



Central Asia Regional Economic Cooperation Program

Energy Action Plan Framework (2010-12) Completion Report

**Senior Officials' Meeting on
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Energy Action Plan Framework Completion Report

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List of Acronyms

APMP	Afghanistan Power Master Plan
AraIDIF	Dynamic Information Network for the Aral Sea Basin
CAPS	Central Asian Power System
CAREC	Central Asia Regional Economic Cooperation
CARs	Central Asian Republics
CASA-1000	Central Asia – South Asia 1,000 MW export project
CDC	Coordination and Dispatch Center
DSM	Demand Side Management
EAP	Energy Action Plan
Energy Strategy	Strategy for Regional Cooperation in the Energy Sector of CAREC Countries, approved in 2008
ESCC	Energy Sector Coordination Committee of CAREC
EU	European Union
EWP	Energy Work Plan
GSPA	Gas Sales and Purchase Agreement
IFAS	International Fund for Saving the Aral Sea
IsDB	Islamic Development Bank
MC	Ministerial Conference
MI	Multilateral Institution
MTPP	Medium-Term Priority Project
M&DS	Modeling and Decision Support Activities
PRC	People's Republic of China
RESET	Regional Energy, Security Efficiency and Trade
RPMP	Regional Power Master Plan
SDC	Swiss Agency for Development and Cooperation
SMEs	subject-matter-experts
SOM	Senior Officials' Meeting
TUTAP	Turkmenistan, Uzbekistan, Tajikistan, Afghanistan, and Pakistan
UNECE	United Nations Economic Commission for Europe

Energy Action Plan Framework (EAP) Completion Report

I. INTRODUCTION

A. Energy System of Central Asia

1. During the Soviet era, the Central Asian Republics (CARs) energy system was designed to take advantage of regional endowment of diverse energy resources. The CARs were interconnected to some extent by gas supply network and to a lesser extent by oil pipelines. However, the electrical interconnection, through the 500kV Central Asian Power System (CAPS), was the backbone of this energy exchange arrangement. Regional cooperation in the power sector mixed the thermal-based power systems of Kazakhstan, Turkmenistan, and Uzbekistan systems with the hydro-based systems of Tajikistan and the Kyrgyz Republic. Tajikistan and the Kyrgyz Republic exported energy during the summer when their hydro-based power was at a maximum, and imported energy during winter when they were in energy deficit. The Tajikistan and Kyrgyz Republic water releases were coordinated to meet the irrigation needs in the downstream countries.

2. Beginning in the early 1990s, the CAR countries have progressively moved to follow energy self-sufficiency model. Regional power trade collapsed from 25TWh in 1990 to 3.4TWh in 2011, profoundly impacting the CARs. Water storage limitations have resulted in frequent summer spillage in Tajikistan, causing loss of opportunity to generate clean energy. Both Tajikistan and the Kyrgyz Republic face winter energy deficits due to demand growth, disconnection from CAPS, and reduction in gas imports, all of which is only further exacerbated by their over-dependence on hydropower. In recent years, due to low hydrologic conditions, the winter energy deficit was more pronounced, with the winter of 2007/8 being particularly severe. Similar difficult situation is likely to recur during future low hydrological conditions. The need to generate power from hydro resources (mainly in winter) coupled with irrigation needs (mainly in summer) poses operational constraints on reservoir operation. Consequently, some countries are forced to generate electricity using expensive fossil fuels instead of importing surplus electricity generated from renewable resources from neighboring countries; upstream countries are compelled to develop more expensive local resources to compensate for lack of winter generation from hydropower.

3. The CAPS is an interconnected network with system operation and maintenance being coordinated by the Coordination and Dispatch Center (CDC) located in Tashkent. Turkmenistan withdrew from CAPS in 2003 and is now interconnected with Iran's power system. It continued to export to CAR countries from islanded power plants, but has stopped doing so since 2009. The three Central Asian countries that share a border with Afghanistan are exporting power to Afghanistan, which is also interested in joining CAPS and wishes to meet a part of its growing demand with imports from CAR countries. Currently, energy trade is conducted on a bilateral basis, but these arrangements face constraints stemming physical infrastructure limitations, as well as political and commercial barriers. The energy sector vision and strategy for the region was formulated to address these problems.

4. The difficulties that CAR countries face in managing their domestic energy networks as well as the regional linkages, is rooted in their inherited Soviet Union era energy and irrigation infrastructure systems. Poor infrastructure maintenance, diverging priorities within individual countries and increased export price and opportunities for gas and oil has further compounds

the situation. The Central Asia Regional Economic Cooperation (CAREC) program has been working with countries to find solutions to the above-mentioned problems. CAREC has also worked to further the goal of regional power integration. Thus far, it has done so through the development of a regional energy strategy in 2008 and the preparation of an Energy Action Plan (EAP) Framework in 2009.

