CMERF Potential Study Topics
Outline Terms of Reference:

1. The following outlines include the background, impact, outcome, and scope of each potential CMERF study topic. Information on activities, implementation arrangements, and detailed costs will be worked out once member countries have decided which of these studies they wish to participate in.

A. Designing and approving efficient and adequate tariff structures appropriate to different consumer categories, and involving lifelines, reliability premiums, discounts for pre-payment, and/or wattage limitations

2. **Background:** Three essential features of electricity markets can be usefully considered together when designing regulations. First, different types of consumers have different capacities to pay for electricity. Second, most CAREC electricity systems are, or will soon be, constrained in terms of the power or energy that they can deliver. Third, consumers also differ with respect to their requirements of the power system, and tendency to pay their power bills. The first point means that regulators are required to design tariff structures that keep electricity affordable to the poor, while still allowing the system to recover its costs. The second means capacity constraints must be allocated in an orderly fashion for the system to function efficiently.

3. The third feature permits these flexible tariff structures to be applied cheaply, while improving efficiency. Specifically, different types of consumers can be offered different contracts, some of which will involve limitations on the wattage or energy they can draw, include clauses allowing them to be cut off more frequently, or may require prepayment for electricity. In return for accepting such restrictions on the quality of supply, consumers can receive discounts or lifeline tariffs. For any such scheme which requires consumers to distinguish themselves to work, the scheme must be simple, and there must be a robust way of ensuring that those who receive cheap electricity actually bear the quality restrictions.

4. **Scope:** The study will examine the possibility of such schemes in up to two electricity systems. It will proceed in five stages. (i) An international consultant will identify the constraints on the power system that need rationing (load, energy, credit) from existing reports. (ii) The regulators will provide inputs regarding their priorities in terms of social protection, and indicate the costs that must be recovered. (iii) The international consultant, in consultation with a small team of local consultants, will design a survey to assess different types of consumers' service needs, and economic willingness to accept service restrictions. (iv) The local consultants will implement the survey. (v) The international consultant will produce a report providing practical suggestions for allocating tariff support to the poor, while allocating constraints equitably.

5. **Outcome and Impact:** The outcome of the study will be learning experience which will teach member regulators how to segment markets in order to efficiently and affordably allocate scarce electrical capacity and energy. The impact will be improved capacity to design and review such pricing and market segmentation schemes.

B. Considerations when licensing new capacity in a regional grid

6. **Background:** When prices of wholesale power, transmission, or ancillary services are regulated using rate-of-return methods, the regulator issuing a license enters into a regulatory compact with the licensee. The regulator implicitly is agreeing to set prices that allow the

investor to recover its financial costs. Thus, the act of granting a license has implications for future tariff rulings. These in turn would shape future investments. Therefore, the regulator is inevitably required to make its own assessment of the role of the project within the country and region's least cost development plan.

7. **Scope:** The study will assist regulators in one or two countries to create a least cost development plan. It will proceed in two stages: (i) Each country's regulator will assist a local consultant in drawing up a detailed assessment of electricity power demand. (ii) The regulator and international consultant will develop an assessment of unmet demand by time of day and season. (iii) The regulator and international consultant will develop long-term peak power demand and electrical energy demand forecasts under various scenarios for economic growth and tariff reform. (iv) The regulator and domestic consultant will provide a list of potential power projects that can be developed based on availability of fuel and hydropower resources. (v) The international consultant will prepare normative cost estimates for the various potential power projects. (vi) The international consultant will assist the regulator in identifying the least cost development plan. (vii) The international consultant will prepare the least cost development plan.

