Ministry of Energy and Water Resources of the Republic of Tajikistan

ВАЗОРАТИ ЭНЕРГЕТИКА ВА
ЗАХИРАҲОИ ОБИ
ҶУМҲУРИИ ТОҶИКИСТОН

Current situation with EE and RES in Tajikistan

Dr. Aminjon Gulakhmadov

25/10/2023, DUSHANBE

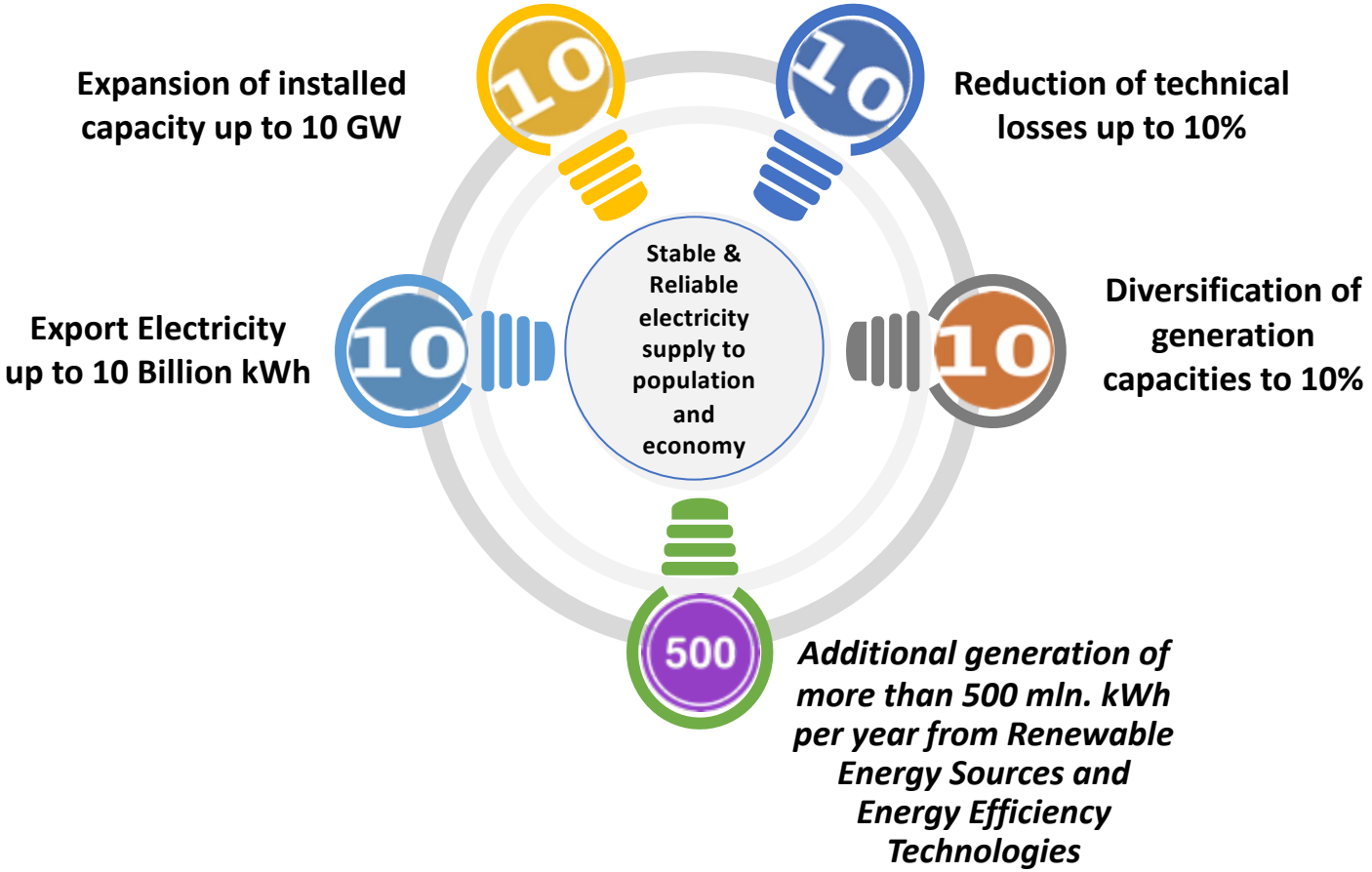
Ministries and institutions handle matters related to energy

- The Committee for Environmental Protection which regulates the sustainable management of energy resources and monitors the environmental regulations (emissions, pollution, waste)
- The Ministry of Finance which provides financial aid for EE projects and other institutions including the SAES
- The State Committee for Investments which is entrusted with creating attractive conditions for attracting investment
- The Antimonopoly Service (AMS) which establishes energy pricing and electrical tariffs
- The State Statistical Committee under the Office of the President which addresses energy statistics
- The State Agency for Measurements, Standardization and Certification
- Other Institutions related to construction, transport and industry

General development of the energy sector in Tajikistan is guided by the following laws and legal acts:

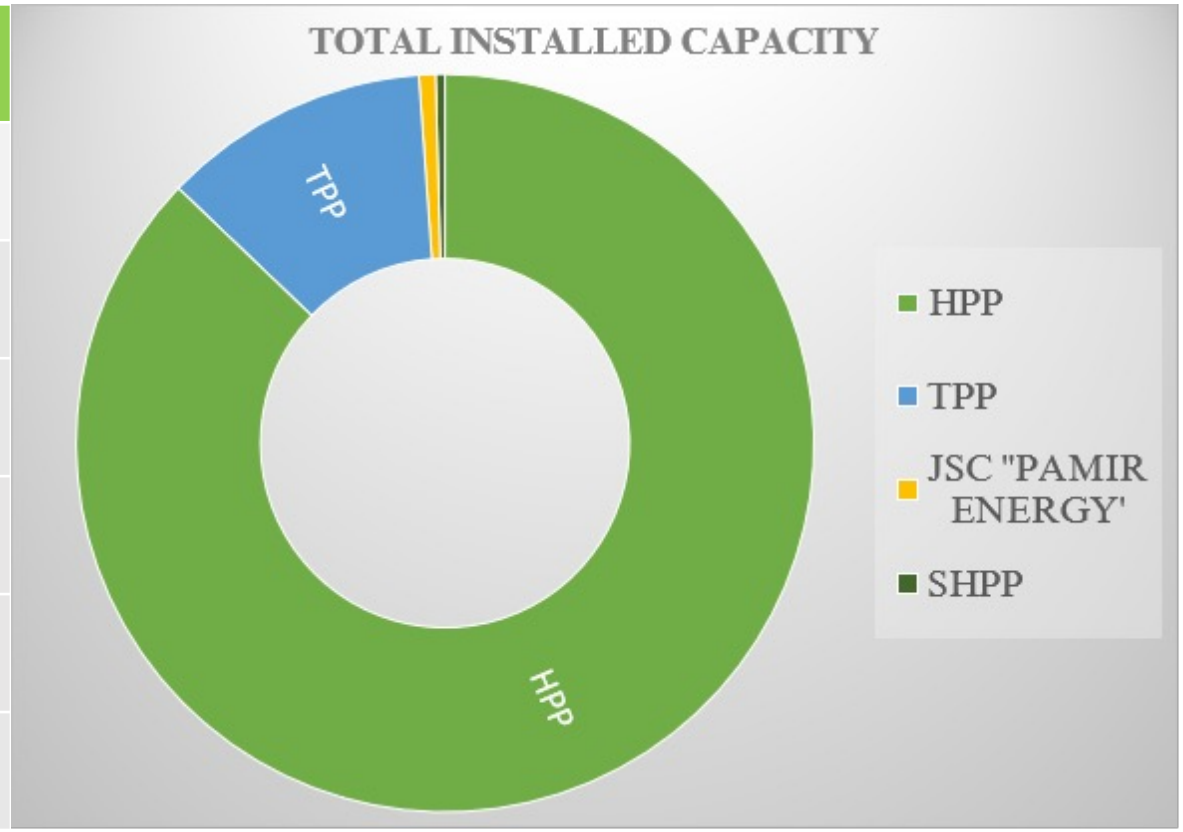
- Constitution of RT
- The Law of RT “On Energy”
- The Law of RT “On Energy Savings and Energy Efficiency”
- The Law of RT “On Privatization of State Property”
- The Law of RT “On Licensing of Separate Types of Activity”
- The Law of RT “On Concessions”
- The Law of RT “On Usage of Renewable Energy Sources”
- The Law of RT “On Safety of Hydrotechnical Facilities”
- The Law of RT “On Nature Protection”
- Tax Code of RT
- Water Code of RT
- A number of industry-specific Orders of the Government of the Republic of Tajikistan
- Other legal acts and international norms recognized by RT.

