CONCEPT NOTE
for ensuring electricity supply in Uzbekistan in 2020-2030

Chapter 1. General Provisions

This Concept Note on the provision of electricity in the Republic of Uzbekistan in 2020-2030 was developed with a view to satisfy growing demand in the Republic of Uzbekistan and ensuring further balanced development power sector based on international best practices and modern trends in the development of electricity industries globally.

The Concept Note defines mid-term and long-term objectives and directions for the development of power sector in the country, priorities and benchmarks as well as arrangements aimed at ensuring the efficiency and effectiveness of the government's energy policy at different stages of practical implementations guaranteeing achievement of planned goals.

The Concept Note shall be regularly amended and adjusted as necessary.

This Concept Note covers the following:

an analysis of current situation in the power sector of the Republic of Uzbekistan;

prospects (trends) of growth in electrical power demand in the country;

general provisions of the government's power sector policy and its main components;

outlooks of the development of power sector in the Republic of Uzbekistan;

action plan for the implementation of this Concept and expected results.

The following terms are used in the Concept Note:

AEM - Advanced Electrical Metering, an automated system for electrical power consumption control;

NPP - Nuclear Power Plant;

RES - Renewable Energy Sources;

WPP - Wind Power Plant;

PSPP - Pump Storage Power Plant;

GT - Gas Turbine;

PPP - Public-Private Partnership;

HPP - Hydro-Power Plant;

ECE - Energy Conversion Efficiency;

TL - Transmission Line;

SHPP - Small Hydro Power Plant;

CCGT - Combined Cycle Gas Turbine;

SS - Substation;

TS - Transformer Site;

TPP - Thermal Power Plant;

CHPP - Combined Heat and Power Plant;

PV - Photovoltaic; PVPP - Photovoltaic Power Plant.

Chapter 2. Analysis of Current Situation

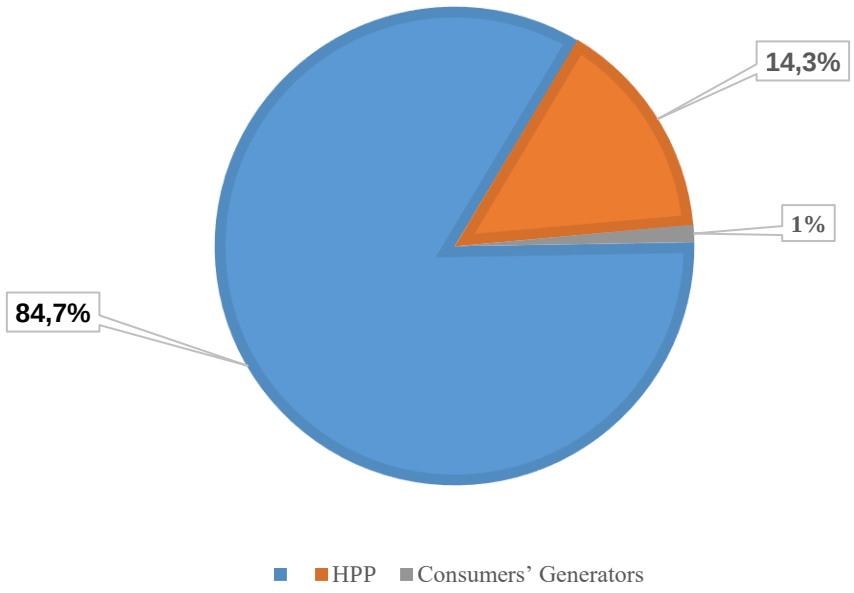
Currently, available generating capacity totals at 12.9GW, including:

TPP - 11 thousand MW, or 84.8 per cent;

HPP - 1.85 thousand MW, or 14.3 per cent;

consumers' generators and isolated plants' capacity is over 133MW, or 1 per cent.

Figure 1 - Power Generation Mix



11 TPPs, including 3 CHPPs, are the main source of power generation. The capacity of modern energy efficient generating units is 2825 MW, or 25.6 per cent of aggregate TPP capacity.

89.6 per cent of total power generated in the country 2019 was generated by TPPs. Meanwhile, the aggregate generating capacity of power units operating in the integrated power system during the peak load hours totals 8.6 thousand MW.

The hydropower sector features 42 HPPs including 12 large HPPs with aggregate capacity of 1.68GW (90.8 per cent of overall HPP capacity), 28 SHPPs with aggregate capacity of 0.25GW (13.5 per cent), and 2 micro-HPPs, with aggregate capacity of 0.5MW. 30 HPPs with aggregate capacity of 532MW are run of the river plants (4 large plants - 317MW, and 26 SHPPs - 215 MW). There are 10 HPPs with reservoirs, with aggregate capacity of 1.4 GW. The efficiency of hydropower utilization in the country is at 27 per cent.

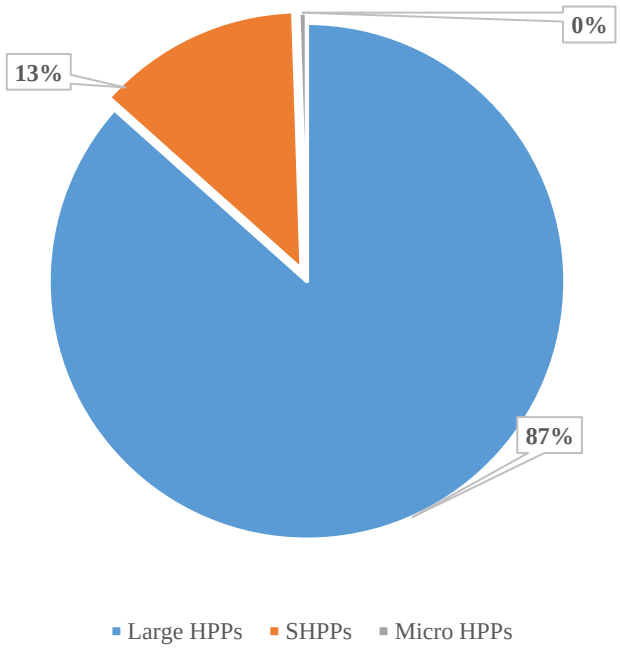


Figure 2 - HPP Structure

Transportation of electrical power from generating sources is implemented using a network of 35-500kV transmission lines including:

77 substations with aggregate capacity of 22,830MVA;

9 768km TLs,

Distribution and delivery of electrical power to the in-country consumes are implemented using 35-110kV distribution grid including:

1 626 nos 35-110kV SS, with aggregate capacity of 20,421MVA;

28,642km of 35-110 kV transmission lines;

75,534 substations with aggregate capacity of 13,933MVA;

223,987km of 0.4-10kV transmission lines.

Meanwhile, substantial portion of power sector assets has been in service for over 30 years, including 66 per cent of transmission grid and 62 per cent of distribution grid, 74 per cent substations and over 50 per cent transformer sites. This is one of the factors contributing to the growing level of technical losses of electricity during transportation and distribution.

The average technical losses of electricity in transmission grids is at 2.72 per cent and at 12.47 per cent in distribution grid.

