



Kyrgyzstan's transition to renewable energy



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The Kyrgyz Republic



- **Population**
- In 2022 = 7 mln people, by 2050 expected growth - 28% to 52%, average projection 9426,858 mln people.
- **Climate change**
- The Kyrgyz Republic is vulnerable to the impacts of climate change, with impacts can lead to a decrease in small hydroelectric power generation in Kyrgyzstan.
- **Deteriorating infrastructure**
- The deterioration of energy sector infrastructure coupled with the financial crisis in the energy system will eventually lead either to a significant decrease in the quality of produced energy or to an increase in energy prices.
- Both of these impacts could increase demand for independent energy production and pave the way for the deployment of reliable renewable energy technologies.
- **Local air pollution**
- The Kyrgyz Republic is among those Central Asian nations most affected by diseases linked to indoor air pollution. In the winter months, Bishkek regularly features among the top polluted cities in the world due to its air quality.
- Renewables could help replace fossil fuels (especially coal) in heating and power generation, thus reducing air pollution. Vehicular emissions can be reduced through greater adoption of public transport and the uptake of electric vehicles.

<http://data.un.org/>

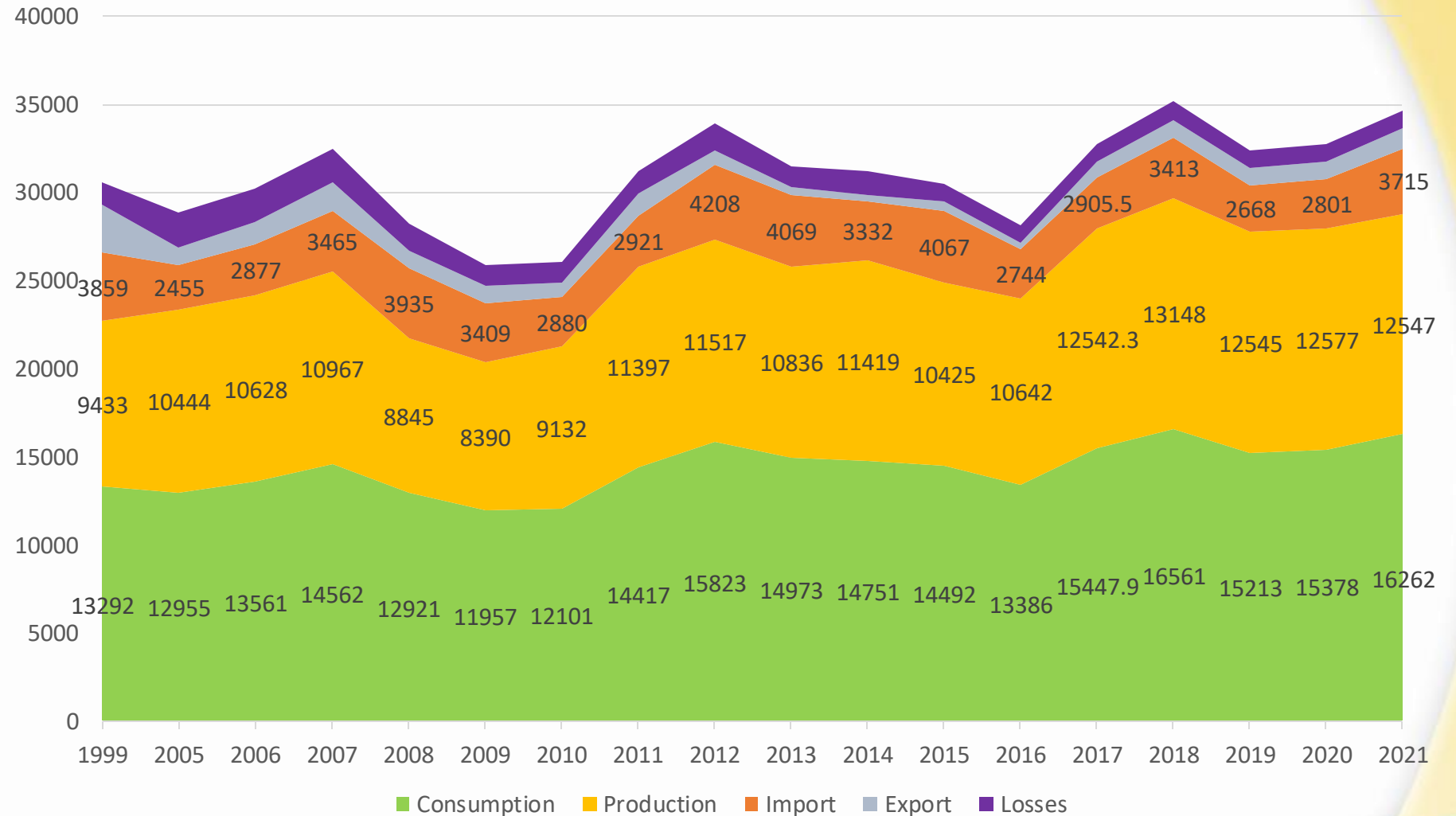
<https://www.irena.org/Publications/2022/Dec/RRA-Kyrgyz-Republic>