C. Appropriate pricing of ancillary services

8. **Background:** Ancillary services are essential in a power grid for maintaining reliability and quality of power supply from the generators to the consumers. Although commercial transactions have traditionally depended mainly on the price for capacity (kW) and energy (kWH), new electricity markets have further unbundled the costs to establish markets for ancillary services. Such markets allocate value to (i) frequency response service that enable supply to be at the designated frequency (50 Hertz), (ii) various types of reserve services that become available quickly and within 10 minutes (spinning, or quick start machines), or within 30 minutes (supplemental generation capacity or curtailable demand), (iii) reactive power and voltage control services that enables the supply voltage at consumer end to remain within prescribed limits during high and low demand periods, and (iv) black start service that enable resumption of power supply following a system-wide power. The regulators need to ensure that the costs incurred in providing these services are also recovered from the consumers through tariffs. It is generally difficult and fairly complicated to assign the benefits arising from these services to specific consumer categories, but the impact of overall improvement of reliability and quality of power supply is shared by all consumers.

9. **Outcome and Impact:** The impact and outcome of the ancillary services study will be to improve the capacity of the regulators to analyze the cost factors of the four types of ancillary services and suggest an option for unbundling the electricity tariff.

10. **Scope:** The study will focus on any one of the CAREC member countries. It will be carried out in four stages. (i) The international consultant will collect information about at least four electricity markets in other countries that have separate markets for ancillary services. Such markets should have been in operation for about 2 years and the consultant will provide the price trends for different ancillary services and the contributing factors. (ii) The international consultant and the regulator will provide details regarding the country’s power system and the measures of reliability and quality of power supply. A local consultant, with guidance of the international consultant, will analyze the grid related information to estimate the size of possible markets for each of the ancillary services. (iii) The international consultant will use normative cost data to estimate the cost of providing the ancillary services. (iv) The international consultant

will prepare a model to determine how such costs may be recovered from the consumers and how the providers may be compensated.

D. Risk sharing under power purchase agreements (PPAs)

11. **Background:** Raising private investment in generation facilities has proven difficult in many developing countries. As a consequence, PPAs have required governments to take on a large share of the commercial risk involved in building new generation capacity, often through take or pay contracts. These risks are costly to governments. For governments seeking private investment, arriving at a realistic assessment of how much risk investors would be willing to bear is often difficult, because potential investors tend to overstate their degree of risk aversion as a negotiation strategy. Regulators, who are required to endorse such contracts, face a greater challenge if the agreements are generous to the investor. They also need to understand how much risk it is reasonable to expect investors to bear; and how to reduce the risks to investors without shifting them to the government.

12. **Outcome and Impact:** The study will improve regulators understanding of how to minimize the risk of power sector investments, and what appetite private investors might have for such risks. This would improve the design of PPAs.

13. **Scope:** Up to three member countries could participate in this study. The study will involve four components: (i) A local consultant and the regulator will assist an international consultant to obtain a clear view of the risks of investing in each participating country's power sector. (ii) A thorough survey will be made of the experiences of developing countries with comparable industry structures that have negotiated power purchase agreements to provide an assessment of how much risk can be borne by investors. (iii) A plenary discussion will be held at the following CMERF meeting by personnel actually involved in negotiating the most successful of these agreements. (iv) A final report will be written providing suggestions of how to minimize the risks that must be borne by the governments of the countries participating in the study.

E. International Power Transmission: assessing the benefits of non-discrimination and open access.

14. **Background:** It is widely recognized that cross border power trade increase the size of the electricity market and brings benefits, and that these benefits are maximized by instituting rules prohibiting preferential treatment of domestically produced electricity. In particular, this requires that transmission tariffs do not discriminate against power sourced internationally, and that buyers wishing to source power from international producers are legally and technically free to do so. It has also been noted that open access carries with it a risk such as congestion. It is therefore necessary to examine what the relative economic benefits of different transmission pricing schemes would be to a country that permits buyers of electricity to source electricity freely from within and outside its borders.

15. **Outcome and Impact:** The outcome and impact of this study will be improved understanding of the impact of transmission pricing on regional market development, and the consequences of discriminatory pricing for domestic consumers.

16. **Scope:** Up to four member countries connected by a common power grid could participate. The study will proceed in three stages: (i) An assessment is made of the costs of

domestic and international power sources, and transmission capacity relative to load. (ii) An economic simulation model of the power market is created and used to simulate power prices flows and consumption under different schemes for transmission pricing, and regimes dictating the freedom given to consumers in sourcing power. (iii) A report on the simulations is presented, evaluating the economic benefits from different transmission pricing schemes, comparing them to current practice, and providing regulatory advice on transmission pricing.

