



**REPUBLIC OF TÜRKİYE
MINISTRY OF ENERGY AND
NATURAL RESOURCES**

NUCLEAR POWER PROGRAMME OF REPUBLIC OF TÜRKİYE

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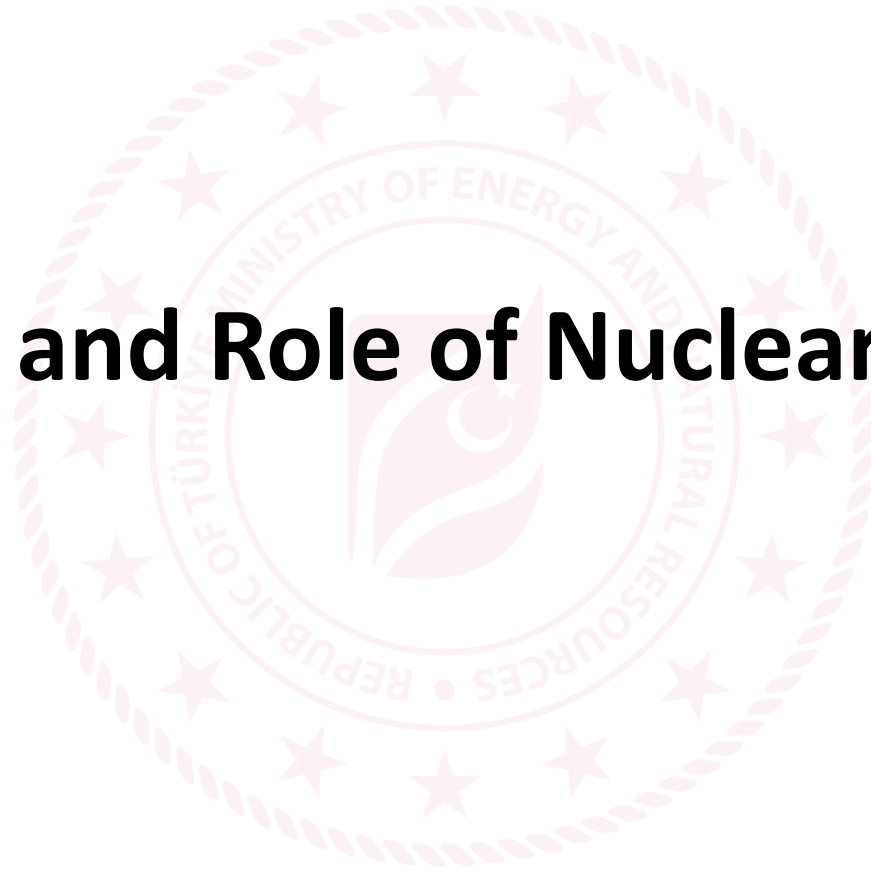
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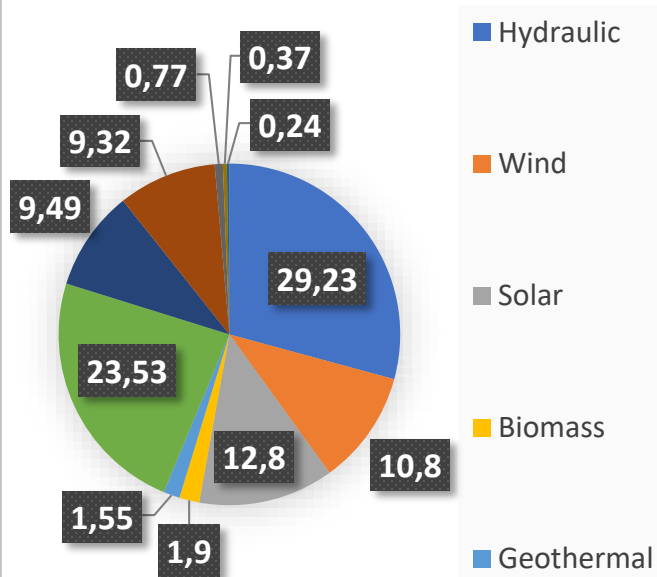
PART I

Energy Outlook and Role of Nuclear Energy

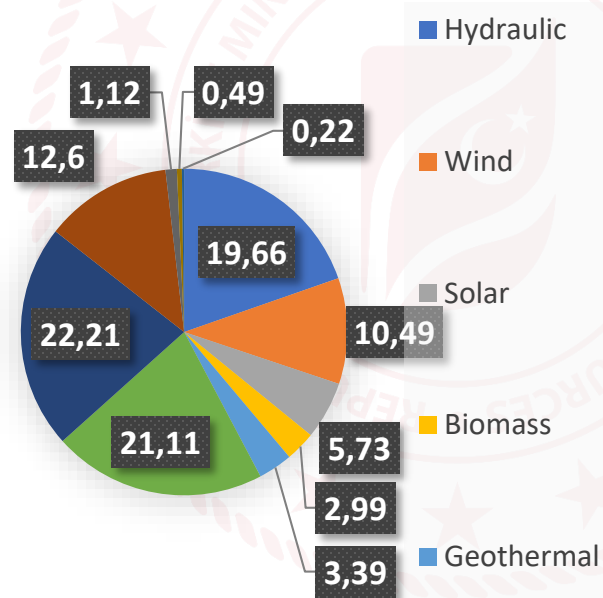


Electricity Market Outlook & Installed Capacity (2023)

