Talent Management for Nuclear Power in Russian Federation

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Advisor to Director General

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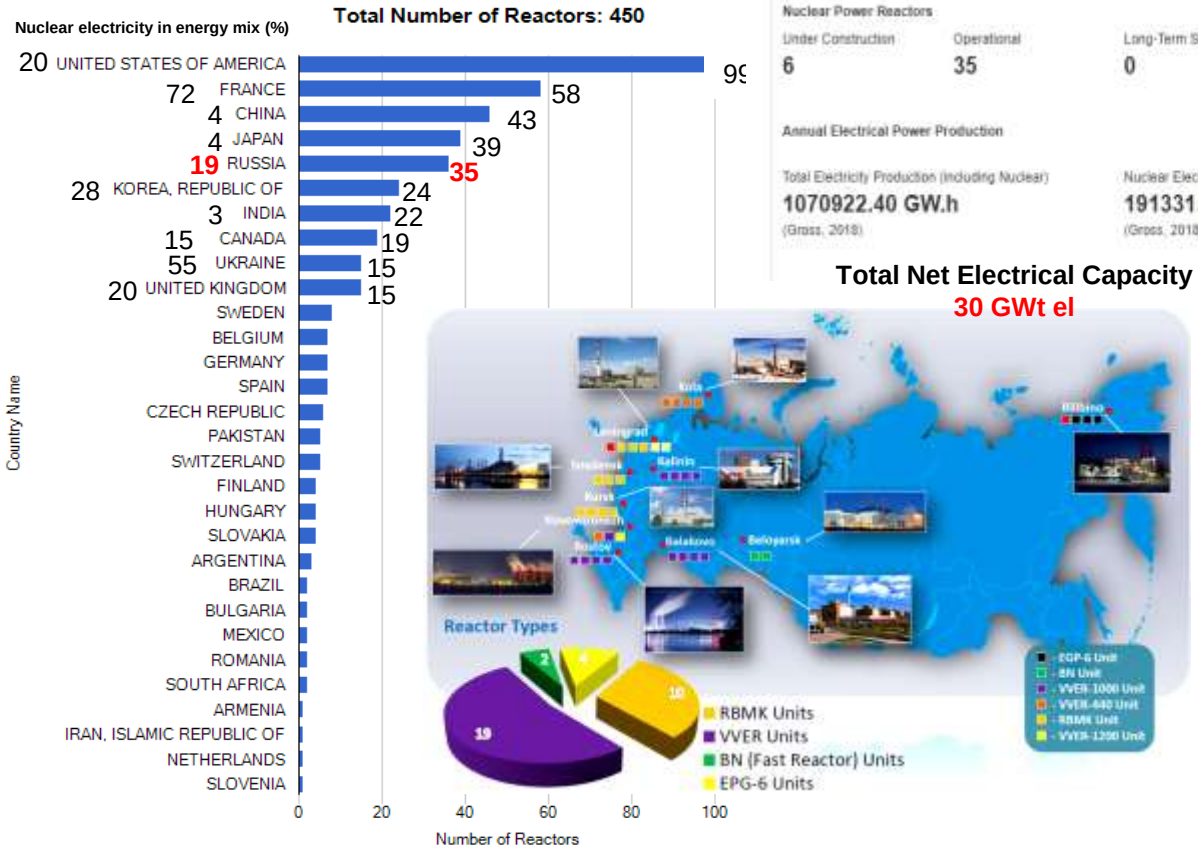
Russian Nuclear Power in a Nutshell



Total Net Electrical Capacity

30 GWt el

Bilibino NPP

4 units
Reactor type: EGP-6
Thermal Power: 65 MW
Electric Power: 12 MW
Cogeneration
U#1 1974-2019
U#2 1974-
U#3 1975-
U#4 1976-