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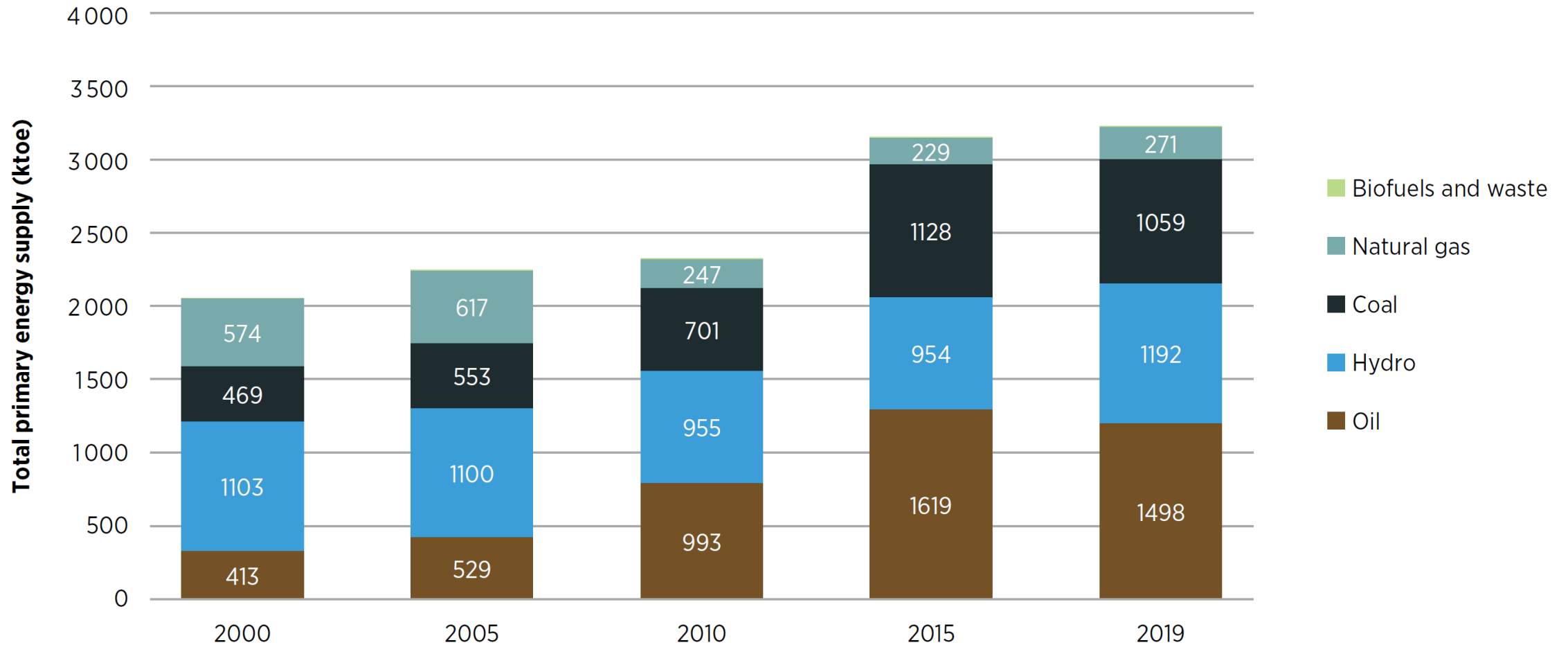
Kyrgyzstan Energy Balance

Energy balance, thousand of tons of oil equivalent

	% of Consumption	Growth since 2005
Consumption	100.0%	25.5%
Production	77.2%	20.1%
Import	22.8%	51.3%
Export	6.8%	5.1%
Losses	6.1%	-49.1%



Total primary energy supply by fuel

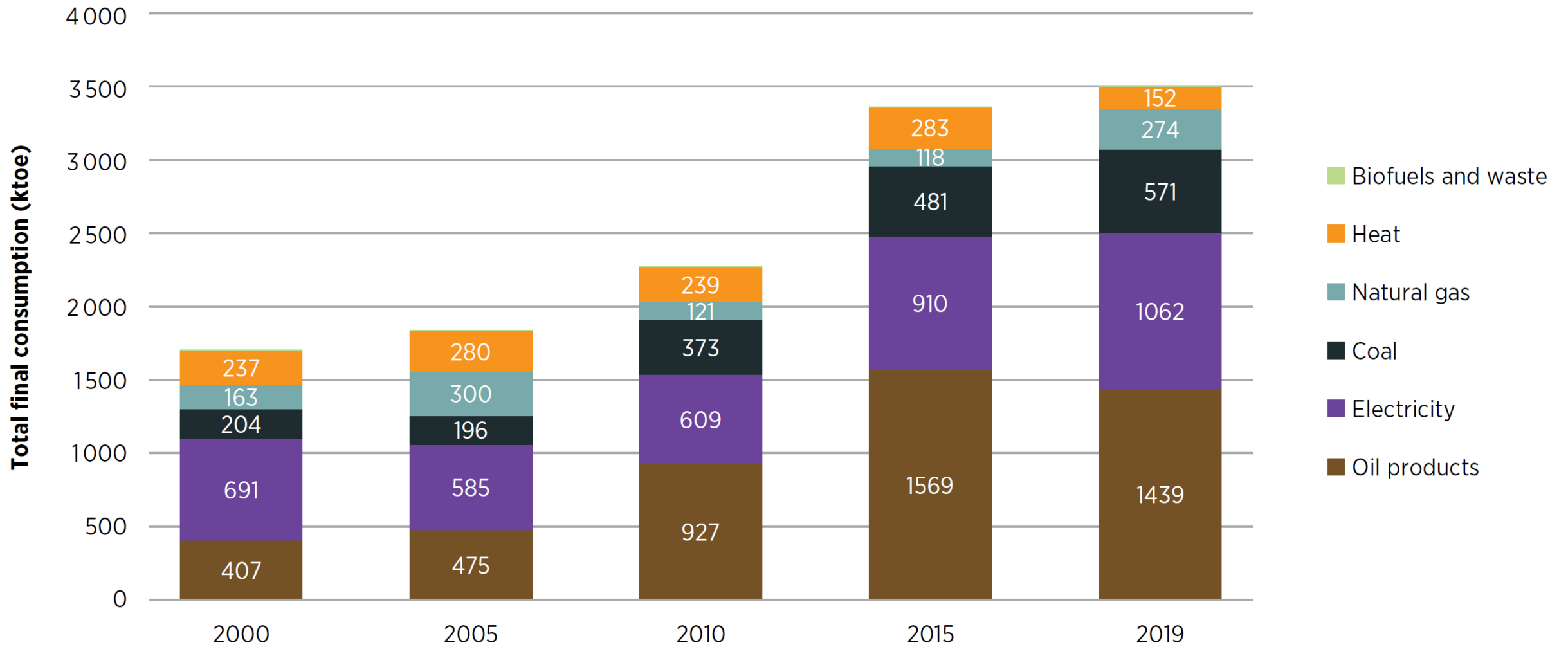


Source: IEA (2020b).

Note: ktoe = kilotonne of oil equivalent.

