ROSATOM EDUCATION AND TRAINING APPROACH FOR NEWCOMER COUNTRIES
NPP PROJECT
**WHAT IS ROSATOM EDUCATION AND TRAINING APPROACH?**

ROSATOM singles out the subject of Human Resources education and training as a separate pillar of the NPP project, which has the same level of importance as such critical issues as nuclear infrastructure development, design and construction of nuclear facilities, etc. Availability of sufficient numbers of highly qualified specialists required for efficient and safe NPP operations and for appropriate development of the national nuclear program as a whole is always a big challenge, especially for countries that are just embarking on their national nuclear program. Therefore, ROSATOM sees development of personnel as a long-term effort, aiming to meet both the required number of education and training programs for the NPP being built and strategic interests of the partner country in transferring of nuclear knowledge to local educational institutions.

**ROSATOM provides the following levels of educational programs:**

<table>
<thead>
<tr>
<th>Vocational education</th>
<th>Over 100 educational institutions</th>
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<tbody>
<tr>
<td>• Programs of working specialties</td>
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<tr>
<td>• Training at workshops</td>
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<tr>
<td>• Practice at relevant Russian institutions and universities</td>
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<tr>
<td>• Joint educational programs with colleges of the partner country</td>
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<table>
<thead>
<tr>
<th>Higher education</th>
<th>Consortium of ROSATOM Supporting Universities</th>
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</thead>
<tbody>
<tr>
<td>• Bachelor, master, post-graduate programs</td>
<td></td>
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<tr>
<td>• Practice at Russian NPPs</td>
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<tr>
<td>• Joint educational programs with universities of the partner country</td>
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<tr>
<td>• Train-the-trainer, re-training and enhanced training of academic staff</td>
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</table>

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<thead>
<tr>
<th>In-company training</th>
<th>Consortium of ROSATOM subsidiaries to train NPP Personnel</th>
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<tbody>
<tr>
<td>• On-the-job training</td>
<td></td>
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<tr>
<td>• Practical training using models of NPP systems and full-scale simulators</td>
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<tr>
<td>• Theoretical courses</td>
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<tr>
<td>• Development of managerial skills (training)</td>
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</table>

SKILLED WORKERS

YOUNG PROFESSIONALS

PROFESSORS

HIGHLY QUALIFIED SPECIALISTS UP TO TOP-MANAGEMENT
**HOW TO PLAN AND CONTROL PERSONNEL EDUCATION AND TRAINING?**

ROSATOM has developed its own best practice for launching and monitoring the education and training process that ensures on-time availability of the necessary personnel for national nuclear program development and implementation. The following are the key steps to be taken:

<table>
<thead>
<tr>
<th>WHAT</th>
<th>WHY</th>
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<tbody>
<tr>
<td>Nominate responsible organization and responsible official(s)</td>
<td>«One stop» to address relevant questions</td>
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<tr>
<td>Sign Memorandum of Understanding concerning education and training of personnel in the field of nuclear energy and related areas</td>
<td>Create the basis for extended collaboration and stakeholder involvement</td>
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<tr>
<td>Draw stakeholder map</td>
<td>List of all stakeholders related to the topic: ministries, relevant universities, nuclear industry-focused universities and other educational organizations</td>
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<tr>
<td>Create the joint HR-focused working group for in-depth discussions</td>
<td>Involve all responsible organizations in the process of assessment of education and training requirements, etc.</td>
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<tr>
<td>Evaluate available educational resources (as a part of nuclear infrastructure assessment)</td>
<td>Describe available nuclear and nuclear-relevant educational resources of the partner country and define the starting point for planning</td>
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<tr>
<td>Develop country plan</td>
<td>Work out proposal covering all categories of required personnel, breaking it down to each person and position</td>
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</table>
ROSATOM APPROACH TO EDUCATION AND TRAINING

ROSATOM HR Solution is designed to assist partner countries in developing an appropriate Capacity Building concept while maintaining required safety, security and sustainability levels of their nuclear power programs. Being an integral part of the Capacity Building concept, education and training programs, created within the framework of ROSATOM HR Solution, it fully complies with IAEA standards and Systematic Approach to Training (SAT).

The comprehensive principles of ROSATOM in Education and Training cover different stages of personnel development – from college to university and further to a specific job. It includes programs that allow projecting a feasible long-term career path for every employee – from entry level positions to top management. ROSATOM uses mixed Educational and Training formats to provide trainees with both theoretical knowledge and practical experience.

