OPPORTUNITY TO IMPLEMENT THE ENERGY EFFICIENCY PROJECTS WITHIN THE JCM

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Head of Energy Conservation Department

3 October, 2019 Ulaanbaatar, MONGOLIA
The Energy Conservation Law has been promulgated by the Parliament /State Great Khural/ of Mongolia on November 26th 2015

Scope of the law:
- Energy sector
- Environment sector
- Construction sector
- Industrial sector
- Public
- Implementation sector

Relations to be regulated:
- ERC
- State entity
- Accreditation
- Designated consumers
- Advertisement
- Training & Certification
PURPOSE of the Program is to reduce GHG emission, mitigate climate change through integrated management of conservation and efficient use of energy, and to introduce and promote use of advanced energy efficient techniques and technologies.

General objectives:

- Construction sector:
- Industrial sector:
- Transportation sector:
MAIN FUNCTIONS OF ERC

1. To organize the work of creating legal mechanisms to implement the law;

2. To develop and implement state policies and national programs;

3. To define and register designated consumers, receive information and reports;

4. To prepare energy conservation managers, award certificates;

5. To accredit professional organizations;

6. To create an information system, promote the laws.
“DESIGNATED CONSUMER” is any legal entity, whose energy usage is above the energy consumption threshold as defined by Government;

CLASSIFICATION:

- Building: 89 entities;
- End user: 115 entities;
- Energy sector: 25 entities;
- Total Designated entities: 229 entities.

1. Appoint energy conservation manager within 3 months
2. Install energy meters
3. Give information to ERC within 6 months
4. Provide training to conservation manager
5. Inform about manager's appointment, release
6. Provide working conditions to the manager
7. Get the first energy audit within 18 months
8. Get an energy audit every three years
9. Develop a program, a plan to conserve energy
10. Report to Energy Regulatory Commission
### Total consumption of the Designated entities, 2018

#### Number of DC

- Mining: 19%
- Heavy industry: 8%
- Light industry: 13%
- Commercial building: 15%
- Public building: 19%
- Energy sector: 26%

#### Percentage of consumptions

- Mining: 55%
- Heavy industry: 2%
- Light industry: 4%
- Commercial building: 3%
- Public building: 4%
- Energy sector: 2%

#### Grid

<table>
<thead>
<tr>
<th>Grid</th>
<th>Entity and Industry</th>
<th>Residential</th>
<th>Total number of consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CRIPG</td>
<td>41,320</td>
<td>575,168</td>
</tr>
<tr>
<td>2</td>
<td>WRIPG</td>
<td>4,590</td>
<td>44,379</td>
</tr>
<tr>
<td>3</td>
<td>ERIPG</td>
<td>2,193</td>
<td>28,522</td>
</tr>
<tr>
<td>4</td>
<td>SRPDG</td>
<td>1,916</td>
<td>14,393</td>
</tr>
<tr>
<td>5</td>
<td>AUIPG</td>
<td>2,147</td>
<td>22,775</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>52,166</td>
<td>685,237</td>
</tr>
</tbody>
</table>

#### Total Consumers:

- 685,237

#### Electricity consumptions:

- 8308.3 mill kWh

#### Total DC:

- 229
- 4590 mill kWh
GREEN Future, Sustainable development

Renewable energy

Energy efficiency

JCM
Total demand: 4805.4 mill kWh
Transmission and Distribution losses: 813.7 mill kWh 16.5%

Total Generation: 6087.8 mill kWh
Import: 1522.5 mill kWh
Inner usage: 773.9 mill kWh 13.6%
Global electricity demand, 2016-2040

A lot of this electricity is used to power industrial electric motors

- More than 40% of all electricity used powers industry
- Two-thirds of this is used by electric motors
- Approximately 30% of global electricity consumption

Source: U.S. Energy Information Administration, Manufacturing Energy Consumption Survey 2014, Table 5.1, October 2017
Electric Motor Life Cycle Costing