Активация Windows
Чтобы активировать Win

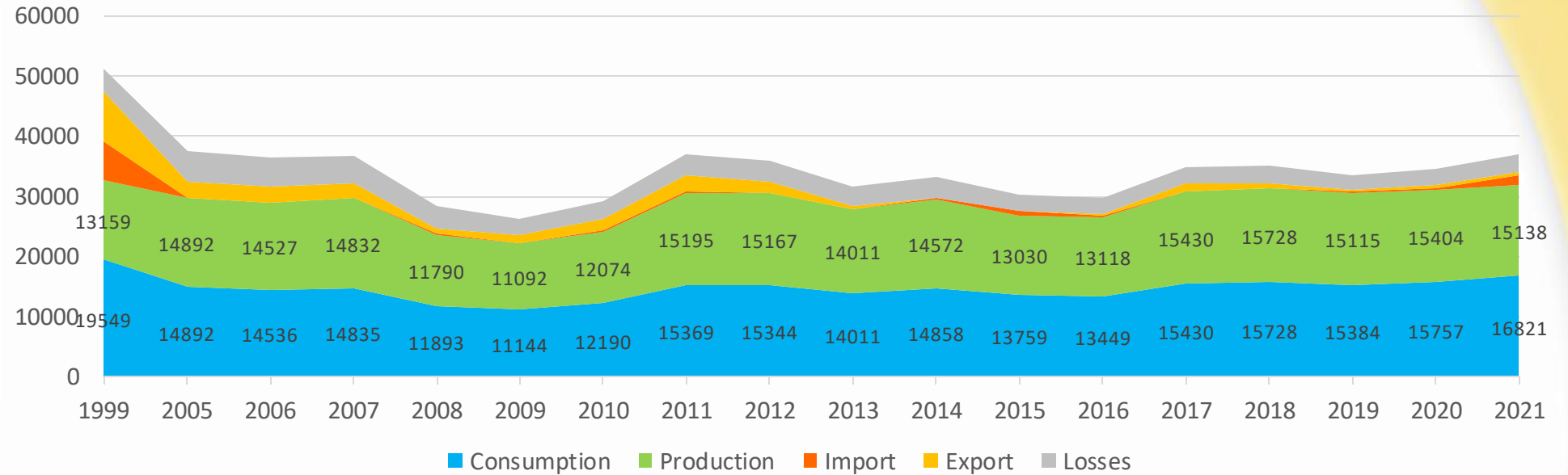
Total final energy consumption



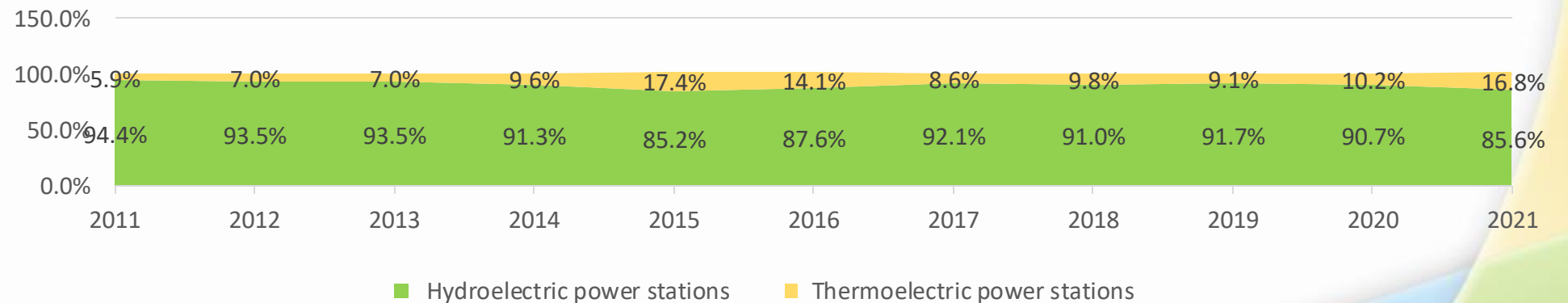
Kyrgyzstan Electricity Balance

Electricity balance, mln kWh

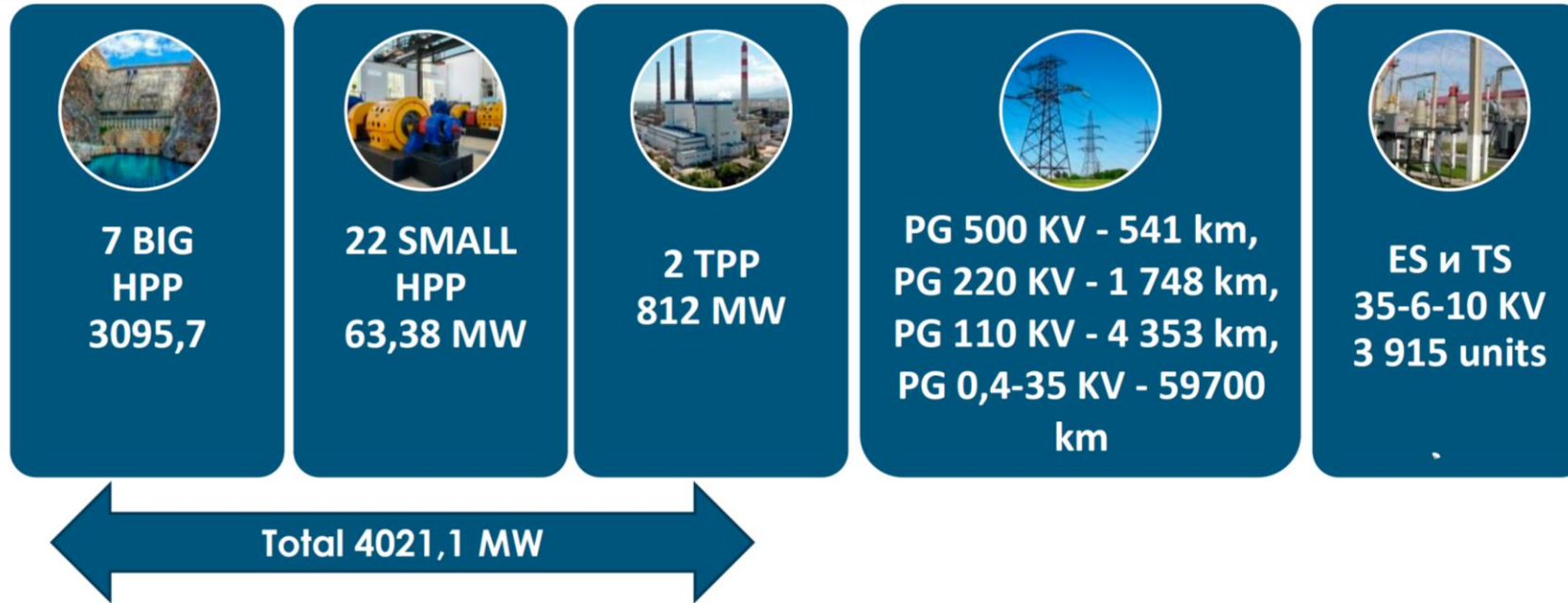
Electricity	% of Consumption	Growth since 2005
Consumption	100.0%	13%
Production	90.0%	1.7%
Import	10.0%	841350%
Export	3.3%	-79.4%
Losses	16.3%	-46.7%



