Kazakhstan: Power Sector Reform

Transmission Tariff Methodology

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TRANSMISSION TARIFF METHODOLOGY

The following report presents Hagler Bailly's recommendations for the Anti-Monopoly Committee of Kazakhstan on transmission tariff methodology This report is deigned to be a practical guide for the Committee to aid in the process of reforming the current tariff process and introduce international tariff principles in Kazakhstan to support the current operations and future development of the electricity industry While this report deals directly with transmission tariffs, many of the principles also apply to designing and implementing distribution tariffs

Objectives of Transmission Pricing

As a starting point in the process of recommending a specific transmission tariff methodology, a core set of objectives can be identified which drive the tariff process

- Economic Efficiency

The main objective of any tariff methodology should by to derive a set of transmission prices that are the most economically efficient This requires that they give the correct pricing signals in four key areas location of new generation and demand (and retirement of old generation), use of the network by system users, operation of the network by the TSO, and development of the network

- Revenue Requirement

For any transmission company, this objective is paramount Transmission companies must be able to earn sufficient revenue to cover all reasonable costs and achieve an adequate rate of return so that they will have the capital needed to operate and further develop the system If rates of return allowed by the regulators are too low, transmission companies will have little or no interest in taking on risk, which means that they will be concerned simply with recovering all the costs incurred in maintaining and operating the network at the expense of further system expansion

- Regulatory Process Efficiency

Since KEGOC has a natural monopoly over the transmission system it must be regulated This will require the collection of financial, operations, and market data by the AMC and the periodic review of tariff rates It is important that this information gathering and regulatory decision-making process be streamlined and efficient since bureaucratic delays in necessary price changes as well as overly intrusive demands on the regulated company can result in significant operating losses The goal of the regulatory commission should be to establish an efficient regulatory

regime that encourages minimum-cost operations by the regulated industry By developing a regulatory framework that encourages minimum-cost operations, the regulator is able to reduce the need for active intervention and avoid delays

Industry Structure

To a large degree, the structure of the electricity industry will dictate the most appropriate methodology for transmission tariffs There are two basic electricity transmission structures predominate in the world today

- "transmission channels" through an integrated electric utility,
- "open access" over an independent network

An "open access"system is based on an independent transmission network that serves a number of wholesale electricity producers and consumers An open access system is established in an unbundled electric power industry to ensure the impartiality of the Transmission System Operator (TSO) Because the power system in Kazakhstan has been unbundled into a system of independent power plants and RECs connected over a high voltage network, the "open access" structure applies best However, the Kazakhstan case is not a perfect fit since the system is only partially unbundled

While KEGOC is the TSO in Kazakhstan, it is not yet operating a truly independent transmission system KEGOC still has interests in 10 RECs and a major thermal power plant This presents a conflict of interest on the part of KEGOC in providing open access to all system users The issue of TSO conflict of interest lies outside of the immediate topic of adopting a more appropriate transmission tariff methodology for Kazakhstan However, this issue must be addressed by the Anti-Monopoly Committee to ensure open access to the transmission system and to accurately identify the costs of transmission apart from the other business activities of KEGOC

Completing the unbundling of the electricity industry will aid the work of the AMC by simplifying the financial information needed from KEGOC in the tariff process When the high voltage network is independent of electricity sales and purchasing functions and solely operates on revenues derived from transmission services, transmission prices can be derived from a "bottom-up" analysis of the actual costs of transmission As long as KEGOC continues to derive revenues from electricity generation, distribution, and other non-transmission operations, these revenues must be excluded from the balance sheet of the transmission entity However, in a system that lacks sufficient transparency and stringent financial auditing, the ability to disguise costs and co-mingle revenues between business operations may require the physical separation of operations to ensure the accurate reporting of financial figures It is highly recommended that the AMC take the steps necessary to force KEGOC to divest itself of any non-high voltage transmission activities

