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

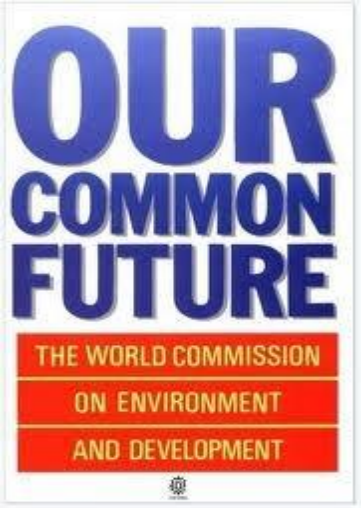
The concept of sustainable development

Gro Harlem Brundtland,
norvegian 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 IAIA

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.

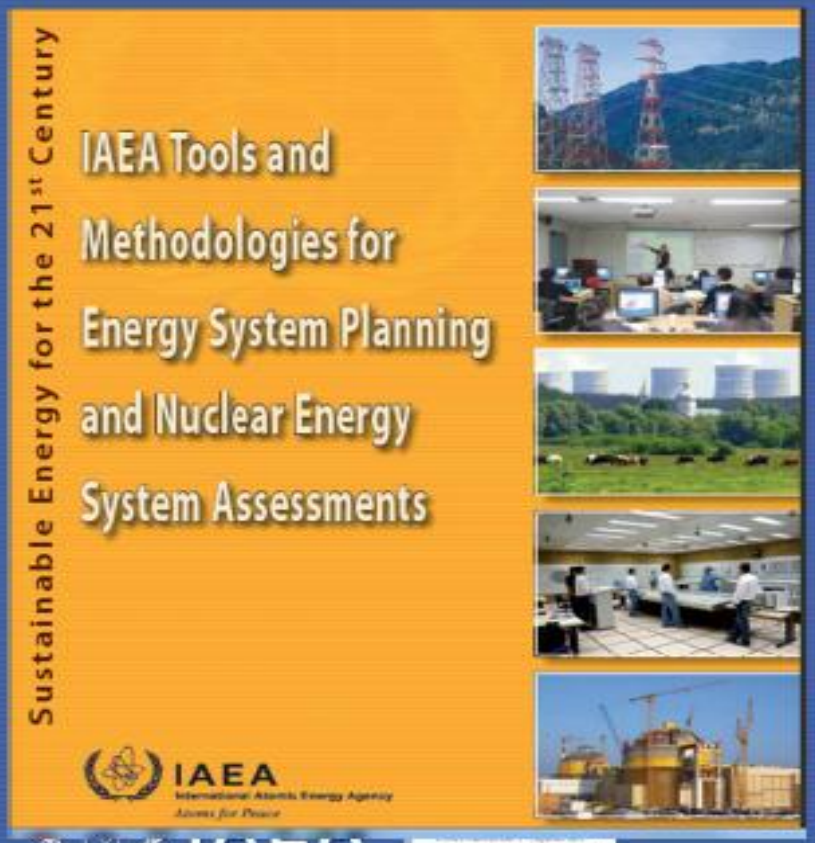
Director General

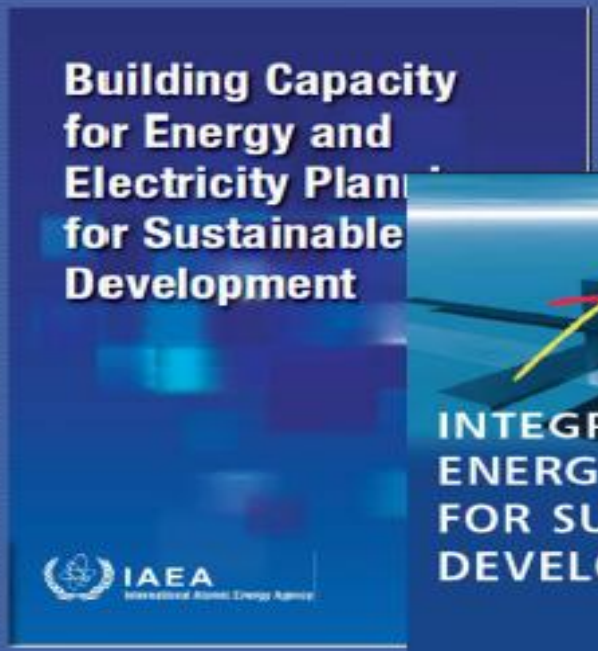
Yukiya Amano

IAEA

IAIA documents for Energy Systems planning

Energy Tools and Methodologies for ES Planning





Overview on 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 .