**TOTAL INSTALLED
CAPACITY (MW)
SHARE
(%)**



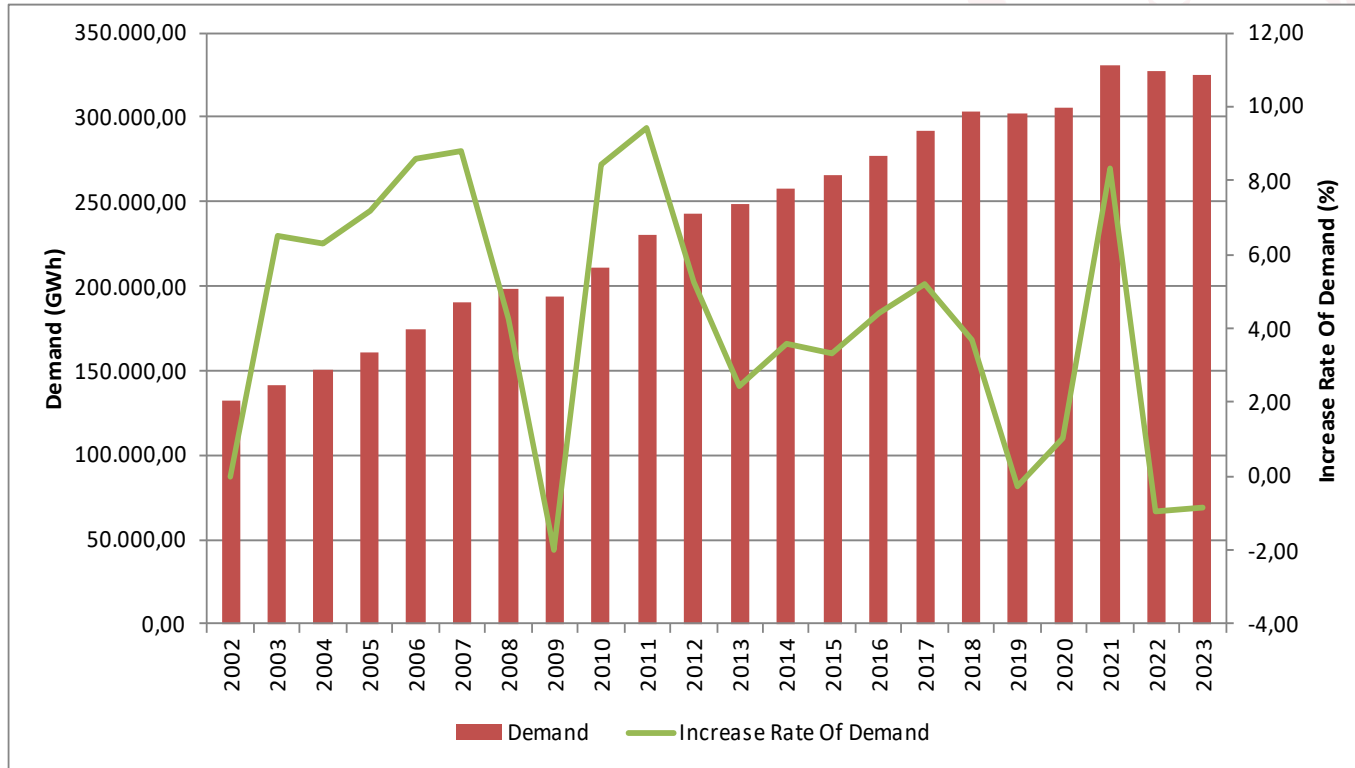
**TOTAL PRODUCTION
(MWH)
SHARE
(%)**



- ❑ **Total Installed Capacity:** 109.348 MW (at the end of the 2023)
- ❑ **Peak Demand in 2023:** 55.118 MW (increased by 5.42% compared to 2022)
- ❑ Türkiye is able to meet its electricity demand from existing power plants.
- ❑ High dependency on imported primary energy sources (approx. %70)
- ❑ 98% of the natural gas, 92% of the oil and 50% of coal were imported last year.

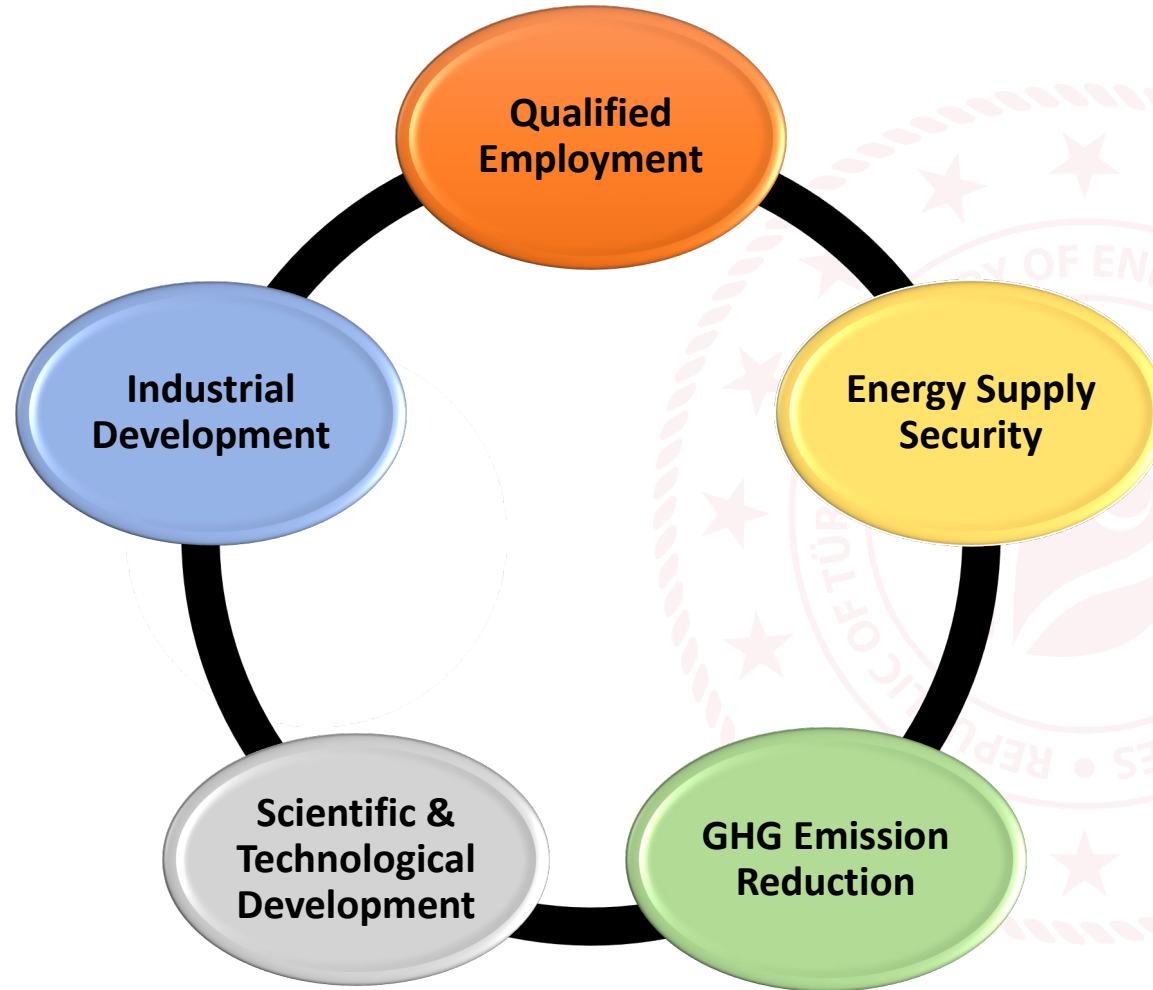
Electricity Demand (2002 – 2023)