B. Key Elements of CAREC Energy Strategy

5. Guided by the shared vision of “Good Neighbors, Good Partners and Good Prospects” under the CAREC program, the Strategy for Regional Cooperation in the Energy Sector of CAREC Countries (“Energy Strategy”) was developed in accordance with the Comprehensive Action Plan endorsed by the 5th CAREC Ministerial Conference held in Urumqi, People’s Republic of China (PRC) in October 2006, and was endorsed by the 7th CAREC Ministerial Conference held in November 2008 in Baku, Azerbaijan. The strategy emphasizes energy security through cooperation and integration leading to trade-driven economic growth in the region. It also recognizes joint use and protection of trans-border rivers thus, seeking to enable the development of best solutions to meet future energy demand and promote development of new and renewable energy sources of the region. The regional cooperation strategy is structured along the following main dimensions (energy corridors):

- i. Cooperation opportunities within Central Asia.
- ii. Central Asia–PRC: this dimension focuses on energy trade and investments between PRC and the CARs.
- iii. Central Asia–South Asia: emerging and potential energy (electricity and gas) trade between CARs and South Asia.
- iv. Central Asia–Russian Federation: the region’s oil and gas exports till now have been mainly to Russian Federation or through Russian Federation to western destinations. Russia invests in exploration/production in the Central Asian countries and manages their pipeline systems. There is also electricity trade between Russian Federation and Kazakhstan.
- v. Central Asia–European Union (EU): the EU dimension focuses on facilitating exports of Central Asian and Azeri exports of energy to Europe. Azeri oil and gas are already flowing towards the west.

C. Energy Action Plan Framework

6. In May 2009, CAREC Senior Officials requested multilateral institutions to work with CAREC countries to prioritize actions under the Energy Strategy, in the form of an Action Plan that would guide future steps in the countries of the region in a better and well-coordinated manner. An Energy Action Plan (EAP) Framework, which was the main focus of meeting of the Energy Sector Coordinating Committee (ESCC) held on September 2-3, 2009 in Almaty, Kazakhstan, was finalized and submitted to the 8th Ministerial Conference held in Mongolia in October 2009 which endorsed the document.

7. The EAP Framework – a key document guiding the activities of ESCC for a 3-year period (from 2010 to 2012) – focused on opportunities of regional integration through power development, with only indirect assessments for bulk management of oil, gas, and coal

resources. Among the various energy corridors outlined in the Energy Strategy, the EAP made the Intra-Central Asia corridor as its main area of concentration with key attention given to the following themes:

- **Energy Demand/Supply Balance and Infrastructure (Pillar 1).** Promote energy security and regional trade by optimizing integrated transmission and generation (infrastructure) expansion.
- **Regional Dispatch and Regulatory Development (Pillar 2).** Maximize the benefits of the coordinated CAPS.
- **Energy-Water Linkages (Pillar 3).** Strengthen cooperation by integrating energy and water analysis.

8. It was envisioned that outputs from the EAP would be categorized as one of the following: (i) investments, (ii) knowledge and capacity building, and (iii) policy development. The initial activities included additional diagnostic or foundational studies, and immediate investments. These activities intended to enhance energy security through better coordination of energy and water management on a regional basis, develop institutional capacity, strengthen infrastructure and the role of CDC and national dispatch centers.

D. Completion of EAP Framework and Follow-up Actions

9. The Energy Strategy document has helped to crystallize the vision – which is to achieve energy security, energy market integration, and energy trade-driven growth – for the development of energy sector in the CAREC countries. Guided by the Energy Strategy, the EAP laid the foundation for achievement of a coordinated and effective development of the region’s energy sector through the prioritization of investments with a special attention to regional coordination of trade and energy-water synergies.

10. In its meeting held in Baku in November 2011, the MC endorsed a “Strategic Framework for the Central Asia Regional Economic Cooperation Program 2011-2020” (CAREC 2020), highlighting the need to further accelerate progress across the core business areas. The future road-map of the energy sector growth in CAREC region is anchored in CAREC 2020, which forms the basis of assignment of future priorities and helps to track progress against the vision and targets for the sector. The overall sector objective continues to be the same as stipulated in the Energy Strategy document, which is to overcome the impact of uneven distribution of energy resources and to spur a greater ownership by the countries of the future regional initiatives. The end-result will optimize energy solutions for the region and cooperation in the area of trade, market relations, joint use and protection of trans-border river systems, and knowledge sharing.

