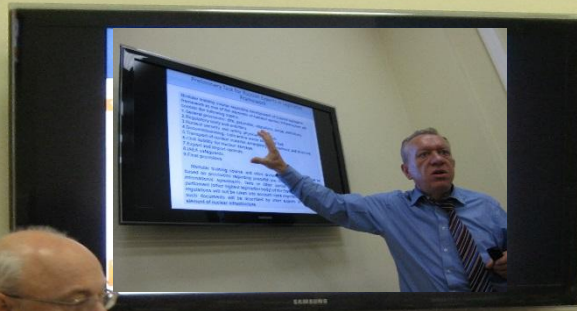
VNIAES Experience in Integrated Management Systems

Andrey Yuzhakov
Nikolay Tikhonov

Russian Research Institute for Nuclear Power Plants Operation,
VNIAES JSC



Moscow, 10.11.2014



JOINT STOCK COMPANY «ATOMIC ENERGY POWER CORPORATION»

ROSATOM CENTRAL INSTITUTE
FOR CONTINUING EDUCATION & TRAINING
(ROSATOM-CICET)



ROSATOM CENTRAL INSTITUTE FOR CONTINUING EDUCATION & TRAINING ACTIVITIES IN SUPPORT NEWCOMER COUNTRIES

Vladimir ARTISIUK

23.09.2014
18th IAEA General Conference

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ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
«РОСЭНЕРГОАТОМ»

Half a century of Novovoronezh NPP operation

Povarov V.P.
Deputy Director General - Director of JSC Concern
Rosenergoatom branch "Novovoronezh NPP"



Integrated Quality System of JSC "Rosenergoatom Concern" - Basis for Ensuring Safety and Enhancement of Efficiency

Speaker: Kapitonova Natalia,
Chief Expert, Department of Quality

Working Group: Meeting on Nuclear Infrastructure Development
12th of November, 2014

www.rosenergoatom.ru

NI development of Bangladesh : visit to Rosenergoatom's Virtual Prototyping Center

Meeting in November 2014

The main objectives:

increasing competencies and long-term plan for the development of nuclear infrastructure in Bangladesh



NI of Bangladesh : development of the Plan

Meeting in November 2014

During hot and constructive dialog the Integrated PLAN of NI development was designed by members of Working Group and Russian experts



NI development of Bangladesh : visit to Rosenergoatom's Virtual Prototyping Center

Meeting in November 2014



VVER - 1200

In virtual reality you can see
the future NPP in details

Progressive experience of Bangladesh : Visiting the site of new Units of NVNPP –VVER-1200

Meeting in November 2014

Site of 6 and 7 Units

Guests in reality saw something with which learned in the center of prototyping.

During a technical tour the Bangladesh delegation got competent answers NPP managers and specialists, visited the operating unit №5, ground facilities of unit №6, full-scope simulators VVER-1000 and VVER-1200, where she learned about the criteria for operational personnel for nuclear power plants, as well as examined the technical means by which features Novovoronezhskiy branch of FSUE "Emergency Technical Center of Minatom of Russia" (Saint-Petersburg) operate.