LONG-TERM ENERGY SECTOR DEVELOPMENT STRATEGY

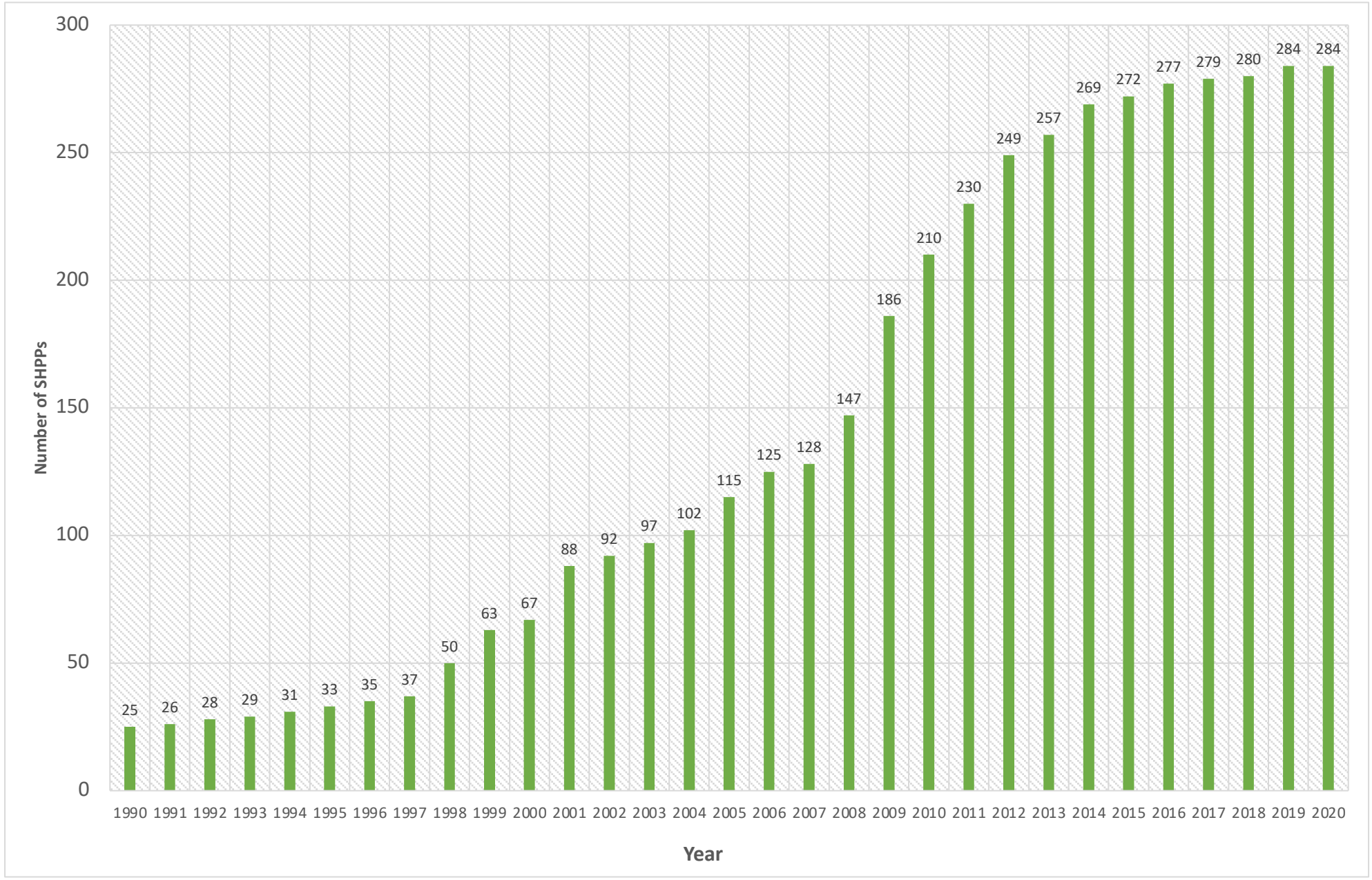


GENERAL CAPACITY BY SOURCES

Installed Capacity		(MW)
HPPs OSHC “Barqi Tojik"		
Including:	HPPs	5696,47
	TPPs	718
HPPs OJSC “Pamir Energy”		44,79
Small HPPs (284 pcs)		24,8
Total in the Republic of Tajikistan		**6484**



DYNAMIC OF DEVELOPMENT SMALL HYDROPOWER



PROSPECTS FOR SOLAR AND WIND POWER STATIONS

Construction of a solar and wind station in Sughd Region – 200 MW (WB)
Construction of a solar station in Sughd Region – 100 MW (ADB)
Construction of a solar and wind station in Sughd Region – 50 MW (USAID)
Construction of a solar station in Sughd Region – 7 MW (ODA Korea)
Construction of a solar station in the Gorno-Badakhshan Autonomous Region – 3 MW
Construction of a solar station – 100 MW (EBRD)

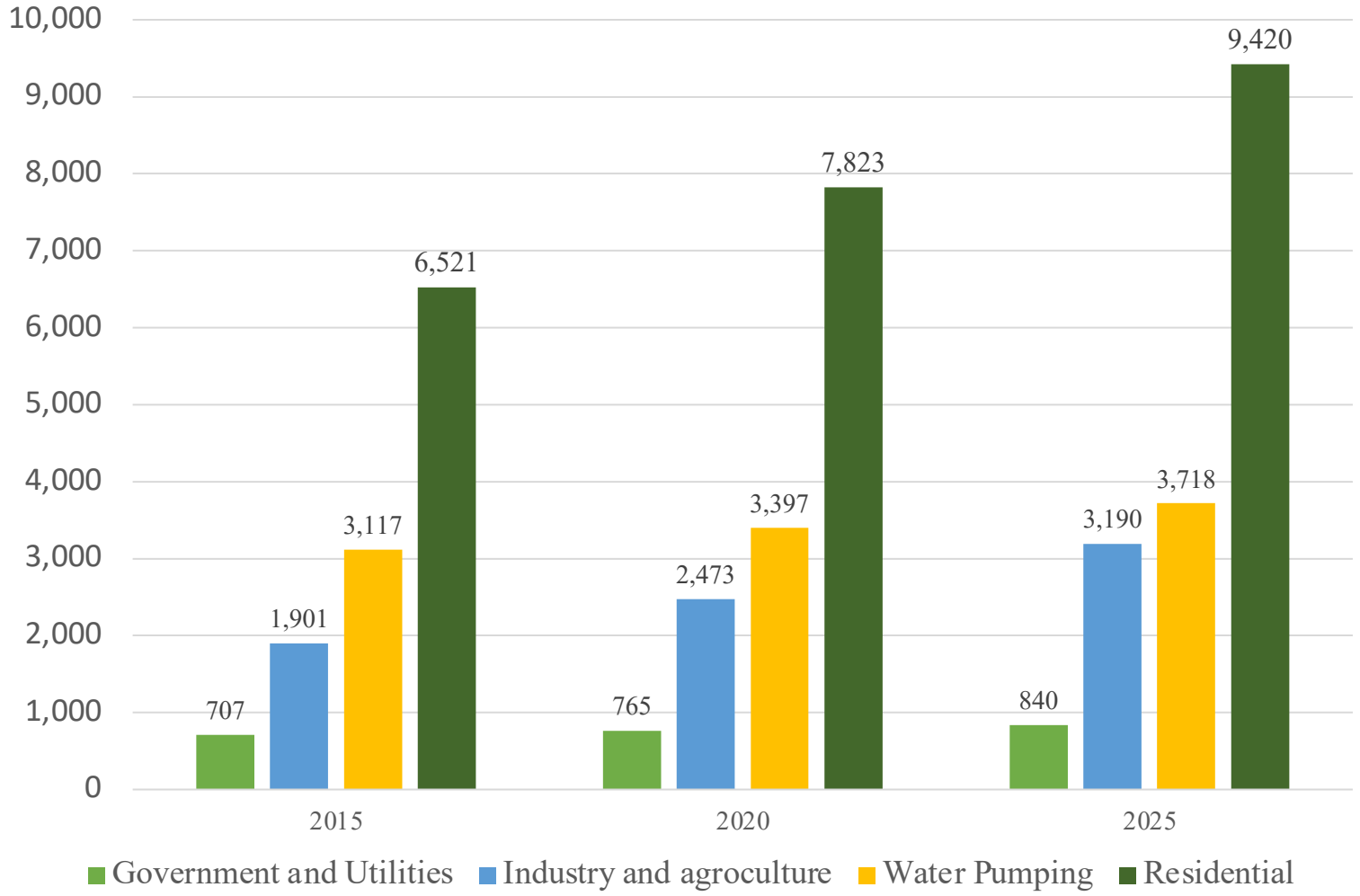
THE POTENTIAL OF RENEWABLE ENERGY SOURCES

