Central Asia Regional Electricity Market
CAREM
Financial Modeling and Forward Financial Analysis

“Power Sector Financial Sustainability”

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Tien Shan Hotel
Almaty – Kazakhstan
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All efforts are directed towards:

1. Strengthening priority transmission infrastructure in all countries (In collaboration with DFIs).

2. Returning to a coordinated, synchronized operation of all national transmission systems.

3. Increasing the volume of existing cross-border bilateral power exchanges.

4. Facilitating the creation and operation of an intra-regional multilateral platform for power exchange.

5. Migrating to a wider competitive Regional Electricity Market.
Why CA needs to shift to a Market-base Structure?

i. A REM is the only way to fully benefit from a large-scale complementarity of resources.

ii. Complementarity combined with electricity competitive trading offers a strong potential to defer construction of new power plants (saving of millions of US$).

iii. A competitive electricity market delivers the best possible prices.

iv. REM underpinned by strong transmission links and efficient pricing will ensure sufficient power sector liquidity and competition.
Why CA needs to shift to a Market-base Structure?

V. A well-functioning REM will send powerful signals to private investors about the existence of an improved investment climate.

VI. A REM brings financial discipline to the power sector.
Power Sector Financial Sustainability

KEY INDICATORS:

- Supply the Demand
- Recover all Costs
- Make Investment
- Comply with E&S Norms

FINANCIAL SUSTAINABILITY
Power Sector Financial Sustainability

- The power sector is a **key driver of any economy**: it is not only a major contributor of gross domestic product (GDP), but also provides key inputs for all other sectors. To fulfill these functions, the sector must be financially sustainable.

- When the power sector is not financially sustainable that means it is not able to meet the needs of the economy and thus it **holds back progress**, imposing a burden on society, especially on government budget.

- A financially unsustainable power sector implies that electricity **tariffs are kept below the cost of supply**, and that it is unable to make investments in response to increased electricity demand.
A power sector is considered financially viable if it meets the following **four criteria** which reflect the overall performance of the sector:

a) Supply electricity demand with acceptable quality;

a) Generate enough revenues to recover investment, generate profit, and to cover all costs associated with generation and delivery of electricity to consumers;

a) Make investments to anticipate future demand growth;

a) Comply with environmental and social norms.
Ability to Reliably meet Demand

1. Generate enough electricity and reliably deliver it to end-users to meet their demand and what the economy needs to sustain its growth. This is reflected by maintaining an adequate balance between installed effective capacity and demand.

2. A reserve margin of **10-20% of effective capacity** is usually required to ensure that the system can deal with surges of demand. A reserve margin that is too high, however, indicates system inefficiency because a significant amount of capacity is idle during normal demand periods.
### Прогнозный баланс электрической энергии Единой электроэнергетической системы Республики Казахстан в период 2019-2025 годы

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### Прогнозный баланс электрической мощности Единой электроэнергетической системы Республики Казахстан на час совмещенного максимума нагрузок в период на 2019-2025 годы

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### Генерация

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<td>1473</td>
<td>2076</td>
<td>2540</td>
<td>3298</td>
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On the demand side, tariffs are a factor that influences electricity consumption, and tariffs that are not cost-reflective promote wasteful consumption.

It is important for the sector not only to meet demand but also provide reliable service. The quality of service is reflected through the extent to which customers are supplied continuously, without interruptions.

A simple variable that can capture the quality of power supply is the number of outages (SAIFI, SAIDI, CAIDI), both those which were scheduled and informed to customers and those which were not. Outages often reflect inadequate generation capacity or deficiency in power transmission or distribution. Outages, both in terms of number and duration, have a detrimental effect on the economy of a country.
Ability to Recover Costs

1. The **ability to recover costs** requires the power sector to at least balance its costs and revenues.

2. Information on specific costs for generation, transmission and distribution should be available in your company.

3. In the absence of data, it may be possible to approximate costs from **benchmark values**, but the accuracy of such estimates may be low and will not allow to build a reliable Financial Model.
Costs can be expressed as electricity generation unit costs for each fuel type (gas, coal, oil, hydro, or renewable) and are calculated by dividing the costs associated with each generation type by the total amount of electricity generated from each source.

