GNERC
When Balance is Achieved

Navigating Power Grid Scarcity

Georgia's experiences with RES integration

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Georgian power system

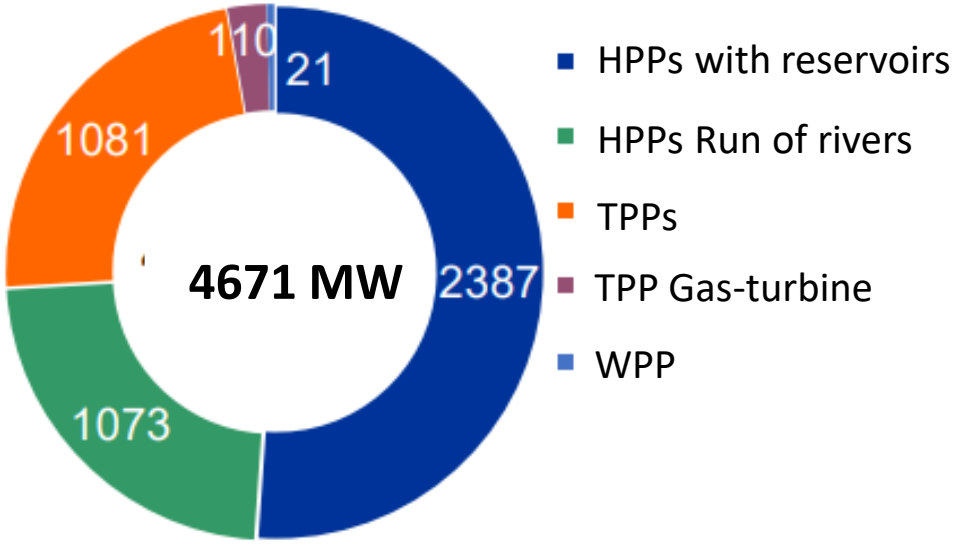
When Balance is Achieved

Installed capacities of the existing power plants – 4671 MW

HPPs - 3 460 MW

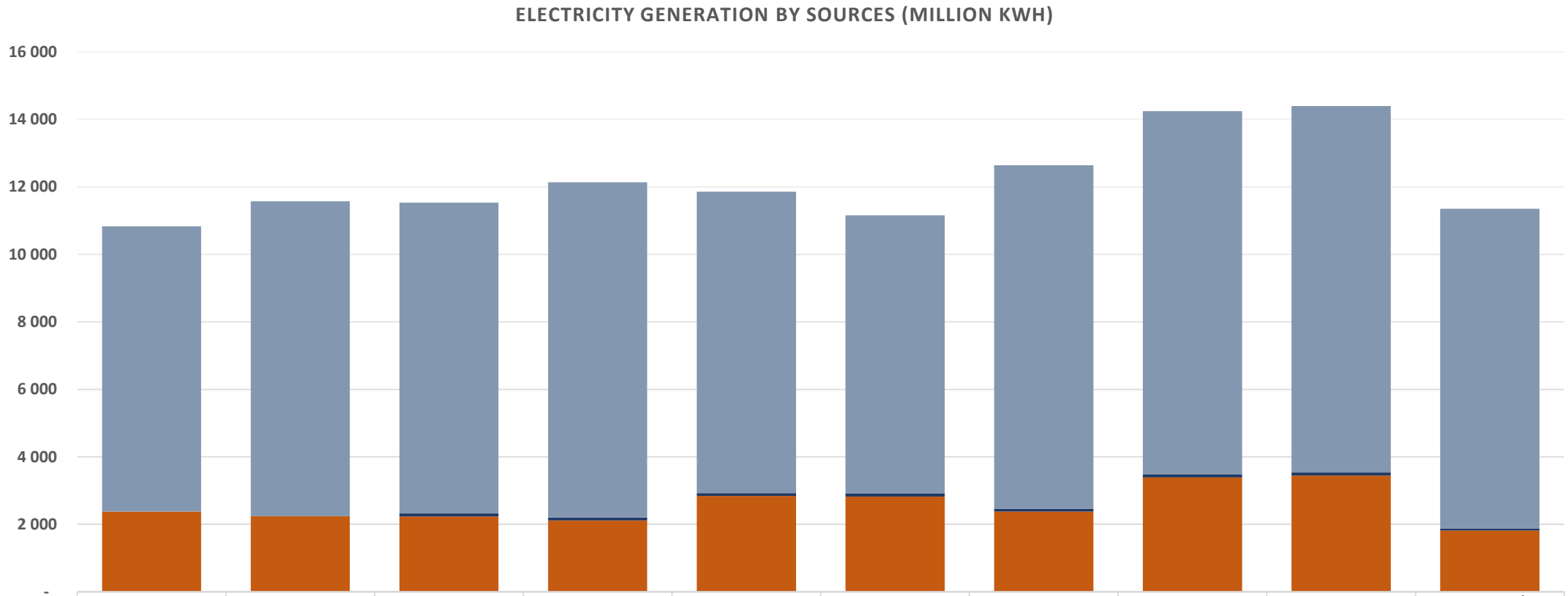
