



РОСЭНЕРГОАТОМ

ЭЛЕКТРОЭНЕРГЕТИЧЕСКИЙ ДИВИЗИОН РОСАТОМА

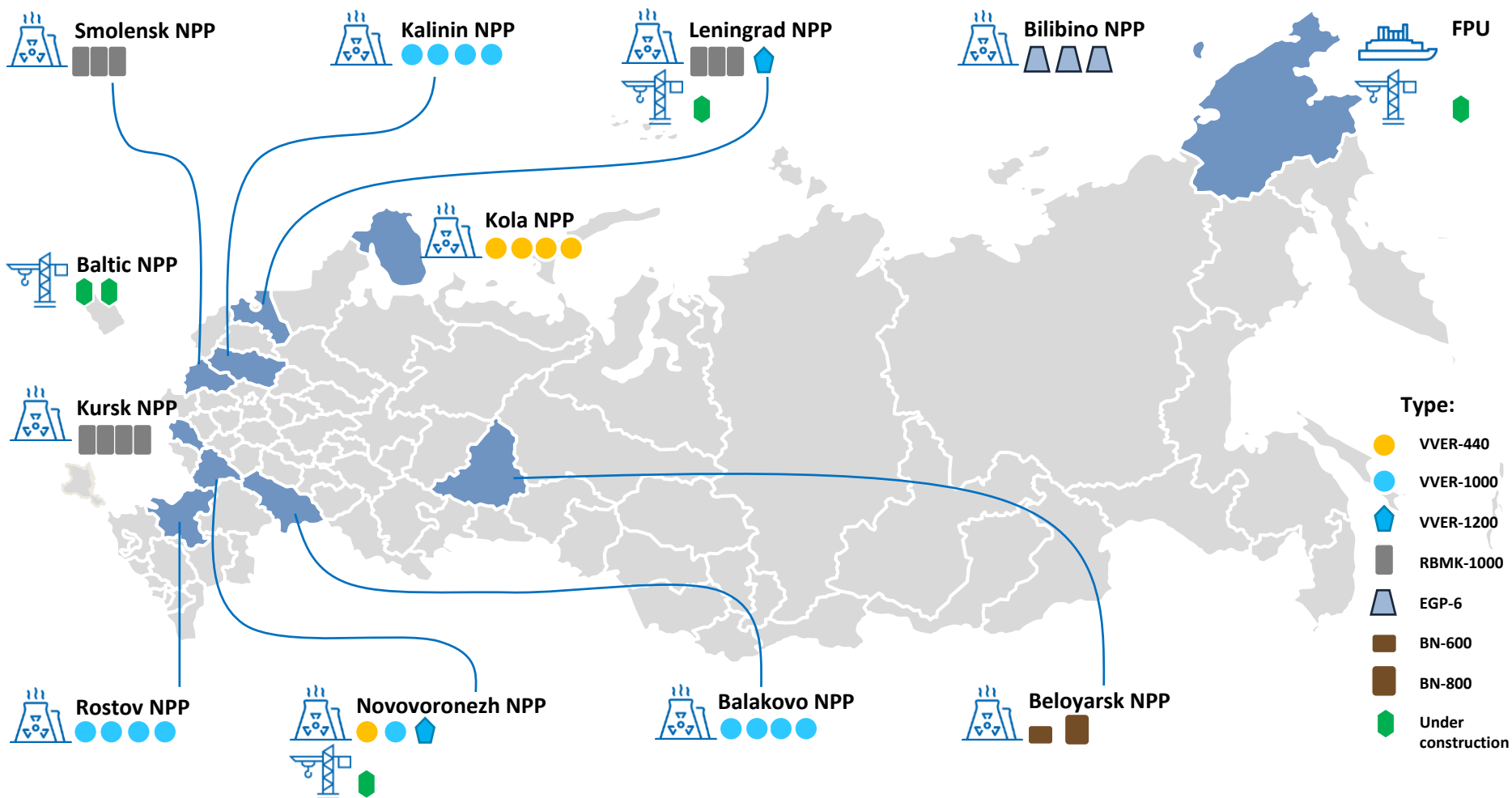
Main results of optimization of occupational radiation protection at NPPs in Russian Federation

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The operating organization for Russian NPPs: Rosenergoatom Concern

Units in operation and under construction



Nuclear Power in Russia

35 units in operation at 10 NPPs

7 units under construction (including the Floating Power Unit)