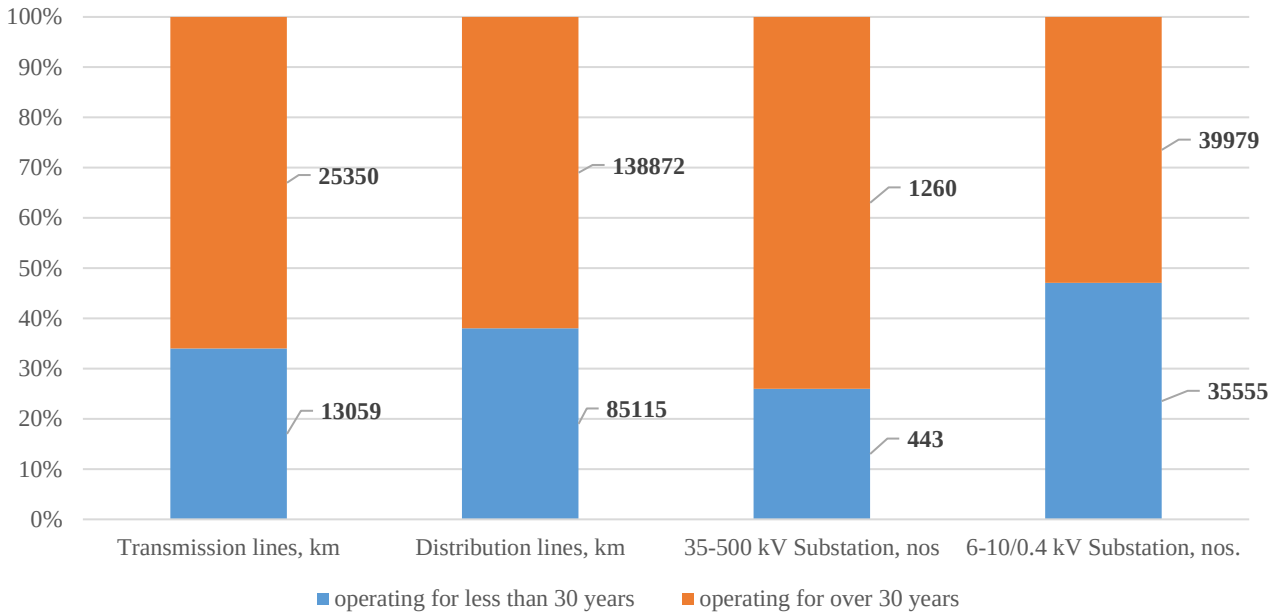


Figure 3 - Current condition of transmission grid

The country's power system is nominally divided into 5 regional power grids:

North-Western (Republic of Karakalpakstan and Khorezm Region);

South-Western (Kashkadarya, Samarkand, Bukhara and Navoi Regions);

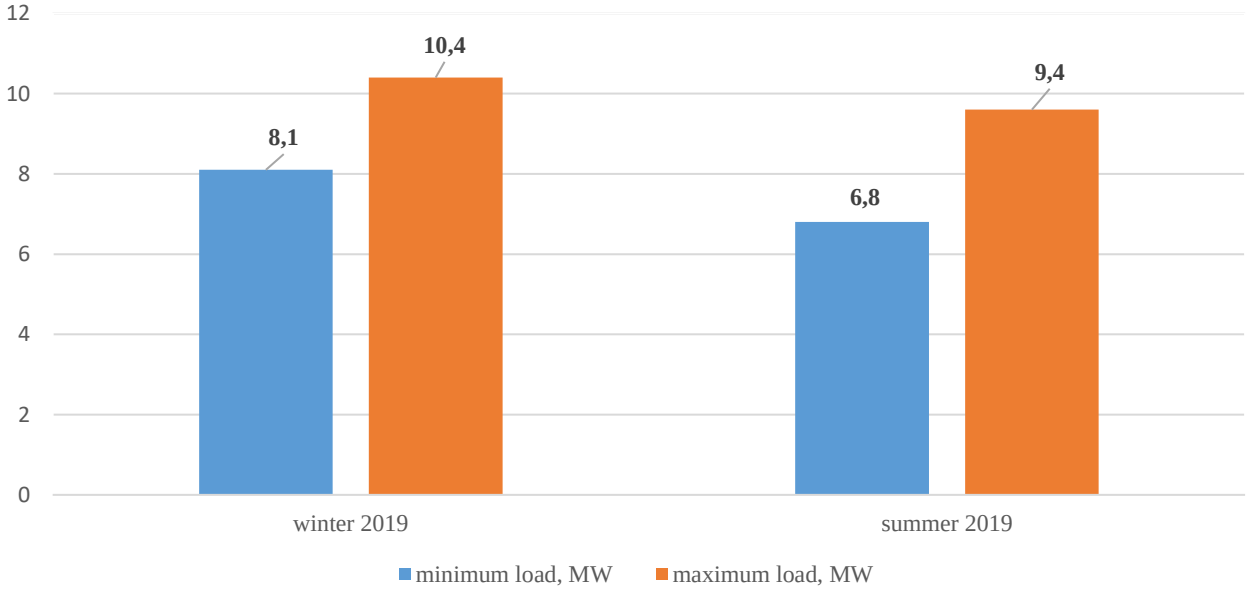
Southern (Surkhandarya Region);

Eastern (Andijan, Namangan and Ferghana Regions);

Central (Djizzak, Syrdarya, Tashkent Regions and Tashkent City).

Maximum load during peak hours in winter 2019 was at 10.4 thousand MW, difference between minimum and maximum load was at 2.3 thousand MW. Meanwhile, peak consumption in summer 2019 reached 9.4 thousand MW, with difference between minimum and maximum load being 2.6 thousand MW.

Figure 4 - Minimum and maximum loads in winter and summer periods in 2019



At the same time, the existing shortage of regulating capacity leads to daily additional restarts of TPP generators resulting, accordingly, in excess fuel consumption and extra wear of technological equipment.

At the same time, there is a number of problems present including the following major issues:

low electrical conversion efficiency (25-35 per cent) of TPP generators commissioned over 25 years ago and high fuel consumption rate compared to modern combined cycle processes (x2 times);

high level of wear and tear in distribution grid and transformer infrastructure resulting in outages and lower quality of electricity;

low throughput of most of existing transmission lines and transformers limits capabilities for supply of electricity to consumers in required volumes;

low level of automation and digitization of power sector assets affects capacity to prevent and quickly eliminate technical issues.

Despite availability of huge solar energy potential, there are no industrial scale solar PV plants operational in the country. The wind energy potential, meanwhile, is not sufficiently studied, and, as a result, there are no operational industrial scale wind farms.

At the same time, the country is taking steps to develop legislative framework conducive to the development of this sub-sector of power industry. Thus, Republic of Uzbekistan Laws “On the use of renewable energy sources” and “On Public-Private Partnerships” have been adopted and the “Regulation on connection of businesses generating electrical power to the integrated power grid, including those utilizing renewable energy sources” was approved.

Two pilot projects are underway, 100MW each, for construction of solar PV plants in Samarkand and Navoi regions under PPP arrangements. According to the Agreements, investor companies shall complete construction in 2021 and shall commission the PV plants.

Chapter 3. Demand dynamics and structure outlook by 2030

Domestic demand for energy resources is defined by the expected economic development trends, changes in the structure of national economy and in the level of its energy intensity.

Reduced energy intensity of the national economy is the key priority of Uzbekistan’s energy policy, and unless this is accomplished, power sector will remain a bottleneck hindering the country’s socio-economic development.

Power generation growth rates in 2012-2019 were recorded at 2.6 per cent per annum on average. However, the demand for electrical power was not satisfied in full, with shortages averaging at about 9.4 per cent of demand.