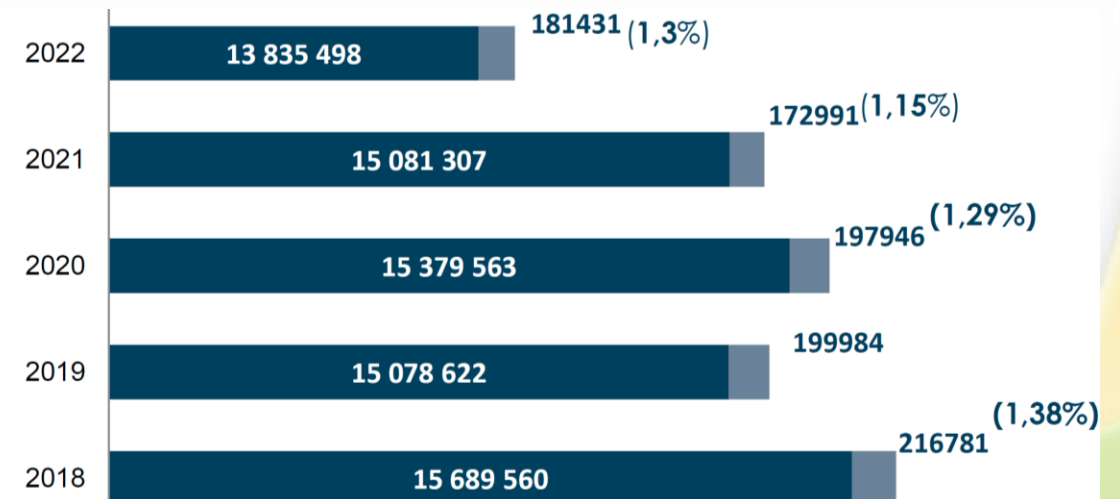
Electricity production, %



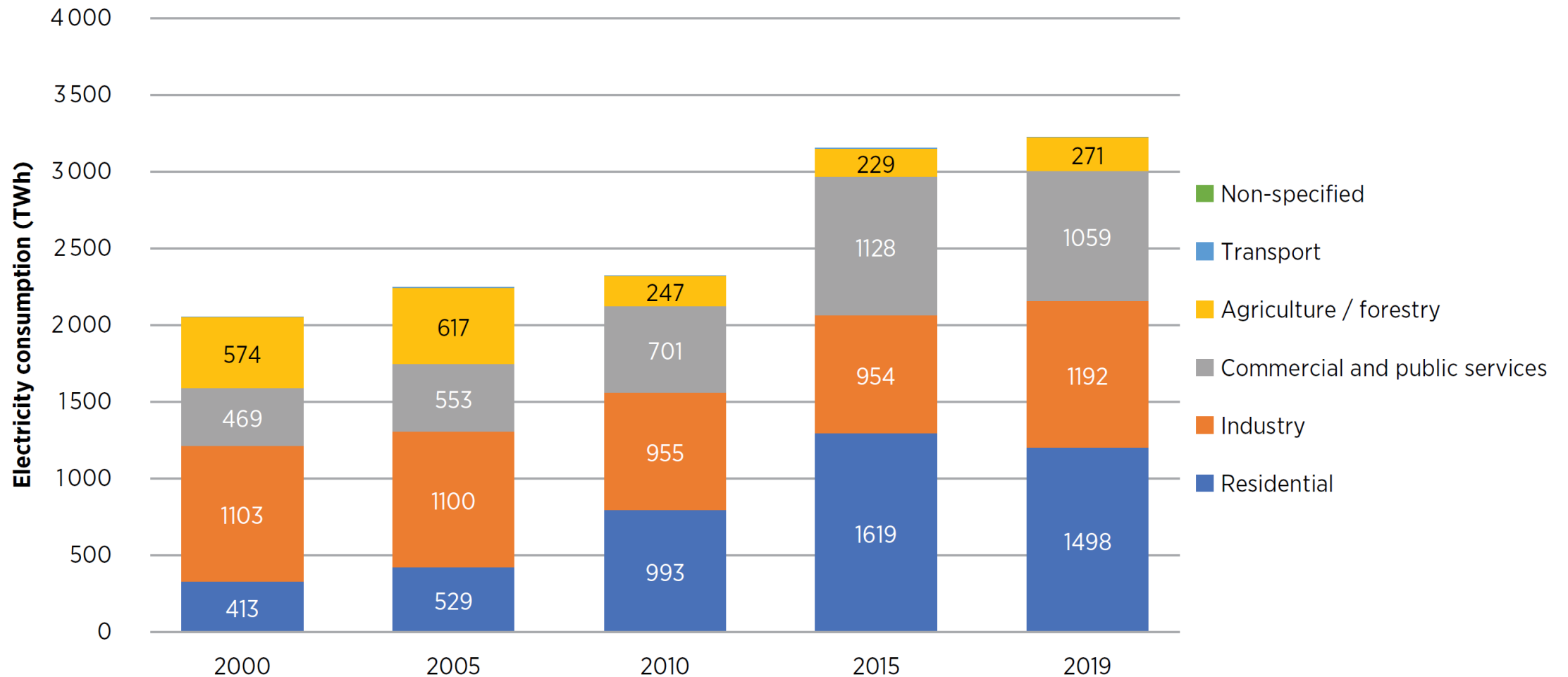
Kyrgyzstan Power Sector composition



Generation, kWh
Large vs Small HPP



Electricity consumption by sector



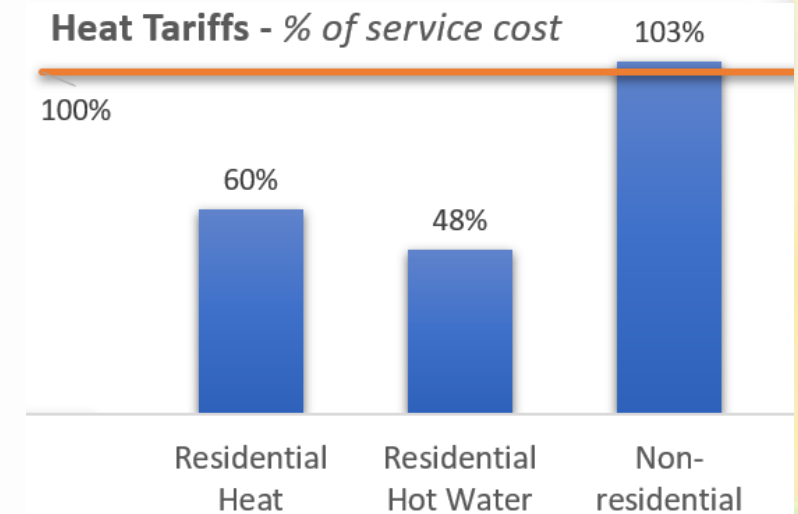
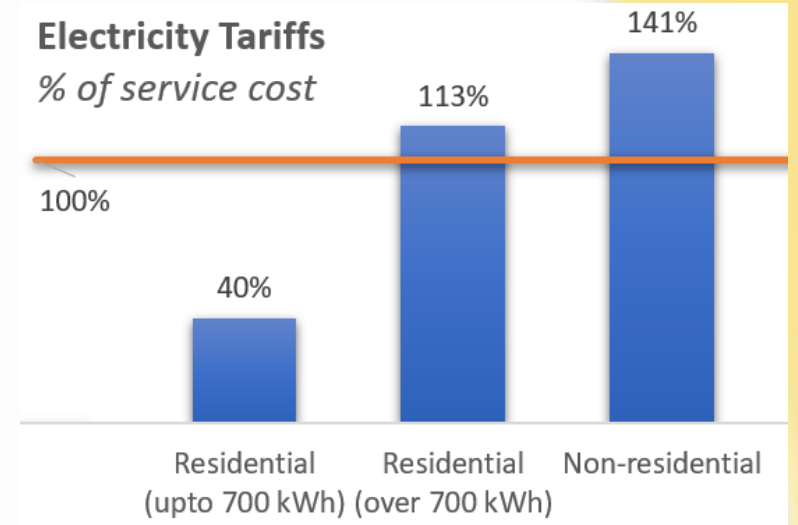
Source: IEA (2020b).

Note: TWh = terawatt hour.

Активация Window
Чтобы активировать Window
"Параметры".

Background – Energy sector tariffs

- Electricity and heating tariffs are not-sufficient for cost recovery
- Electricity and heating tariffs are cross subsidize
- Tariffs was unchanged since 2015 up tp 2021 and is the lowest in the region
- Only 25% heat consumption metered
- Without change in tariffs, electricity sector deficit can increase to KGS 12 billion (roughly USD 140 million) by 2025
- The system fails to provide price signals for efficient energy use
- Leads to severe under-spending on maintenance and new investments
- Renewables cannot compete with retail tariffs
- Tariff reforms have started with increase of electricity prices in 2021 by 10% and in 2022 by additional 30% for households, but electricity tariffs are still below production costs due to concerns about affordability and willingness to pay



Relevant national policies

National policies:

- National Energy Program for 2008-2010 and the Strategy for the Development of the Fuel and Energy Complex until 2025;
- National Development Strategy of the Kyrgyz Republic for 2018-2040;
- The concept of green economy in the Kyrgyz Republic "Kyrgyzstan - a country of green economy" (2018);
- Green Economy Development Program up to 2023 (2019);
- Master Plan for the Development of the Energy Sector of the Kyrgyz Republic until 2040 (2022);
- National Water Strategy up to 2040;
- **No national policy on energy sector development outlining RE! but pending Program of Development of the Fuel and Energy Complex until 2035**

International obligations:

- NDA – reduce greenhouse gas emissions by 16% unconditionally and by 44% with international support;
- Carbon neutrality by 2050.

Legislation

- Land, Water, Forest Codes
- Laws: "On Energy", "On Electricity", "On Investments in the Kyrgyz Republic", "On PPP"
- Law "On Renewable Energy" (2008) (subject to change)
- Regulation "On the conditions and procedure for the implementation of activities for the generation and supply of electricity using renewable energy sources" (Decree of the Government of the Kyrgyz Republic No. 583 of 10/24/2022)