11. The approach for the development of the region’s energy sector has been outlined in the strategic and diagnostic studies that were embarked upon during 2010-12 under the auspices of EAP. With the ground-work having been laid through the completion of these studies, a new 3-year (2013-15) Energy Work Plan (EWP) will take-over from where EAP left-off, by undertaking the step-wise realization of those investments and initiatives that have emanated from the EAP. It is expected that the newly formulated EWP will lead to the further enhancement of energy cooperation among countries of the region. The EWP and the detailed lists of medium and long term projects are included in a separate document which was endorsed by the ESCC and Senior Officials’ Meeting (SOM) in their meetings of May and June 2012, respectively.

II. OUTCOMES ACHIEVED UNDER THE EAP FRAMEWORK

12. The ESCC was responsible for overseeing the implementation of the three key pillars of EAP defined above, supported by sub-committees and working groups working to develop:

- **Diagnosics:** Review of existing studies, consulting country specialists and undertaking new analysis to confirm the key issues and identify possible options for strengthening regional coordination.
- **Policy:** Identify areas of policy reform/development.
- **Capacity Building:** Strengthen regional and national organizations relevant to the enhancement of regional power trade, infrastructure development and a more comprehensive understanding of energy-water linkages. Deliver training and knowledge sharing on various models for interconnection and energy-water coordination.

13. Following are the actions carried out and the results achieved against each of the pillars:

A. Energy Demand/Supply Balance and Infrastructure (Pillar 1)

14. As part of the Action Plan for Pillar 1, a diagnostic study was undertaken, by ADB-funded consultants, on the power sector of Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan. Each of these countries is served by different portfolios of generation mixes. Because of their different mixes, their availability characteristics, and non-coinciding peak demand requirements, there is a significant inter-trade potential between these countries. The study concluded that increased inter-trade activity would reduce incidences of unmet demand (mainly during winter), conserve and optimize utilization of renewable and fossil fuel resources, reduce environmental impact from emissions, and from more efficient water management, and provide economic benefits from these measures. Further economic benefits will accrue due to increased system generation redundancy, a lowering of the need to run fuel-costly thermal power plants, and a general improvement in the availability of system ancillary services. The study, which concluded in October 2010, recommended the preparation of a Regional Power Master Plan (RPMP) for Central Asian countries, which would be dovetailed with the Afghanistan Power Master Plan (APMP).

15. The action for the preparation of the RPMP was endorsed by the CAREC Ministerial Conference in October 2009 and the funding of the technical assistance was approved by ADB in June 2010. The supervision of the RPMP preparation was done by the technical subcommittee established under the ESCC Pillar 1. The goal of the RPMP was to identify generation and transmission needs in Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan, and also address the technical conditions for synchronous interconnection of Afghanistan system to Central Asian system. The contract for carrying out the study was awarded to Fichtner of Germany on 29 November 2010 through a competitive process.

16. On 3-4 March 2011, members of Pillar 1 Subcommittee and representatives of ADB, World Bank, USAID, and CDC met in Almaty to discuss the Inception Report of the RPMP presented by Fichtner. The methodology, schedule and outputs presented in the RPMP were endorsed by subcommittee members. In October 2011, while discussing the draft final report, the subcommittee advised Fichtner to incorporate specific recommendations on Demand Side Management (DSM) and to quantify the benefits of regional cooperation in monetary figures in the final report.

17. The ESCC meeting held in May 2012 endorsed the RPMP second draft final report, which: (i) Estimates that the generation and transmission needs in Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan will cost upwards of US\$ 35 billion over the next 20 years; (ii) Rank-orders the priorities in which the various investment projects are to be undertaken in each of these Central Asian countries; and (iii) Recommends the various institutional measures that are necessary for the implementation of these plans. The report includes a 10-year investment plan, which has led to the preparation of a Medium-Term Priority Projects (MTPP) list for the energy sector that accompanied CAREC 2020.