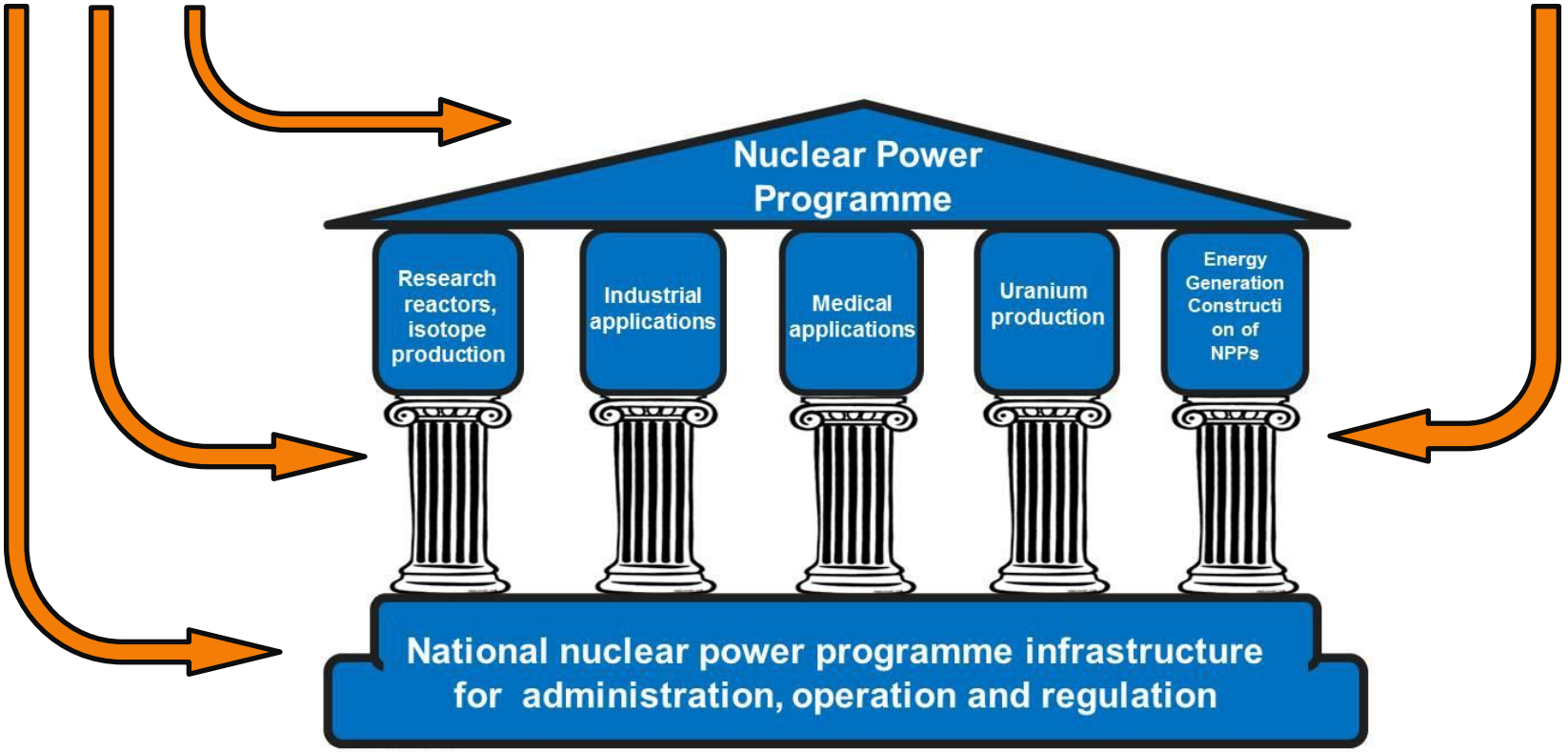
If all Criteria (124) are met in all 7 areas

the assessed nuclear energy system is sustainable.

“Programme” vs “Project”

“State” responsibility - programme

“Vendor” responsibility - project



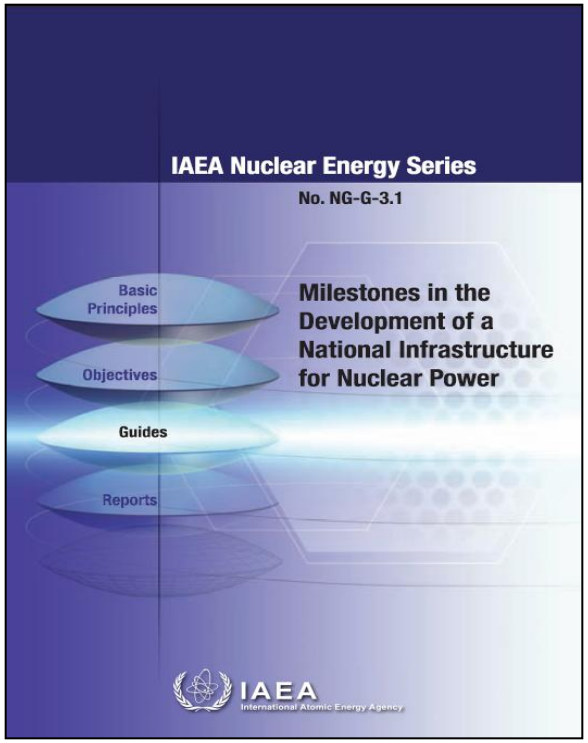
Infrastructure Milestones

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

IAEA

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

Energy Solution

Modern NPP design (Gen III+)
NPP construction and life cycle management support (fuel, services, modernization)
Operation & maintenance
"Licensing" , etc - Rostechnadzor

Industrial Solution

NPP equipment manufacturing, service & works localization,
Technology transfer,
Certification of local suppliers, participation in third countries projects