Electric Energy Demand and Rate of Increase by Years (GWh-%)



Main Observations

- ❑ The demand has increased compared to the previous year in the last 20 years, except for 2009, 2019 and 2022.
- ❑ **Demand Growth:** doubled in 15 years between 2004 – 2019.
- ❑ **Total Electricity Demand in 2023:** 330 TWh (0.17% increase compared to the previous year)
- ❑ After the intensive period of pandemic, electric energy demand in 2021 increased by 8.13% compared to the previous year.



Fundamentals of National Energy Strategy

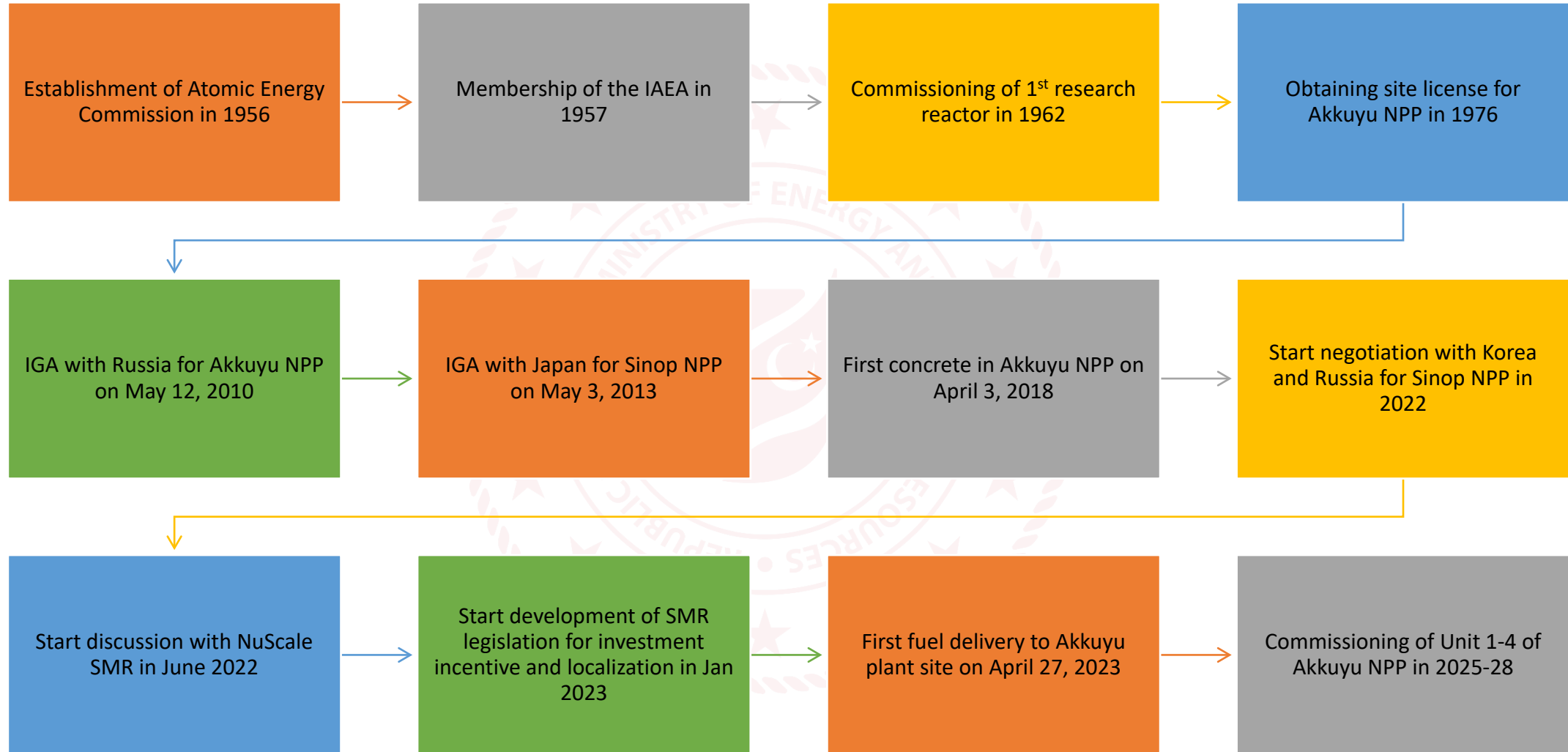
- To ensure the diversification of resources in the supply of oil and natural gas
- To increase the share of domestic and renewable energy in electricity generation
- To incorporate in nuclear power into electricity generation portfolio