18. The APMP is underway through ADB financing while the feasibility study of a power inter-connection between Turkmenistan and Afghanistan, also funded by ADB, is at an advanced stage. The APMP inception report was reviewed at a meeting held in Istanbul from 24-26 April 2012. The completed pre-feasibility study of the interconnection between Turkmenistan and Afghanistan was also discussed in this meeting. As both of these studies are being done by Fichtner (Germany), and many of the issues discussed in them are inter-linked, this joint meeting proved to be highly useful in resolving some key issues and acted as a coordination forum among all concerned parties. Aside from the high level representatives from Afghanistan and Turkmenistan, the meeting was attended by ADB, Islamic Development Bank (IsDB), USAID and the World Bank, which provided useful inputs to these ongoing studies of a sub-regional nature. The guidance provided by the Istanbul meeting enabled Fichtner to complete the interim report and present it at the meeting held in Stuttgart, Germany, on 27-28 June 2012. The report highlighted that for the network expansion, regional projects with involvement of Afghanistan will be considered such as: the Turkmenistan–Afghanistan transmission line interconnection project, the interest of the Afghan neighbors, Tajikistan, Turkmenistan, and Uzbekistan to wheel power to Pakistan, and the transmission line corridor for supply of Turkmenistan thermal generation in winter to Tajikistan.

B. Regional Dispatch and Regulation (Pillar 2)

19. Under the EAP Framework, a diagnostic study was carried out by Mercados–Energy Markets International (Spain) with World Bank funding. The findings and recommendations of the study were discussed and endorsed by the ESCC. The study performed a SWOT (strengths, weaknesses, opportunities and threats) analysis of interconnected/isolated operation in the CAPS and recommended short-, medium- and long-term solutions as well as immediate opportunities for easing constraints or improving combined grid operation, without any major investments. It simulated the integrated and isolated operation scenarios for all five countries of the CAPS, noted the different time of occurrence of peak loads in each country and variability in minimum and maximum demand supplied on most of the days, and concluded that significant overall savings can be achieved in the operation and system costs. The analysis indicates that, if the CAPS countries were to operate their power systems jointly, more than \$1.6 billion could be saved in the first 3 years of operation, due to more efficient thermal power generation and optimal dispatch. The joint operation of CAPS would also increase the level of security of supply, with associated savings estimated at more than \$0.6 billion. Thus, more than \$2.1 billion could be saved over 3 years through integrated operation.

20. The study further pointed out that the main issue is to elevate the confidence of countries to benefit from regional integration through cooperation. It categorized its recommendations based on implementation time frame and level of cooperation needed at the highest level of decision makers in these countries, in three categories. In the short term, the suggestion is to look at options to increase power trade without changes in the national regulation or the power sector organizations in the countries. It suggested looking at resolution

of some technical issues to facilitate the power trade (e.g. improved protections coordination), and on commercial environment. The study also recommended other measures to be considered over medium and long term, including realizing integrated power system operation benefits with modern tools (e.g. better commercial metering and supervisory control, and real time dispatch and settlements) and to create an efficient regional energy market (e.g., implement regional scale generation and transmission projects).

21. One of the key short-term recommendations of the diagnostic study is to organize awareness and capacity of the technical decision makers through seminars and discussions of all involved stakeholders to enhance collaboration among the countries of the region. The ESCC and USAID's Regional Energy Security, Efficiency and Trade program (RESET) are finalizing a program of capacity building and training to enhance cooperation and take steps for better regional electrical system integration. So far, two capacity-building workshops have already taken place; one on Renewable Energy and Energy Efficiency measures and one on Operating Competitive Wholesale Markets. The workshops were held this year in Astana in July and in Bangkok in September, respectively.

C. Energy-Water Linkages (Pillar 3)

22. Subsequent to an energy-water linkages workshop in September 2009 – which explored existing regional water and energy modeling, brought experiences from other basins and started to identify needs and a plan of action for the analytic and modeling effort – the ESCC articulated a need to improve the analysis of energy-water linkages of the Central Asia Region. Accordingly, under the EAP Framework, an initiative on Modeling and Decision Support Activities (M&DS) on Energy–Water Linkages in the region was launched. The objective of the two-phase M&DS activity is to strengthen regional cooperation through an analytical framework that integrates energy and water usage in the region. The EAP focused on the first phase under the M&DS activities. Through a consultative process involving both technical experts and users, defined a need for (i) a consensus regional water-energy model structure, (ii) data requirements, and (iii) supporting institutional platforms that were consistent with new realities of sovereign development in the region. In addition, a review of existing models was undertaken, along with the development of a “first generation” basin model from existing free and publicly accessible open-source information, including remote sensing and satellite imagery. The next work program of the ESCC will implement the findings and outcomes.