Financial Solution

BOO projects implementation;
State credits,
Partnership projects

Knowledge, skills, human capital

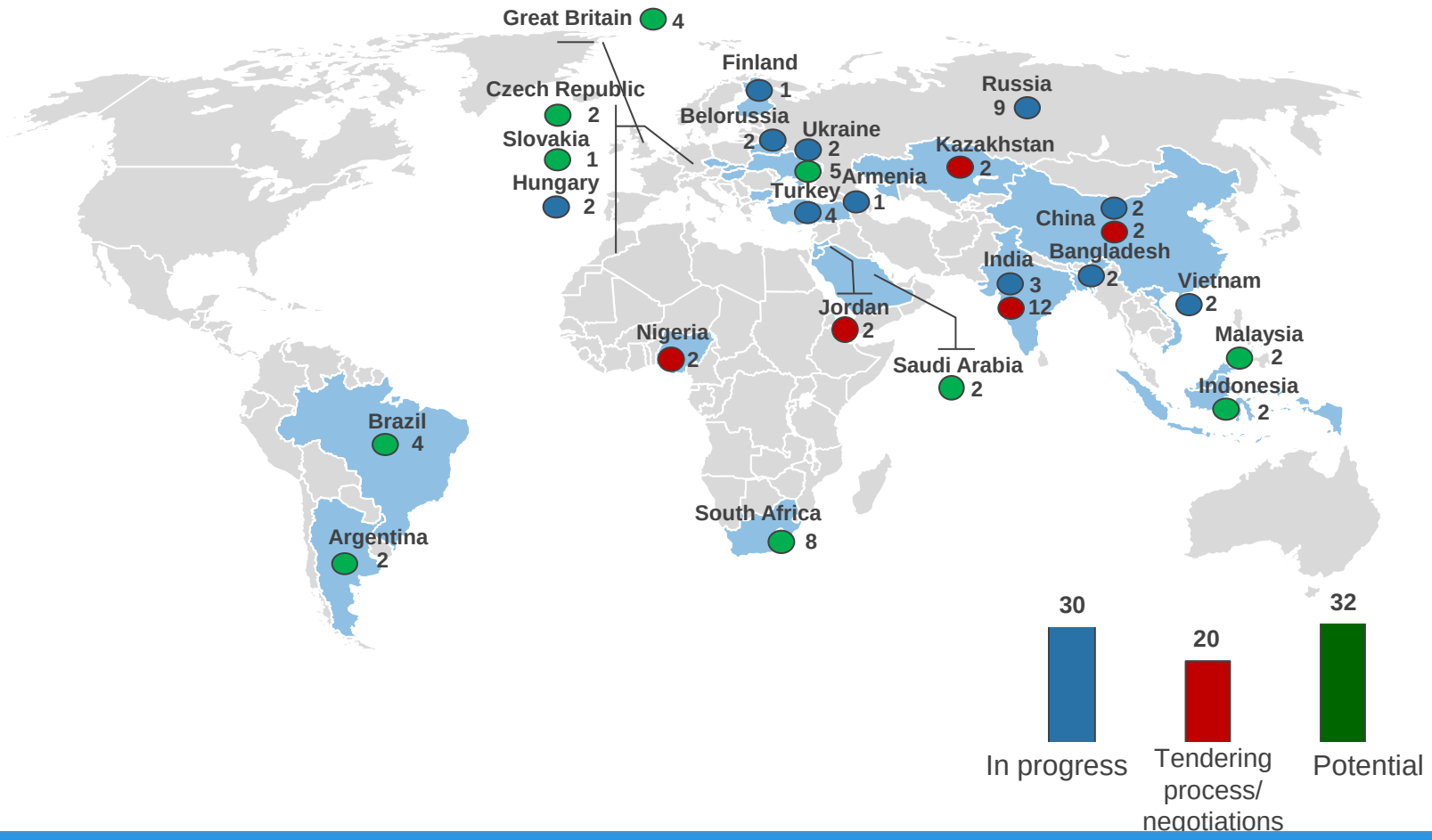
Personnel education & training (incl. traineeship on NPP sites), NPP operation experience exchange
Personal for RB - Rostechnadzor

Nuclear Infrastructure

Assistance in the development of skills in governance of the national nuclear program: 19 elements of nuclear infrastructure
"Regulations" - Rostechnadzor