RESOURCES	Gross potential MW	Technical potential MW	Economically feasible potential MW
Hydro energy	60,167	32,476	32,476
Solar energy	1,822,894	1,494	545
Wind energy	62,257	3,853	1,926
Bioenergy	1,614	1,614	807

AVERAGE ANNUAL WIND SPEED IN THE TERRITORY OF THE REPUBLIC OF TAJIKISTAN

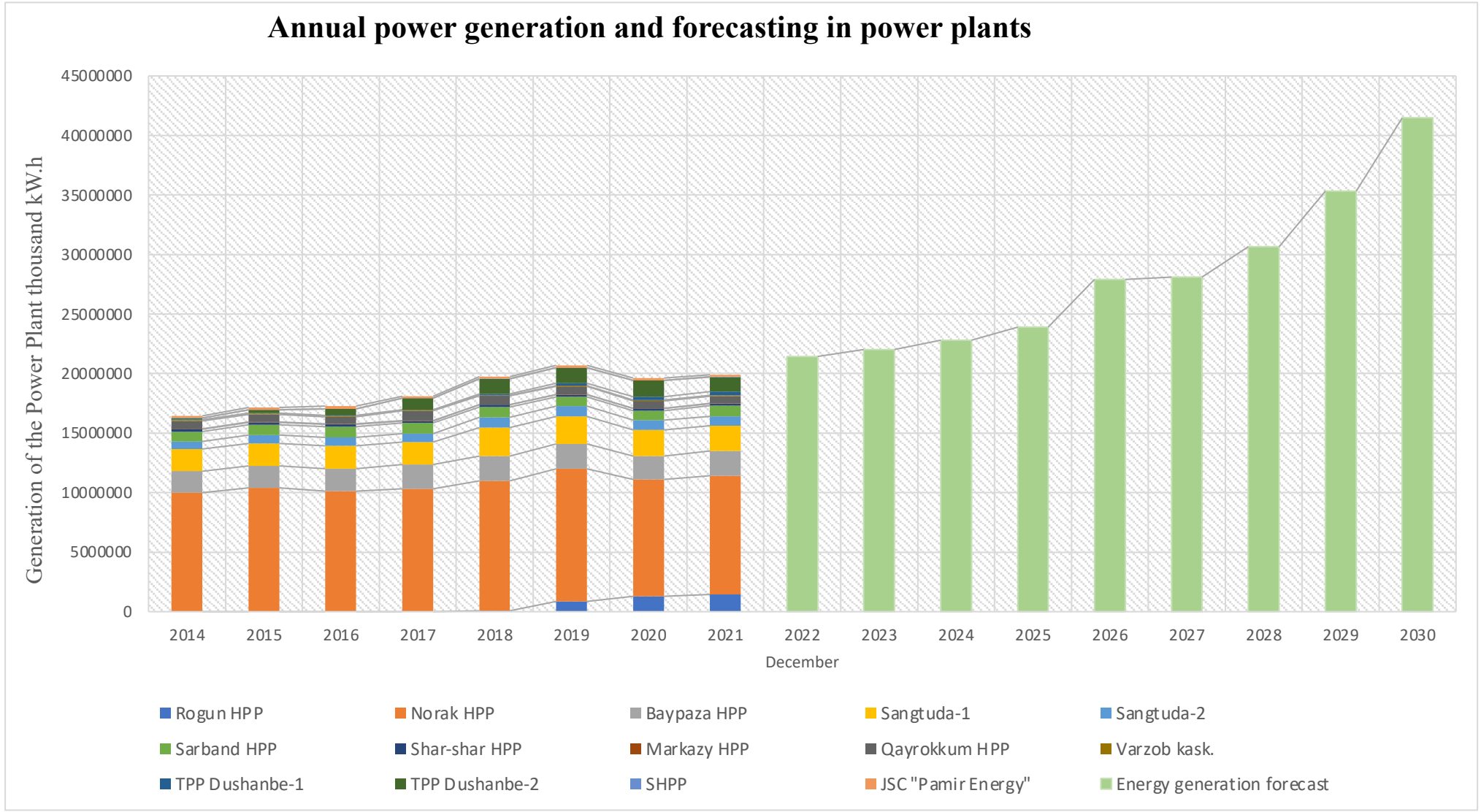
Region	Month												Year
	1	2	3	4	5	6	7	8	9	10	11	12	
Khujand	5,3	5,5	5,6	4,8	4,2	4,0	4,4	4,4	4,0	3,8	4,6	4,8	4,6
Panjakent	1,6	1,8	2,1	2,4	2,2	2,2	2,1	2,1	2,2	1,8	1,5	1,4	2,0
Yovon	2,7	3,4	3,1	2,6	2,6	2,6	2,0	1,7	1,8	1,8	1,7	2,1	2,3
Garm	3,6	3,5	3,1	2,3	1,9	2,0	1,9	2,1	2,2	1,8	2,8	3,2	2,5
Murghob	1,2	2,1	2,7	3,2	3,0	3,0	2,6	2,3	2,2	2,2	2,0	1,5	2,3
Ishkoshim	0,9	1,6	2,2	2,4	2,6	2,6	2,7	2,7	2,4	1,9	1,4	1,0	2,0
Anzob	5,0	5,5	5,5	4,7	4,1	4,1	3,9	4,0	4,2	4,5	4,7	4,8	4,6
Khorugh	1,6	1,8	2,6	2,7	2,3	2,6	2,8	2,8	2,4	2,0	1,9	1,8	2,3
Shaymok	2,1	2,6	2,5	2,6	2,5	2,1	2,0	1,9	2,1	2,3	2,6	2,3	2,3
Fedchenko glacier	7,1	7,4	7,2	6,6	5,7	4,8	4,0	4,0	4,8	5,9	7,4	7,1	6,0