WPPs- 21 MW

TPPs - 1191 MW



Electricity generation by sources

When Balance is Achieved

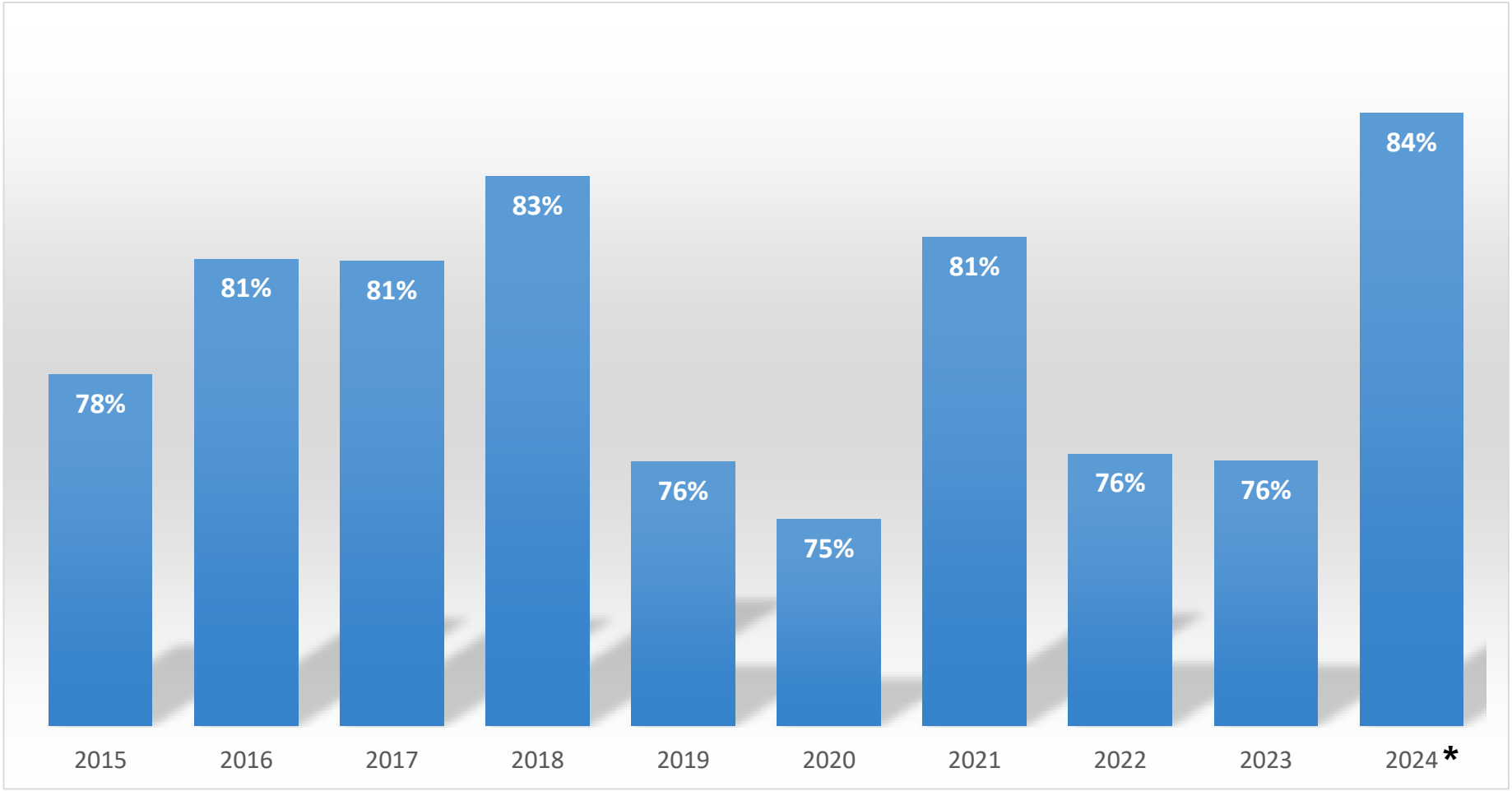


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024 *
HPP	8 454	9 329	9 210	9 936	8 932	8 248	10 182	10 771	10 863	9 480,6
WPP	-	9	88	84	85	91	83	87	86	60
TPP	2 379	2 235	2 233	2 115	2 840	2 821	2 380	3 388	3 446	1 815