Alternatively, you can also calculate the **Levelized Cost of Electricity (LCOE)** defined as the US$/kWh cost (in real terms) of building and operating a power generating plant over an assumed financial life and duty cycle. This is the sum of overnight capital, fixed and variable operation and management (O&M), financing, an assumed risk-adjusted rate of return.
The LCOE is a plant- or technology-specific calculation. To measure the overall electricity generation unit costs, one can take the weighted average of the electricity generation unit costs for all fuel types based on the share of electricity generated from each fuel type.

Important indicators of the operational efficiency of the power sector:

- The share of O&M;
- System technical and commercial losses;
- Total revenues;
The debt ratio, or the proportion of debt a company has relative to its assets, indicates the risks it faces. A high debt ratio means that the company finances a lot of its assets via debt and has low borrowing capacity, which may hinder its ability to finance its future investments;

The current ratio, or the proportion of current liquid assets a firm has relative to its current liabilities, measures the company’s ability to pay its short-term obligations with its existing resources.
Ability to Recover Costs (cont’d)

The calculation of the difference between total costs and revenues will allow for an estimation of net profits/losses, which is a proxy for cost recovery, or the ability of the sector to have cost-reflective tariffs.
Ability to make Investments

1 As demand grows over time, the power sector needs to **continuously make investments** to ensure that it can meet future needs. Necessary investments include capital expenditure in generation, transmission and distribution (new assets and replacing depreciating ones).

2 The projection of demand will help estimate the investments needed to meet future demand.
Since consumers are the source of revenue for the power sector, its ability to meet the customers’ needs should therefore be an important aspect of performance. The main dimensions of customer service should include: (1) access and (2) affordability.

The definition of access to electricity involves not just connection to the network but also consumption of a specified minimum level of electricity which in turn denotes living standard.
Power Sector Financial Sustainability

Ability to Operate Following E&S Norms

3 A variable indicative of the commercial viability of the power sector is its **affordability**. This measure establishes a direct relationship between tariff structure and the purchasing power and well-being of consumers. That is, whether households are able to purchase enough electricity to meet basic requirements.

4 The issue of affordability needs to be weighed against the need for **cost recovery**. If tariffs are set lower than cost recovery, raising electricity tariffs to recover cost would reduce the number of households that can afford the basic level of electricity consumption.
# Complementarity in Central Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>RESOURCES</th>
<th>DOMINANT RESOURCE</th>
<th>FUEL IMPORT</th>
<th>GENERATION</th>
<th>IMPORT ELECTRICITY</th>
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<tbody>
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<td><strong>TAJIKISTAN</strong></td>
<td>Hydro, Coal, Natural Gas (*)</td>
<td>HYDRO</td>
<td>-- Coal, Natural Gas (UZ)</td>
<td>93% 7%</td>
<td>KR, UZ</td>
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<tr>
<td><strong>KYRGYZSTAN</strong></td>
<td>Hydro, Coal (*)</td>
<td>HYDRO</td>
<td>-- Coal (KZ), Natural Gas (UZ), Fuel Oil (UZ)</td>
<td>94% 6%</td>
<td>KZ, TJ</td>
</tr>
<tr>
<td><strong>KAZAKHSTAN</strong></td>
<td>Coal, Oil, Hydro, Natural Gas</td>
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<td></td>
<td>81% - Thermal 10% 9%</td>
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<tr>
<td><strong>UZBEKISTAN</strong></td>
<td>Natural Gas, Oil, Hydro</td>
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<td>--</td>
<td>86% 9% 2% 3%</td>
<td>KR, TJ</td>
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<tr>
<td><strong>TURKMENISTAN</strong></td>
<td>Natural Gas, Oil</td>
<td>GAS</td>
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(*) Modest / Largely undeveloped