23. Following the CAREC meeting in Almaty in September 2009, a set of consultations were undertaken in the fall of 2010 with individual energy and water technical specialists from national institutes and in some cases ministerial counterparts in Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan. Findings were presented at the CAREC meeting in Bishkek in October 2010. A second set of consultations took place in spring 2011, in Kazakhstan, Kyrgyz Republic and Tajikistan, and Afghanistan in the form of national workshops. These brought together national technical experts from water-using sectors (e.g., government officials & technical water and energy experts, academia, NGOs and Academy of Sciences) to discuss and identify national priorities for water and energy management (core indicators of any model); review case studies with applicable modeling analytics; and identify national priorities for strengthening energy-water analysis.

24. National stakeholders clearly highlighted that today's economics on energy and water requires a new and different approach; transparency, and quality and access to information are significant concerns, where national engagement and ownership is vital and policy makers need to be involved in the process. National stakeholders noted there are common analytical needs

across countries but national priorities need to be reflected and better understood in both basins, inclusive of Afghanistan. Specifically, these consultations identified challenges with data flow, data sharing and access to existing basin models. Technical counterparts recognized that the recent advances and innovations in resource management, transparent analytical tools, and building capacity are critically needed to better understand and manage resources and support informed dialogue to secure energy and water benefits, for all countries in the basin. Findings were presented at the CAREC meeting in Baku, Azerbaijan in May 2011.

25. Concurrently, an independent first generation demonstration model of water flows — Dynamic Information Network for the Aral Sea Basin (AralDIF) — was produced by the University of Washington. The objective of this model was to identify available independent, publicly accessible data and model platforms for energy-water analysis. The model enables visualization and simulation of water and energy linkages in Amu Darya and Syr Darya river systems, with a purpose to: (a) develop better understanding of the energy and water resources linkages, and (b) facilitate a dialogue and discussion with regional and national technical stakeholders on strengthening analysis for water resources management. The basic premise of the AralDIF was to develop the data layers needed to model (to describe the dynamics of) the movement of water through the Amu Darya and Syr Darya river systems, based on and meeting of 4 principles: (a) the data to develop the model are fully transparent, and derived initially from globally available open-source data sets; (b) the full mass-balance of water is accounted for across the entire basin, as the basis of the hydrologic cycle; (c) energy and water linkages, including hydropower, irrigation, and other land use practices are then superimposed on the basic hydrological cycle; and (d) the model is scalable (in space and time). The model was informally presented at the cancelled October 2011 ESCC meeting in Bangkok¹.

26. As the final activity of the EAP energy-water linkages pillar, the World Bank and its partners, Swiss Agency for Development and Cooperation (SDC) and United Nations Economic Commission for Europe (UNECE), hosted a regional workshop, “Strengthening Analysis for Integrated and Adaptive Water Resources Management in Central Asia,” (4-6 July 2012 in Almaty, Kazakhstan). The workshop engaged a range of technical and policy expertise from Central Asia and the international community. National delegations from all six countries (Afghanistan, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan) were represented with 34 delegates; five or six participants in each national delegation, inclusive of multi-sectoral representation (e.g., water resources, agriculture, hydro-meteorological, environment, and policy-makers); in addition in attendance were observers from international donor organizations; and a cadre of technical specialists who were the workshop speakers. In addition, a cadre of technical specialists complemented Central Asia speakers on international experiences, and numerous international donor organizations observed.

27. The workshop agenda explored current approaches and emerging analytical tools. These included examples of: a range of data and information sources; modeling tools; the importance of an information interface; opportunities to develop national capacity; and standardized data platforms, integrating open source ‘top-down’ (such as the AralDIF platform) with local-sourced ‘bottom-up’ data. A review of the current institutional structure in Central Asia provided recommendations for a more effective legal framework and transparent institutions to build cross-border trust regarding data exchange. The issue of balancing hydropower and irrigation was reiterated, and the need to use appropriate tools that integrate national perspectives was re-emphasized.

¹ This ESCC meeting was cancelled due to flooding in Bangkok.

28. The Almaty workshop concluded with a road map for the second M&DS phase to be undertaken in the next ESCC work program. Significantly, the workshop identified eight principles that establish a new paradigm for future work (see box). The road map proposes a three-year (2013-2015) regional work program to be supported by, and integrated with, individual national road map programs. The work program identifies specific activities in four key areas: data, modeling, institutional strengthening and capacity development, such as: activate a web-based data portal, define a shared information system integrating 'top-down' and 'bottom-up' data; develop appropriate water conservation analytical tools; develop appropriate multi-country flood management tools; strengthen inter-regional climate change adaptation/mitigation activities; train on global experiences in international data and modeling; and explore institutional needs, particularly related to International Fund for Saving the Aral Sea (IFAS).