PART II

Status of Nuclear Power Programme of Türkiye

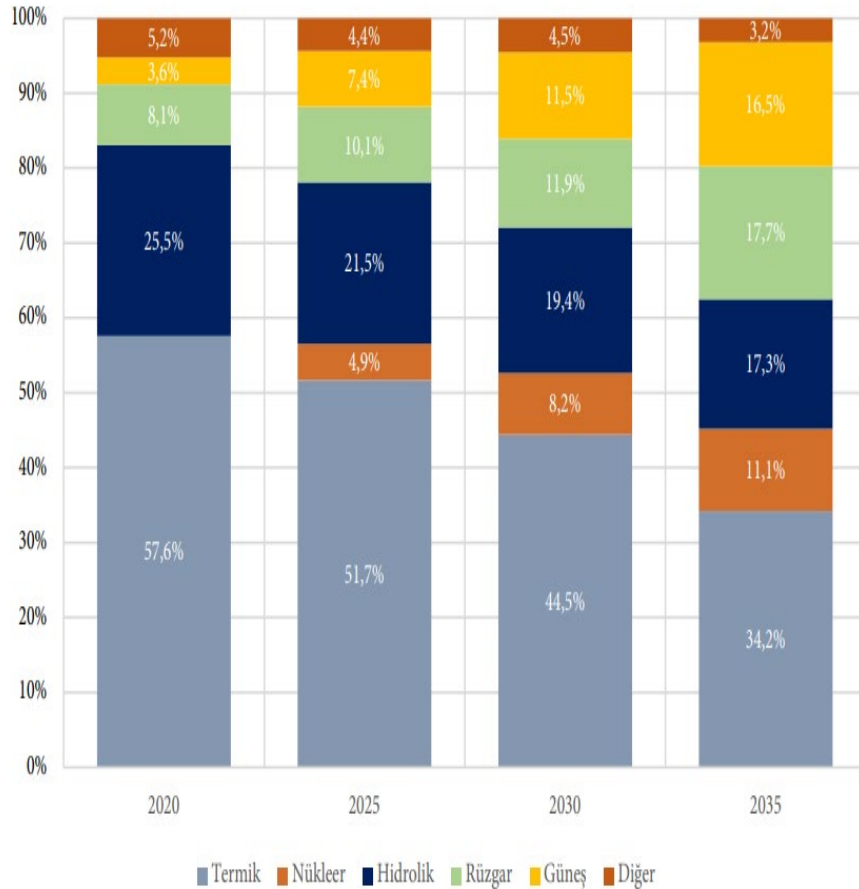


History of the Nuclear Power Programme in Türkiye



Türkiye National Energy Plan (announced in 2022)

National Energy Plan Projection



Introduction of
nuclear energy
until 2025

11.1% nuclear
share in 2035

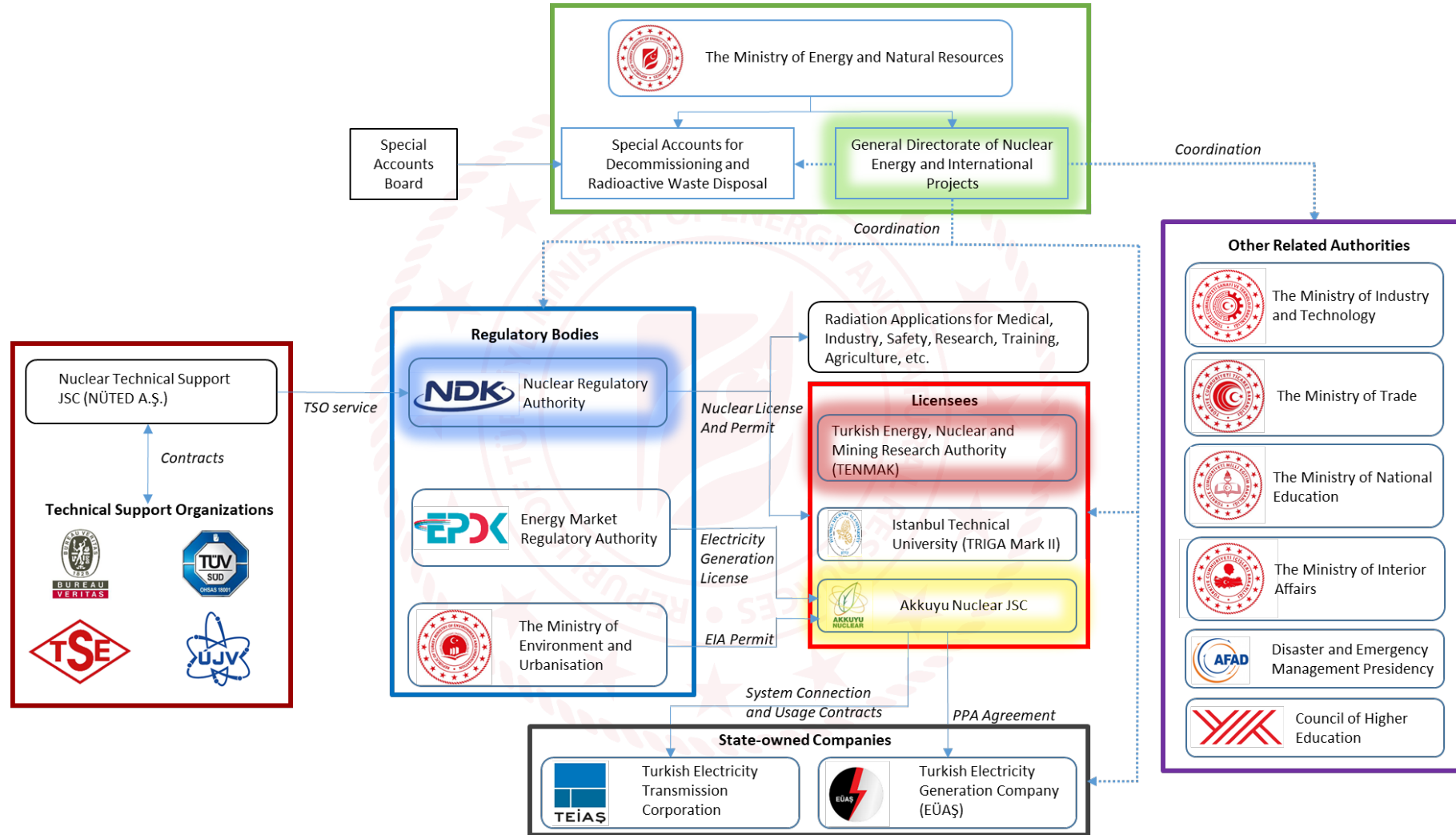
29.3% nuclear
share in 2053

- Approximately 20 GWe nuclear capacity until 2053 to achieve decarbonization goal
- 12 large scale reactors on 3 sites + 5 GWe SMRs