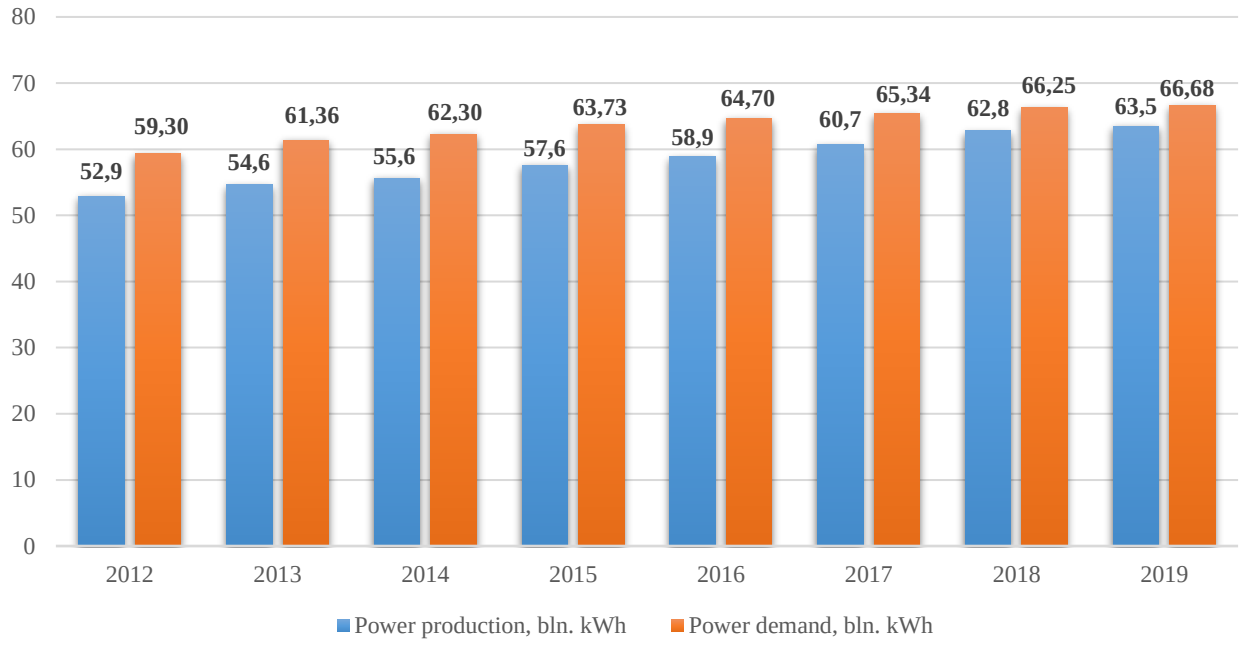


Figure 5 - Actual power production and demand trends in 2012-2019

The estimates show that annual power consumption growth rates up to 2030 shall be at around 6-7 per cent.

By 2030, nationwide consumption is estimated to reach 120.8 bln kWh (1.9 times growth compared to 2018). Residential population's power demand shall reach 21.9 bln kWh (1.8 times compared to 2018), and that of economic sectors will reach 85.0 bln kWh (2.2 times compared with 2018).

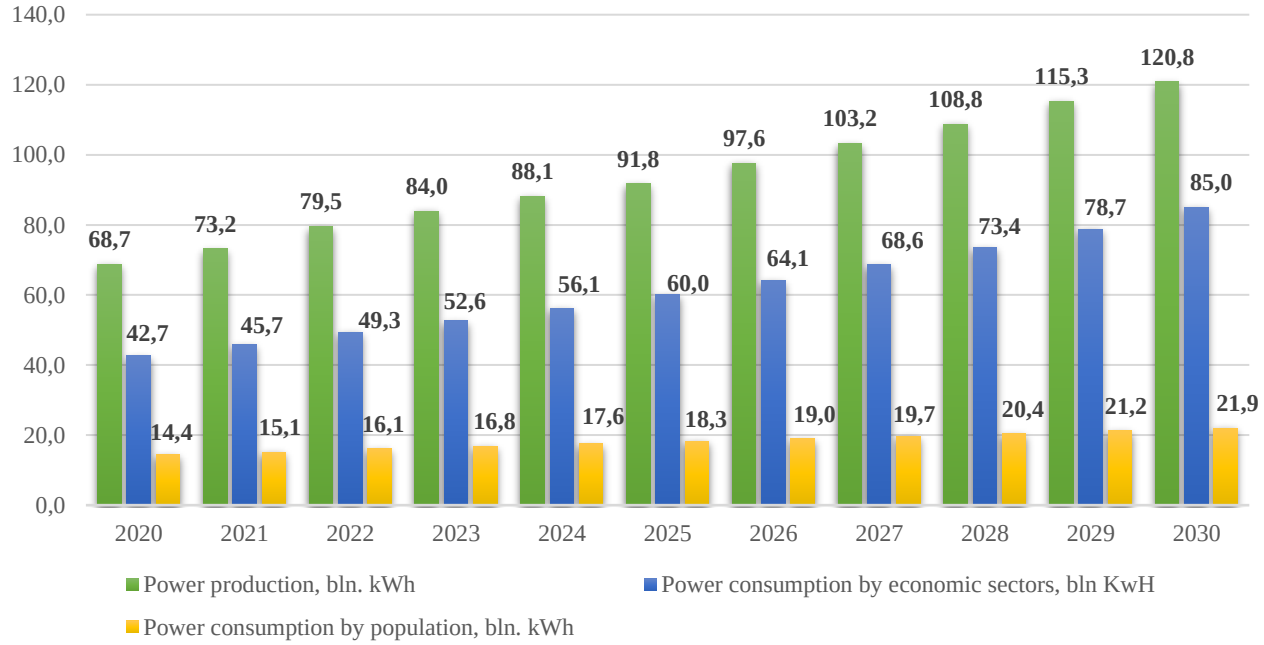


Figure 6 - Electrical power generation and consumption outlook by 2030, bln kWh

Per capita consumption is expected to reach 2,665 kWh per annum by 2030 and, compared to actual consumption of 1,903 kWh in 2018, that features a 71.4 per cent growth. This rate is substantial lower than that of comparator countries in 2018 including Korea (9,711), PRC (4,292), Russian (6,257), Kazakhstan (5,133), Turkey (2,637kWh).

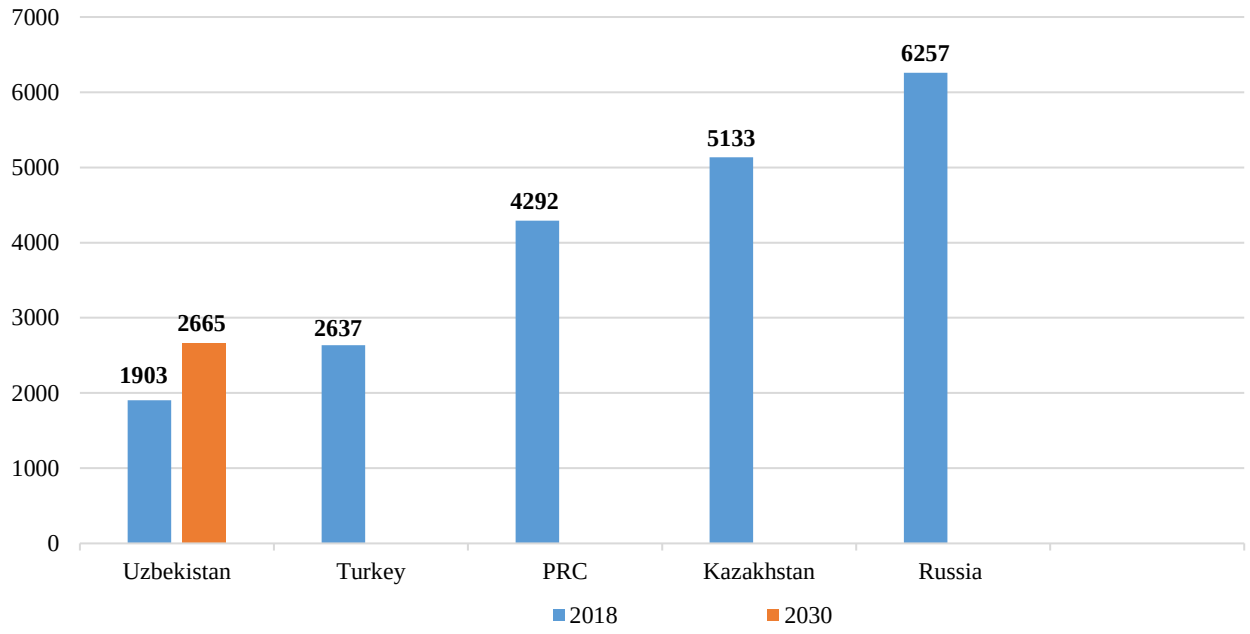


Figure 7 - Per capita power consumption, kWh per annum

Main factors contributing to the power consumption growth are as follows:

economic growth (GDP is expected to increase 1.9-fold by 2030);

improved living standards leading to increased use of power consuming equipment;

population growth up to 37.4 people according to the UN data, with simultaneously increased urbanization;

fulfilment of uncovered demand that is estimated at around 10 per cent.