Eight Governing Principles for Strengthening Analysis for Water Resources Management

Cooperation

- ✓ Balance of national and regional ownership
- ✓ Emphasis on national and regional consultations

Knowledge outputs

- ✓ Basin modeling addressing national and regional priorities and constraints
- ✓ Presentation of information in user-friendly accessible formats

Open source

- ✓ Emphasis on open source data, information products and models placed in the public domain
- ✓ 'Top-down' and 'bottom-up' data appropriately integrated

Capacity and institutions

- ✓ Existing human and technical resources combined with emerging technology
- ✓ Institutional and financial stability

D. Indicators

29. As part of the CAREC results framework, the ESCC prepared specific indicators to monitor and measure progress of the Energy Strategy. ESCC collected quantifiable data based on the EAP, and analyzed, aggregated, and fed it into the results framework that was used as the basis of a CAREC development effectiveness review. The agreed energy indicators were as follows: (i) transmission lines (above 220kV) constructed or upgraded (km), and (ii) increased energy generation capacity (MW). The ESCC also thoroughly discussed four additional indicators for their possible inclusion in the results framework, which are: (i) agreements reached on the energy transit, (ii) agreements reached on the energy trade, (iii) agreements reached on riparian issues; and (iv) volume of exports and imports of electricity.

III. IMPEDIMENTS TO THE IMPLEMENTATION OF EAP FRAMEWORK

30. This section discusses the barriers that were encountered in the implementation of EAP Framework. The diagnostic studies that were carried out identified four main challenges that are responsible for slower than projected growth of the regional power trade. These are:

- Political – lack of willingness and commitment;
- Technical – limited regional interconnections;
- Commercial – deficient market mechanisms and legal framework; and
- Funding – shortage and/or lack of timely availability.

31. The impediments are explained in detail below.

A. Political concerns

32. The consensus view of ESCC members was that lack of political willingness and commitment among the member countries is proving to be the most difficult barrier to overcome. To counter this challenge, steps were taken to make the ESCC forum more effective through the participation of subject-matter-experts (SMEs) comprised of specialized international consultants who deliberated upon specific sectoral issues. These SMEs offered experience elsewhere, stimulated discussion on new approaches and emphasized the importance of addressing the outstanding issues. Furthermore, the sub-committees and working groups created to address the key pillars of EAP enabled an exchange of perspectives and opinions founded on common analytical or consultation structures. The results of these efforts have started to bear fruit. This was evident during the May 2012 meeting of ESCC in Manila and the workshop on knowledge exchange on water resources management in Almaty in July 2012. All members actively participated in discussions and demonstrated a sense of urgency to resolve the issues through active cooperation. (For the outcome of ESCC's meeting of May 2012, please refer to the separately available meeting brief.)

B. Technical issues and their resolution

33. Guided by the broader political situation in the Central Asian region, the CAR countries are currently exerting significant effort to secure their energy independence, such as building their own national grids, and looking for new opportunities for electricity exports. Expansion of international trade in electricity is mainly targeted at South Asian countries, often at the peril of the Intra-Central Asia trade. Countries have invested less in strengthening and modernizing the CAPS, or exploring mutually beneficial options for energy and water management.

34. Technical issues related to energy-water coordination include lack of a common knowledge base, exacerbated by poor systems for information sharing, distrust in existing data and models, need for more significant integration of national priorities and resource features, and attention to resolving operational issues such as flood management and, over a longer time frame, climate change.

35. The transmission network in the CAPS region is a radial-ring circuit and is designed on the basis of covering the regional demand and at providing import-export opportunities to the countries. The adequate utilization of an extensive transmission network like CAPS depends on development of facilities to dispatch and coordinate power flows, and a proper regulatory and

institutional system to manage and maximize benefits to participants. The facilities at CDC are old and in need of significant investment to bring them at par with modern control and dispatch centers.

36. The power generation and transmission systems, while offering about 7,000 MW of installed capacity to suffice for regional reserves, generation capacity and transmission/distribution networks (in some countries), are of significant age and in a deteriorating condition thus acting as a barrier in the way of maintaining the desired level of generation reserve. Most generation and transmission/distribution equipment is from the Soviet period and has not been upgraded and/or repaired for a considerable period. In order for the equipment to provide the required generation reserve on a reliable basis there is a need for its replacement which will require a huge capital expenditure. On the other hand, some of the CAPS countries cannot cover domestic demand through their own facilities due to technical limitations all of which has prevented the region from enhancing the level of integration. The technical problems of CAPS as well as the constraints faced by each of the CAR countries in operating independently were first highlighted in Mercados' study on system diagnostics and, more recently, in the RPMP. The proposed investment projects have been ranked in order of priority in the RPMP so that the most urgent constraints can be removed in the medium term (2013-15) and the secondary problems can be addressed in the longer term (2016-20). The recommendations have been considered while preparing the EWP (2013-15).