Electricity consumption forecast by consumer type in Tajikistan (GWh)



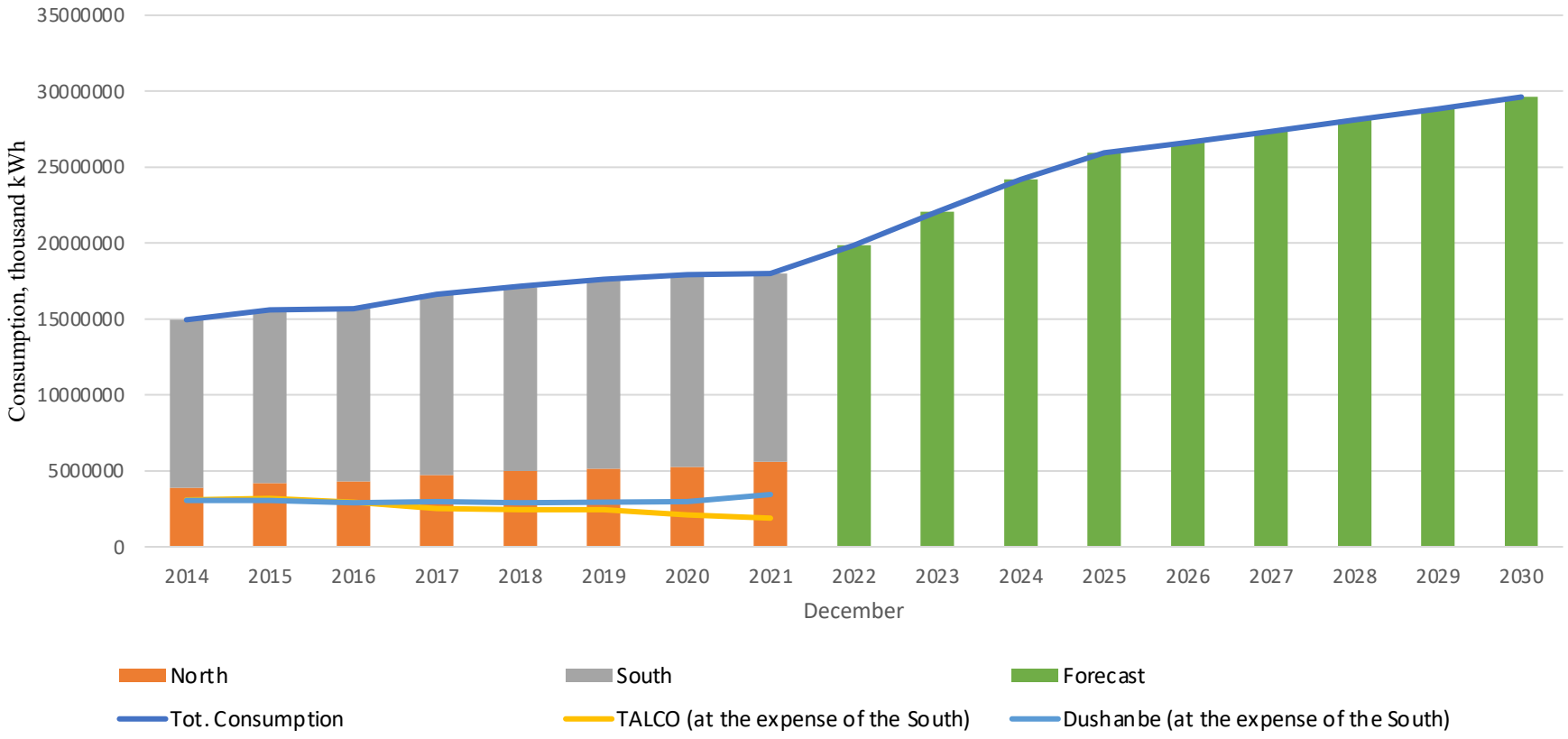
Source: Tajikistan's Power Sector Development Master Plan.

ANNUAL ELECTRICITY GENERATION AT POWER PLANTS FOR 2014-2020 AND ELECTRICITY GENERATION FORECAST FOR THE PERIOD 2021-2030



CONSUMPTION RATES

Annual electricity consumption in 2014-2020 and domestic demand for electricity in 2021-2030.



Substantial energy saving potential

Substantial energy saving potential

№	Consumer type	Electricity consumption in 2014 (KW/h)	Improvement	Possible potential energy saving kWh per year
1.	The state-owned aluminum company (TALCO)	3,073,046.10	22%	676.070.142
2.	Water pumping	2,474,793.80	15%	371.219.07
	Total			**1.047.289.212**

Source: World Bank, 2012.