Given the country's geographic location conducive to the use of its transit potential, it is expected that power imports and exports shall equalize by 2030 and reach 6 bln. kWh per annum.

Overall power load during peak maximum hours in 2030 is expected to reach over 20.9 thousand MW as opposed to 10.4 MW in 2019 winter, meaning that generating capacities must increase by almost 2 times (+10.5 thousand MW) by 2030.

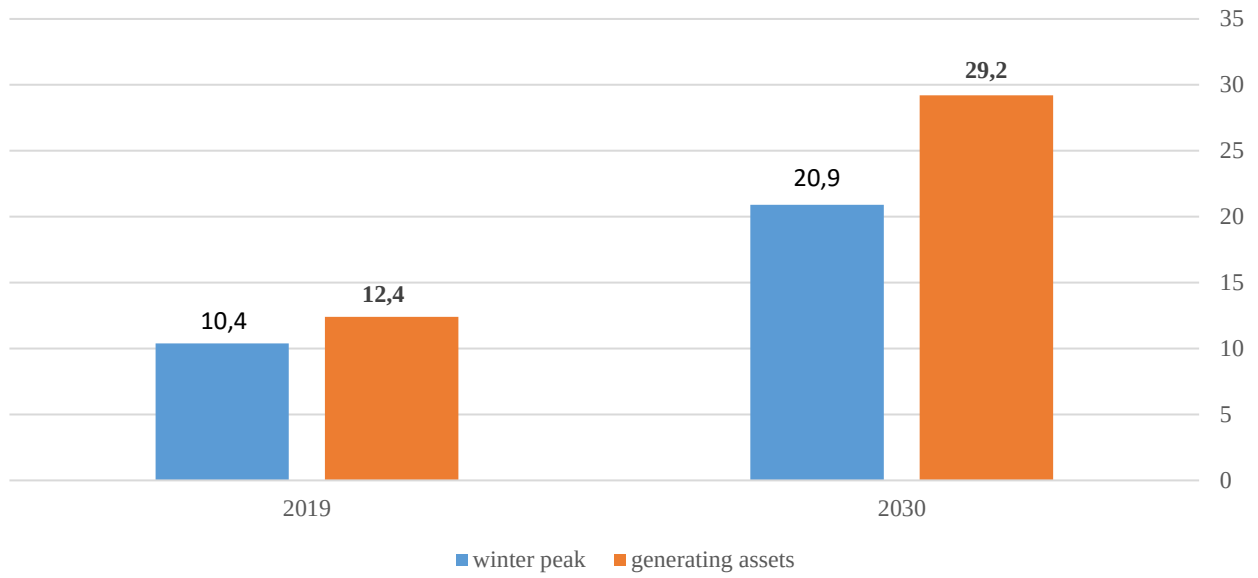


Figure 8 - Forecast generating capacity to maximum load in 2019-2030, thousand MW

Chapter 4. Main objectives, goals and priorities of this Concept Note

The key goal of this Concept Note for provision of Republic of Uzbekistan with electricity in 20203-2030 is to satisfy the increasing demand for electrical power at competitive prices as well as dynamic development of power sector in the Republic of Uzbekistan through modernisation and reconstruction of existing power plants, construction of new generating assets using energy efficient power production technologies, improvement of power metering systems, fuel diversification and development of renewable energy sources.

The following are the main objectives of the improvements in provision of the country with electrical power:

1st - satisfying the country's electrical power demand in full through domestic generation without dependence on energy imports and thus ensuring energy security;

2nd - improvement of national economy's energy efficiency with parallel reductions in energy intensity achieved through, inter alia, creation of economic mechanisms to stimulate rational use of electrical power by consumers;

3rd - increasing energy efficiency of generation, transmission and distribution of electrical power to satisfy the growing demand;

4th - reduction of power equipment wear through consistent renewal, increasing reserves in generation and transmission assets;

5th - development and expansion of renewables use and their integration into the unified power system;

6th - development of efficient basic electricity market model.

In order to efficiently fulfil the following objectives and achieve targeted goals of this Concept Note, implementation of the following key priorities must be ensured:

1st, modernisation and construction of new power sector assets required to ensure efficient functioning of domestic market, improvement of power metering

system and despatch controls through introduction of modern information and communication technologies;

2nd, improvement of efficiency and rational use of electricity at all stages of technological processes based on the use of energy saving technologies and optimization of generating assets;

3rd, ensuring diversification in power and heat energy sectors through increased share of renewable energy sources and creation of renewable energy investment project mechanisms utilising PPP approaches, enhancement of government policies related to development of renewable energy sources, demonstration of renewable energy projects;

4th, development of comfortable, rule of law based, administrative environment for investments and wholesale power sales with a view to attract long term investments, first of all foreign direct investments;

5th, enhancement of corporate governance, increasing transparency of state-own power enterprises' financial and economic operations;

6th, expansion of trans-boundary trade and strengthening of regional cooperation through the reinstatement and modernisation of transmission lines connected to neighbouring countries' power systems;

7th, development of market relations through step-by-step liberalisation and reduction of government's role, creation of a new market model based on clear separation of rights and responsibilities between actors in this sector at each step of market evolution, starting from Single Buyer and all the way to establishment of competitive wholesale and retail markets.

Chapter 5. Implementation of key priorities of the Concept Note

The key priorities of the Concept Note shall be implemented through the implementation of systemic activities aimed at the following:

1. Development of thermal power sector.

Thermal power remains one of the main sources of power generation in the country, and its development based on the use of energy efficient technologies shall ensure the power sector's overall sustainability.

In order to increase efficiency of TPPs during construction of new power plants operating in base-load condition, the use of combined-cycle technologies with generator efficiency over 60 per cent shall be the preferred approach.

Implementation of 13 projects is envisaged in 2020-2030 including 6 projects for construction of new TPPs with aggregate capacity of 3.8 thousand MW, 6 projects for expansion of existing TPPs increasing their capacity by 4.1 thousand MW through construction of CCGTs, GTs and a coal generator, as well as 1 project for modernisation of generators 1-5 at the Novo-Angren TPP increasing capacity by 330 MW.

As a result, total installed TPP capacity shall reach 14.7 thousand MW by 2030, generating 70.7 bln kWh per annum (1.3 times increase compared to 2018).