*Data including the month of September 2024

Share of RES in total production of electricity

When Balance is Achieved



*Data including the month of September 2024

Hydropower Development

When Balance is Achieved

(2013-2024)Total HPPs Built: 63

Total Installed Capacity: 773 MW

Annual Breakdown:

2020: 6 HPPs, 24 MW total installed capacity

2021: 5 HPPs, 20.5 MW total installed capacity

2022: 10 HPPs, 26.7 MW total installed capacity

2023: 5 HPPs, 8.2 MW total installed capacity

2024: 3 HPPs, 50 MW total installed capacity

Planned Hydropower Projects (2024-2025)

HPPs to be Completed: 16

Total Planned Capacity: ~150 MW

Ongoing Renewable Energy projects

When Balance is Achieved

Current Active Renewable Energy Contracts
- **Total Active Contracts:** 278

Hydroelectric Power Plants (208 Contracts)
- **Installed Capacity:** 1,733 MW
- **Annual Output:** 8.62 billion kWh
- **Total Investment:** 2.66 billion USD

Wind Power Plants (28 Contracts)

- **Installed Capacity:** 1,402 MW
- **Annual Output:** 5 billion kWh
- **Total Investment:** 2.45 billion USD

Solar Power Plants (42 Contracts)

- **Installed Capacity:** 817 MW
- **Annual Output:** 1.4 billion kWh
- **Total Investment:** 621.2 million USD

Feasibility Study				
Type	Quantity	Installed Capacity (MW)	Annual Electricity	Investment (million USD)
WPP	25	1274	4896,8	2287
HPP	144	1160	5912,3	1785,5
PV	38	805	1424,3	614,3

Building Permit - Construction Phase				
Type	Quantity	Installed Capacity (MW)	Annual Electricity	Investment (million USD)
WPP	3	128	382	182,7
HPP	64	572	2715,8	877
PV	4	11	17,3	6,9

The Regulation For micro-electric plants

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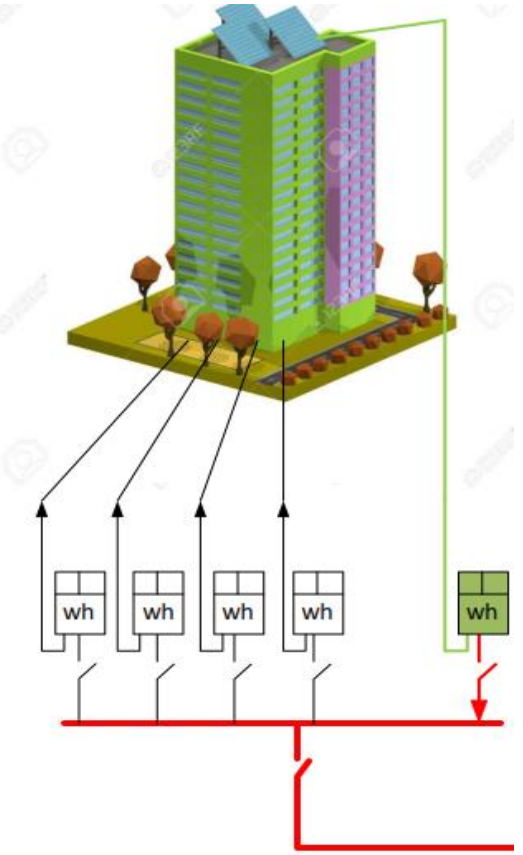
Development of (micro-electric plants) net-metering regulations in Georgia since 201

