Future Development of Energy Sector of Georgia

Ministry of Energy of Georgia
Key Players

Ministry of Energy – Policy Implementer


Georgian State Electrosystem – (GSE) Technical Operator

Electricity System Commercial operator – ESCO owned by market participants
To ensure energy security of the country through diversification of energy sources and transit routes;

To develop east-west and north-south energy transportation infrastructure in order to increase transit capacity of the country;

To provide energy safety through the construction of new hydro power plants;

To rehabilitate existing and construct new infrastructure for electricity transmission and natural gas transportation;

To attract foreign investment in the energy sector in order to develop energy infrastructure of the country;

To strengthen co-operation with the international organizations in order to contribute to acceleration of affiliation of the country in European and Euro-Atlantic organizations;
Policy and Objectives

- Maximum utilization of Hydro and other Renewable resources
- Replacement of Thermal generation by Hydros and other Renewables
- Expansion and Improvement of High Voltage Power Lines connected to the Electricity Systems of Neighboring Countries
### Electricity Balance 2002-2008

<table>
<thead>
<tr>
<th>GW/h</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export</td>
<td>-252</td>
<td>-236</td>
<td>-71</td>
<td>-122</td>
<td>-96</td>
<td>-634</td>
<td>-679</td>
</tr>
<tr>
<td>Import</td>
<td>740</td>
<td>1080</td>
<td>1288</td>
<td>1399</td>
<td>777</td>
<td>434</td>
<td>649</td>
</tr>
<tr>
<td>TPPs</td>
<td>513</td>
<td>635</td>
<td>874</td>
<td>1031</td>
<td>2220</td>
<td>1515</td>
<td>1286</td>
</tr>
<tr>
<td>Seasonal HPPs</td>
<td>2026</td>
<td>2007</td>
<td>1933</td>
<td>2047</td>
<td>2352</td>
<td>2322</td>
<td>2164</td>
</tr>
<tr>
<td>Regulating HPPs</td>
<td>4686</td>
<td>4496</td>
<td>4095</td>
<td>3983</td>
<td>3049</td>
<td>4510</td>
<td>4997</td>
</tr>
</tbody>
</table>

| Total Domestic Generation | 7225 | 7132 | 6902 | 7061 | 7621 | 8347 | 8441 |
| Y-O-Y Growth % (Base year 2004) | 0% | 2% | 10% | 21% | 22% |
| Total Growth from 2004 GW/h | 0 | 159 | 719 | 1445 | 1539 |
Electricity Balance 2008

Seasonal Asymmetry of Generation and Consumption

Winter
- Thermal & Import: HIGH
- Hydro: LOW

Summer
- Thermal & Import: LOW
- Hydro: HIGH

15% Thermal & Import
85% Hydro
100% Total

Current vs. Projected

Graph showing monthly consumption and generation from January to December:
-GW/H:
-Import (Export), Thermal, Hydro, Consumption