All programs are split into functional components presenting all key categories of personnel (CP) required for successful implementation of a nuclear power program:

- **Nuclear infrastructure personnel**
  - CP1: Programs for full cycle of nuclear infrastructure development in compliance with IAEA recommendations

- **NPP personnel**
  - CP2: Programs for NPP life cycle including simulators & on-the-job training at own and reference NPP

- **Construction-engineering personnel**
  - CP3: Programs focused on developing skills in field of construction project management for nuclear industry

- **Scientific and research personnel**
  - CP4: Programs focused on application of professional knowledge in industry key scientific and research areas

- **Young specialists and professors**
  - CP5: Industry-focused higher education programs in Russia, professor exchange, etc.

Further information about the ROSATOM educational programs for all key categories of personnel can be found on the website: [www.AtomHRS.com](http://www.AtomHRS.com)
**ROSATOM HR SOLUTION ROADMAP FOR THE NPP PROJECT**

ROSATOM presents the ROSATOM HR Solution Roadmap for the NPP project. The ROSATOM HR Solution Roadmap for the NPP project outlines the key aspects of a two-unit NPP project development (NPP life-cycle stages, nuclear infrastructure development) in the partner country, while applying the relevant IAEA recommendations (IAEA Milestone Approach) (STEP 1).

Moreover, the Roadmap contains recommendations for the education and training of all categories of personnel for NPP project development in the partner country (STEP 2).

### KEY STAGES OF NPP CONSTRUCTION

<table>
<thead>
<tr>
<th>IAEA MILESTONE 1</th>
<th>IAEA MILESTONE 2</th>
<th>IAEA MILESTONE 3</th>
<th>NPP Decommissioning</th>
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</thead>
<tbody>
<tr>
<td>Pre-Project</td>
<td>Design Development</td>
<td>NPP Construction</td>
<td>Comissioning</td>
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</table>

#### IAEA MILESTONE 1
- Ready to make a knowledgeable commitment to a nuclear programme
- Establishment of NEPIO, Regulatory and Atomic Energy Commission
- IGA on nuclear energy signed (i.e., after management changes, function reallocations, etc.)
- IGA on powerful use of atomic energy signed

#### IAEA MILESTONE 2
- Pre-Project: Feasibility study developed
- High-level country plan developed
- Joint HRD working group formed
- Mandatory level of understanding concerning education and training of personnel in the field of nuclear energy and related areas signed
- Building completed
- Site licence obtained
- IGA on nuclear infrastructure signed
- IGA on NPP construction cooperation signed

#### IAEA MILESTONE 3
- Ready to invite bids/negotiate a contract for the first NPP
- Fuel delivered on site
- First concrete poured
- Construction license obtained
- Establishment of Training center
- Start of fuel loading
- Commencement of commercial operation of 1st unit
- Operating license obtained
- Commencement of commercial operation of 2nd unit

#### IAEA MILESTONE 4
- Site licence obtained
- IGA on nuclear infrastructure signed
- IGA on powerful use of atomic energy signed
- Establishment of NEPIO, Regulatory and Atomic Energy Commission

### EDUCATION AND TRAINING

**CP1 Nuclear infrastructure personnel**
100–300

**CP2 NPP personnel**
1050–1200

**CP3 Construction-engineering personnel**
90–135

**CP4 Scientific and research personnel**
800–1200

**CP5 Young specialists and professors**
800–1200

*The information presented in the ROSATOM HR Solution Roadmap for the NPP project is for reference purposes only. Time periods and elements may vary according to the specifics of the partner country and certain conditions.*

**STEP 1: Find your position**

The partner country should first define its current position in accordance with the Key stages of NPP construction. Such indicators as core stages of an NPP life cycle and IAEA Milestones are marked on the graphic.

**STEP 2: Define your demand for education and training**

Depending on its current needs, a partner country may define its demand for education and training of personnel by category:

- Nuclear infrastructure personnel
- NPP personnel
- Construction-engineering personnel
- Scientific and research personnel
- Young specialists and professors

The ROSATOM HR Solution Roadmap for the NPP will be of interest not only to newcomer countries, but also to existing operators.