Nuclear Icebreakers

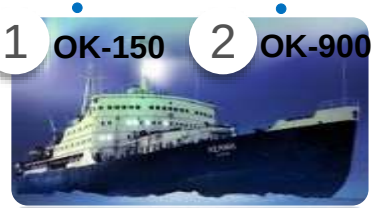
Commissioning

1959 — “Lenin” — 1 OK-150 / 2 OK-900

1970* — “Lenin” — 2 OK-900

1975 — “Arktika” — 2 OK-900A

1977 — “Sibir” — 2 OK-900A



* OK-150 is replaced by OK-900

1985 — “Rossiya” — 2 OK-900A

1988 — “Sevmorput” — 2 OK-900A

1989 — “Sovetskiy Soyuz” — 2 OK-900A

1989 — “Taymyr” — 3 KLT-40M

1990 — “Vaygach” — 3 KLT-40M

1992 — “Yamal”) — 2 OK-900A

2007 — “50 Let Pobedy” — 2 OK-900A

4 RITM-200

3 nuclear icebreakers of the Project 22220 are currently under construction

Rosatom: Some Achievements in 2020

3 November, 12:03 Belarus NPP, Unit#1 (VVER-1200, Gem 3+.) connected to the grid. First kWt*h were produced.

3 October 18:00 Icebreaker “Arctica” (2 nuclear reactors RITM-200, 175 MWt each) during the sea trials reached the geographical North Pole (maximum ice thickness – 3 m).

22 May, Floating NPP “Academician Lomonosov” started commercial operation (2 nuclear reactors KLT-40S, total installed capacity – 80 MWt-el)

Youth is Future

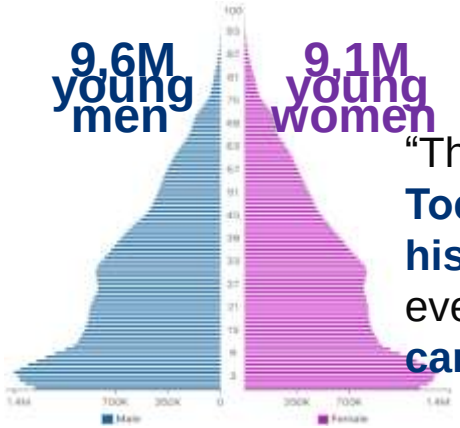
WYF in Egypt (2017), 3200 participants from 113 Countries

World Youth Forum launched in 2017 with the initiative of young Egyptians and supported by President of Egypt

Mr Abdelfattah El-Sisi, President of Egypt

”**Egypt’s Youth are its hope**… With their Enthusiasm and knowledge, Egypt’s future will be built… And with their dedication Egypt will prevail“

منتدى شباب العالم
WORLD YOUTH FORUM
SHARM EL SHEIKH 2017 - ٢٠١٧ شرم الشيخ



Egypt Population Pyramid

Young people are at the heart of the 2030 Agenda

“This is important to all of us and especially to young people. **Today’s generation of young people is the largest in history**. They are more educated, active and connected than ever before. They have high aspirations for the future. **They can be a powerful force for the SDGs**.”

Mr Achim Steiner, UNDP

Mr António Guterres, UN Secretary-General

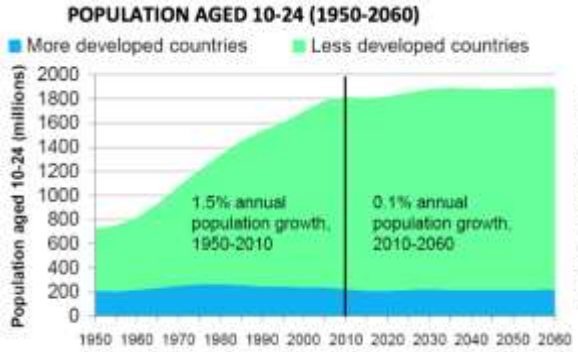
On behalf of the UN Secretary-General Mr Achim Steiner addressed a message to youth at the WYF 2017

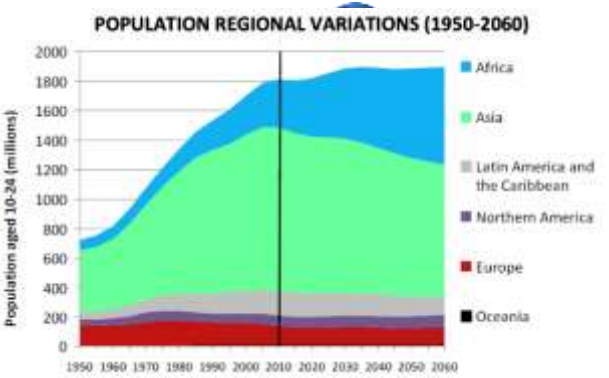
https://wyfegypt.com/index.php

Youth 2030: UN Youth Strategy

"**The future** of humanity and of our planet lies in our hands. It **lies also in the hands of today's younger generation who will pass the torch to future generations.**"