Projected values are indicated for each month.
## Georgian HPPs

<table>
<thead>
<tr>
<th>Name</th>
<th>Installed Capacity MW</th>
<th>Working Capacity MW</th>
<th>Annual Generation GW/h</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation Total</strong></td>
<td>3,320</td>
<td>3,029</td>
<td>8,441</td>
<td>32%</td>
</tr>
<tr>
<td><strong>Thermal Plants Total</strong></td>
<td>710</td>
<td>660</td>
<td>1,279</td>
<td>22%</td>
</tr>
<tr>
<td>Mtkvari Energetika(300)</td>
<td>300</td>
<td>280</td>
<td>492</td>
<td>20%</td>
</tr>
<tr>
<td>Tbilisresi (150)</td>
<td>300</td>
<td>270</td>
<td>662</td>
<td>28%</td>
</tr>
<tr>
<td>Airturbine</td>
<td>110</td>
<td>110</td>
<td>125</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Hydropower Plants Total</strong></td>
<td>2,610</td>
<td>2,369</td>
<td>7,162</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Regulating HPP's Total</strong></td>
<td>1,991</td>
<td>1,796</td>
<td>4,998</td>
<td>32%</td>
</tr>
<tr>
<td>Enguri HPP</td>
<td>1,300</td>
<td>1,180</td>
<td>3,130</td>
<td>30%</td>
</tr>
<tr>
<td>Vardnili HPP</td>
<td>220</td>
<td>200</td>
<td>561</td>
<td>32%</td>
</tr>
<tr>
<td>Khrami 1 HPP</td>
<td>113</td>
<td>90</td>
<td>220</td>
<td>28%</td>
</tr>
<tr>
<td>Khrami 2 HPP</td>
<td>110</td>
<td>110</td>
<td>347</td>
<td>36%</td>
</tr>
<tr>
<td>Shaori HPP</td>
<td>38</td>
<td>36</td>
<td>131</td>
<td>42%</td>
</tr>
<tr>
<td>Dzervula HPP</td>
<td>60</td>
<td>50</td>
<td>133</td>
<td>30%</td>
</tr>
<tr>
<td>Moonlake Georgia</td>
<td>20</td>
<td>20</td>
<td>60</td>
<td>34%</td>
</tr>
<tr>
<td>Zhinvali HPP</td>
<td>130</td>
<td>110</td>
<td>415</td>
<td>43%</td>
</tr>
<tr>
<td><strong>Seazonal HPP’s Total</strong></td>
<td>618</td>
<td>573</td>
<td>2,164</td>
<td>43%</td>
</tr>
<tr>
<td>Rioni HPP</td>
<td>48</td>
<td>48</td>
<td>160</td>
<td>38%</td>
</tr>
<tr>
<td>Gumati Cascade</td>
<td>66</td>
<td>60</td>
<td>236</td>
<td>45%</td>
</tr>
<tr>
<td>Vartsikhe Caskade</td>
<td>184</td>
<td>160</td>
<td>763</td>
<td>54%</td>
</tr>
<tr>
<td>Lajanuri HPP</td>
<td>113</td>
<td>110</td>
<td>341</td>
<td>35%</td>
</tr>
<tr>
<td>Zemo Avchala HPP (Zahesi)</td>
<td>37</td>
<td>32</td>
<td>134</td>
<td>48%</td>
</tr>
<tr>
<td>Ortachala HPP</td>
<td>18</td>
<td>18</td>
<td>80</td>
<td>51%</td>
</tr>
<tr>
<td>Chitakhevi HPP</td>
<td>21</td>
<td>21</td>
<td>89</td>
<td>49%</td>
</tr>
<tr>
<td>Atsi HPP</td>
<td>16</td>
<td>16</td>
<td>54</td>
<td>39%</td>
</tr>
<tr>
<td>Bzhuzha HPP</td>
<td>12</td>
<td>12</td>
<td>59</td>
<td>56%</td>
</tr>
<tr>
<td>Satskheni HPP</td>
<td>14</td>
<td>12</td>
<td>18</td>
<td>17%</td>
</tr>
<tr>
<td>Tetrikhevi HPP</td>
<td>14</td>
<td>8</td>
<td>13</td>
<td>18%</td>
</tr>
<tr>
<td>Khadori HPP</td>
<td>26</td>
<td>26</td>
<td>95</td>
<td>42%</td>
</tr>
<tr>
<td><strong>Other Small HPP’s (under 13MW)</strong></td>
<td>50</td>
<td>50</td>
<td>123</td>
<td>28%</td>
</tr>
</tbody>
</table>
The Cadastre of small hydro power technical potential of Georgia’s rivers includes around 300 potential places for new hydro with total capacity 4000 MW.

- Cascade of Neskra (5 HPPs) – 87,3 MW
- Cascade of Tekhuri (6 HPPs) – 20 MW
- Cascade of Gubazeuli (4 HPPs) – 26,9 MW
- Cascade of Oni (3 HPPs) – 272 MW
  Ann. Generation – 1.5 TW/h

Information on Potential Projects available at:
www.minenergy.gov.ge
New projects / Large Scale

**Cascade of Oni HPPs**
- Installed capacity – 272 MW;
- Average projected annual generation – 1,530 TWh;

**Khudoni HPP**
- Installed capacity – 750 MW;
- Average projected annual generation – 1,66 TWh;

**Cascade of Namakhvani HPPs**
- Installed capacity – 450 MW;
- Average projected annual generation – 1,6 TWh.
Potential Wind Farms In Georgia