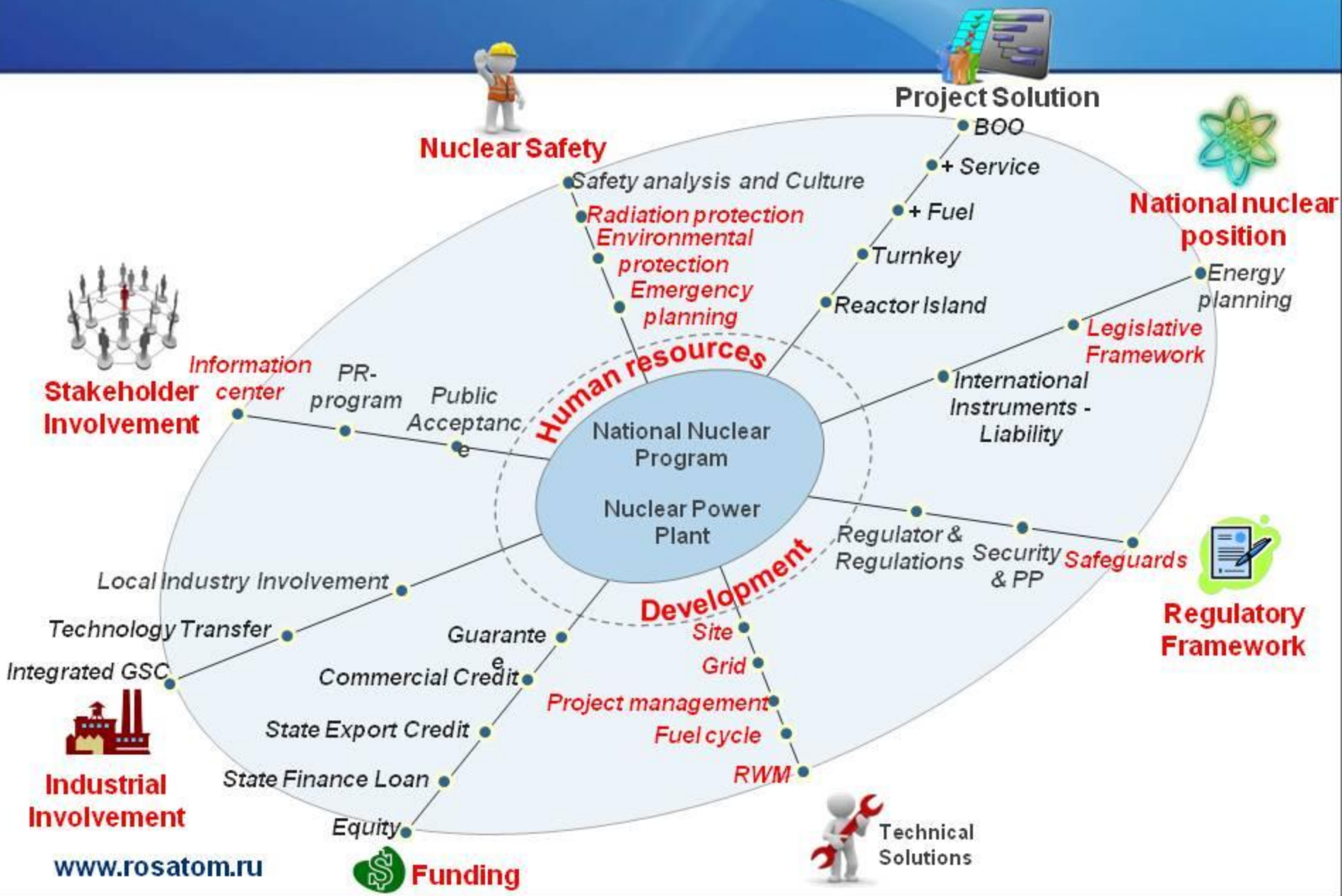
Rosenergoatom has a leading role

Rosatom NPP construction perspective backlog

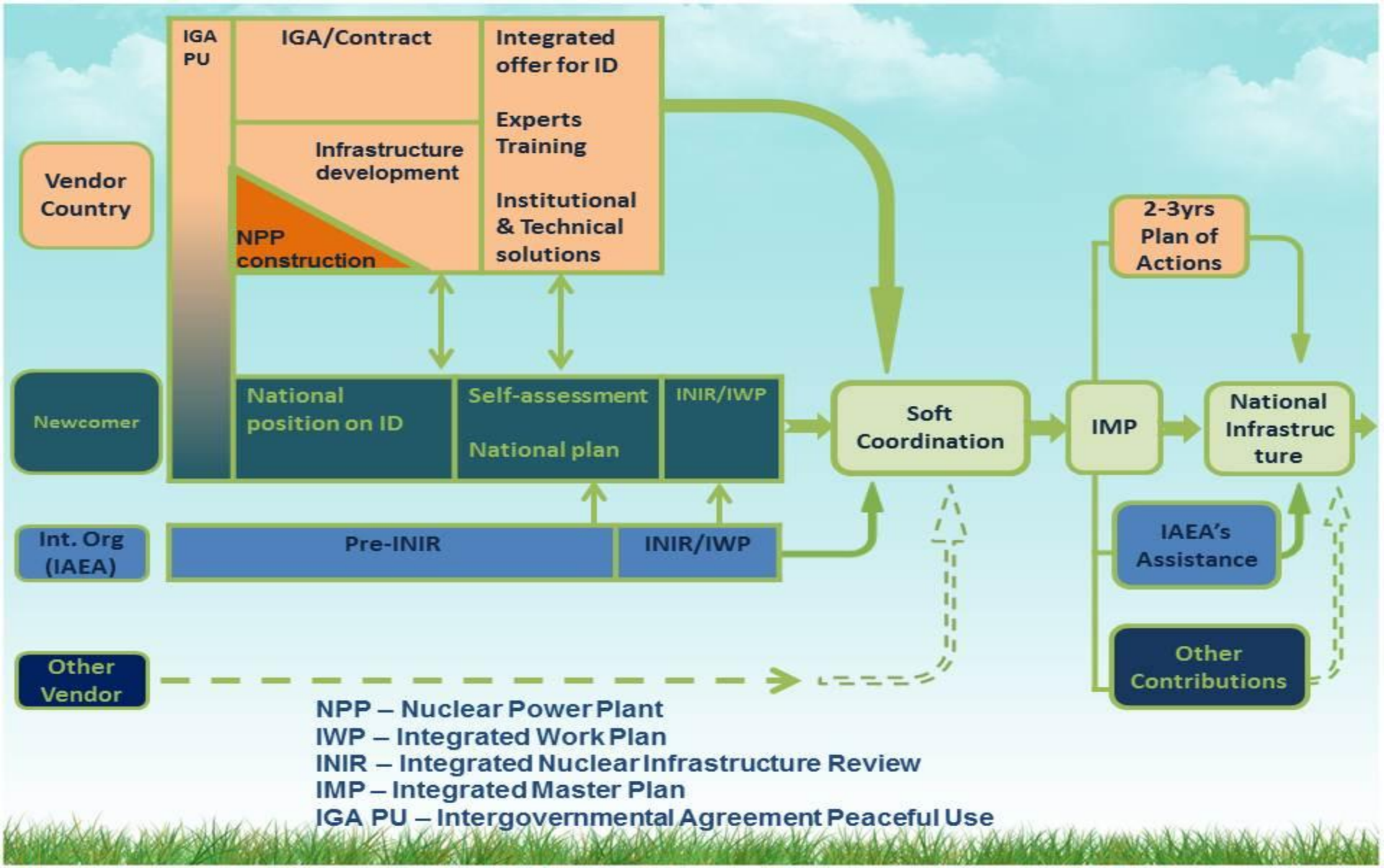


More than 80 units