- Regulations on the procedure for issuing documents for the design, construction and other changes in real estate and assessment of the conformity of completed facilities put into operation in the Kyrgyz Republic (Resolution of the Cabinet of Ministers of the Kyrgyz Republic No. 114 dated 08/06/2021)
- Rules for the technological connection of generation sources, electrical networks of electrical distribution organizations and electrical installations of consumers to electrical networks (Decree of the Government of the Kyrgyz Republic dated March 29, 2018 No. 169)
- Order of the Department for Regulation of the Fuel and Energy Complex of the Ministry of Energy of the Kyrgyz Republic "On the establishment of a single tariff for electricity generated by installations using renewable energy sources" dated January 23, 2023 No. 8.
- Decree of the President of the Kyrgyz Republic dated March 23, 2023 No. 62 "On the issues of alienation of lands intended for the use of renewable energy sources"

Current RE incentives

- Small HPPs include plants with a capacity of up to 30 MW, other RE without restrictions;
- Free sale of energy obtained from RES to its consumers;
- Grace period of 15 years for the purchase of electricity from renewable energy entities using a multiplying factor of 1.3 ($1 \text{ kWh} = 3.4 * 1.3 = 4.42 \text{ som}$ (0.05\$));
- Acquisition of RES electricity by an energy company under the relevant agreement, regardless of which electricity company's networks the RES installation is connected to;
- Supply and payment of electricity from renewable energy entities on the basis of PPA concluded for the duration of the grace period;
- Unhindered transit of electricity from renewable energy entities;

Current RE incentives

- Exemption from income tax for 5 years from the date of commissioning;
- Exemption from VAT on imports into the territory of the Kyrgyz Republic of specialized goods and equipment intended for the construction of power plants using renewable energy sources (the list of equipment is approved by the Cabinet of Ministers);
- Exemption from compensation for agricultural and forestry losses during the construction of RES installations by domestic investors, for PPP projects;
- A draft NLA is being developed on the provision and use of lands of the water fund;
- Subjects of the fuel and energy complex are required to obtain a license for the sale of electrical energy issued by the authorized state body for the regulation of the fuel and energy complex. RE entities are exempted from obtaining a license for the production of electrical energy.