29 GW installed capacity

204 TWh electricity generation in 2018

19 % nuclear power share of total electricity production

0 number of INES2 level and above events

0 number of workers with dose more than 18 mSv

Regulatory requirements and dose reduction stages

**The Russian Federation federal law «On Public Radiation Safety»
(No. 3-FZ, January 9, 1996)**



From 1 January 2000: An effective dose of 20 mSv per year averaged over five consecutive years (100 mSv in 5 years) and of 50 mSv in any single year

Stage 1

1995 – 2004

Compliance with dose limits

Stage 2

2005 – 2014

Dose optimization

Stage 3

2015 – 2024

Achievement of targets

Key outcomes

Stage 1 1995 – 2004

- number of workers with dose more than 20 mSv per year was minimized
- individual doses more than 100 mSv in 5 years were excluded

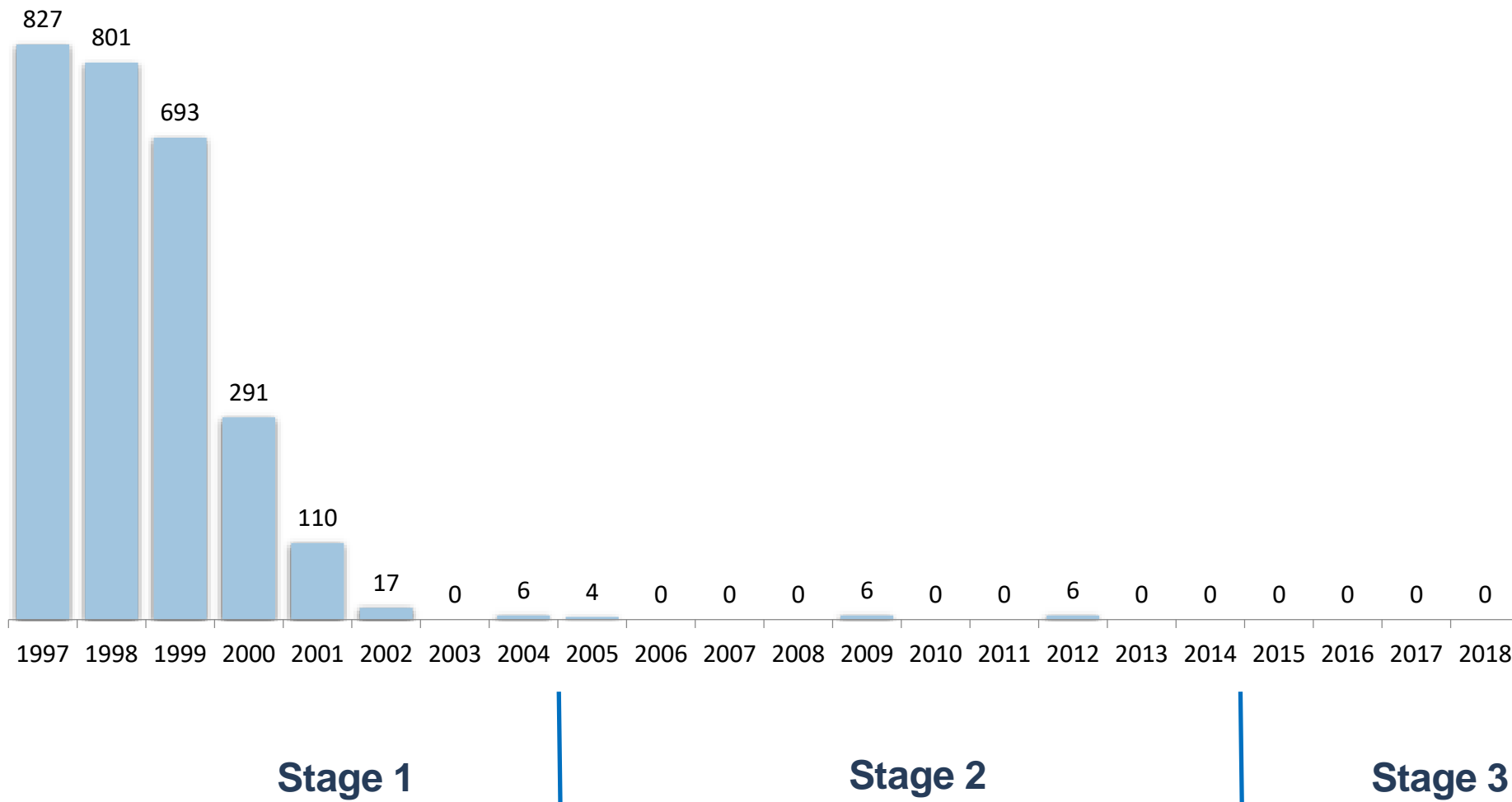
Stage 2 2005 - 2014

- individual doses more than 20 mSv per year were excluded
- collective dose was optimized