- **Nuclear Regulation Law (Number: 7381 entered into force on March 8, 2022)**
 - General principles and national policy on spent fuel (SF) and radioactive waste (RAW) management and decommissioning (DECOM),
 - Establishment of independent nuclear regulatory body, the NDK,
 - Establishment of a national nuclear technical support organization, NÜTED,
 - Reorganization of TAEK as to carry on, organize, support, coordinate and supervise scientific, R&D, technical, and administrative studies for the use of nuclear energy, ionizing radiation and accelerating technologies for peaceful purposes.
 - Contains the provisions regarding to Nuclear Third Party Liability in line with 2004 Paris Protocol.

Organizational Structure in Nuclear Sector



Key Parameters of the Akkuyu NPP Project & IGA

PARAMETERS	
Estimated CAPEX	20 billion USD
Reactor type	VVER-1200 (AES-2006)
Number of units	4
Installed capacity	4800 MWe
Operating life-time	60+20 years / 3+Gen
Reactor vendor	Atomenergomash (AEM)
EPC contractor	Titan 2 – IC Ictas Construction JSC
Owner/Operator	Akkuyu Nuclear JSC (100% belongs to Rosatom)
Financial sources	Fully funding by ROSATOM
Electricity sale	• 50% of output, 15 years, weighted average tariff (123.5 USD/MWh) • After PPA period, 20% of net profit to Turkish treasury

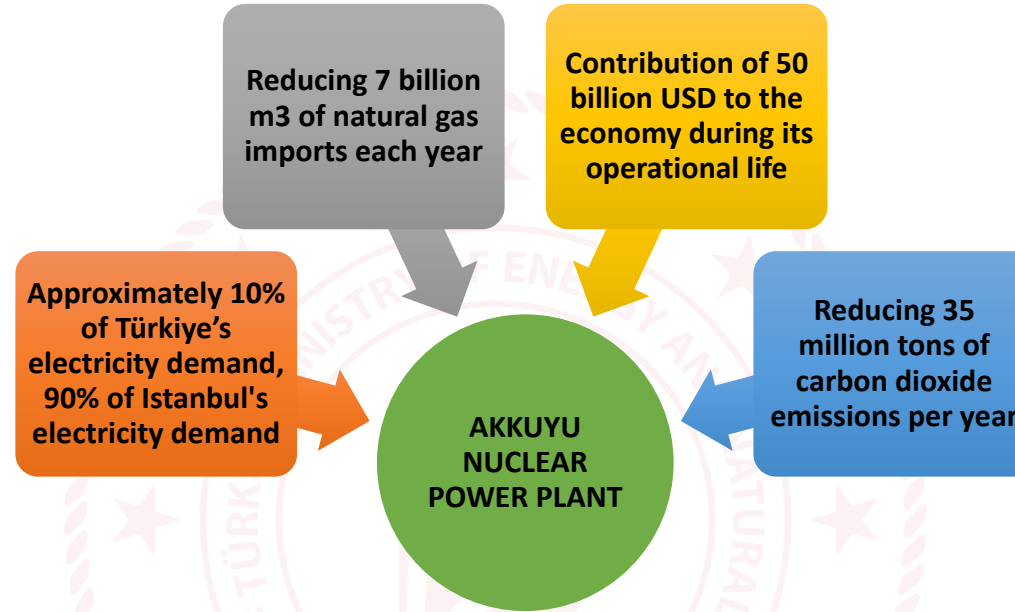
Responsibilities of Host Government (Ministry of Energy & Natural Resources)

- Allocation of plant site with its current licenses and infrastructures
- Grid connection of the plant
- Power purchase guarantee
- Tax incentives
- Outside infrastructure development
- Local industry and workforce development for nuclear sector
- RAW disposal

Responsibilities of Vendor Company(Rosatom)

- Financing and insuring
- Design, construction, commissioning, operation, maintenance, modernization and decommissioning
- In-site infrastructure development
- Procurement of all equipment, material and service
- Supply of fresh nuclear fuel (takeback option for reprocessing)
- SF & RAW storage within plant site → transfer for disposal
- Contribution to nuclear funds
- Training of local operating staff
- Maximize local content

Economic Impact of the Akkuyu NPP Project





Unit	Start of Construction
1	3 April 2018
2	8 April 2020
3	10 March 2021
4	21 July 2022

Sinop and Thrace Nuclear Power Plant (NPP) Projects

Sinop NPP Project

- **3 May 2013:** IGA was signed by Türkiye and Japan (4 units Atmea-1, total installed capacity 4480 MW)
- **July 2018:** Technical and commercial feasibility were completed and submitted to Ministry of Energy and Natural Resources (MENR) by Japanese Consortium.
- **June 2019:** After the review and negotiations on feasibility report, Sinop NPP Project has been suspended.
- **September 2019:** Environmental Impact Assessment (EIA) Report was submitted to Ministry of Environment, Urbanization and Climate Change by Türkiye Nuclear Energy Company (TÜNAŞ).
- **September 2020:** EIA Positive Result was obtained for the Sinop NPP Site.
- **27 January 2023:** TÜNAŞ was granted the “Owner” status from nuclear regulatory authority (NDK)
- **30 May 2023:** Site Approval application has been made by TÜNAŞ
- **3 April 2024:** Site Approval has been obtained from NDK