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:

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

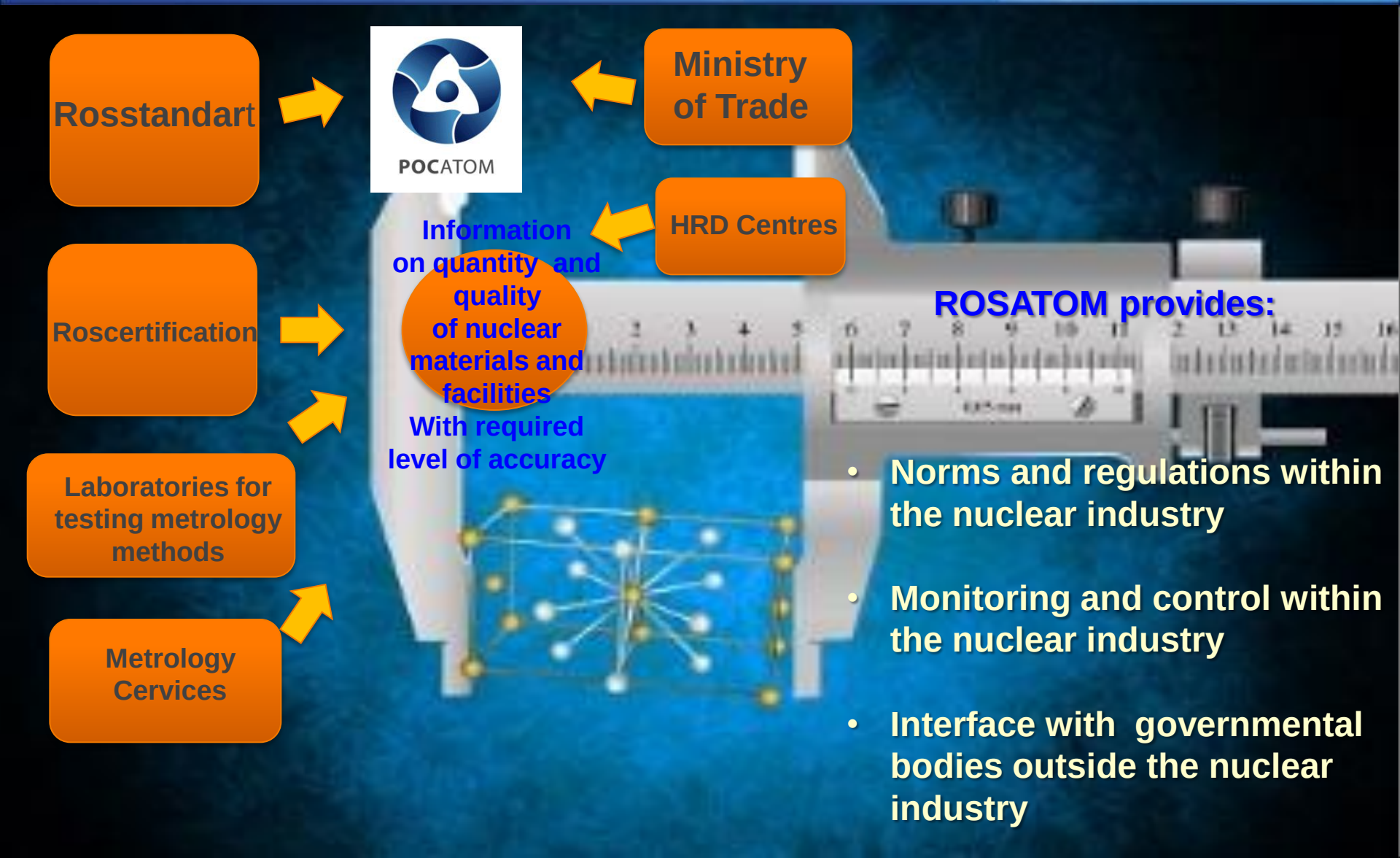
Examples from Russian practice including the legal support of each elements