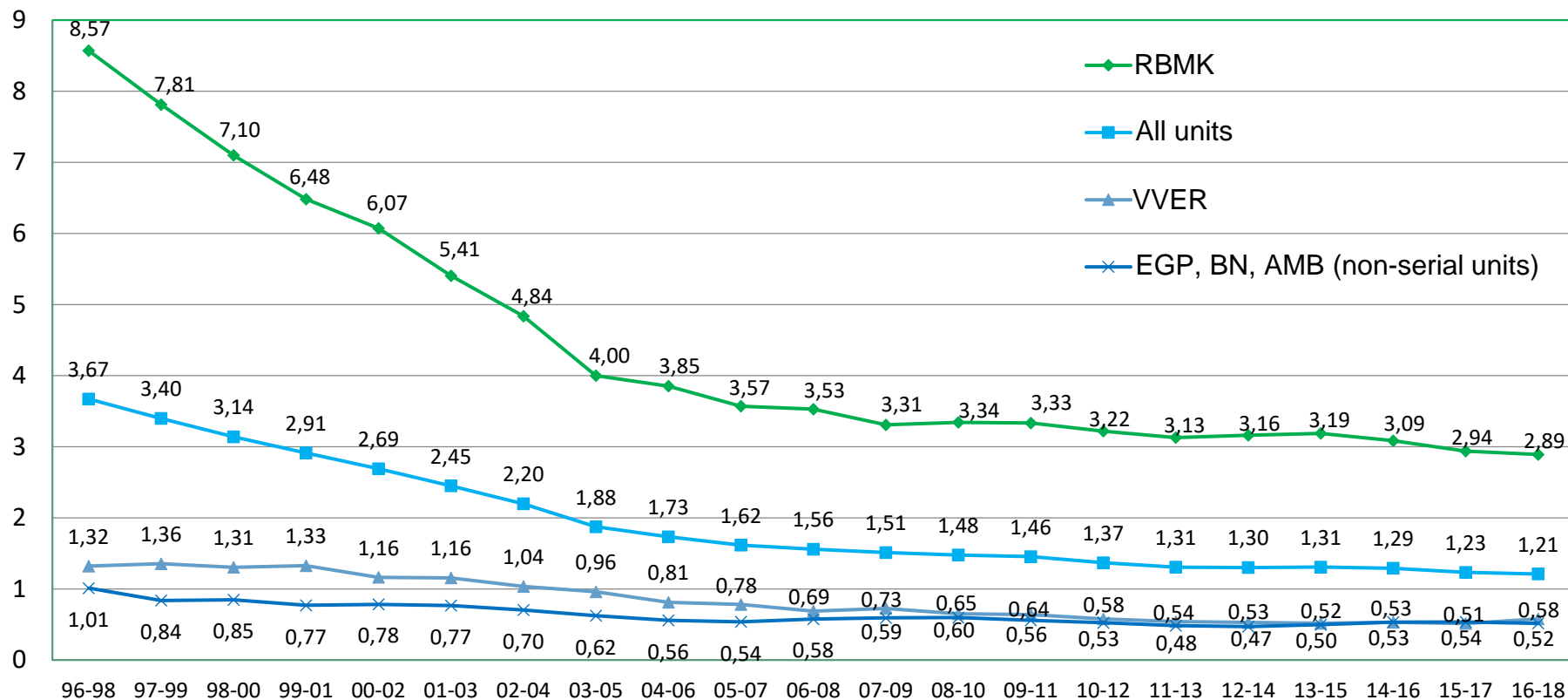
Stage 3 2015 – 2019

- individual doses more than 18 mSv per year were excluded
- 72 % of workers have doses less than 1 mSv