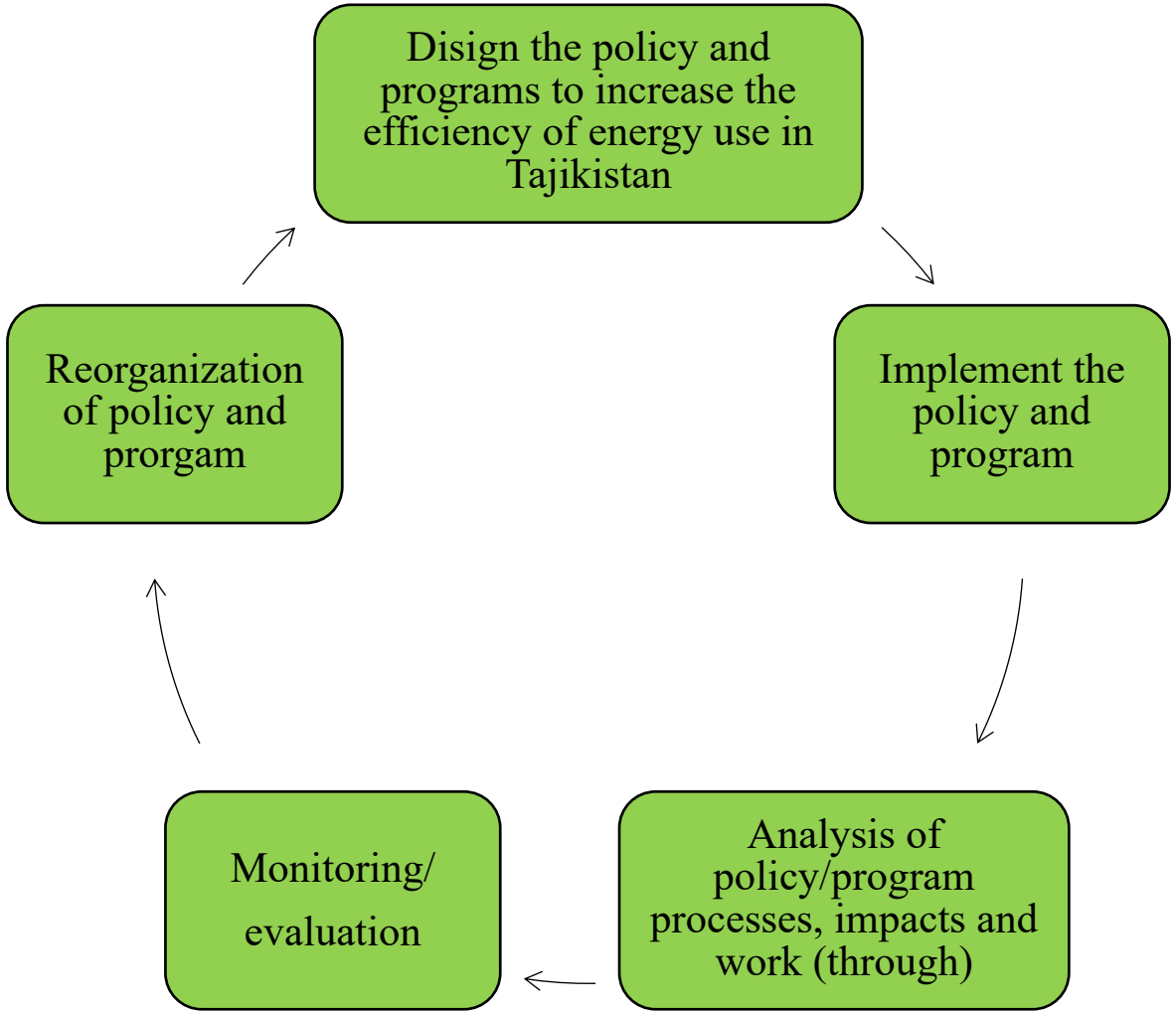
Government participation in improving energy efficiency

—Decree of the President of the RT “On additional measures for the economic use of energy and energy saving”, April 24, 2009, #653;

—Law of the Republic of Tajikistan “On Energy Saving and Energy Efficiency”, September 19, 2013, #560. Parliament of the RT;

—Energy efficiency strategy (National Development Strategy, 2030).

Role of the agency that implement the state energy efficiency policy in Tajikistan



To increase the efficiency of energy use in Tajikistan the following recommendations should be implemented:

1) Introduce market-based energy prices;
2) Establishment the agency that coordinates and monitors the effectiveness of energy efficiency policies;
3) Exchange ideas and experiences, discuss energy efficiency issues with other countries, also participate in global cooperation in the field of energy efficiency;
4) Introduce solar photovoltaic off-grid power systems for villages where there is no central power supply.

Training programs for state institutions personnel involved in energy efficiency shall be organized.

They shall cover the following issues:

- EE technologies and practices;
- Energy performance of buildings;
- Energy efficiency standards and labelling schemes for energy-using products;
- Financial support mechanisms for implementation of energy efficiency projects;
- Energy efficiency as a criteria in public procurement;
- Monitoring (measurement) and verification of energy savings.

The resolution of the Government of the Republic of Tajikistan was adopted on March 1, 2023 No. 51.

Renewable Energy Program for 2023-2027.

Action Plan

- Construction of small hydro power plants in the Sughd region.
- Construction of 11 small hydro power plants in GBAO.
- Electrification of rural areas in GBAO
- Construction of small wind power plants
- Construction of a solar power plant in rural areas.
- Training of specialists in the field of renewable energy sources.
- Study of the possibility of using hydrogen in Tajikistan.

LIST OF POTENTIAL PROJECTS

CONSTRUCTION OF SHUROB HPP

Normal water level	977,0 м
Rated capacity: earth dam	850 MW
concrete dam	900 MW
Mean annual development: earth dam	3100 GWh.
Concrete dam	3200 GWh.
Reservoir volume: the full	27,0 million m3
useful	5,0 million m3