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

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

Specific solutions: "Centers" based on Russian experience

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

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 Zulkvarnain 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. "

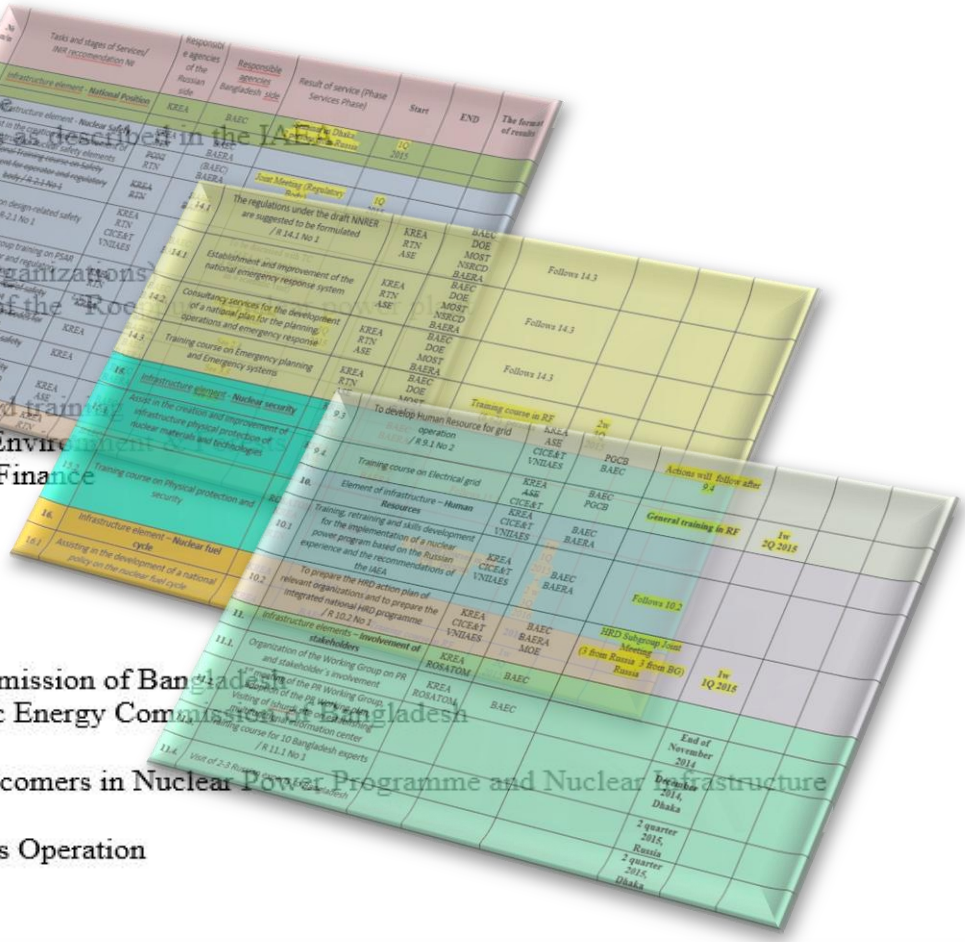
NI of Bangladesh : development of the Plan

Meeting in November 2014

Preliminary plan

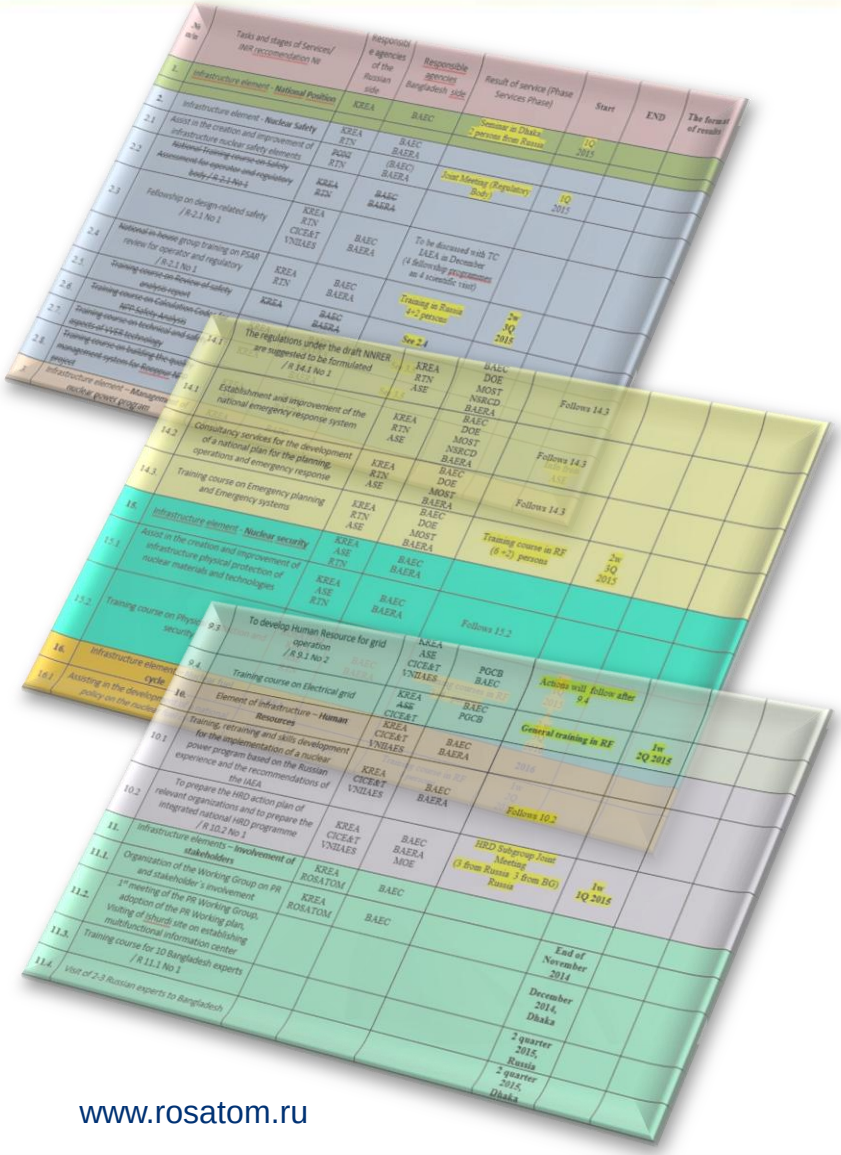
Bilateral cooperation of the Russian Federation and the People's Republic of Bangladesh to establish and improve the national infrastructure nuclear power program , 2014-2017