Creation of Green Energy Fund

- By Resolution of the Cabinet of Ministers of the Kyrgyz Republic dated November 14, 2022 No. 621, the Green Energy Fund under the Cabinet of Ministers of the Kyrgyz Republic was established, one of the tasks of which is to subsidize an energy company to recover the costs of purchasing electrical energy from renewable energy entities. At the same time, it should be noted that the funds of the fund are formed at the expense of the republican budget.
- In accordance with the Decree of the President of the Kyrgyz Republic dated March 23, 2023, UE No. 62, it was decided that the Green Energy Fund under the Cabinet of Ministers of the Kyrgyz Republic the right of perpetual (without specifying a term) use of lands suitable for the use of renewable energy sources is granted.

RE plans (Ministry of Energy, 2023)

Количество действующих МГЭС – 24

1	ОАО «Чакан ГЭС» - 9 МГЭС	38,5МВт
10	Калининская	1,4 МВт
11	Ыссык Атинская	1,6 МВт
12	Найманская	0,6 МВт
13	Марьям ГЭС	0,5 МВт
14	Джидалик	1 МВт
15	Кыргыз Ата	0,4 МВт
16	Тегирментинские ГЭС	6,1 МВт
17	Конур-Олонская	3,6 МВт
18	Кок-Сайская	3,4 МВт
19	Тонская	3,6 МВт
20	Озгур	0,23 МВт
21	Сокулукская 2	2,4 МВт
22	Жиптик	2 МВт
23	Окталио	0,85 МВт
24	Буйга	0,4МВт

Общая мощность **66,5 МВт**

Планируемые к вводу в 2023 году МГЭС, ВЭС и СЭС:

1	Бала-Саруу ГЭС	25 МВт
2	Лейлек ГЭС	6 МВт
3	Кыштут ГЭС	1 МВт
4	Көгарт ГЭС	7 МВт
5	Ыссык-Ата ГЭС	4 МВт
6	Кайнама-1 ГЭС	9,6 МВт
7	Исфайрам-1 ГЭС	4 МВт
8	Ала-Башская ГЭС 1	4,5МВт
9	Аксы ГЭС	2,6 МВт
10	Тосту ГЭС	1 МВт
11	Белес ГЭС	0,54 МВт
12	Айгыр Жал ГЭС	2,4 МВт
13	Курак-Тектир	1,2 МВт
14	Ленинполь	2,3 МВт
15	Буйга	6 МВт
16	«СиЭнЭй Энерджи» ЖЧК	2 МВт
17	Метрум ТЭК (ВЭС)	10 МВт
18	Күн-булагы СЭС	50 МВт
19	Бишкек Солар СЭС	100 МВт

Общая мощность **239,1 МВт**

Планируемые к вводу МГЭС на 2024 год:

1	Ак-Терек ГЭС	4 МВт
2	Саркент ГЭС	2 МВт
3	Турген ГЭС	15МВт
4	Шамси ГЭС	10 МВт
5	Боз-Учук ГЭС	0,7 МВт
6	Жергез ГЭС	6,2 МВт
7	Кара-Жыгач	1 МВт
8	Сары-Таш	1 МВт
9	Аманат	0,5 МВт
10	Адын-Ункур	0,85 МВт
11	«СиЭнЭй Энерджи»	12 МВт
12	Кожо-Кайыр ГЭС	0,3 МВт

Общая мощность **53,5 МВт**

Ведутся работы для реализации проектов по строительству МГЭС:

1. Орто-Токой – 21МВт
2. Каракуль – 18МВт
3. Папан – 20МВт

Общая мощность **59 МВт**

Реконструкция Лебединовской ГЭС

Планируемый ввод
ВЭС и СЭС на общую
мощность **1600 МВт**

- Acting 25 SHPP (66.5 MW), planned in 2023 – 19 RE (239,1 MW), in 2024 – 12 SHPP (53,5 MW) and 1600 MW of solar and wind power plants

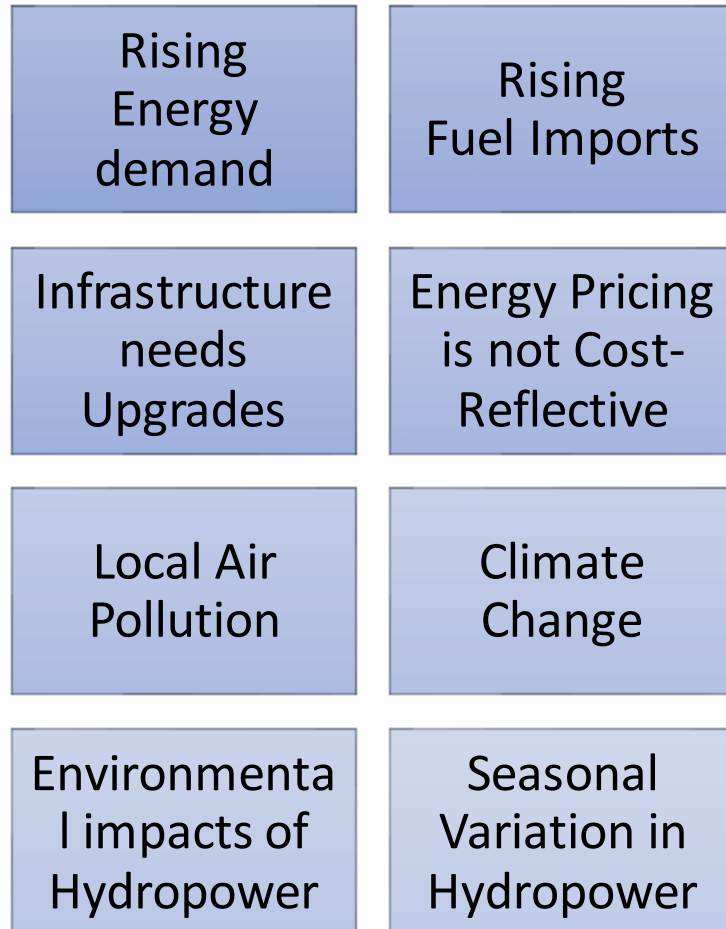
Активация Windows
Чтобы активировать Windows,
"Параметры"

Suggested additional incentives

- Grace period for renewable energy projects using water energy for a period of 15 years, using solar, wind, biomass, geothermal energy for **25 years**;
- Approval by the Cabinet of Ministers of the Kyrgyz Republic of a standard form of a **PPA** for the supply of electricity from renewable energy sources;
- the signatories of the PPA will be the Ministry power engineers of the Kyrgyz Republic, National Electric Grids of Kyrgyzstan and Green Energy Fund under the Cabinet of Ministers of the Kyrgyz Republic
- Semi-annual **indexation** of the tariff for electricity from renewable energy sources to the US dollar exchange rate during the grace period;
- Implementation of the auction bidding mechanism for the selection of the most profitable projects;
- Development of a regulation on **microgeneration (net-metering)** and rules for connecting microgeneration facilities to the national electrical grid.