- **Likhi** 630 MW 2000 GWh
- **Kutaisi** 150 MW 340 GWh
- **Gori** 200 MW 480 GWh
- **Tskhratskaro** 100 MW 260 GWh
- **Djvari** 30 MW 75 GWh

Total capacity ~ 2000 MW
Total output ~ 5000 GWh

Source: KARENERGO - Scientific Wind Energy Center
State Investment Program “Renewable Energy”

Small and Medium Scale HPPs (<100 MW)

- The GoG has approved the standard terms and conditions for the greenfield investments in HPPs. The Ministry of Energy has announced the solicitation of expressions of interest by investors in greenfield HPPs and other renewable energy plants under BOO structure.

- A list of prospective greenfield HPP sites has been published by the Ministry of Energy on its website (www.minenergy.gov.ge). The list comprises 81 sites, with small and medium scale capacity. Most of the prospective HPPs comprising the list that are expected to be run-off-the-river facilities.

- Investors interested in investing in greenfield HPPs from the list are required to submit a standard application form to the Ministry of Energy of Georgia, available on its website. Once an application is received for a particular greenfield site, the site will be marked as “Under Offer” on the MoE website, and will remain available for other investors to submit competing applications during a 30-day period. If no competing application is submitted during this period, the initial prospective investor is automatically declared the winner upon submitting a bank guarantee in the amount of US$170,000 per MW of prospective capacity, and is invited to sign a standard MoU with the Ministry of Energy, as well as other standard documentation. In the event that more than one prospective investors apply for the same greenfield site, the winner will be declared in accordance with a transparent formula assigning equal weights to the size of the bank guarantee (per MW of prospective capacity) and declared time to completion.

- The winner will be able to purchase the land of the greenfield site at a nominal price following the execution of a land SPA with the MoED.

Large Scale HPPs (>100 MW)

- The GoG invites interested prospective investors to initiate discussions regarding the terms and conditions of investing in several large greenfield HPP sites, with prospective capacities ranging from 100 MW to 700 MW.

- Short listed bidders shall be selected in accordance to the conditions for expression of Interest by GoG.

- Winner signs the MOU with GOG and gets its support throughout the whole period of investment.

- The winner will be able to purchase the land of the greenfield site at a nominal price following the execution of a land SPA with the MoED.
Structure of the Power Sector

Direct contracts between power producers & consumers

Balancing market – ESCO

PPA’s* between HPP developers & ESCO

HPPs with designed capacity up to 13 MW deregulated

Electricity export - deregulated

*PPA – Power Purchase Agreement
Necessary permits, licenses and rights to construct new HPP in Georgia

- Permit or License
  - Acquisition or rent agreement on land: Local authorities
  - Water usage Permit: Ministry of Environment
  - Permit for construction: Ministry of Economy
  - Generation license (if above 13 MW)*: GNEWRC

* Hydro Power Stations less than 13mw do not need generation license
Market Overview

Direct Customers and Dist. Co

Where to sell

ESCO

(Export)
Attractive Investment Environment

✓ Easy, transparent, fast evaluation and approval of procedures

✓ BOO based offer

✓ Government support through whole process of project development

✓ Guaranteed power purchase for the first 10 years of operations

✓ Direct Contracts and Deregulated Market Price

✓ Licence free export
Safe Investment Environment

- Georgia – Member of European Energy Charter
- Georgia – Observer of European Energy Community on the way to Membership
- Georgia – Active Participant of European Commission Program INOGATE project
- Involvement in European Neighborhood Policy
WHY the Energy Sector of Georgia?

- Large economic HPP greenfield potential at 32 TWh
- Deregulated power sector with very impressive turnaround since 2004
- Distribution companies privatized and operating at a profit
- Significant existing private investment in generation assets
- Strong government support for developing hydropower resources
- Increased simplification of procedures
- Increasing export markets

www.georgiahydroinvest.com
www.minenergy.gov.ge
Future Development of Energy Sector of Georgia

THANK YOU

Ministry of Energy of Georgia