I. Individual connection using a reverse meter.

II. Group connection/switching on of users (under a single transformer substation).

III. Virtual net metering.

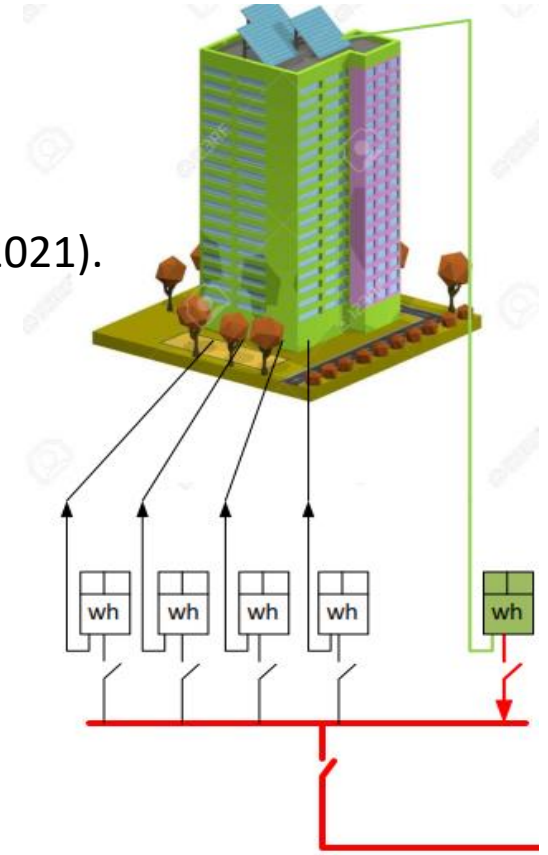


The Regulation For micro-electric plants

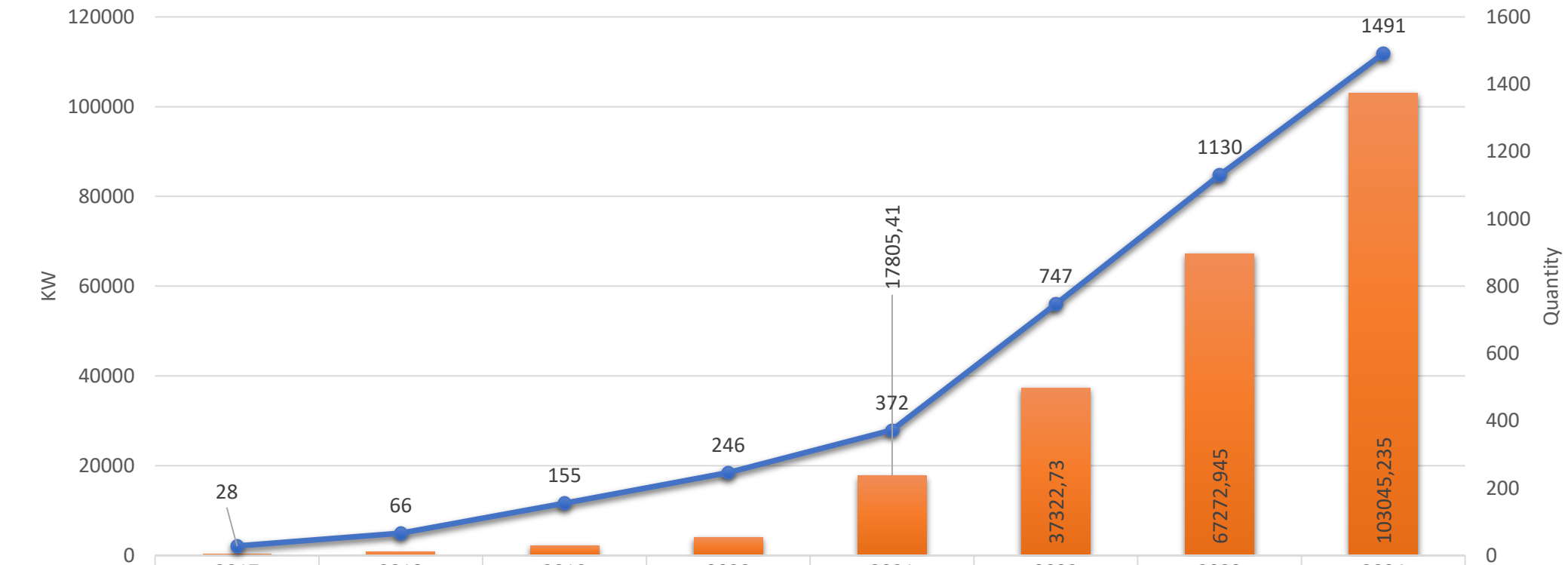
When Balance is Achieved

Net metering regulation scheme:

- The installed capacity of the micro-electric plant is 500 kW (previously 100 kW before 2021).
- Renewable energy source.
- Connection to the network follows a single-window principle.
- Monthly billing for generation and consumption.
- Carryover of excess electricity to the following month.
- Annual reimbursement for excess generated electricity.