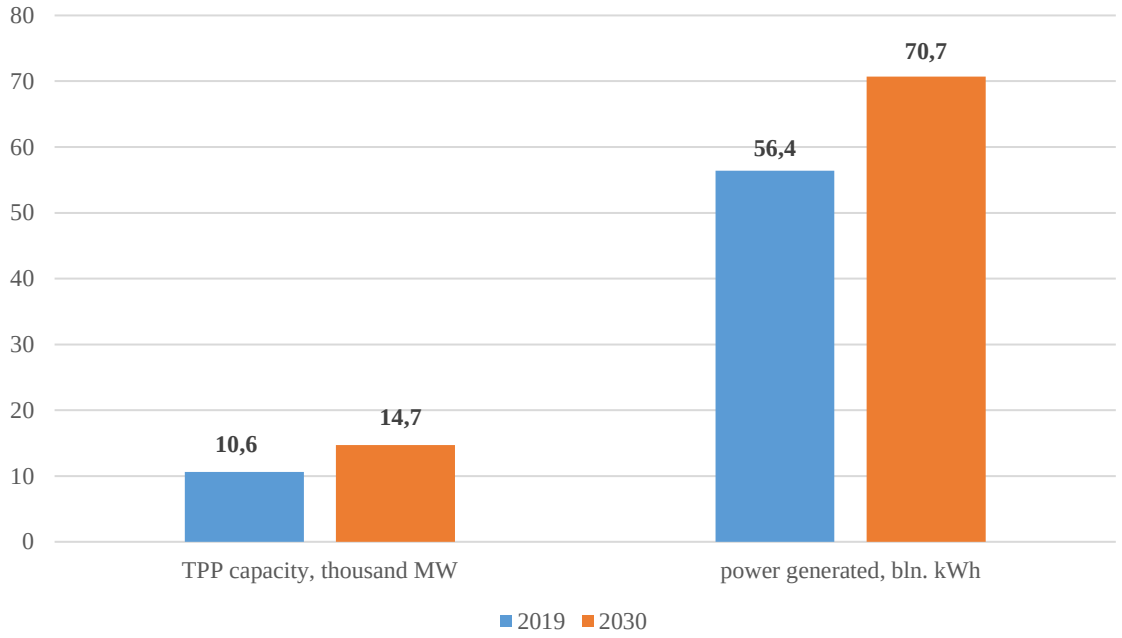


Figure 9 - Increases in installed capacity and power generated in 2019-2030

Investors shall be selected in 2020 for construction of two new TPPs in Syrdarya Region with total capacity of 2,600-3,000 MW. The projects shall feature the use of modern CCGT with unit capacities of 650-750 MW; commissioning of plants is expected in 2023-2024.

Projects will also be implemented to expand the Navoi TPP with a construction of the third 650MW CCGT to be commissioned in 2023-2024, and the fourth CCGT of the same capacity to be commissioned in 2024-2025.

Expansion of Talimarjan TPP with construction of the third and the fourth CCGTs with total capacity of at least 900MW is planned for 2023-2024.

Construction of a 1300MW TPP utilizing CCGT technology is planned in Kashkadarya or Surkhandarya regions to be commissioned in 2025-2026.

Construction of regulating power plants to compensate peak loads in the power system, with total capacity of around 1,200MW, will be accomplished using gas turbine (50-100MW) and gas piston engines. It is expected that investors shall be identified in 2020 for construction of two regulating power plants with capacity of 200-300MW. The said power plants shall be commissioned in 2021-2023.

Development of coal generation shall involve construction of a new 150MW coal generator at Angren TPP (Phase 2) as well as phased modernisation of existing generators at Novo-Angren TPP with year-round combustion of coal as well as reduction of harmful atmospheric emissions.

Development of co-generation units for heat and hot water supply in cities shall be accomplished mainly through integration of medium capacity GT units. In particular, a 17MW GT shall be commissioned at Ferghana CHPP in 2020 and two GTs with total capacity of 54MW shall be delivered in 2022 at Tashkent CHPP.

Obsolete and worn TPP assets shall be decommissioned as new generating assets are brought online. Total capacity of equipment to be decommissioned that is beyond

its economic life shall reach 5.9 thousand MW by 2030.

Meanwhile, out of energy efficiency considerations, reserve capacity shall be created that can be utilised subsequently for provision of ancillary services (system reserve).

2. Renewable energy based generation

Special attention shall be paid in 2020-2030 to the development of renewable source-based generation, especially solar energy. These projects shall be implemented exclusively using financing provided by investors - independent power producers.

Targets indicators for annual capacity introduction in 2020-2030 have been approved in order to achieve renewable energy goals envisaging construction of 3GW wind and 5GW solar power capacities.

Creation of large scale wind farms with single site capacities ranging from 100 to 500 MW mostly concentrated in North-Western region (Republic of Karakalpakstan and Navoi region) shall be the main priority direction of wind power development.

Solar PV plants with capacities ranging from 100 to 500MW shall be focused mainly in Central and Southern regions (Djizzak, Samarkand, Bukhara, Kashkadarya and Surkhandarya regions). However, 50-200MW solar PV plants shall also be constructed in other regions of the country. To this end, large solar PV plants (with overall capacity of over 300MW) shall be gradually equipped with industrial scale power storage systems to ensure stabilisation of intermittent generation and regulate peak loads.

With a view and promote foreign direct investments in renewable sector of the country, competitive bidding processes (tenders and auctions) shall be implemented together with international financial institutions in 2020-2022 to identify investors under the Build-Own-Operate arrangement and long-term (up to 25 years) Power Purchase Agreements for the supply of solar power shall be signed.

Thus, competitive bidding for construction of solar PV plants in Djizzak, Samarkand and Surkhandarya regions with total capacity of 600MW shall be conducted in 2020 with a support of international financial institutions (Asian Development Bank, World Bank Group, European Bank for Reconstruction and Development), and bidding announced for construction of additional 800MW solar PV in other regions of the country as well as construction of WPPs.

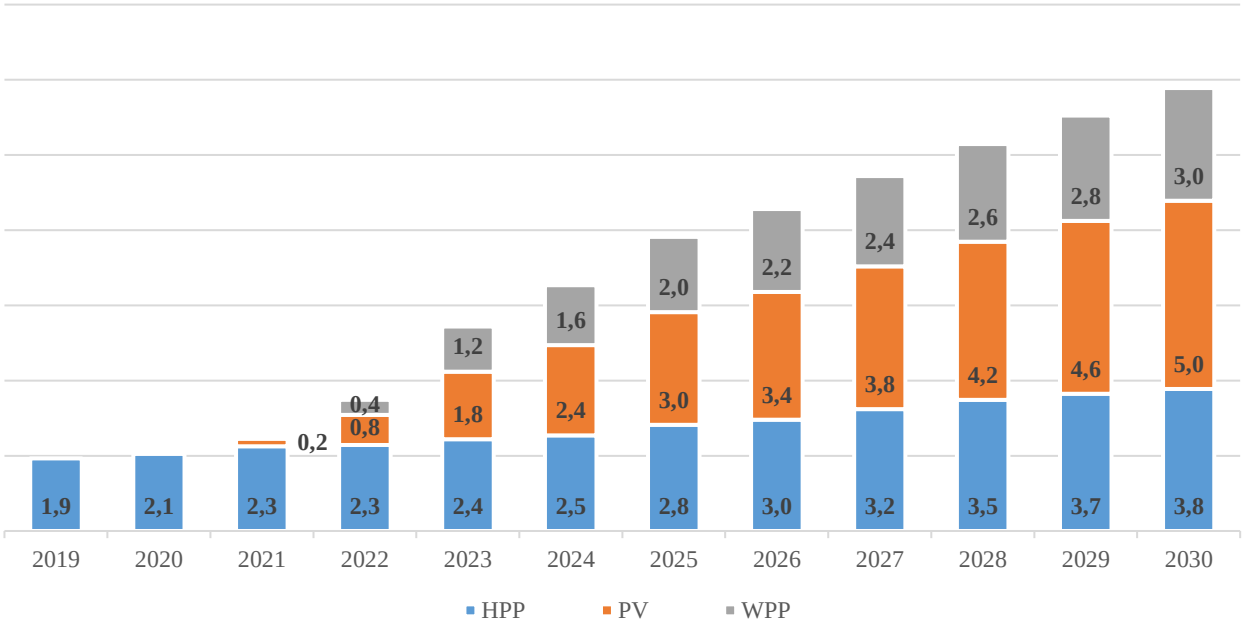


Figure 10 - Renewables-based generation structure by 2030, MW

Attention shall also be paid to creation of small scale isolated (not connected to the integrated power grid) solar PV plants in remote settlements of the country as well as regions where development of eco-tourism is planned.