C. Commercial and institutional barriers

37. The commercial barriers (in the absence of political barriers) are seen to be relatively easier to overcome and are partially being tackled through the launching of a comprehensive capacity building program being provided in coordination with the CAREC Institute. Attention is being paid to arranging implementable and legally binding sale-purchase agreements which will go a long way in arriving at internationally acceptable commercial arrangements of power trade. One key issue needing attention is to inculcate a payment discipline for all the electricity trade. In absence of such a discipline or inadequate mechanism, there will be a reluctance to explore trade opportunities. In addition, adequate metering arrangements will facilitate the uncontrolled load flows as well as enable the accurate accounting of energy trade among the countries of the region.

38. The interconnected network of Central Asian countries is operated by the CDC (based in Tashkent), which regulates and monitors the demand-supply balance, power voltage, and frequency. CDC is a nongovernment, noncommercial organization working under the apex power council, which is comprised of heads of power utilities and transmission companies of Kazakhstan, Kyrgyz Republic, Tajikistan and Uzbekistan. During the ESCC meeting held in Manila, Philippines, in May 2012, the shortage of full-time working staff from other countries of the region (beside Uzbekistan) in the CDC was highlighted as a barrier in the way of a common understanding among the countries of the basic issues. It was recommended that steps be taken to diversify the geographical representation in the CDC by deploying more professional staff from Kazakhstan, Kyrgyz Republic, Tajikistan, and Turkmenistan.

39. The institutional anchor for regional energy and water issues was similarly identified as a challenge at the Almaty workshop in July 2012. Strengthening the IFAS is a key element in deterring adequate platforms for dialogue and coordinated management of both extreme and normal conditions.

40. The desired level of country ownership of CAREC and mainstreaming regional cooperation into national development plans has varied across countries. Much of the programming has been led by the participating multilateral institutions (MIs), highlighting the need for the countries to step up and take greater ownership of CAREC. The bringing together of six MIs has benefited the CAREC countries in terms of financial and technical support. However, going forward, the countries themselves will have to adopt a collective leadership role for an enhanced cooperation in the energy sector.

D. Funding and programming limitations

41. The aim of the EAP Framework was to remove the technical barriers to regional energy integration, as described in the preceding paragraphs. From 2010 to 2012, CAREC has embarked on 22 energy projects worth \$2.5 billion. However, a much larger funding program with a clearly defined set of priorities is needed to overcome these barriers. To date, this has not been possible because an agreed pipeline of energy projects that reflects regional and national priorities, and would assist with mobilizing more financing, has been lacking. The private sector has also played a less than anticipated role in CAREC, particularly in financing projects. The abysmal private involvement in the energy sector of the region is largely attributable to the lack of an enabling environment. Moving forward, CAREC will need to engage the private sector more systematically in order to mobilize the required technical and financial resources for the sector strategies and action plans.

42. The non-inclusion of CAREC strategies and priorities into the country-based development plans and investment plans has also posed a major challenge. The convergence of regional and national priorities has occurred only to a limited degree because regional cooperation was less of a priority for many CAREC countries compared to state-building following their independence in the early 1990s. Finally, since CAREC has worked on the principle of consensus-based decision making it has inhibited certain projects and initiatives from being incorporated into the regional programming. Nevertheless, the participating MIs have taken upon themselves the role of driving the regional cooperation as far as possible with some success.

IV. CONCLUSIONS AND WAY FORWARD

A. The 2013-15 Energy Work Plan (EWP)

43. The EAP (2010-12) played an important role in defining the approach for the achievement of region's energy sector objectives by highlighting the need for and carrying out key strategic and diagnostic studies and through outlining the guiding principles for the future development of the energy sector of the region. Based on the EAP guiding principles, significant progress has been made on the cross-cutting themes (three pillars) and the results achieved to date now need to be further built upon. This is to be done through the formulation of an Energy Work Plan (EWP) for 2013-15 which would act as a guide for step-wise realization of implementation steps that will lead to enhanced level of regional energy cooperation.