Thrace NPP Project

- Site characterization activities
- Vendor selection
- Intergovernmental negotiations

PART III

Human Resources Development



Employment Opportunities in the Nuclear Sector

Construction: 30,000 employees

Operation : 15,000 employees (3 NPPs)

Maintenance: 15,000 employees (3 NPPs)

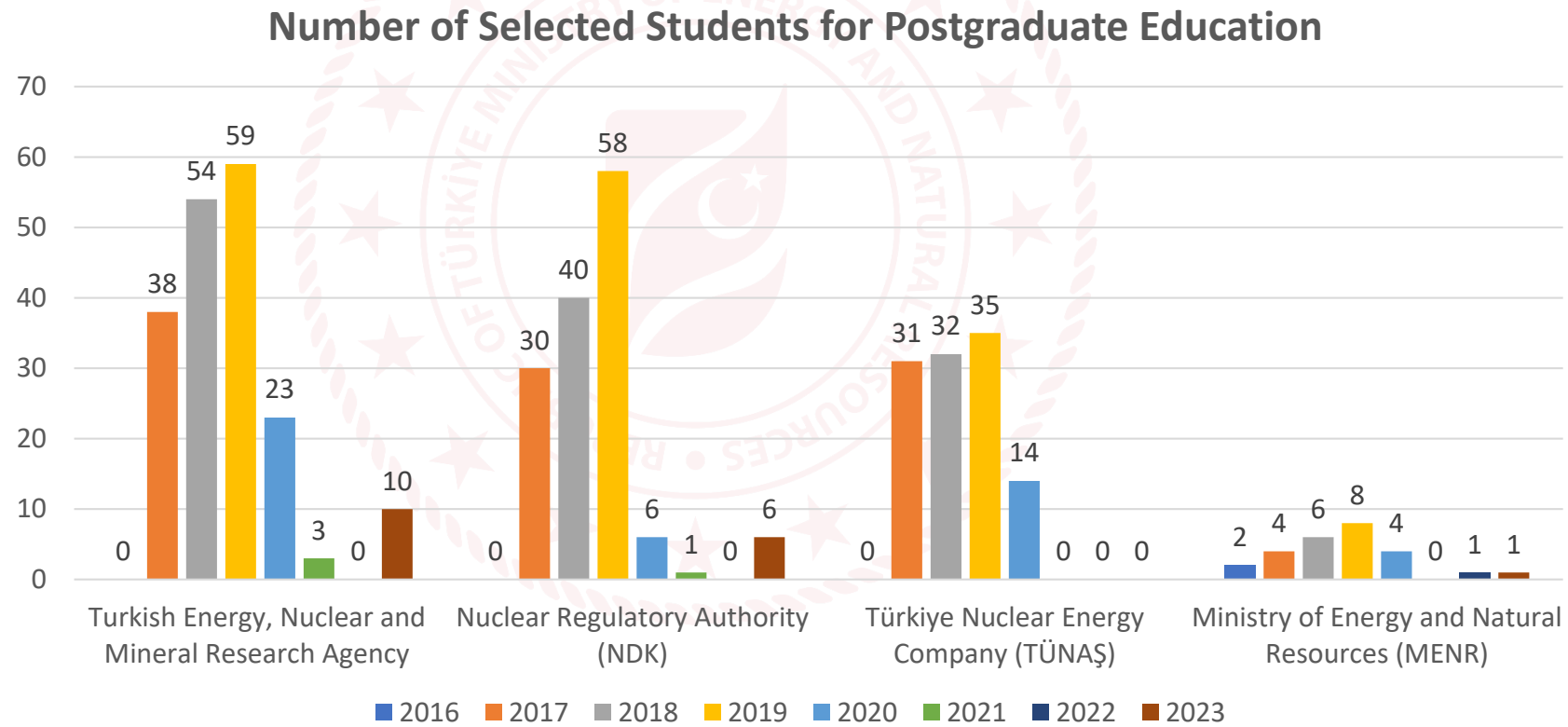
National Industry: More than 20,000 employees

Public Institutions: More than 1000 employees



Human Resources Development in the Public Institutions

- Ministry of Education provides scholarship and offers abroad education opportunities for postgraduate students on behalf of public institutions