Tariff Design for an Unbundled Transmission System

The main priority in the tariff process for any transmission company is to ensure that its revenue requirement is met through the applied tariff methodology The AMC should identify the revenue requirement of KEGOC at the initial phase of the process KEGOC's revenue requirement basically consists of the annual budget that it drafts and submits for governmental approval This budget represents all KEGOC's allowable operating costs, capital expenses, and financial profits for the year Funds to satisfy the revenue requirement must be collected through charges applied to transmission system users The manner in which these charges are applied to users is extremely important because it will have a major impact on how the financial burden of supporting the transmission system is allocated and on the way the transmission system develops in the future

There are several ways in which the costs of maintaining and operating the transmission network can be applied to system users The method that Hagler Bailly recommends for Kazakhstan unbundles tariff costs into a two part tariff, separating transmission capacity costs from incremental system usage costs The capacity costs are defined as KEGOC's operating costs, capital expenses, and financial profits for the year as outlined in the approved annual budget These costs represent KEGOC s revenue requirement The revenue requirement is then divided among system users according to their proportional share of the coincident peak period of transmission system usage The coincident peak period can be defined as the period (e g , day, week, or month) of highest total transmission system usage While there are other ways to divide such costs among users, Hagler Bailly recommends using the coincident peak period method since it allocates costs according to the time period in which the transmission grid is under the greatest stress

1) $\frac{\text{Revenue Requirement}}{\text{Share of Coincident Peak}} = \text{Capacity Payment}$

The coincident peak is an important point to examine since the size of the coincident peak indicates when new capacity in the system is needed to efficiently transmit electricity between generators and wholesale customers The coincident peak method sends the proper economic signals to system users by valuing the scarcity of the transmission resource Hagler Bailly recommends that the AMC consider using the annual coincident peak day as the period to examine when allocating costs Thus, a wholesale customer who accounts for 5% of transmission system usage during the annual coincident peak day of the previous year will be charged with meeting 5% of KEGOC's annual operating and capital budget for the coming year This method provides wholesale customers with strong pricing signals to reduce their consumption during peak usage on the system Such pricing signals will serve to moderate peak demand periods on the transmission system, stimulating consumers to shift demand to off-peak periods when possible and reducing the need to invest in additional transmission assets

If there is strong seasonal transmission system demand by certain wholesale consumers, or if the capacity payment must be more responsive to changes in the customer base in Kazakhstan (i e ,

many new companies entering the market, many old users leaving the market), then the capacity payment could be based on the quarterly coincident peak, rather than the annual coincident peak This is largely a question of transmission system usage patterns and the desire on the part of the Regulatory Commission for the most equitable distribution of transmission costs However, the need to adjust tariffs on a regular basis must be weighed against the issue of regulatory efficiency

One of the primary benefits of using a capacity payment method is that it guarantees that the revenue requirement of the transmission company will be met regardless of transmission system usage Thus, system users pay for the operation, maintenance, capital construction budget and regulated profit margin of the transmission company no matter how much electricity is transmitted across the high voltage lines This greatly reduces the financial risks to the transmission company and allows for the normal planning, financing, and construction of new system additions

The second part of the two-part tariff accounts for the incremental energy costs of transmitting electricity through the high voltage grid These costs are primarily due to transmission losses Hagler Bailly recommends that any other marginal costs associated with incremental system usage other than losses be included in the capacity charge This will allow the energy portion of the transmission costs to be based solely on losses, which can be determined by the empirical measurement of losses by KEGOC between high voltage line connection points using the appropriate meters and system telemetry

Currently the tariff methodology in Kazakhstan uses a distance component rather than a losses component There are several problems with this approach First, the distance component is only an approximation of the cost of transmission Using a distance component does not take into account how heavily the line is loaded, a major factor that increases transmission costs It also does not distinguish between differences in the resistance levels of the materials in a new transmission line as opposed to an old line, another important factor affecting costs A distance component can only be applied after choosing a transmission path, however there is no guarantee in a multi-line transmission system that the electricity will always flow along a pre-determined path Because of these shortcomings, the distance component does not give the proper signals regarding the actual cost of transmitting electricity