2030 Agenda, paragraph 53





Today is the largest generation of young people ever – 1.8. Billion (~90% in developing countries)

New York, 24 September 2018 *– Youth 2030: The United Nations Youth Strategy, launched by Mr. Guterres at a high-level event of the 73rd session of the General Assembly*

There are 20 youth-specific targets spread over key SDGs

Rosatom E&T System

ROSATOM

Education of personnel in educational entities

Basic school education

Identifying Talents in schools and attracting them to nuclear industry

Школа РОСАТОМА

Vocational education

Over 100 educational organizations that provide applicants to Universities

ATOM SKILLS

Higher Education (over 230 programs)

National Research Nuclear University (MEPhI) and the consortium of key universities

Consortium of 18 leading universities that provide 2/3 of Rosatom yearly employment

Other Universities - partners

Over 100 technical and classic universities

Nuclear programs and initiatives National collaboration Consortium of Rosatom Target Universities

Scientific and Research Base

Math
Chemistry
Physics
IT
Robotechnics
Material Science
Biology
Laser Technology

Facilities

- Research reactor
- Neutrino water detector
- Education and Research Center of Nuclear Technology
- Radiation and Environmental Safety
- Nanocenter

18 Universities in 23 cities of 19 regions of Russia

60 years
of experience in nuclear education

21400+
international students

10500+
postgraduates and doctoral students

30758
academic staff

500+
international business partners

20
Nobel Prize winners

Cooperation with international organizations: ENEN, IAEA, WNU etc.

Education Tracks

1-st level HE	2-nd level HE	Rosatom Target Universities (Consortium)	Recruitment	Professional field
Bachelor degree or partner country	**Key Master programs**	**Leading universities**	**Nuclear products**	**Content**
Bachelor of science (Physics)	Nuclear power engineering	**MEPHI**, **TPU** SPbPU, NNSTU, MEU	NPP	Reactor, turbine, water treatment…
	Nuclear engineering and applications	**TPU, MEPHI**, SPbPU, NNTU, UFU	RR, CNST, Nuclear Infrastructure	Exploitation of RR, isotopes, radiation of materials
Bachelor of engineering (electrical, chemical…)	Material science	**SPSU**, MEPHI, UFU	RR, MEGA science projects	Material science, exploitation of mega science projects…
	Radiochemistry	MSU (Radiochemistry department)	CNST, Nuclear Infrastructure	Back-end/Final stages of the life cycle, Nuclear infrastructure - radioactive waste , …

International Partnership

ROSATOM

UNIVERSITY AGREEMENTS	Educational networks	Staff (HE) re-training
• Joint Programs • Guest lectures • E-learning courses • Summer/Winter Schools	• STARNET • ENEN (ENEN-RU Forum) • NEST	• TTT courses • Scientific educational textbooks • E-learning courses

Train-The-Trainers Course
“NPPs with SMR: Main Aspects and Life-cycle”

15 to 26 March 2021, Nizhny Novgorod, Russia

Organizers:
- **Nizhny Novgorod State Technical University named after R.E. Alekseev (NN**
- **Rosatom Technical Academy (Rosatom Tech)**

The course is aimed at **faculty members and university management** involved in the initiation or development of nuclear curricula in universities of countries embarking on nuclear power programmes, in particular, seeking to develop nuclear power with **SMR**

In cooperation with JSC «Afrikantov OKBM» -the chief designer of RITM-200 and KLT-40S SMRs

The main topics:

- NPPs with advanced SMR
- Design and technological solutions for SMR. RITM-200 and KLT-40S
- Development perspectives and application of NPPs with SMR
- Floating power units: status and options for future projects. Marine atomic water desalination complexes using energy modules with SMR
- SMR for perspective nuclear floating thermal power plants and vessels
- Probabilistic safety analysis for nuclear power plants with RITM-200 and KLT-40S reactor
- Approaches to classification and management. Issues of civil liability for nuclear damage during the construction and operation of SMR
- Physical protection for transportable NPPs with SMR
- Basic principles of nuclear power plant management
- Development of educational programmes on SMR technology