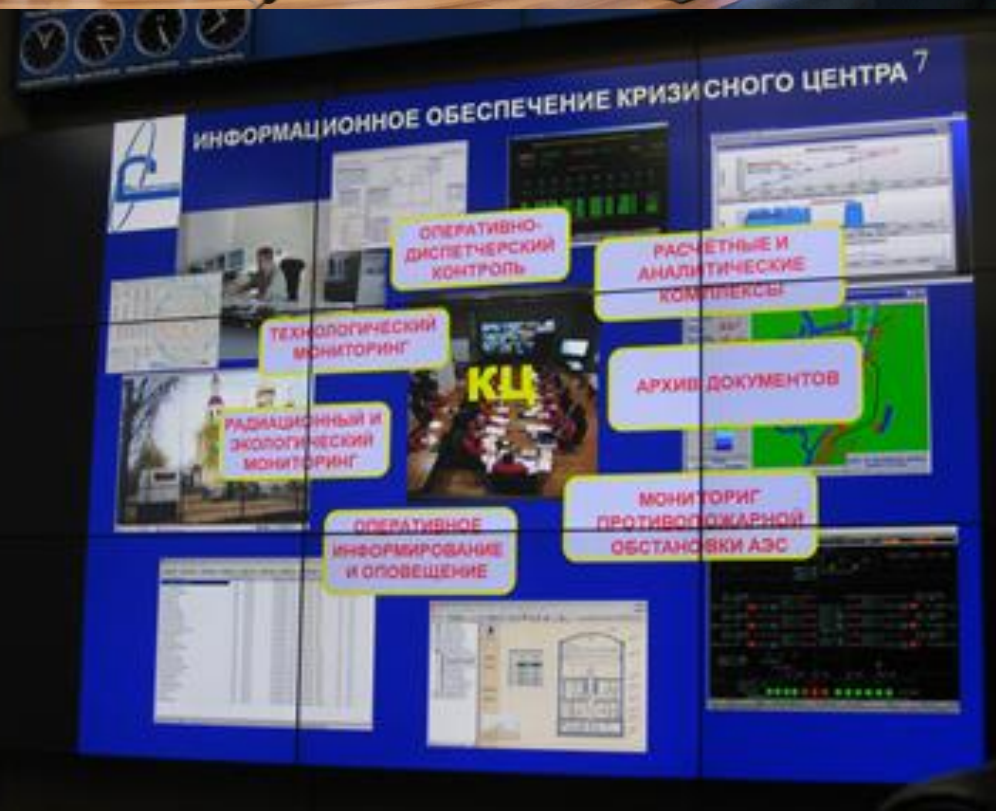
NI development of Bangladesh : visit to Rosenergoatom's Crisis Center

Meeting in November 2014



NI development of Bangladesh : visit to Rosenergoatom's Crisis Center

Meeting in November 2014



NI development of Bangladesh : visit to Rosenergoatom's Crisis Center

Meeting in November 2014



NI development of Bangladesh : visit to Moscow center of WANO

Meeting in November 2014

Michael Jackass, Director of WANO-MC, briefed the guests on WANO activities, with the main programs of WANO.



NI development of Bangladesh : visit to Moscow center of WANO

Meeting in November 2014

The representative of Bangladesh expressed interest in the benefits that provides membership in the World Association of Nuclear Operators. These advantages, of course, include the use of the best world experience gained in the nuclear industry, to ensure the safe operation of nuclear power plants.



Progressive experience of Bangladesh : visits to NPPs

Meeting in November 2014



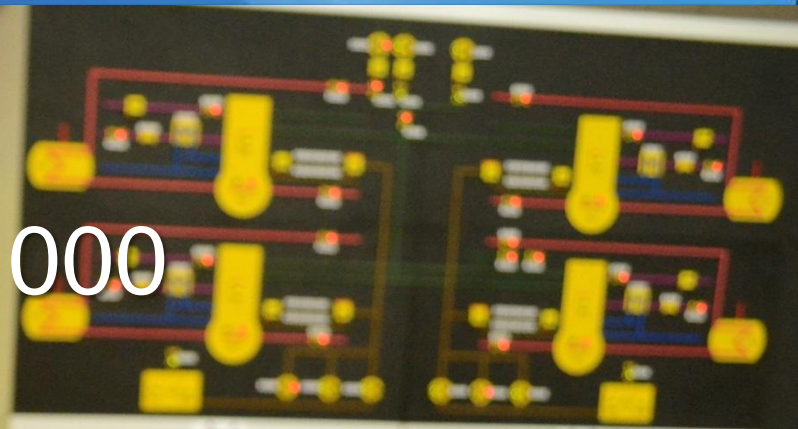
Meeting in November 2014

A man in a dark suit is seated at a control console, looking intently at a large computer monitor. The monitor displays a complex data visualization, including a large green circular chart with internal patterns and several smaller graphs and data tables. To his left, another person's shoulder and arm are partially visible. The background shows a control room environment with various panels and equipment.

Progressive experience of Bangladesh : visits to NPP's full-scope simulators

Meeting in November 2014

VVER-1000



Progressive experience of Bangladesh : visits to NPP's full-scope simulators

Meeting in November 2014

VVER-1200