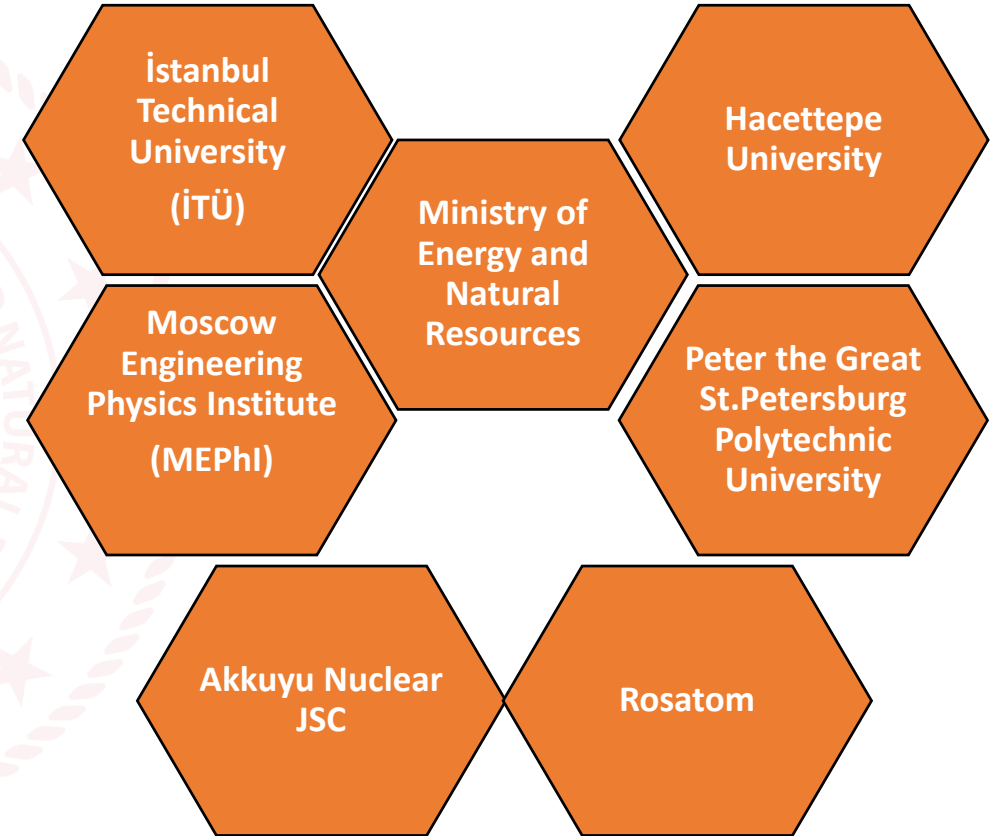


Improving Postgraduate Nuclear Education in Türkiye

- Since 2011, 400 students have been sent to Russia's leading universities to receive higher education in the field of nuclear engineering with the scholarship of Akkuyu Nuclear JSC (owner and operator).

Studies on the development of joint education programs in the field of nuclear energy at undergraduate and graduate levels between Turkish-Russian universities

- In the 2024-2025 academic year, 42 students will receive master's degree education in the Russian Federation.
- Studies on cooperation programs between Turkish universities and Russian universities are to be continued under the coordination of the Ministry of Energy and Natural Resources.



Training Centers & Simulator in the Akkuyu NPP Site



Titan2 - IC İçtaş Construction Education and Training Center

It has been operating for training of construction and assembly workers (theoretical and practical training). After the training the center provides certificates to trainees with the approval of Ministry of Education.



Akkuyu Nuclear NPP Education Center & Simulator

Practical training will be provided for the plant's operating personnel, maintenance and repair personnel, in-service training and mission preparation training at the training center where a full scope simulator and analysis simulator are located. The full scope simulator was established at Akkuyu NPP Site on November 26, 2023 and training started at there.

Vocational Education in Nuclear Sector

June 2020

A workshop was held with the involvement of Ministry of Education, MENR, Akkuyu Nuclear JSC, Titan 2-IC İçtaş Construction to prepare a textbook for technical & vocational high schools.

October 2020

Ministry of Education, MENR, Akkuyu Nuclear JSC and Titan 2-IC İçtaş Construction signed «Collaboration Protocol»

2021

- 7 pilot high schools have been selected
- Per August 2021, train for trainers education are given to 15 related lecturers who work in 7 pilot high schools.

2023-2024

Silifke Nuclear Energy Vocational and Technical High School has been established in 2023.



Vocational Education in Nuclear Sector

The lectures of «Introduction of Nuclear Energy» and «Russian Language» are integrated into curriculum of the following departments:

- Welding
- Electrical Installation and Panel Assembly
- Concrete, Cement and Ground Technologies
- Building Surface Coating
- Concrete Building Systems
- Building Plumbing Systems
- Heating, Ventilating & Air Conditioning (HVAC) Systems
- Coil winding

