INTER RAO UES

Foundation «Energy Without Borders» and its R&D Program

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INTER RAO UES Group Profile

- ✓ **INTER RAO UES is a diversified energy holding that owns power generation, engineering, distribution and trading assets in Russia and CIS countries as well as in Baltic and Transcaucasian regions**
- ✓ **The company has a leading position in the electricity import-export activities in Russia**
- ✓ **The company is present in all key segments of the Russian power market**

- ✓ **Number of shareholders – 330 thousands**
- ✓ **Installed power capacities – 29 GW**
- ✓ **Length of electricity grids – 30 000 km**
- ✓ **Number of power plants – 28 (in 6 countries)**
- ✓ **Number of employees – 47 000**

International business

- INTER RAO operates in 27 countries of the world
- International assets of INTER RAO currently include generation and trading companies as well as grid operators
- Our import and export combined exceeded 26 bn kWh in 2011
- International generation assets of INTER RAO produced 15 BLN kWh of electricity in 2011 (including Armenian NPP)
- INTER RAO owns grid operators in Georgia and Armenia. Our transmission lines span 34 thousand kilometers and serves more than 1.4 million individual consumers.
- INTER RAO focuses its strategy on expanding existing markets and entering retail sales and engineering markets

INTER RAO UES is closely looking at emerging markets of Asia, Africa, Latin America and Middle East as well as mature European markets

International generation assets

Name	Country	Installed capacity
Razdan TPP	Armenia	1, 110 MW
Mtkvari TPP	Georgia	300 MW
Khrami HPP-1	Georgia	112,8 MW
Khrami HPP-2	Georgia	114,4 MW
Ekibastuzskaya TPP-2	Kazakhstan	1 000 MW
Vydmantai Wind Park UAB	Lithuania	30 MW
Moldova TPP	Moldova	2 520 MW
Total for international assets		**5 186,8 MW**

Strategic goals and objectives of the INTER RAO UES Group R&D Program

Strategic goals

- Implementations of the INTER RAO UES Group Strategy tasks
- Development of science and technology capabilities for the purposes of innovative development and technology upgrading of the company
- Achievement INTER RAO UES Group leadership in the energy sector

Strategic objectives

- Development of the advanced energy technologies defining modern science and technology progress in industry
- Increase of active equipment energy efficiency, its reliability and safety, improvement of ecology
- Development of management and marketing innovations

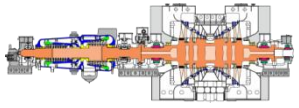
Structure of the Foundation program

•Power engineering technologies for renovation and modernization

INTER RAO UES R & D Program

•Effectiveness, reliability, ecology of assets in operation

•Managing and marketing innovation



Program R &D «Power energy partnership »

•NGCC power plant with electric power more than 370-400 MW

• Ultra-super critical coal-fired power plant

•Technology of recycling of ash and slag

Foundation «Energy without borders»

Program «Skolkovo»

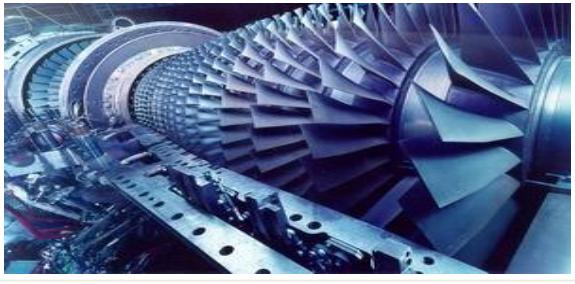
•R&D Center

•Innovation-technology center (ITC)

• Skolkovo science and technology Institute partnership

Program R &D «Science and Technology Leadership»

- World trends;
- Main directions of technology platforms;
- Focus of the Russian Federation Government policy in energy industry;
- Science and technology leadership of Group INTER RAO UES in the power industry



Private – public partnership

Ministry of Energy

Federal Program «Power efficiency and development of power industry»

Ministry of Education and Science

Federal Program «Development of science and education »

Federal Purpose Program “Research and development of advanced technologies….."