The Dynamics of the Development of Micro Power Plants in Georgia in the Period of 2016-2024 (September)



	2017	2018	2019	2020	2021	2022	2023	2024
Installed Capacity	283,3	745,01	2162,21	4053,41	17805,41	37322,73	67272,945	103045,235
Customers	28	66	155	246	372	747	1130	1491

Ensuring Grid Stability - Micro Power Plant Integration

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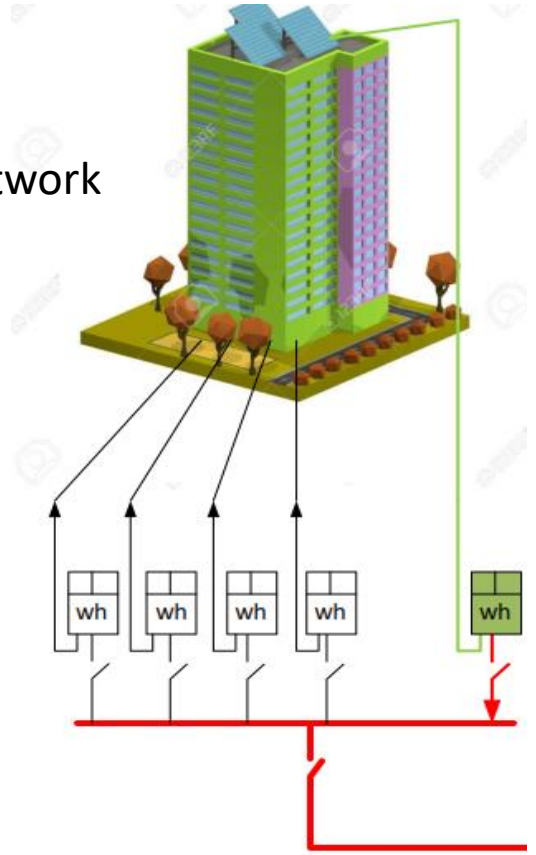
The Resolution N19 of June 28, 2021 on Approving Distribution Network Rules

- The total installed capacity of micro power plants connected to a system operator's network cannot exceed 8 percent of the peak load in that operator's distribution network.



Installed Capacity of Micro Power Plants Now Exceeds 8% Limit

Upcoming Change in Distribution Network Rules:

Increasing Micro Power Plant Capacity Limit from 8% to 14%

Georgian power system flexibility - challenges

- Georgian power system is characterized by asymmetric generation/consumption pattern due to low demand and high generation in summer and high demand and low generation in winter;
- Georgia has low system inertia, which complicates the integration of renewable energy;
- Georgia is not energy independent. Power system Operates synchronously with Neighboring Systems 99% of the Year for Frequency Stability.

Georgian power system flexibility - Solutions

Current Solutions for Grid Stability in Georgia

I. Construction of Large Reservoir Hydropower Plants

Examples: Khudoni HPP (700 MW), Nenskra HPP (280 MW), Nakra HPP Cascade (433 MW)

Challenges: Large reservoir HPP development is hindered by social protests.
Solution: these challenges requires a comprehensive approach (Stakeholder Engagement, Government and NGO Support and etc.)
Objective: Increase system flexibility and enable integration of above **1000 MW** of renewable energy into the grid.

II. Development of Energy Storage Facilities

Included in Georgia's Ten-Year Electric System Development Plan (200 MW*h)

Challenges: lack of regulatory frameworks.
Solution: Develop Comprehensive Regulatory Frameworks (under developing)
Objective: Increase system flexibility and enable integration of **700 MW** of renewable energy into the grid.

Integration RES to the distribution network - Challenges

DSO has aging Infrastructure

Much of Georgia's electricity distribution infrastructure is outdated, leading to inefficiencies and higher operational and rehabilitation costs. Modernization is required to improve reliability and capacity for integration RES.

Until February 16, 2023, the connection of RES to the distribution network was deregulated, according to the rules of the distribution network. Specifically, the power plant would apply to the distribution system operator for a connection, and the operator would issue technical conditions for the connection. These technical conditions included both the requirements for connecting to the distribution network and a list of necessary strengthening and repair works. This often led to disputes between the power plant owner and the distribution system operator, resulting in frequent complaints to the GNERC.

Based on the above, projects for power plants using renewable energy sources often became unfeasible and were subsequently suspended.

Integration RES to the distribution network - Solution

To support the integration of renewable energy sources into the grid, the Commission has developed new amendments that establish stringent principles for connecting to the distribution grid.

Possible standard options for RES (up to 15 MW) connecting to the distribution grid have been defined:
I. Arrangement of a connection cell at the DSO's substation.
II. Integration into the DSO's power transmission line.

The connection point (network readiness) fee is established based on the power to be connected, as follows:

a) For stations with an installed capacity of up to 2 MW: 60,000 GEL (20 270 euro) per MW.

b) For stations with an installed capacity ranging from 2 MW to 15 MW: 300,000 GEL (101 351 euro) per MW.

THANK YOU FOR YOUR ATTENTION!

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