Pilot Schools: Silifke, Gülnar, Toroslar, Tarsus, Akdeniz, Erdemli

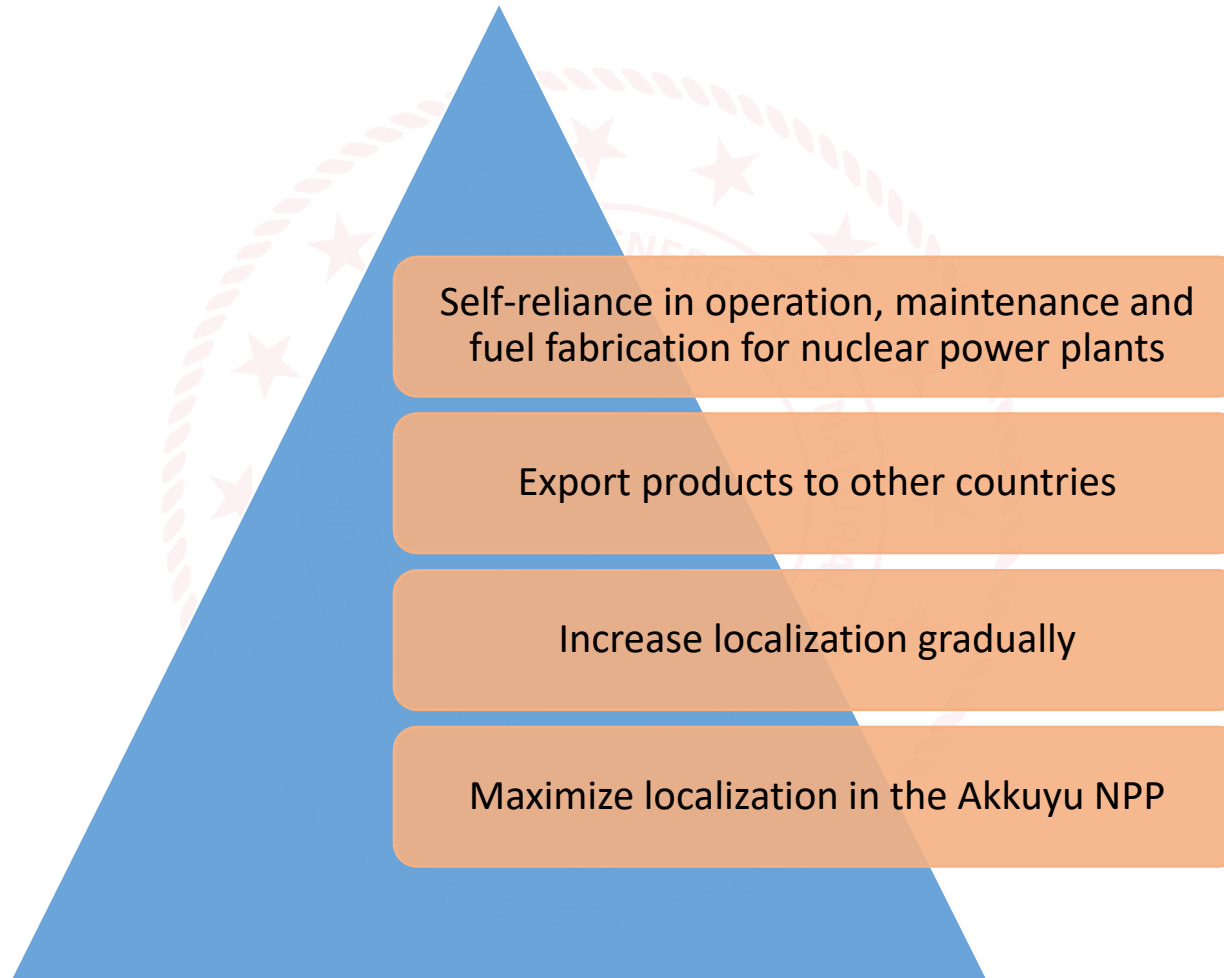


PART IV

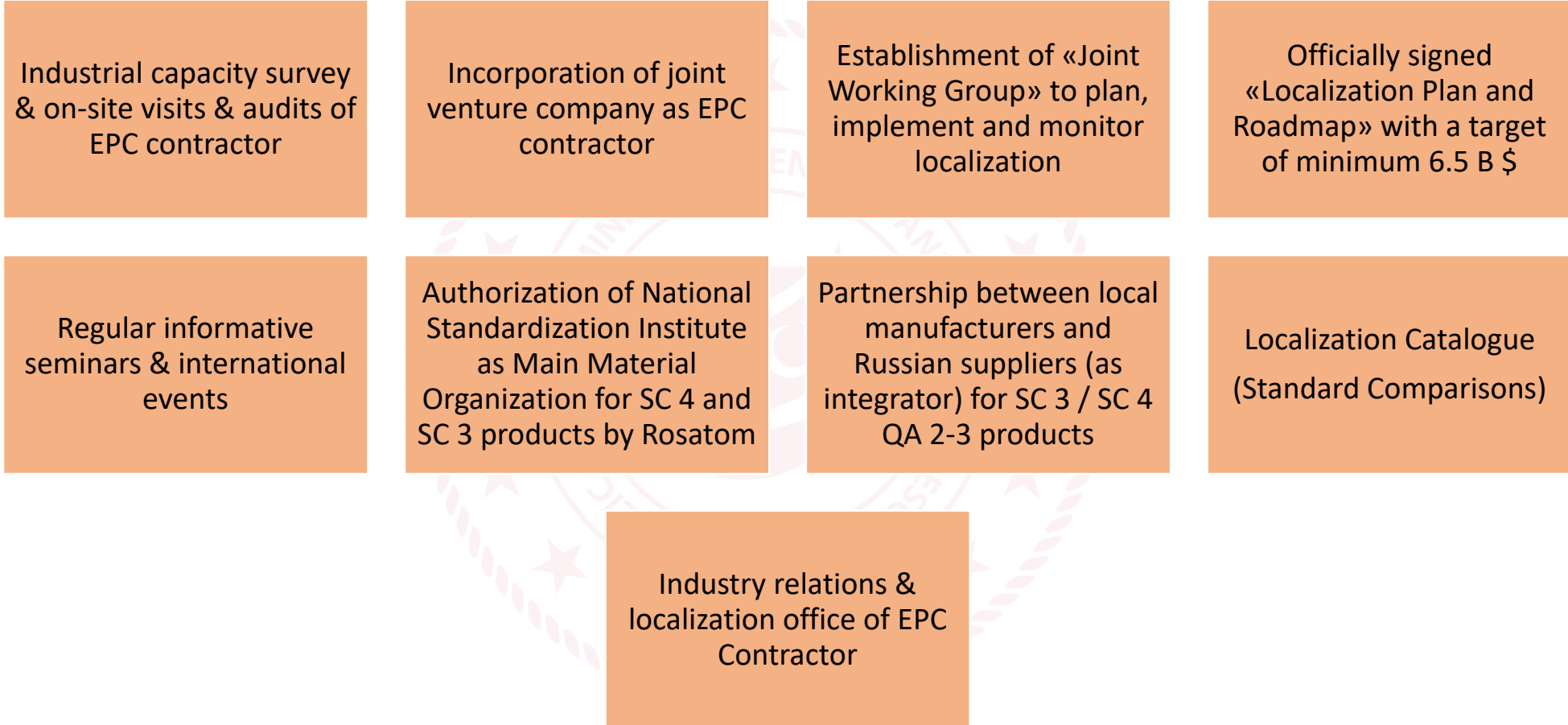
Industrial Involvement



Step by Step Localization Targets



Major Actions to Increase Localization



Prominent Capabilities of Turkish Companies

- Electrical equipment and materials such as energy and power cables, cable ducts, transformers etc. with international standards
- Advanced machining, welding and casting
- Worldwide companies in construction sector, construction of industrial facilities and hydrotechnical structures
- Mechanical and electromechanical equipment such as valves, pumps, pipes & fittings, exchangers, boilers, tanks and pressurized vessels with international standards such as ASME, API, GOST for refineries and thermal & conventional power plants etc.
- Valuable experience in software sector especially simulation. Participation of aviation, defense and TURKSAT satellite projects with national software.
- Experienced companies working in risky industries such as aviation and defense with AQAP 2110 and AS 9100 certificates
- HDPE pipes and fittings for water intake and discharge systems
- Steel structures, rebars



Thank you for your attention!