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



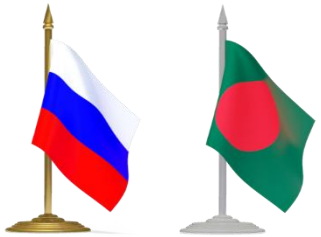
Abbreviation:
AECD (TSO) - Atomic Energy Centre Dhaka (Technical support organizations)
ASE - CJSC "Atomstroyexport- NIAEP" JV – Russian Contractor of the Project
BAEC - Atomic Energy Commission of Bangladesh
BAERA - Bangladesh Atomic Energy Regulatory Authority
CICE&T - ROSATOM central institute for 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

NI of Bangladesh : development of the Plan



December 2014:

the Plan will be finalized



In 2015:

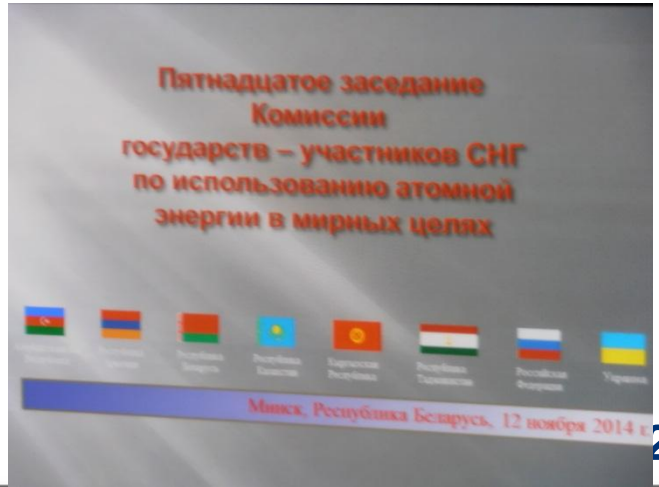
The Plan will be submitted for approval.

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

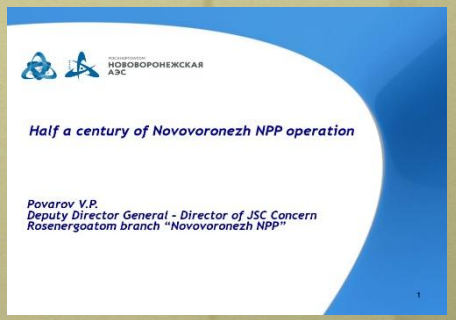
Thank you for your attention

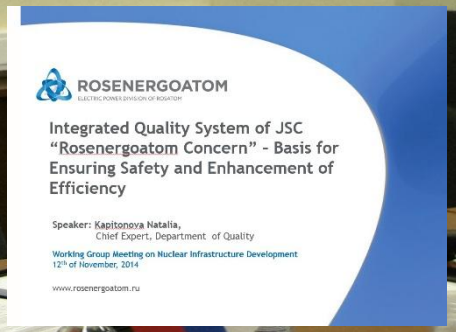
Andrey Sitnikov
JSC “Concern Rosenergoatom”

sitnikov-ae@rosenergoatom.ru

NI of Bangladesh : development of the competence

Meeting in November 2014





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

Meeting in November 2014

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

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.