DOE 2004 Industrial Energy Savings Roadmap

- Energy Costs: 88%
- Purchase Costs: 3%
- Installation Costs: <1%
- Maintenance Costs: 6%
- Other Costs: 3%

Initial Costs + Future Costs = Life Cycle Costs (LCC)
Potential of the Pilot projects

Pilot project-1: Chinggis khaan Hotel

Project finance: 28 million MNT

Technical specification: ABB, ACS510-01, 30kW*2

<table>
<thead>
<tr>
<th>Unit</th>
<th>CP - 1</th>
<th>CP - 2</th>
<th>CP - 1</th>
<th>CP - 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor kW</td>
<td>22</td>
<td>22</td>
<td>8.35</td>
<td>8.35</td>
</tr>
<tr>
<td>Inverter Hz</td>
<td>50</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Working time Time</td>
<td>2280</td>
<td>816</td>
<td>2280</td>
<td>816</td>
</tr>
<tr>
<td>Electricity consumption kWh</td>
<td>50160</td>
<td>17952</td>
<td>19038</td>
<td>6813.6</td>
</tr>
<tr>
<td>Total kWh</td>
<td></td>
<td></td>
<td>68112</td>
<td>25851.6</td>
</tr>
</tbody>
</table>

Without VSDriver | With VSDriver | Conservation
Electricity consumption kWh | 68,112.00 | 25,851.60 | 42,260.40
Percentage %       | 37.95%      | 62.05%    |
Potential of the Pilot projects

Pilot project-2: Bor-Undur mine and ore dressing plant

Project finance: 37 million MNT

/\purchase+service/

Technical specification: ABB, ACS880-01 inverter, 200kW*1

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity consumption per year /without inverter/</td>
<td>MWh</td>
<td>324,2</td>
</tr>
<tr>
<td>Electricity consumption per year /after installed inverter/</td>
<td>MWh</td>
<td>207,1</td>
</tr>
<tr>
<td>Result /save electricity/</td>
<td>MWh</td>
<td>117,2</td>
</tr>
<tr>
<td>Percentage of the savings</td>
<td>%</td>
<td>36</td>
</tr>
<tr>
<td>Saved cost</td>
<td>Mill MNT</td>
<td>23.79</td>
</tr>
<tr>
<td>Reduction CO2</td>
<td>Tons /year</td>
<td>108</td>
</tr>
</tbody>
</table>

Regulated by VSD

\[
\text{Шугамын хүчдэл, В А фазын гүйдэл, A} \quad \text{В фазын гүйдэл, A2} \\
\text{С фазын гүйдэл, А3} \quad \text{Давтамж, Гц}
\]
Amorphous transformer project of 303 units of UB city center

**Project finance:** Total 7994.39 mill. MNT /Approximately/

**Project description:** Reduction of technical losses due to replacement of outdated transformers of Ulaanbaatar city center with amorphous transformers.

<table>
<thead>
<tr>
<th>Aging</th>
<th>Number of transformer</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 25 years</td>
<td>612</td>
<td>33%</td>
</tr>
<tr>
<td>Unknown installed Year</td>
<td>93</td>
<td>5%</td>
</tr>
<tr>
<td>Less 25 years</td>
<td>1,122</td>
<td>61%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transformer load</th>
<th>Voltage level</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35 kV</td>
<td>10 kV, 6 kV</td>
</tr>
<tr>
<td>No load</td>
<td>4</td>
<td>118</td>
</tr>
<tr>
<td>Low load (&lt;40%)</td>
<td>42</td>
<td>1175</td>
</tr>
<tr>
<td>Normal load(40% - 60%)</td>
<td>22</td>
<td>548</td>
</tr>
<tr>
<td>High load (60% to 100%)</td>
<td>6</td>
<td>345</td>
</tr>
<tr>
<td>Over 100%</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>2202</td>
</tr>
</tbody>
</table>

- Decrease of technical loss.
- Decrease of company's import deviation.
- Benefit from the project shall be in total 2268.58 million MNT.
- Reduction of annual CO2 emissions by 146.03 tons.
THANK YOU FOR YOUR ATTENTION