Moreover, medium-scale solar PV (1-20MW) plants shall be developed for generation of electric power to cover own needs of industrial enterprises and industrial parks.

Considering rapid growth in the consumer's capacity to generate own power and supplying excess to the integrated power grid as well as in order to stimulate development of domestic investment potential, a targeted programme for installation of about 150 thousand solar PV plants (2-3kW capacity) and water heaters (200 litres on average) in 2-2.5 per cent households in 2021-2025 was approved. With residential renewables installations, it is expected that 4.3 per cent households' demand in the country, or about 800 million kWh, shall be satisfied thanks to introduction of partially isolated renewable energy units.

3. Hydropower development.

Implementation of 62 projects is envisaged in 2020-2030 including construction of 35 HPPs totalling 1537MW and modernisation of 27 existing HPPs with 186MW capacity added.
As a result, total installed HPP capacity shall reach 3,785 thousand MW by 2030, generating 13.1 bln kWh per annum (2.2 times increase compared to 2019).

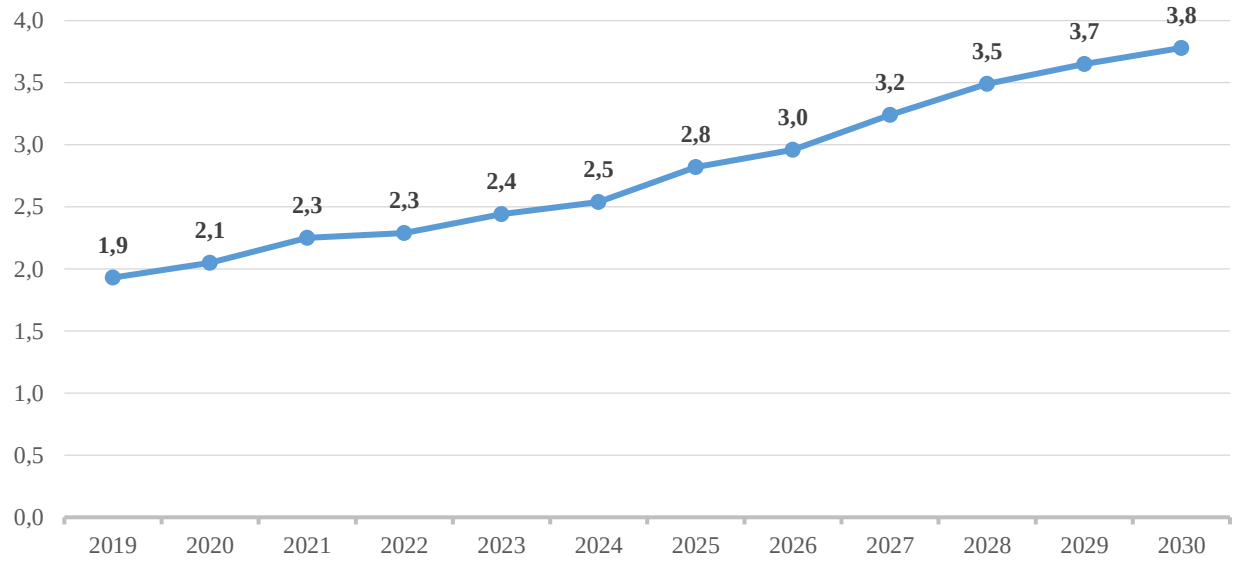


Figure 11 - Growth of installed HPP capacity in 2018-2030, MW

A number of new HPPs are planned to by constructed up to year 2030, including:

In Central power region: 6 large HPPs with total capacity of 1,176MW, 3 SHPPs with total capacity of 33MW and 2 micro-HPPs with capacity of 2MW;

In South-Western power region: 17 SHPPs with total capacity of 114MW: 5 micro-HPPs with capacity of 5MW;

In Southern power region: 4 HPPs with total capacity of 271MW and one SHPP with capacity of 25MW;

In Eastern power region: 8 SHPPs with total capacity of 68MW and 9 micro HPPs, capacity of 5MW.

4. Development of transmission grid

Transmission network is responsible for transportation of electrical power across the country's regions as well as international transit, export, import of electricity and facilitates interoperation with neighbouring countries' power systems.

Transmission networks are owned by the state through the National Power Networks of Uzbekistan JSC - the systems operator, and are not subject to privatization and/or external operation/management.

The National Dispatch Centre of the National Power Networks of Uzbekistan JSC shall continue implementing centralised operational dispatch of all power plants as well as transmission and distributions grids.

The Transmission Network Development Plan up to 2030 shall be developed and approved in 2020 with the assistance from the World Bank, reflecting integration of new generating sources including renewable-based.

It is expected that by 2025, with a view to increase power supply reliability, all power networks of the integrated power system shall be connected into a single 500kV grid.

The following key measures shall be implemented in order to realize this objective:

connection of new generating assets and improvement of reliability of power supplies in the North-Western power region, to support, inter alia, newly commissioned industrial capacities in the Republic of Karakalpakstan and Navoi Region, through construction of the following assets:

a) a 177km 220kV TL based on 500kV specification, from Navoi TPP to Besopan SS, with subsequent conversion to 500kV;

b) a 500/220kV SS in Muruntau, with two 501MVA (each) automatic transformers;

c) a 500kV Sarymay SS, with two 501MVA (each) automatic transformers;

d) a 226km 500kV TL from Sarymay SS to Muruntau SS;

e) a 255 km 500kV TL from Sarymay SS to Karakul SS;

satisfying the growing demand for electrical power of the consumers in Tashkent city and Tashkent Region through construction of a 500/220/110kV SS, with two 501MVA capacity (each) automatic transformers and a 46km long 500kV TL (originating and ending at L-550 and L-502 500kV TLs);

improving reliability of the Southern power region as well as improving export and import potential and interoperation with other countries' power systems through construction of the following power assets:

a) a 500/ 500/220kV SS in Surkhandarya region, with two 501MVA (each) automatic transformers;

b) a 200km long 500kV TL from Surkhon-500 SS (Republic of Uzbekistan) to Puli-Khumri SS (Islamic Republic of Afghanistan);

c) a 63 km long 500kV TL from Guzar SS (Republic of Uzbekistan) to Regar SS (Republic of Tajikistan);

By 2030, all 220kV transmission lines and substations shall be converted from backbone to distribution function.

The following key measures shall be implemented in order to realize this objective:

two-phase modernisation and reconstruction of substations and transmission lines:

a) first phase, up to 2022, covering 22 different 220/110kV substations;

b) second phase, up to 2028, covering 44 different 110-220kV substations and transmission lines;

construction of five new dual 220kV transformer substations, with aggregate capacity of 1,250MVA, and construction of a total of 246km 220kV transmission lines.

Moreover, as new energy intensive industrial enterprises are and new power plants are commissioned, additional 220kV substations and transmission lines shall be constructed.

To facilitate speedy maintenance and, inter alia, reduction of operating costs and quick recovery of technical disturbances and deviations, the above projects shall integrate the following digitization and automation principles:

to ensure real time operation of systems for collection, processing, display and backup of data on power generation, transmission and distribution, and to optimize electricity flows and loads on generating assets, a phased integration of a SCADA system for technical management of dispatch and data acquisition;

modern technologies like “Digital Substation” shall be integrated in the design and construction of new substations as well as modernisation and reconstruction of existing ones.

new standards governing construction of multi-circuit overhead transmission lines based on IEC standards shall be introduced with a view to reduce operating costs and land acquisitions during construction of new backbone transmission lines.