- **To apply contact head of project office “Nuclear Education Transfer” Mr. Ilia FILIPEV ISFilipyev@rosatomtech.ru**
- **More info: http://rosatomtech.com/train-the-trainer-courses-for-university-faculty-members/**

ROSATOM: International Training Activity on SMRs

ROSATOM

FNPP "Akademik Lomonosov", Pevek

2020

Training course on "Simulation Codes for Safety Assessment of SMR and VVER-type reactors".
03-06.02.2020/ 16 participants

2017

SV on SMR's and floating **16 – 27 October, 2017**/ Financing – IAEA (TC)/ **4 participants**

2016

Three Training Courses on HTGR/SMR technology
/November- December, 2017./ Total:14 participants

2015

SV on floating NPP and fast reactor SMR technology.
Training on floating NPP and fast reactor SMR technology
28.11-16.12.2016/ 3 participants

2013

Training Course on "The Assessment of Advanced Pressurized Water Reactors Utilization in New-comer Countries" **09-13.11.2015/ 5 participants**

The Training Seminar on "Introduction to the Liquid Metal Fast SMR Technology"
29.09.-04.10.2013/ 14 participants

2011

The Technical Workshop on the topic "The Development of Curricula for Training of Foreign Specialists in Small-Power Nuclear Plants in Russia" **7.06.2011**

Making Use of International Platforms

An intensive **3-days group work on considering SMRs as a harmonization option for energy mix** has been held at the Joint Russia-IAEA Nuclear Energy Management School for Young Professionals 2019

OBJECTIVES

DISCUSS DEPLOYMENT OF DIFFERENT SMR TECHNOLOGIES IN A GIVEN REGION BY PERFORMING A COMPARATIVE EVALUATION

PREPARE AND PRESENT YOUR FINDINGS

SMRs AND REGIONS


CAREM
Argentina


NuScale
USA


RITM
Russia


HTR-PM
China


SMART
Korea

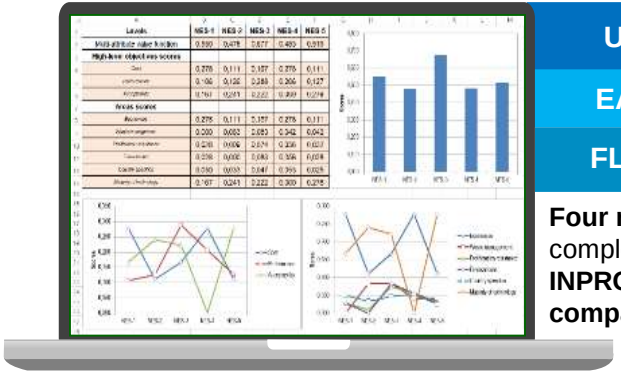

NORTHERN


DRY


MOUNTAIN


ISLANDS

IAEA INPRO KIND-ET Tool



USER-FRIENDLY

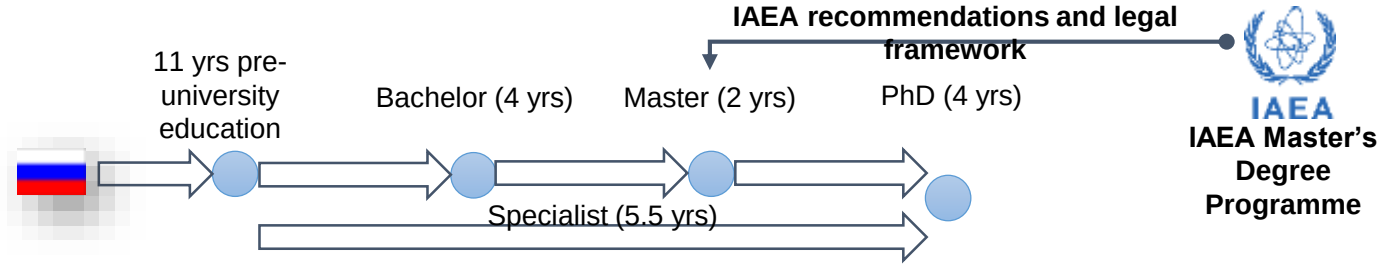
EASY TO USE

FLEXIBLE

Four region dedicated groups completed their projects using IAEA **INPRO Excel-based tool for comparative evaluation** – KIND-ET