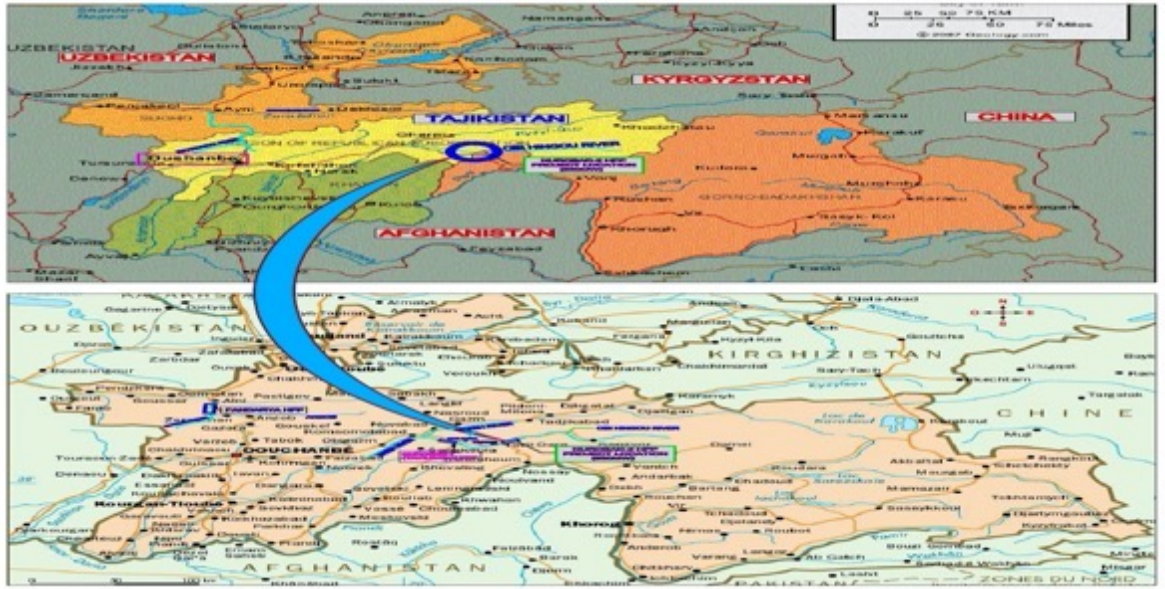
NUROBOD–1 HPP

Installed Capacity	4 x 100 MW = 400 MW
Annual Energy Potential	
Gross Energy Generation (50% dependable inflow yield year)	2,1 billion kWh
Plant Load Factor	61%
Implementation Period	48 Months from the date of financial closure
Project Cost	733 million USD

LIST OF POTENTIAL PROJECTS

NUROBOD–2 HPP

Installed Capacity	4 x 130 MW = 520 MW
Annual Energy Potential	
Gross Energy Generation (50% dependable inflow yield year)	2,6 billion kWh
Plant Load Factor	59%
Implementation Period	60 Months from the date of financial closure
Project Cost	1,038 billion USD



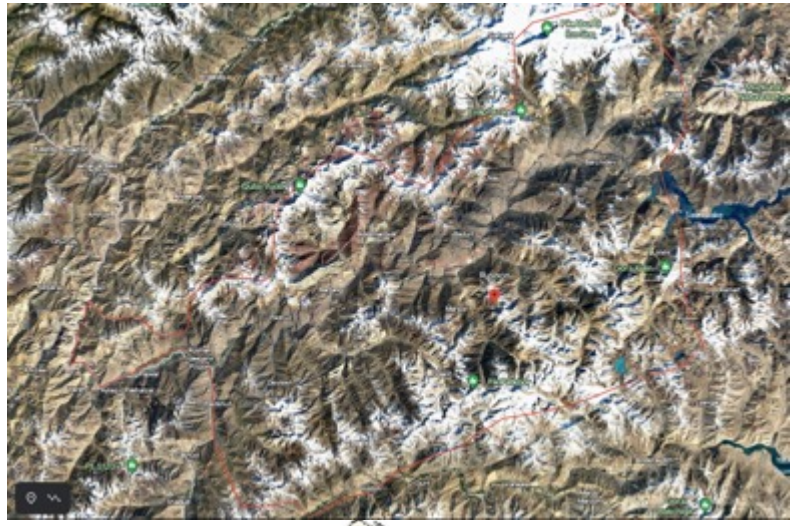
FONDARYO HPP

	units
Capacity:	135 MW
Project cost:	270 million USD
Annual Energy:	561 million kWh
Reducing CO2:	330 million tones

LIST OF POTENTIAL PROJECTS

SANOBOD HPP

Rated capacity: earth dam	**208 MW**
Mean annual development: earth dam	1800 GWh/years
Project implementation period	5,5 year
Project Cost	550 million USD



AYNI HPP

Project name	**AYNI HPP**
Capacity	170 MW
Project cost	340 million USD
Power generation	596 million kWh
Reducing CO2 emissions	360 million tones

Key Categories of the Emission Sources by their Contribution in the Aggregate Emission of Greenhouse Gases in 2016 (including the "Land Use, Change in Land Use and Forestry" Sector)

IPCC Category code	IPCC Category	Greenhouse gas	2016 Ex,t (Gg CO2 Eq)	Lx,t	Cumulative Total
3.A.1	Enteric Fermentation	CH4	4600,33	0,31	0,31
1.A.2	Manufacturing Industries and Construction - Solid Fuels	CO2	1651,14	0,11	0,42
3.B.1.a	Forest land Remaining Forest land	CO2	-1598,19	0,11	0,52
1.A.1	Energy Industries - Solid Fuels	CO2	1014,19	0,07	0,59
2.A.1	Cement production	CO2	978,46	0,07	0,66
1.A.1	Energy Industries - Liquid Fuels	CO2	711,08	0,05	1,00
3.A.2	Manure Management	CH4	689,98	0,05	0,70
3.A.2	Manure Management	N2O	683,53	0,05	0,75
3.C.4	Direct N2O Emissions from managed soils	N2O	487,27	0,03	0,78
2.C.3	Aluminium production	PFCs	383,76	0,03	0,81
1.A.4	Other Sectors - Liquid Fuels	CO2	351,04	0,02	0,83
1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CO2	287,16	0,02	0,85
4.A	Solid Waste Disposal	CH4	226,95	0,02	0,86
3.C.7	Rice cultivations	CH4	216,09	0,01	0,88
2.C.3	Aluminium production	CO2	206,88	0,01	0,89
3.C.5	Indirect N2O Emissions from managed soils	N2O	182,29	0,01	0,91
1.A.3.b	Road Transportation	CO2	121,09	0,01	0,91
4.D	Wastewater Treatment and Discharge	N2O	99,79	0,01	0,92
4.D	Wastewater Treatment and Discharge	CH4	97,26	0,01	0,93
1.A.4	Other Sectors - Solid Fuels	CO2	87,41	0,01	0,93
3.C.6	Indirect N2O Emissions from manure management	N2O	68,35	0,00	0,94
3.C.3	Urea application	CO2	46,48	0,00	0,94
2.A.4	Other Process Uses of Carbonates	CO2	40,70	0,00	0,94
1.B.2.a	Oil	CH4	31,50	0,00	0,94
1.B.1	Solid Fuels	CH4	24,90	0,00	0,95