Construction, modernisation and reconstruction of backbone grid shall be financed by own resources and loans drawn by National Power Networks of Uzbekistan JSC with possible exceptions applicable when connecting independent power producers to the unified power grid.

5. Development of distribution grids

Distribution power networks are used to deliver electricity to end-users and are characterised by relatively dynamic development as well as high level of technical losses.

The following are identified as key priorities in the distribution grid development:

reduction of technical and commercial losses of electricity during distribution;

improvement of reliability and quality of power supply to the consumers.

As transition to wholesale competitive electricity market is done, the functions of distribution grid operation and power sales to consumers shall be separated, with distribution grids remaining in state ownership meanwhile. The functions of power sales shall be gradually transferred to private retailer companies based on PPP arrangements following transparent competitive selection.

New state programme shall be adopted in 2020 envisaging construction of new and modernisation of existing 35-110kV power networks in 2021-2025, and work shall be continued to modernise and reconstruct low-voltage distribution networks with adoption of a new state programme in 2022-2025.

Modernisation of existing and construction of new 110/35/10/0.4kV power distribution networks shall be based on the following principles:

increasing number of 110/35/10kV substations through construction of new substations and upgrading existing 35/10kV substations to higher voltage class;

construction of 10, 35 and 110kV transmission lines through installation of underground cables or use of self-supporting insulated wires within cities and other populated centres;

upgrading 35kV and 110kV substations to closed-type construction within cities and large population centres;

wide-scale application of 35/0.4kV stepdown transformers within cities

and large population centres;

phasing out 6kV voltage power systems transitioning to 10kV and 35kV systems;

replacement of 0.4-10kV overhead TL wires with self-supporting insulated wires with reduction of the length of 0.4kV lines.

In 2020-2021, as part of the power sector digital development programme:

a unified Data Centre shall be established;

Advanced Electrical Metering (AEM) project shall be finalised covering all consumers and power system assets;

“Billing” and “Power Consumption Analysis and Forecasting” software packages shall be developed and commissioned.

Works involving construction of new, modernisation and reconstruction of existing transmission lines and substations shall be financed by long-term IFI loans and from own resources of Regional Power Networks JSC.

6. Transition to wholesale market and improvement of tariff policies in power sector.

Transition to wholesale market shall be implemented in a phased manner in 2020-2023 with every new phase starting once compulsory conditions are met. Competitive wholesale market shall be formed in 2023 and all market participants shall have fair and unobstructed access to backbone transmission networks.

Starting from 2023, all power generators shall become participants of the wholesale market while the state will continue performance of its obligations under the Power Purchase Agreements signed earlier.

To this end, the functions of the Single Buyer shall be transferred in 2021 from National Power Networks of Uzbekistan JSC to the newly established Guaranteed Buyer - a state owned trading company that will also perform power export and import functions.

The following shall be approved in 2020-2022:

models of wholesale power market (monthly contracts - day-ahead trade - intraday trade) and interim stages;

model of balancing power market;

market operation rules;

market participant licensing rules.

The following shall be established in 2020-2021:

Independent Power Market Regulator - a financially independent body separated from the Government that fulfils regulating, licensing and controlling functions in the electrical power and natural gas markets;

Power market Operator - a state owned company (with 10-15 staff at early stages) with online platforms that facilitates all electrical power and natural gas trade operations in the wholesale market. The fee charged by the Operator shall

be approved by the Independent Power Market Regulator.

Since transition to wholesale market shall be phased, some categories of consumers shall be granted the following starting from 2021:

right to purchase electrical power directly from generators;

guarantees of power transmission, with mandatory payment of transmission service fees, from sources of generation owned by such consumers, to the consumption sites.

The following shall be adopted in 2020-2021 in order to create legal frameworks underlying market operations:

New editions of the Republic of Uzbekistan Law “On Electricity”;

Republic of Uzbekistan Law “On the Independent Power Market Regulator”;

Grid Code as well as other required regulatory and legal acts.

The tariff policy in power sector shall be based on the following principles:

establishment of separate non-discriminatory tariffs for generation, transmission and distribution at levels covering actual operating costs, depreciation, capital expenses and allowing to service debt and earn profits for the purpose of dividend payments;

establishment of long-term tariffs for power utilities calculated using stimuli-based methodology, in order to improve their operating efficiency and reduce losses;

maintaining single end-user tariffs in all regions of the country (national tariffs) at levels covering actual costs of purchasing and delivering electricity;

introduction, starting from 2022, of differentiated tariffs for electricity for residential consumers based on time of day, working days / holidays;

introduction, starting from 2023, of feed-in procedure for purchasing excess electricity generated using own renewable sources, at fixed tariffs;

approval of tariffs by the Tariff Committee, and later by the special authorised body - the Independent Power Market Regulator which will also have powers to approve tariff methodology and other regulatory and legal acts pertaining to tariff regulation.

Chapter 6. Expected Results and Quantitative Indicators of the Concept Note

As a result of fulfilment of the objectives identified herein by 2030:

a) installed and available generating capacity after decommissioning of obsolete assets (5.9 thousand MW) shall reach 29.2 thousand MW, including:

natural gas fired TPPs: 13.4 thousand MW (45 per cent);

coal fired TPPs: 1.7 thousand MW (5.9 per cent);

HPP: 3.8 thousand MW (13.1 per cent);

WPP: 3 thousand MW (10.4 per cent);

PVPP: 5 thousand MW (17.3 per cent), including 1 thousand MW with power storage systems accumulating electricity during daylight house and using accumulated electricity at night and during evening periods of peak load in power system;

NPP: 2.4 thousand MW (8.3 per cent).

Additional generating assets created shall reach 16.4 thousand MW including 4.4 thousand MW regulating assets to compensate for peak loads.