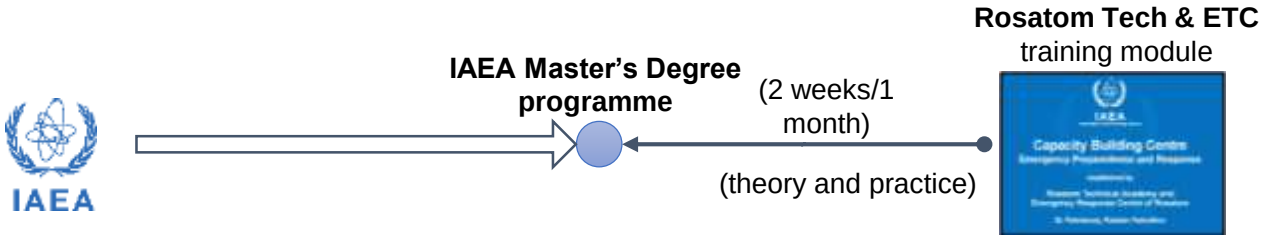
Group projects indicated potential benefits and challenges of SMRs deployment and were evaluated and discussed over with NEM School experts

EPR Education Track in Russia and Synergy with the IAEA MSc Programme



- The Federal State Educational Standard of Higher Education 20.03.01 **Technosphere Safety** (Bachelor's degree programme) – adopted in 2016
- The Federal State Educational Standard of Higher Education 20.04.01 **Technosphere Safety** (Master's degree programme) – adopted in 2015
- Graduates can apply for vacant positions providing for employment in the field of emergency preparedness and response at the enterprises of ROSATOM

TOMSK POLYTECHNIC UNIVERSITY · moscow polytech · MIREA · Voronezh State University · Ural Federal University



A Look into the INPRO's Future

IAEA INPRO International Project on Innovative Nuclear Reactors and Fuel Cycles

ROSATOM

2021 FIRST INPRO SCHOOL ON RUSSIAN SOIL

- Nuclear Energy Sustainability
- Economics of Nuclear Power
- Infrastructure and Safety
- Proliferation Resistance
- Environment and Waste Management
- Role of Technological and Institutional Innovations
- Nuclear Energy System Scenario Modelling
- Enhanced Nuclear Energy Sustainability

2021 INPRO DIALOG FORUM IN RUSSIA

MAIN TOPIC - SMALL MODULAR REACTORS

IAEA

INPRO MSc

INPRO MASTER'S PROGRAMME

for nuclear and STEM graduates

SUSTAINABLE DEVELOPMENT GOALS

ACHIEVING SDGs

INPRO CAPACITY BUILDING ACTIVITIES

INPUT

INTERNATIONAL & RUSSIAN STUDENTS

Nuclear Physics and Engineering | Computer Science | STEM

INPRO MSc

OUTPUT – CORE COMPETENCIES

Apply information technology and numerical analyses for modelling, analysis and problem solving

Use analytical tools developed in the IAEA and Russian Federation for long-term energy planning

Examine nuclear energy systems sustainability based upon INPRO Methodology in the areas:

- Environment
- Safety
- Proliferation Resistance
- Waste Management
- Infrastructure
- Economics

Apply principles of project management

OUTCOME – END RESULTS

Strategic and long-term energy planning in support of the development of national position concerning the start of a nuclear power programme

Building trust and increasing awareness of the INPRO activities to promote peaceful uses of nuclear energy under auspices of the IAEA

Feedback from trainees from emerging countries

Expectations from SMR deployment

- Diversification of power sources (reduce dependence on fissile fuel);
- Reduction of carbon footprint (substitute coal plants);
- Water desalination;
- Industrial heat;
- Power supply for remote areas;
- **Increased intellectual potential of nation**;
- Emerging new industrial option s through localization including manufacturing. Increasing the level of national technological development.

Feedback from trainees from emerging countries 2/2

Expectations from vendors

- Support in development nuclear power infrastructure (owner/operator, regulatory body);
- **Support in establishing national system of HRD**;
- Localization;
- Attractive financing models;
- Referent SMR in vendor country.

Thank you
for your attention

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