Summing up

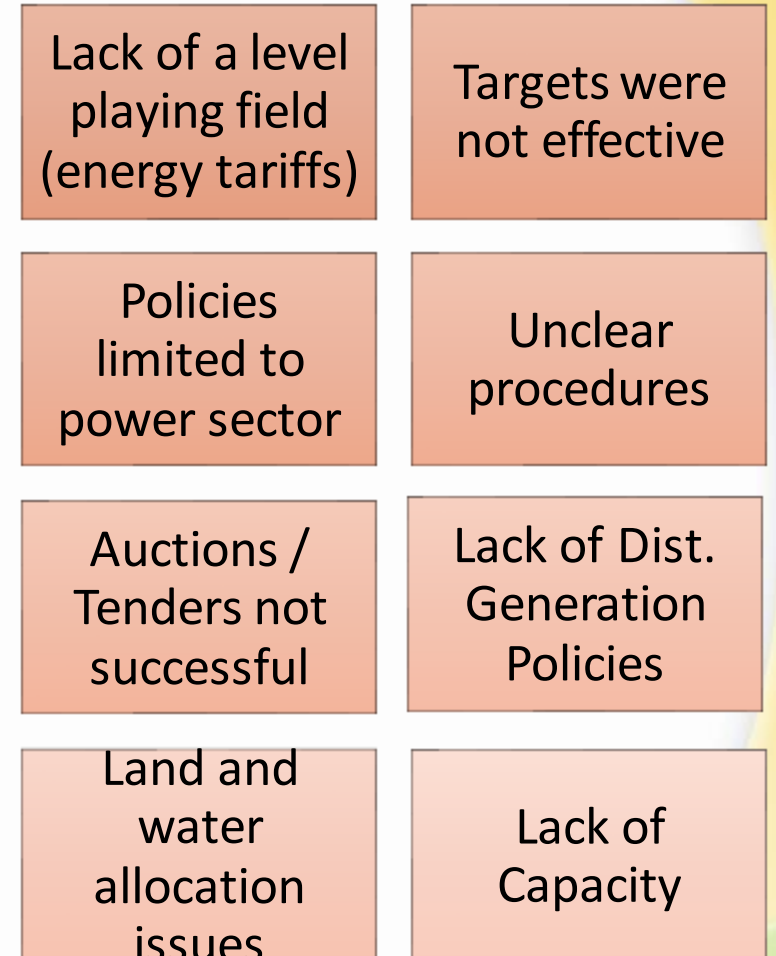
Strong Drivers for diversification



RE Offers Opportunities



BUT ... RE Deployment is Held Back by Issues



Collected Recommendations

Renewables Readiness Assessment (IRENA):

- **Create a level playing field with energy tariff reforms**

Well-designed tariff reforms in the energy sector can help generate revenue while lowering the barrier to market entry for distributed renewable energy technologies. To be sustainable, tariff reforms should be designed in a way to minimise the economic impact on low-income and marginalised parts of society.

- **Streamline the procedure for bringing renewable energy projects online**

Permitting requirements and procedures should be streamlined under an overarching renewable energy law, implemented through concrete secondary regulations, which clearly articulate the process and identify responsible government entities. The design of the procedures should focus on simplicity, flexibility and transparency.

- **Improve the feed-in tariffs**

The feed-in tariffs scheme should be revised and improved based on factors such as changing market conditions, competitive technology costs and clear resource assessments. The selection of an appropriate tariff is an extensive process that should be led by the government with active and diverse representation from all stakeholders. Feed-in tariffs need to be supported by a conducive policy and clear institutional responsibilities.

- **Implement auctions for large capacities**

Auctions can be used to attract investment for relatively large-scale projects in hydropower, solar and wind. They need to be designed in a way that attracts developers, enhances competition and enables price discovery while ensuring project delivery.

Collected Recommendations

- **Enact policies to decarbonise end-use sectors**

The decarbonisation of the heating sector needs a multifaceted approach that includes renewables-based electrification, use of renewable heating (where available, solar thermal, biomass, geothermal) and investments in efficient district heating. In the transport sector, more efficient public transport, electric vehicles and support for alternative modes of transportation (*e.g.* bicycle and walking infrastructure) can help. The introduction of net metering, wheeling and other distributed generation policies can help unlock the small-scale market segment.

- **Improve renewable energy resource mapping**

Zoning for solar PV and wind should be prioritised. An analysis of potential suitability, as conducted by the IRENA, identifies suitable zones for solar PV and wind, and can serve as an important initial step towards a complete zoning assessment. Follow-up studies could build on this exercise by performing detailed technical and economic analyses and ground-based measurements within the identified solar and wind zones.

USAID has financed Solar and Wind Zoning, which is finalized at the moment, and was handed over to MinEnergy

- **Develop long-term energy scenarios**

A detailed long-term planning exercise should be undertaken for energy demand in all sectors to identify the optimal energy mix. Scenario analyses that explore a host of different energy sector futures can be used to inform policy making. Energy sector planning needs to be complemented by reforms in the collection and reporting of energy statistics.

- **Establish comprehensive and ambitious renewable energy targets**

Renewable energy targets should reflect the country's strong renewable energy potential, declining technology costs and rising energy demand. They are best backed by strong political commitment and legislation, to be defined at the level of the sector and further disaggregated by subsector.

Collected Recommendations

- **Adopt a standard power purchase agreement**

Design elements of renewable energy power purchase agreements (PPAs) should be devised in accordance with international best practices to de-risk investments and facilitate financing. This effort may be complemented by a thorough review of contractual project document templates for renewables along with the development of standardized PPAs.