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**Notes:**
- * The information presented in the ROSATOM HR Solution Roadmap for the NPP project is for reference purposes only.
- ** According to customer needs training of personnel for a partner country could be continued in a specific field at all stages of NPP life cycle.
- ** The average approximation of the headcount and the actual figures may be adjusted, depending on the project specifics and the conditions in a partner country.
- ** Time periods and elements may vary according to the specifics of the partner country and certain conditions.
- ** It is recommended that the partner country provide education of young specialists and professors, as well as of employees for the development of their nuclear industry. The specifics depend on how advanced the level of science and education is in the partner country. At the discretion of the customer country, training of personnel could be prolonged throughout the operational life of the NPP.

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**IAEA Milestone Approach**

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Key Aspects</th>
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<tbody>
<tr>
<td>CP1</td>
<td>Initiation</td>
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<tr>
<td>CP2</td>
<td>Design</td>
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<tr>
<td>CP3</td>
<td>Construction</td>
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<tr>
<td>CP4</td>
<td>Operation</td>
</tr>
<tr>
<td>CP5</td>
<td>Decommission</td>
</tr>
</tbody>
</table>

**IAEA Milestone 1**
- Establishment of NEPIO, Regulatory and Atomic Energy Commission
- IGA on powerful use of atomic energy signed
- IGA on nuclear energy signed

**IAEA Milestone 2**
- Feasibility study developed
- High-level country plan developed
- Joint HRD working group formed
- Mandatory level of understanding concerning education and training of personnel in the field of nuclear energy and related areas signed
- Building completed
- Site licence obtained
- IGA on nuclear infrastructure signed
- IGA on NPP construction cooperation signed

**IAEA Milestone 3**
- Fuel delivered on site
- First concrete poured
- Construction license obtained
- Establishment of Training center
- Start of fuel loading
- Operating license obtained
- Commencement of commercial operation of 1st unit
- Commencement of commercial operation of 2nd unit

**IAEA Milestone 4**
- Site licence obtained
- IGA on nuclear infrastructure signed
- IGA on powerful use of atomic energy signed
- Establishment of NEPIO, Regulatory and Atomic Energy Commission

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**Notes:**
- Technical Client Department
- For managers of Technical Client Departments
- Logistics support
- Developed in collaboration with the Federal Environmental, Industrial and Nuclear Supervision Service (ROSSTIONEDZHDINT)
- BIS - Bilateral Specifications
- DGI - Declaration of Interest
- EIA - Environmental Impact Assessment
- IGA - Intergovernmental Agreement
- PSAR - Preliminary Safety Analysis Report
COUNTRY PLAN FOR PERSONNEL EDUCATION AND TRAINING

COUNTRY PLAN DESCRIPTION
A detailed “big picture” of nuclear industry personnel education and training aimed to support implementation of strategic and operational national nuclear energy program objectives at partner countries.

REASONS FOR PREPARING A COUNTRY PLAN
• Consolidate and coordinate training activities for all categories of personnel required for nuclear projects in the partner country.
• Assure readiness of required personnel prior to important milestones (i.e., unit commissioning)
• Define number of required personnel, relevant educational programs, their duration, location, and other essential details
• Estimate budgets required for personnel development in short-term and long-term perspectives
• Setup the system for monitoring of educational activities (plan vs. fact) for a period of up to 15 years

To assure efficient collaboration with parties involved in comprehensive HR planning, ROSATOM developed a specialized software solution, OCTOPUS, which provides necessary support and tools for designing individual country plans for partner countries.

OCTOPUS DESCRIPTION
OCTOPUS is an HR Planning Information System®, which provides tools for instant development of individual Country Plans. One of the OCTOPUS key features is its ability to bind educational tasks with specific milestones according to the guidelines of IAEA NG-G-3.1 “Milestones in the Development of a National Infrastructure for Nuclear Power” document.

KEY FEATURES OF OCTOPUS INFORMATION SYSTEM
• Consolidation of statistical data on trainees, including information related to individual educational tasks on a timeline
• Tracking and developing the career path of each particular trainee (optional)
• Dynamically generated reports based on predefined templates

ADVANTAGES OF OCTOPUS INFORMATION SYSTEM
Core:
• Transparent and efficient training process for all 5 categories of personnel within one plan
• Plan decomposition to the level of an individual trainee
• Monitoring of personnel training program execution, identifying and dealing with timetable-related risks, timely decision making

Contextual:
• Maintaining an up-to-date database of suppliers of educational services and training programs
• Availability of retrospective data on each attendee versus planned and past training programs

Technical:
• Available online 24 / 7
• Multi-user support – several users working at the same time
• Individually managed access level – according to a User role in the training process and associated privileges

OCTOPUS: https://octopus-rosatom.ru