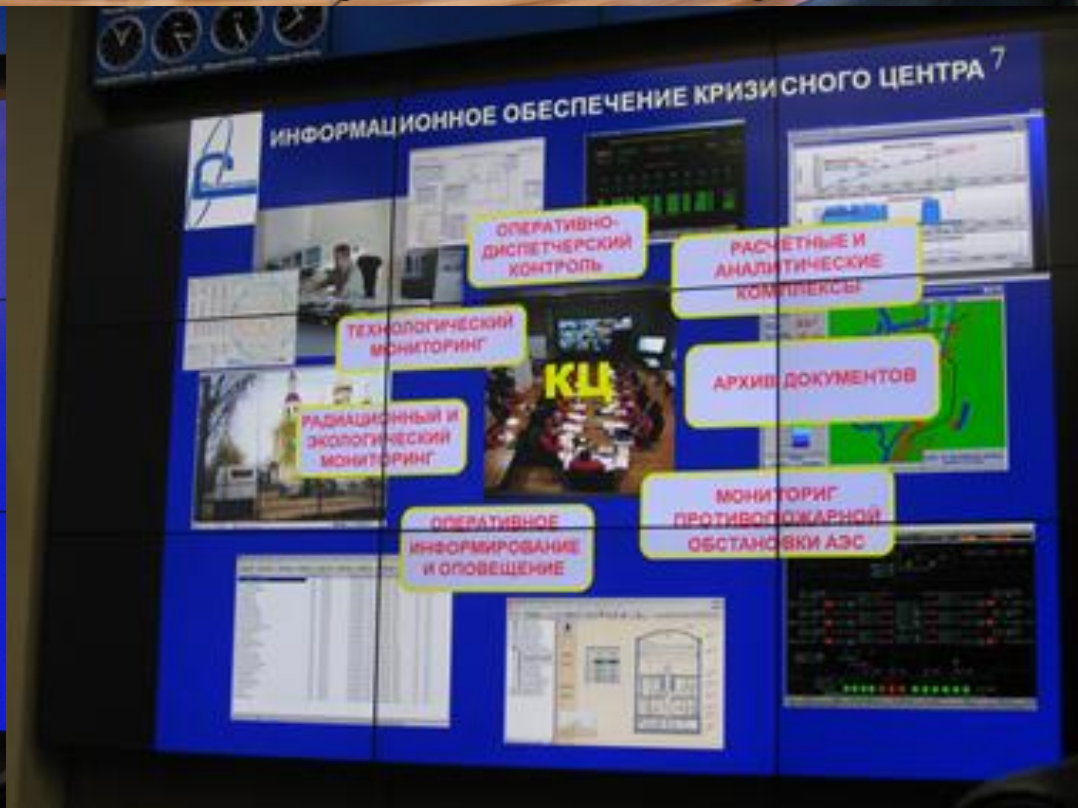
During a technical tour the Bangladesh delegation got competent answers NPP managers and specialists, visited the operating unit №5, ground facilities of unit №6, full-scope simulators VVER-1000 and VVER-1200, where she learned about the criteria for operational personnel for nuclear power plants, as 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





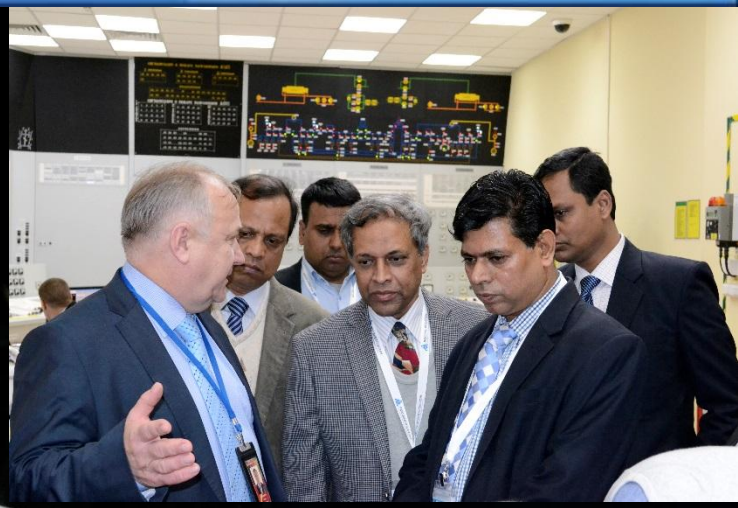




Progressive experience of Bangladesh : visits to NPP's full-scope simulators

Meeting in November 2014

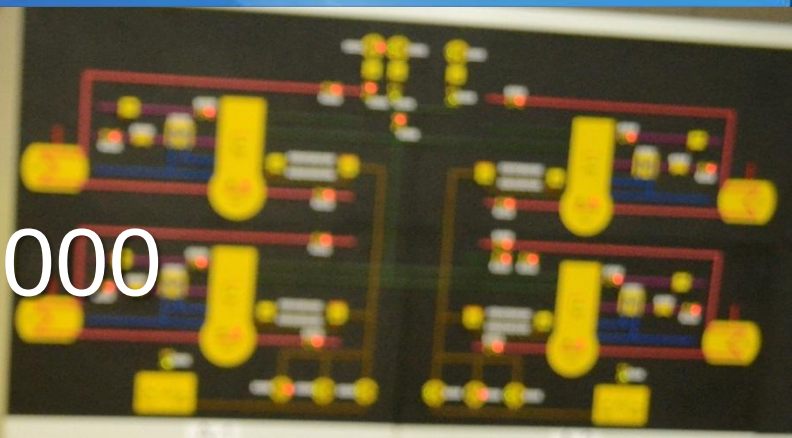
Representatives of the Republic of Bangladesh expressed the hope that the conclusion of a contract with the Russian side will accelerate the transition to the stage of direct construction of NPP "Ruppur", which is scheduled for late 2015. Now Identification of sources of water and electricity for the needs of future construction comes.



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