Number of workers with individual dose more than 20 mSv



Collective doses for different types of reactors, man.mSv/unit

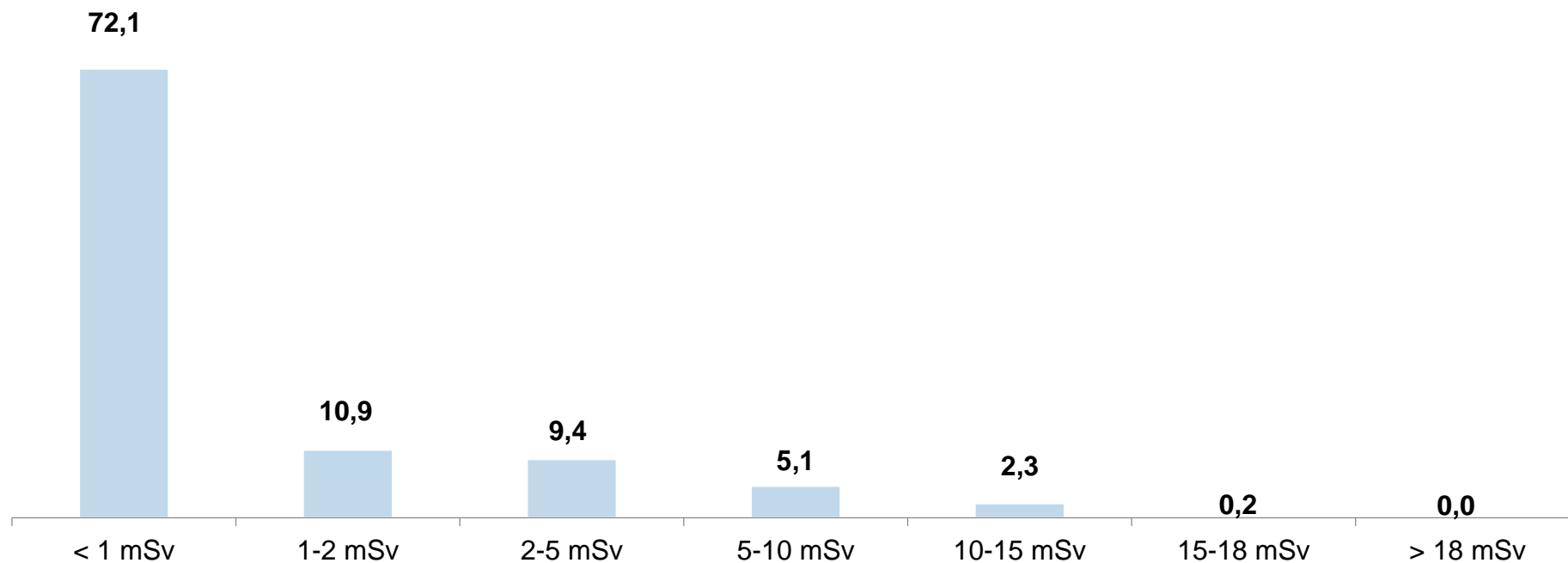


Stage 1

Stage 2

Stage 3

Current distribution of annual effective dose, %



Programme for optimization of occupational radiation protection at NPPs (Dose reduction plan)

Programme duration	<ul style="list-style-type: none">• five years
Specific features of activities shaping	<ul style="list-style-type: none">• individual doses reduction where they have maximum values• source-related collective doses reduction where we can receive maximum benefit at minimum cost;• dose reduction from each source by decreasing exposure of critical groups of this sources
Areas of activities	<ul style="list-style-type: none">• organizational activities• improvement of radiation levels• reduction of exposure time

Dose reduction plan activities

Areas	Activities
Organizational activities	<ul style="list-style-type: none">• development and upgrade of procedures• exchange of operating experience• review of results and improvement of work
Improvement of radiation levels	<ul style="list-style-type: none">• use of shielding• improvement of decontamination methods• preventing spread of contamination
Reduction of exposure time	<ul style="list-style-type: none">• improvement of implementing of technological processes• improvement of work with scaffolding and insulation• using of specialized tools, means of mechanization, remote handling devices, industrial television systems

Target-setting

<ul style="list-style-type: none">• Dose reduction plan targets (5 years)• «Radiation Safety Management» process targets (1 year)	Rosenergoatom Concern
<ul style="list-style-type: none">• Annual dose budget• Dose budget for outage period• Dose-related indicators of radiation works	NPP

Collective dose per unit
Annual maximum individual dose
Maximum individual dose per five years
Number of workers with dose less than 1 mSv

Conclusion

Dose reduction plans have been developed. Occupational exposure optimization activities are implemented as planned

Doses to workers are maintained below regulatory dose limits

Dose trends of workers show a decline over a long period of time