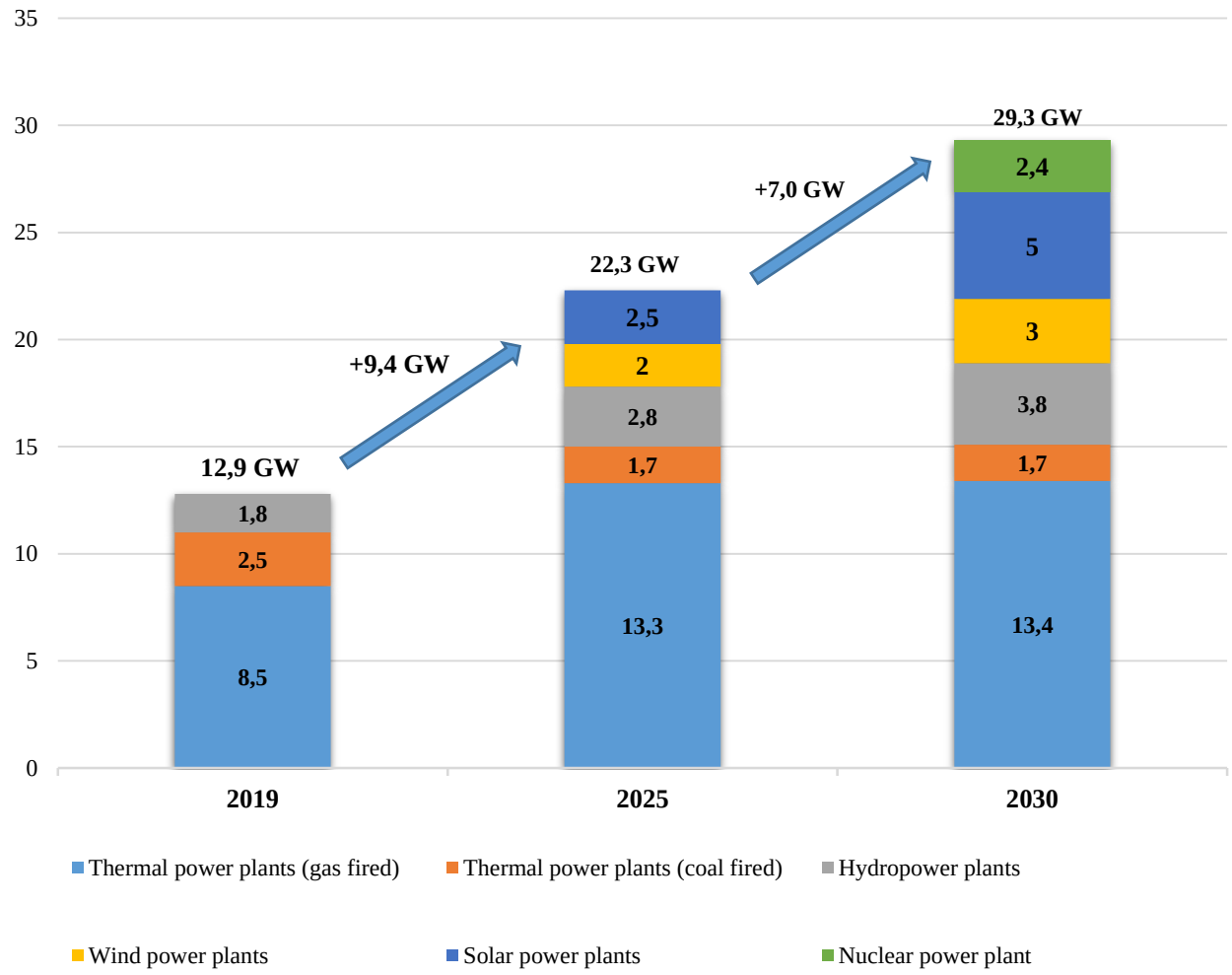


Figure 12 - Growth of capacity in 2019-2030, MW

b) power generation shall reach 120.8 billion kWh, including:

TPP: 70.7 billion kWh (58.5 per cent);

HPP: 13.1 billion kWh (10.8 per cent);

PVPP: 9.9 billion kWh (8.2 per cent);

WPP: 8.6 billion kWh (7.1 per cent);

NPP: 18.0 billion kWh (14.9 per cent);

Consumer-owned generators: 0.6 billion kWh (0.5 per cent);

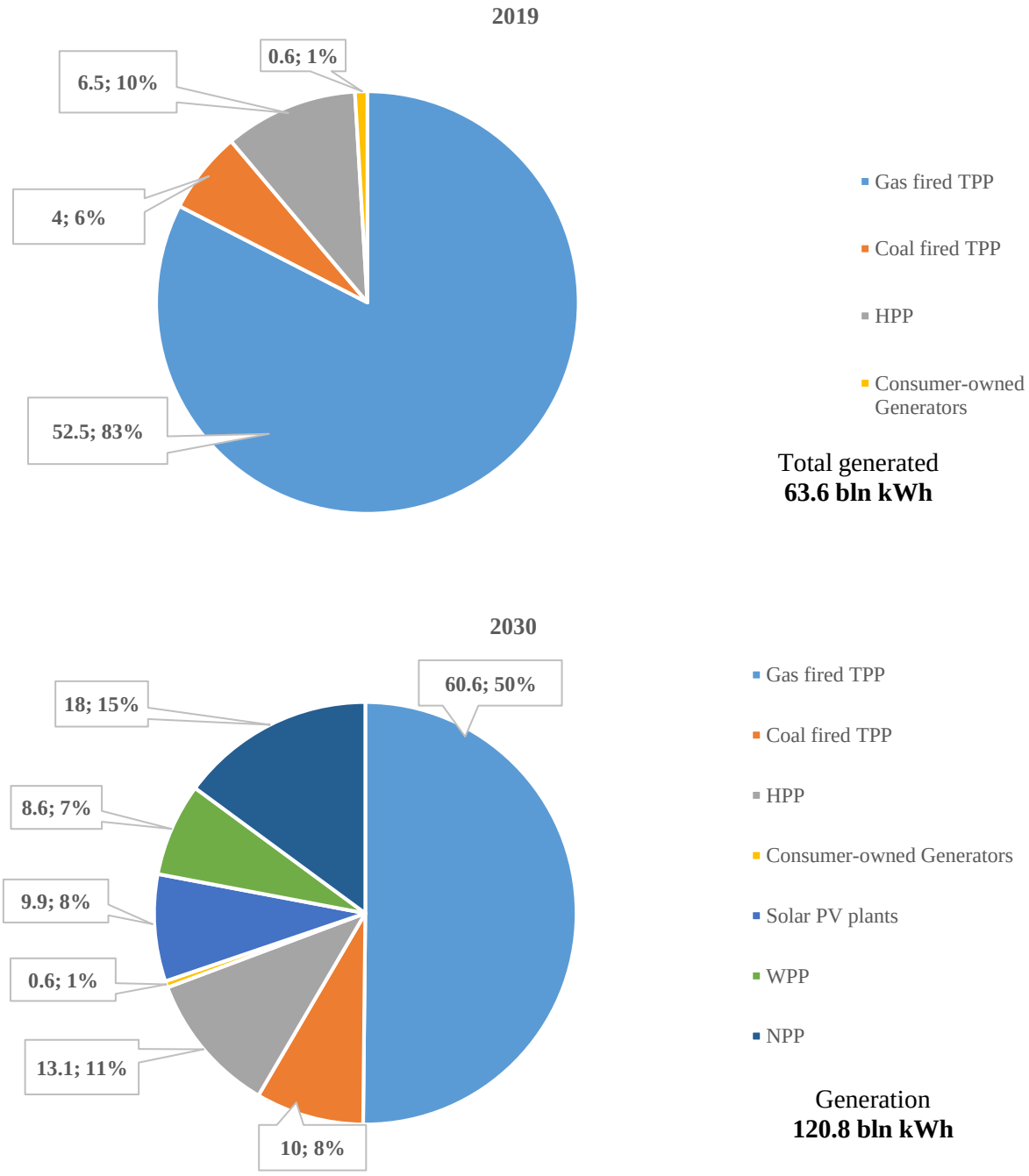


Figure 13 - Generator power changes between 2019 and 2030, billion kWh

c) natural gas consumption shall reduce from 16.5 billion cubic metres down to 12.1 billion cubic metres, while volume of coal fired shall increase from 4.1 million tons up to 8.5 million tons.

Nr.	Fuel	2019	2025	2030
1	Natural Gas (mln. m^3)	15.8	12.7	12.1
2	Coal (mln. tons)	3.6	8.5	8.5
3	Fuel Oil (thousand tons)	204	50	50

Table 1 - Consumption of Fuel for Power Generation

d) the state shall remain the owner of HPPs, NPP and some of the TPPs while most of generation shall be concentrated in private sector;

e) electricity losses in transmission shall reduce down to 2.4 per cent by 2025, equivalent to 1.03 times reduction compared to 2019; distribution losses shall reduce down to 7.9 per cent, or 1.51 time less than 2019 levels.

f) meanwhile, transmission losses shall reach 2.35 per cent by 2030, or 1.05 times lower than in 2019; distributions losses shall reach 6.5 per cent, or 1.85 times less than 2019 levels.

g) development of renewable energy sources shall facilitate fulfilment of objectives of ensuring affordable electricity supplies to the country's regions with electricity shortages, improve environmental conditions and increase energy efficiency, stimulate development of local industries, infrastructure and job creation.