- **Introduce public-private partnerships**

To be successful, the introduction of public-private partnerships (PPPs) in the Kyrgyz energy sector must be backed by strong political will, capable institutions and conducive legislation. Fair risk-sharing criteria must be established. On the public side, there should be an absolute commitment to the long-term payment for energy production. On the private side, penalties should be levied if services are not delivered.

IFC has started a project for PPP Solar PV plant

- **Enhance institutional capacities**

The technical and co-ordination capabilities of public and private sector entities require improvement to facilitate renewable energy deployment. Topics to address include technology costs, grid integration issues, economic management and the introduction of flexibility mechanisms, regulatory aspects, policy design, etc.

- **Educate and train a skilled workforce**

Investment in the education and training of workers such as engineers, technicians and other skilled personnel is very important. Universities, vocational training institutes and schools all have a role to play. Industry upgrade programmes, joint ventures and tax breaks can be used to strengthen local industrial capabilities.

Collected Recommendations

- **SDG 7 Roadmap for Kyrgyzstan (ESCAP)**

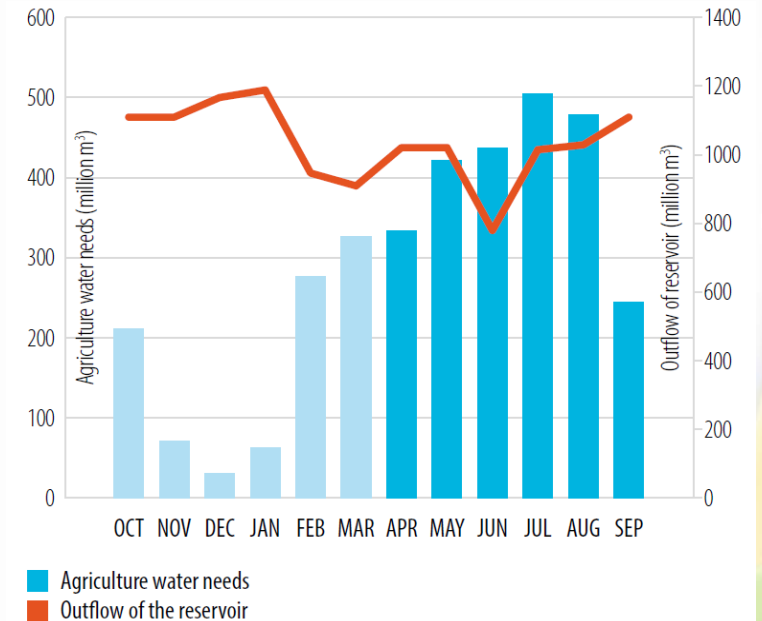
- 1. Access to clean cooking technologies should be a priority.** Induction type electric cooking stoves is the most appropriate long-term solution in achieving 100 per cent access to clean cooking, being the most cost-effective and near-zero GHG emissions option.
- 2. Elimination of polluting heating technologies should be pursued to reduce impacts from indoor air pollution.** Vast number of Kyrgyzstan's population are at risk of health impacts associated with indoor air pollution from coal/biomass combustion for heating purposes. Alternative technologies should be pursued with High Efficiency Low Emissions (HELE) stoves being an appropriate solution in the short-to-medium term.
- 3. Transport electrification is key to energy demand reduction and GHG emission reduction.** Setting a high bar for transport electrification shall result in substantial GHG emissions and energy demand reduction. At the same time, reduces reliance on imported oil products to improve national energy security.
- 4. Pursuance of energy efficiency measures across the whole economy has multitude benefits.** Minimum energy performance standards and transition from electric radiator to heat pump systems in the residential sector alleviate burden on the power supply. Energy efficiency opportunities in the industry and commercial sectors contribute towards GHG emissions and energy demand reduction, albeit at a smaller scale.
- 5. Full decarbonization of the power sector will offer multiple benefits including achieving the conditional NDC target.** Replacing the combined heat and power (CHP) system with renewables, such as solar PV and wind power will help Kyrgyzstan to achieve its conditional NDC target, along with a moderate uptake of electric vehicle.

Water-Energy-Food Nexus



- Take into account that use of upstream hydropower has consequences for water access of irrigated agriculture, the importance of which grew even further as regional trade slumped and the countries had to rely more on their own production.

Discharges of the Toktogul dam and Fergana valley needs by month in 2011.



https://unece.org/DAM/env/water/publications/GUIDELINES/2017/nexus_in_the_Syr_Darya_River_Basin/Syr-Daria-FINAL-WEB-.pdf

Reconciling resource uses in transboundary basins: assessment of the water-food-energy-ecosystems nexus in the Syr Darya River Basin, UNECE, 2017

Collected Recommendations

1. Improve **cross-regional monitoring, data verification and exchange**, and knowledge-sharing, including joint monitoring and joint forecasting for water and energy resources;
2. Develop mechanisms to **incorporate cross-sectoral and cross-border economic impacts** in sector-based policy development through comprehensive analysis of decisions affecting water-food-energy nexus in the CA, using suitable tools, such as system dynamics modelling;
3. **Reinstate regional energy trade** through Central ASIAN Power System, develop the energy market (mix of state and private);
4. **Lower barriers to trading food and agricultural goods**, thus promoting their more cost-, water- and energy-efficient production and exchange within the region;
5. Priority in the energy sector should be **increasing energy efficiency** (minimal energy efficiency standards, supporting transition to public transport, hybrids and EVs);
6. Improve tariff policy, **balancing the prices with** selling excess electricity through **CASA-1000 project and to China** to support subsidies to avoid energy poverty;
7. Decrease losses and support efficient use of generated power and water through **improved infrastructure (water and energy)**;

Collected Recommendations

8. Invest in **mix of small hydro, solar and wind projects in the next 10 years (while large hydro are being built)**, including decentralized solutions with storage capacity in the remote regions;
9. For **non-seismic** areas **consider nuclear power**;
- 10. Construct large hydro** (Kambarata HPP-1, Verkhne-Naryn HPP cascade, Suusamyr Kokomeren HPP cascade, Kazarman HPP cascade, etc);
11. Improve **technical and environmental assessments** to determine the long-term **viability of small hydropower plants**;
12. Support **solar microgeneration (net metering)**;
- 13. Look into energy storage technologies**, such as pumped hydro, fuel cells, hydrogen, as well as CSS for possible coal plants (Kara-Keche).



Thank you!

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