Foundation «Energy without Borders»

Institutes of development

1. «Vnesheconombank»
2. «Rosnano»
3. «Russian Venture Company»
4. Fund assistance to development small enterprises in the science and technology sphere

Ministry of Industry and Trade

Federal Program

«National technological base»

Structure of the Foundation Program

«Science and Technology leadership» Program

INTER RAO UES «R & D» Program

«Skolkovo» Program

Program «Power energy partnership »

Actions	Portfolio 1 Development of advanced power energy technologies	Portfolio 2 Increasing efficiency of operating equipment	Portfolio 3 Organizational and marketing innovations	Portfolio 4 Innovation infrastructure
1	Technological Platform «Environmentally clean and efficient electricity of thermal power generation»	Increasing of power energy efficiency	Management and marketing innovations	Information infrastructure
2	Technological Platform «Distributed small-scaled power generation»	Improvement of maintenance services and safety enhancement	Human capital development	Development of demonstration achievements and transfers of advanced experience
3	Technological Platform «Smart grids»	Improvement of environmental indicators	Systematic and complex research in power industry	Participating in the investment networks, association of venture financing
4	Technological Platform «Bioenergy»	Cooperation with cluster «Energy efficient technologies» ,«Skolkovo»	Development and implementation of education programs with universities	R&D centre in «Skolkovo»
5	Research projects with «Skolkovo»		Development and realization of education programs with «Skolkovo»	Innovation Technology Centre (ITC) in «Skolkovo»

KEY TECHNOLOGY of TP:
Coal- fired plants by 330–660–800 MW with efficiency 44–46%, perspective **TECHNOLOGY ON ADVANCED ULTRA-SUPERCRITICAL PARAMETRES OF STEAM (35 MPa, 700/720 °C)**, providing efficiency 51–53%.

Program«Science and Technology leadership»:
Creation of the coal plants on **ADVANCED SUPERCRITICAL PARAMETRES OF STEAM (35 MPa, 700/720 °C)**, providing electric efficiency 51–53%.

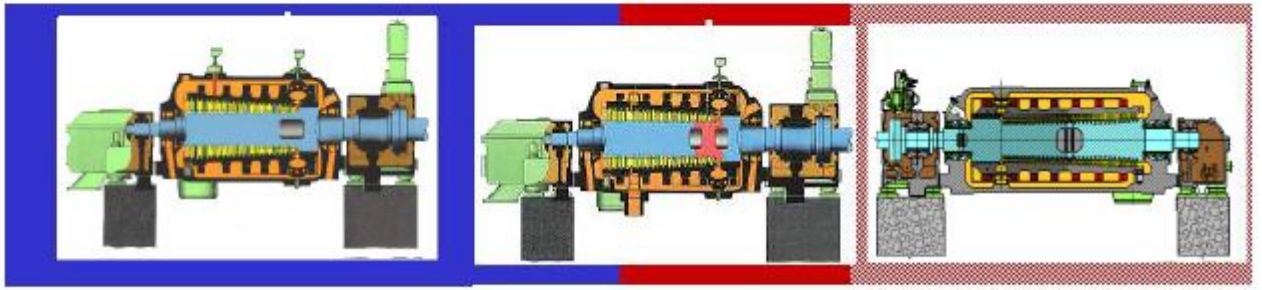
A-USC
(35 MPa, 700/720 ° C)

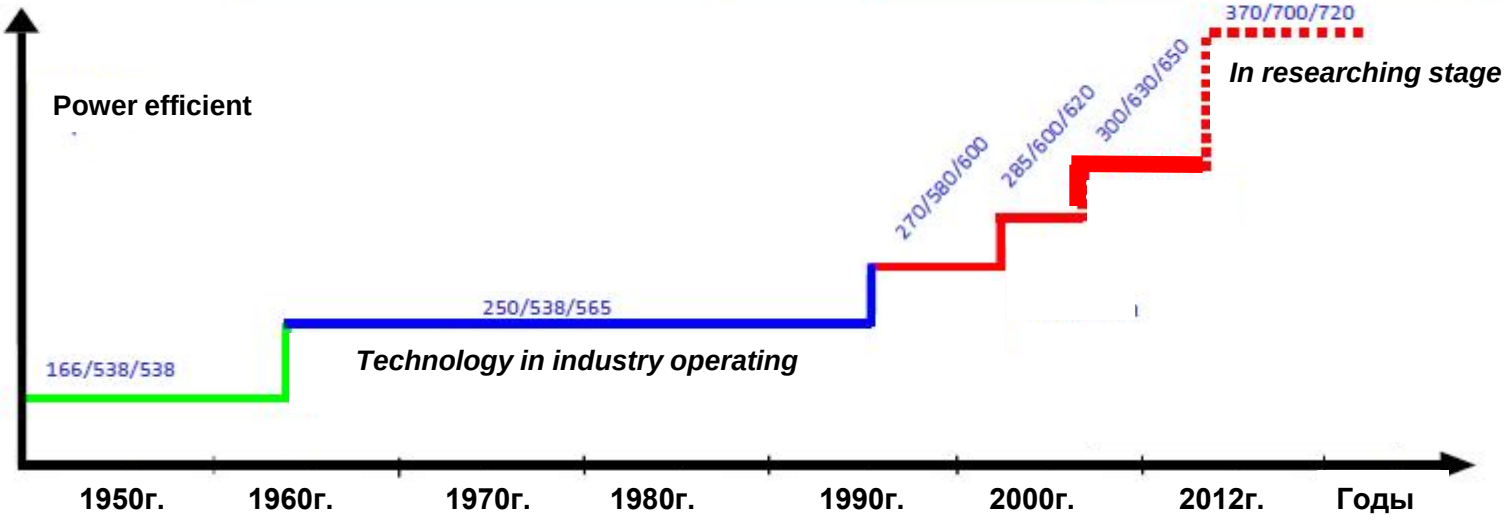
From ultra supercritical parameters to advanced supercritical :