F. Possibilities and pitfalls in the privatization of distribution company management.

17. **Background:** State-owned distribution companies (DISCOs) in most CAREC countries are performing poorly. Auctioning of contracts for the private management of DISCOs has been identified as a potential solution to this problem. Any contracting arrangement will have to balance the needs to: (i) ensure proper payment of generators and the transmission company; (ii) reduce the risk to investors of regulatory inconsistencies; (iii) obtain a good price for the management contract; (iv) prevent commercial risks being passed on to consumers and the government; (v) leverage improvements in reliability and service quality; (vi) ensure adequate transparency in the auction and contracting procedure; and (vii) predictably manage any necessary tariff adjustments.

18. **Outcome and Impact:** The study will build capacity to help design and supervise the privatization of distribution companies.

19. **Scope:** This study will involve up to two DISCOs. It will proceed in three stages. (i) An assessment of the commercial performance, management practices and corporate governance of the DISCO will be prepared by the regulator and a local consultant, with the inputs of DISCO management, and an international consultant. (ii) Case studies will be prepared covering four or five privatizations of comparable DISCOs, focusing on the regulatory and contractual frameworks utilized. (iii) A sample road-map and request for tenders will be drafted for the privatization of the participating DISCO.

G. Costs and input requirements of power utilities across member countries

20. **Background:** Regulators that approve tariffs on reported costs must reach decisions on which costs submitted by the utility are reasonable. It is widely recognized that an information asymmetry exists, and utilities do not always report costs accurately. It is also well accepted that publicly managed utilities do not always seek to minimize their costs. It is therefore vital for regulators to have a clear perception of just how much it costs to run a utility, and what kind of electricity losses are reasonable. While consumers should not pay for inefficiency of utilities, any unreasonable expectation would delay decisions related to tariff increases. International comparisons of operating norms at utilities are therefore extremely useful.

21. **Outcome and Impact:** This study will provide regulators with vital information which they could use to ensure that utilities are given incentives to reduce costs to reasonable levels.

22. **Scope:** This activity could involve up to all seven CMERF member countries. An international consultant will select one local consultant from each participating country. The international consultant will then organize the local consultants into teams who will collect and organize data suitable for making comparisons of reasonable utility costs and losses across member countries.

H. Road-map towards economic dispatch of electricity in CAREC countries

23. **Background:** the Central Asia Power System (CAPS) interconnects large generating capacities in Southern Kazakhstan, Kyrgyz Republic, Tajikistan and Uzbekistan. One objective of electricity regulation is to ensure that electricity service is made available at a low cost for consumers in all the neighboring countries. This requires that the generators with the lowest economic cost of operation are used most intensively. Yet, several CAREC countries do not yet have the capability or procedures in place to ensure that generators are dispatched in economic merit order. In some cases this is because the generators are all owned by one company that may pursue other objectives alongside cost minimization. In others, this is because working out the marginal cost of electricity generation from a combined heat and power plant is conceptually challenging. In both cases, developing proper procedures for economic dispatch will be essential for the introduction of competition. The regulator will be required to understand the rules for economic dispatch if it is to properly regulate utilities, and ensure that generators do not collude to keep prices high.

24. **Outcome and Impact:** This study will facilitate a technical dialog regarding how to source power in Central Asia most economically.

25. **Scope:** Up to four member countries in Central Asia could participate in this study. Each would have to be willing to release information on the cost structures of their generators. The study will be implemented in four phases. (i) The international consultant will determine the economic basis for comparison of costs of power generation from CHPs, other thermal power plants, large storage hydropower projects and other power projects connected to CAPS. (ii) The consultant and the regulators will arrive at a consensus on the basis proposed for economic dispatch. (iii) The regulators and local consultant will collect the required cost-related information for the power plants connected to the CAPS. (iv) The international consultant will prepare a simplified model for determining economic dispatch based on the consensus and cost data.