Using transmission losses to calculate incremental usage costs solves these problems by empirically measuring the actual cost of transmission through system Because KEGOC does not buy and sell electricity, but only provides the service of transporting it between points for customers, transmission losses do not affect KEGOC operations The costs due to transmission losses affect the wholesale buyers and sellers of electricity This means that these costs need to be factored into the wholesale electricity contracts between electricity suppliers and consumers Thus, KEGOC will not receive any payment for losses, it will only receive a capacity payment

However, to facilitate electricity trading, KEGOC will need to develop a matrix indicating general loss factors along its major trunk lines These loss factors will be used by wholesale

market participants during contract negotiations to adjust contract prices according to the appropriate loss factors Contracts between generators and wholesale consumers can be negotiated with a specified transmission loss factor built in, based on the KEGOC matrix Following delivery the actual losses can be calculated based on regular KEGOC meter readings The contracting parties can then settle the differences on their transactions

Price Cap Regulation

Reducing operating and other costs while improving the efficiency of the transmission system is an important aspect of regulatory process for the AMC Because KEGOK operates as a monopoly, there is no incentive from competition for the company to reduce its costs or improve its operations In many countries that employ a cost of service style of regulation, this has resulted in lax cost control on the part of the regulated industry In some cases the regulated utilities have constructed overly redundant systems and purchased the most expensive systems, also known as "gold-plating", as a way to increase revenues since they knew that the regulatory commission would approve these "necessary" costs

Today regulatory commissions using the cost of service tariff methodology require strict justification of costs on the part of the regulated utilities However, while this provides greater incentive on the part of the utility to spend wisely, it does not provide any incentive for the utility to become more efficient and reduce spending The cost of service approach also requires frequent regulatory hearings to approve new tariff levels For this reason, Hagler Bailly recommends that the Anti-Monopoly Commission adopts a price cap tariff methodology

Price cap tariff methodologies establish a benchmark tariff level similar to the cost of service approach The tariff incorporates factors to account for retail inflation (RPI), fuel costs, and other variables beyond the control of the utility In addition a variable is factored in (x) to account for expected efficiency improvements made by the utility The standard tariff equation is generally represented as RPI B x (inflation B efficiency improvements), with other variables factored into the equation as appropriate Thus, the tariff methodology incorporates efficiency improvements on the part of the utility This essentially penalizes the utility if it does not meet the prescribed efficiency benchmark, since the real tariff level is reduced each period, before accounting for the effects of inflation However, the utility also has a financial incentive to make further operational improvements

A price cap tariff is generally set for a multi-year period, for example five years The tariff formula ensures that the tariff is automatically adjusted each year to account for changes in inflation and other economic costs as well as for the prescribed gains in efficiency This reduces the burden on the regulatory committee since it does not have to hold hearings to rule on new cost of service data This method allows the regulated utility to retain any additional earnings from cost saving measures above and beyond the efficiency targets factored into the tariff Thus, the utility is able to increase its profits while cutting costs After the set tariff period expires the

regulatory commission reassesses the tariff formula and adjusts the underlying components and coefficients accordingly for the next period

A price cap tariff methodology is particularly attractive to potential investors Under the price cap formula, the investor is able to earn a fixed return, similar to a cost of service tariff, plus an additional return equal to the cost savings achieved over and above the efficiency factor Due to the relative risks of investing in Kazakhstan, the potential to earn an additional return on the investment through efficiency and cost cutting measures will be a major consideration of any Western investor or lender looking at the Kazakhstan power sector, whether it is a lender to KEGOK or an investor in a distribution company

While this tariff methodology relieves the burden on the regulatory commission of frequently intervening to adjust the tariff level, the commission must still ensure that the utility continues to meet specified standards of service as determined by the regulator and/or the legal parameters of the industry The regulatory commission should monitor the regulated utility to guarantee that the utility continues to maintain the required level of service while it seeks to cut costs and increase efficiency