Super critical (efficiency– to 40 %)
Present situation

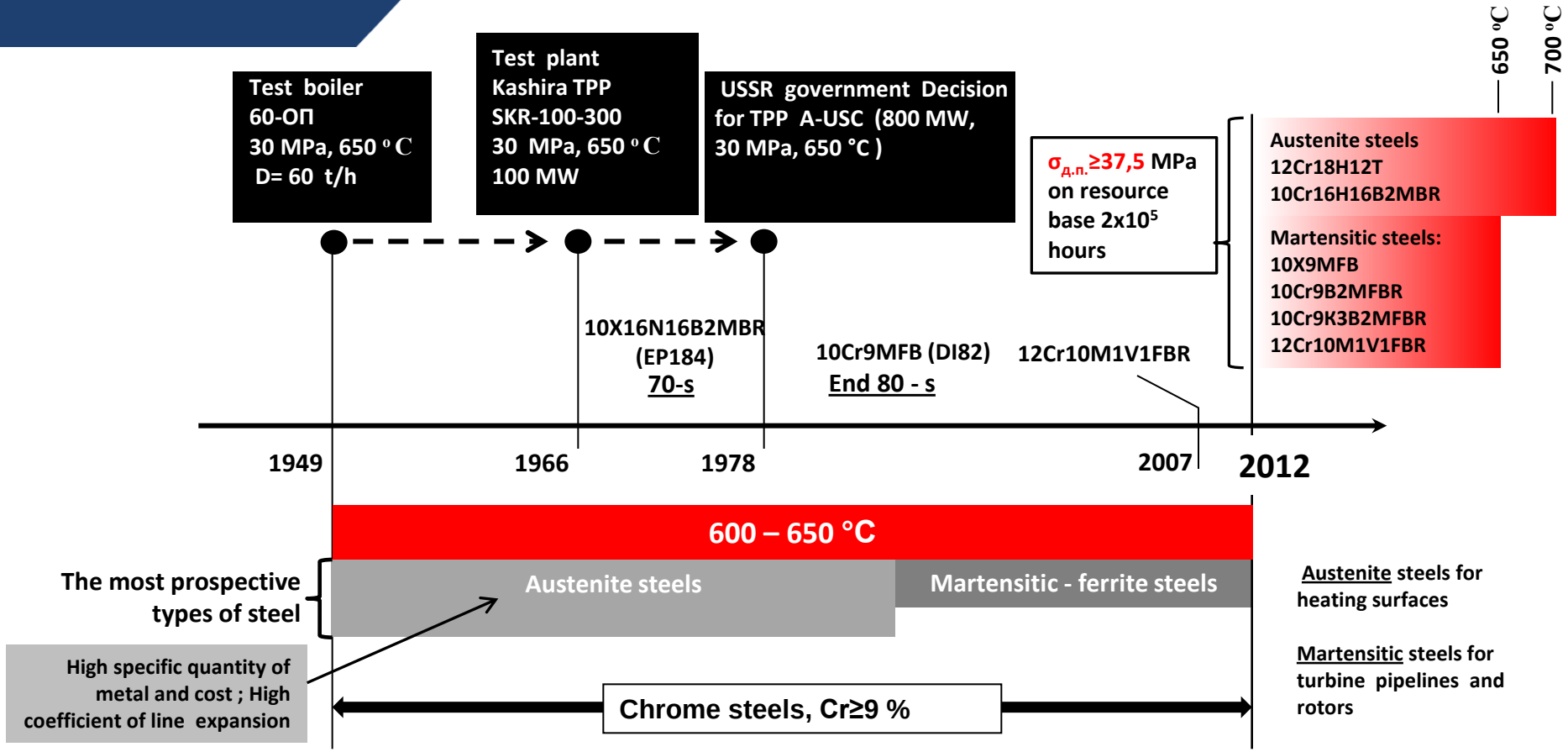
USC (efficiency– to 46 %)
Developments – project of Federal Purpose Program, Program INTER RAO