Key Categories of Emission Sources by Contribution in the Trend of the Aggregate Emission of Greenhouse Gases in 2004 and 2016 (the last year) Covered by the Cadastre (Including the "Land Use, Change in Land Use, Forestry" Sector)

IPCC Category code	IPCC Category	GP gas	2004 Year Estimate Ex0 (Gg CO2 Eq)	2016 Year Estimate Ext (Gg CO2 Eq)	Trend Assessment (Txt)	% Contribution to Trend	Cumulative Total of Column G
1.A.1	Energy Industries - Solid Fuels	CO2	0,000	1014,191	0,091	0,076	0,692
1.A.1	Energy Industries - Liquid Fuels	CO2	279,926	711,078	0,028	0,023	0,912
1.A.1	Energy Industries - Solid Fuels	N2O	0,000	4,798	0,000	0,000	0,997
1.A.2	Manufacturing Industries and Construction - Solid Fuels	CO2	45,406	1651,142	0,143	0,119	0,439
1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CO2	411,690	287,160	0,027	0,023	0,935
1.A.2	Manufacturing Industries and Construction - Gaseous Fuels	CO2	29,352	18,311	0,002	0,002	0,990
1.A.3.b	Road Transportation	CO2	349,858	121,086	0,034	0,029	0,889
1.A.3.b	Road Transportation	N2O	5,473	1,774	0,001	0,000	0,997
2.C.3	Aluminium production	PFCs	1062,787	383,762	0,103	0,086	0,616
2.C.3	Aluminium production	CO2	572,931	206,880	0,056	0,046	0,860
2.C.4	Magnesium production	CO2	0,000	0,000	0,000	0,000	1,000
3.A.1	Enteric Fermentation	CH4	1991,156	4600,330	0,156	0,131	0,320
3.A.2	Manure Management	CH4	400,103	689,978	0,010	0,009	0,944
3.A.2	Manure Management	N2O	397,619	683,532	0,010	0,008	0,952
3.B.1.a	Forest land Remaining Forest land	CO2	-1460,54	-1598,19	0,070	0,059	0,814

Dynamics of Greenhouse Gas Emission in 2004-2016, Gg, CO2 Equivalent

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GHG taking into account LULUCF	8432	8070	8656	9120	9295	8536	7984	8308	7826	8255	8602	11367	13975
GHG excluding LULUCF	9892	9531	10148	10617	10797	10034	9496	9844	9377	9819	10179	12957	15573
Energy	4022	3166	3833	3175	2947	2214	1422	2121	1571	2052	2352	4615	6537
IPPU	1798	1926	2073	2107	1958	1763	1771	1442	1393	1214	1159	1380	1622
Agriculture	2226	2586	2380	3446	4009	4185	4395	4339	4447	4564	4657	4927	6960
LULUCF	-1460	-1461	-1492	-1497	-1502	-1498	-1512	-1536	-1551	-1564	-1577	-1591	-1598
Waste	386	392	370	392	381	374	396	406	415	425	434	445	454

Emission of Greenhouse Gases by Sectors and Gases in 2016, Gg, CO2 Equivalent

	CO2	CH4	N2O	PFCs	CO2 eq
Energy	6415,84	80,74	40,25	NA	6536,83
IPPU	1238,59	NA	NA	383,76	1622,35
Agriculture	37,33	4414,34	2507,90	NA	6959,57
Waste	NO	354,44	99,79	NA	454,23
LULUCF	-1598,42	NA	NO	NA	-1598,42
Total emissions	6093,34	4849,52	2647,94	383,76	13974,56
Total emissions (excluding LULUCF)	7691,76	4849,52	2647,94	383,76	15572,98

Dynamics of Greenhouse Gas Emissions in CO2 Equivalent in Gg in the Energy Sector Subsectors

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1 - Energy	4022	3166	3833	3175	2947	2214	1422	2122	1571	2052	2352	4615	6537
1.A - Fuel Combustion Activities	3996	3136	3800	3139	2910	2177	1383	2080	1525	2006	2303	4562	6477
1.A.1 - Energy Industries	283	91	400	251	300	300	251	584	509	774	759	2157	2714
1.A.2 - Manufacturing Industries and Construction	488	252	696	391	551	399	392	554	361	435	884	1724	1967
1.A.3 - Transport	408	460	514	274	213	263	256	436	183	370	212	255	1371
1.A.4 - Other Sectors	2816	2334	2190	2224	1846	1214	484	507	471	427	448	426	424
1.B - Fugitive emissions from fuels	27	30	33	37	37	37	39	41	47	45	49	53	60
1.B.1 - Solid Fuels	2	2	2	3	4	4	4	5	9	11	18	22	28
1.B.2 - Oil and Natural Gas	25	28	30	33	33	34	35	36	38	35	31	31	32

Dynamics of the Greenhouse Gas Emissions in CO2 Equivalent in the Energy Sector by Gases

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CO2	3 970	3 106	3 775	3 119	2 892	2 157	1 368	2 060	1 511	1 988	2 285	4530	6416
CH4	36	45	46	45	43	45	44	47	50	53	55	61	81
N2O	16	15	12	12	12	12	10	15	10	11	12	24	40
Total GHG emis-sions	4 022	3 166	3 833	3 175	2 947	2 214	1 422	2 122	1 571	2 052	2 352	4615	6537

THANK YOU FOR YOUR ATTENTION