A-USC (efficiency– more than 50 %)
Fund Program





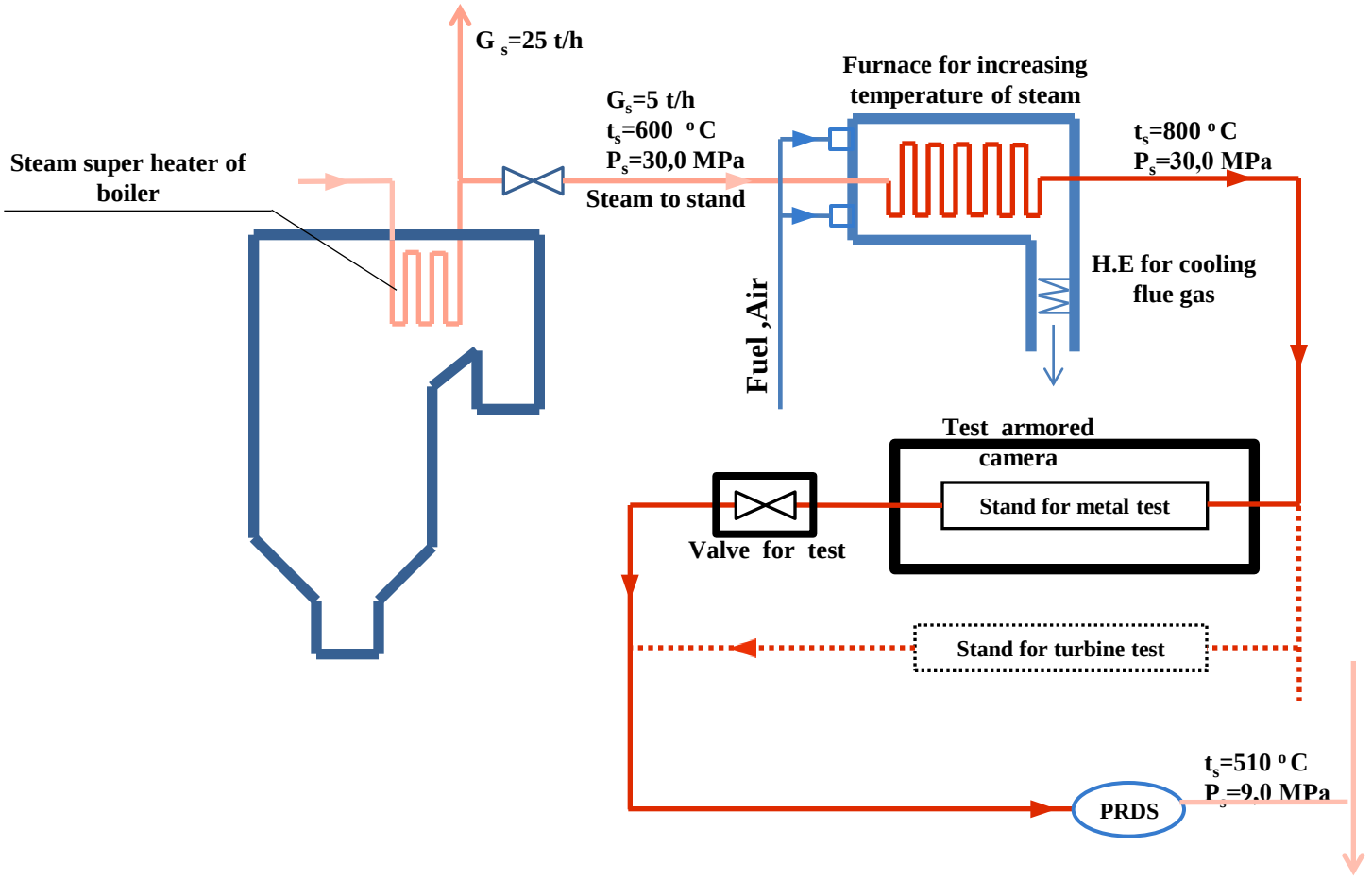
Some history A-USC in Russia



Russian heatproof steels providing base for power plants with steam temperature more than 620 °C.

Experimental stand TPP All-Russian Thermal Engineering institute with furnace for added superheating

Principal scheme of experimental stand with furnace for steam superheating



IEA collaboration with Foundation «Energy without borders»

First steps

- Russian Technological Platform «Environmentally clean and efficient electricity of thermal power generation» (November 2011)
- Expert meeting «Roadmaps of the development and adoption of the foremost energy technologies» (June 2012)
- Review of Technology Roadmap « High Efficiency Low Emission (HELE) coal-fired power generation » (August 2012)

Coming events

- Expert meeting «Cleaner and more efficient coal technologies in Russia » (December 2012)
- Memorandum of Understanding (IEA – Foundation)
- Implemented Agreements – by Technologies or Projects

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Thank you