44. In the EWP, while the Intra-Central Asia corridor will continue to stay in focus, the stage will also be set for power supply to Afghanistan and to Pakistan, thus enhancing the energy integration of Central Asia – South Asia corridor. Already, several initiatives for exploring and developing the power trading market between the Central Asian and South Asian countries are ongoing which include the CASA-1000 project, Turkmenistan, Uzbekistan, Tajikistan, Afghanistan and Pakistan (TUTAP, which was introduced at the May 2012 ESCC meeting held

in Manila, Philippines), Uzbekistan-Afghanistan-Pakistan electricity trade, Turkmenistan-Afghanistan-Pakistan-India (TAPI) gas pipeline, etc. These mega-projects are indication of the Central Asia – South Asia corridor's importance in balancing the supply and demand in the CAREC region. Several other projects are included in the MTPP list, which is a part of the approved EWP.

45. The EWP will continue its focus on the cross-sectoral issues that impeded effective energy trade and cost-effectiveness generation. Specifically, the EWP will implement the “roadmap” for strengthening analysis and dialogue on energy-water management, combining national activities with operational issues with institutional strengthening at the regional level. Further work is also required on interconnection of power systems, building on the CAPS system but broadening the possible configuration of future developments.

46. Another element of the EWP (2013-15) is the identification and mobilization of new financing sources to meet the very large financing needs of the projects included in the MTPP list. For this purpose, besides the MIs and bilateral funding sources, private sector and other avenues of funding will be actively pursued. Additionally, the diagnostic work related to regional dispatches done under the EAP framework will be further built upon by launching those initiatives that will lead to the resolution of issues in this area. Finally, capacity building and knowledge enhancement in the areas of institutional efficiency improvements, clean energy development and energy-water management analysis, among others, will continue to receive close attention.

B. Results Framework and Key Indicators

47. Under the EAP framework, ESCC collected quantifiable, analysis based data and fed it into the results framework, as explained in section II (A) above. The indicators that have been used to measure the results were megawatts (for generation added) and kilometers (for transmission lines constructed). Going forward, two additional indicators, namely rehabilitation (in percentage of efficiency/reliability improvement) and energy trade (in gigawatt hours) will also be used to monitor the progress in the energy sector of CAREC region.

C. Medium-Term Priority Projects (MTPP)

48. Lists of projects, including on-going projects and the MTPP (2012-14) need to be finalized by the countries, based on national and regional priorities. The implementation of these projects will be monitored regularly against measurable performance indicators specified in the EWP 2013-15.

Timeline of Key Actions and Documents under the EAP Framework

Date	Key Actions and Documents	Endorsed/Approved by	Location
Nov 2008	Strategy for Regional Cooperation in the Energy Sector of CAREC Countries ("Energy Strategy")	7 th CAREC Ministerial Conference	Baku, Azerbaijan
Oct 2009	Energy Action Plan (EAP) Framework of the ESCC	8 th CAREC Ministerial Conference	Ulan Bataar, Mongolia
Nov 2011	Strategic Framework for the Central Asia Regional Economic Cooperation Program 2011-2020" (CAREC 2020)	10 th CAREC Ministerial Conference	Baku, Azerbaijan
	<u>Energy Demand/Supply Balance and Infrastructure (Pillar 1)</u>		
Oct 2009	Action for the development of Regional Power Master Plan (RPMP) endorsed	8 th CAREC Ministerial Conference	Ulan Bataar, Mongolia
June 2010	Technical Assistance to prepare the RPMP approved	Asian Development Bank	Manila, Philippines
October 2010	Diagnostic Study on Energy Demand/Supply Balance and Infrastructure Constraints	9 th CAREC Ministerial Conference	Cebu, Philippines
Nov 2010	Contract to prepare the RPMP awarded to Fichtner of Germany	Asian Development Bank	Manila, Philippines
May 2012	Fichtner presents the final draft of RPMP report	ESCC Meeting	Manila, Philippines
April 2012	Afghanistan Power Master Plan (APMP) inception report, presented by Fichtner	Government of Afghanistan and participating IFIs	Istanbul, Turkey
June 2012	Afghanistan Power Master Plan (APMP) Interim report, presented by Fichtner	Government of Afghanistan and participating IFIs	Stuttgart, Germany
Oct 2012	Afghanistan Power Master Plan (APMP) final draft report presented by Fichtner	SOM (to be approved)	PRC
	<u>Regional Dispatch and Regulation (Pillar 2)</u>		
July 2012	RESET Capacity Building Workshop on Energy Efficiency and Renewables	CAREC, IEA, USAID	Astana, Kazakhstan
Sept 2012	RESET Capacity Building Workshop on Modern Energy Markets and Information Systems	CAREC, USAID	Bangkok, Thailand
Oct 2012	17 th CAREC Trade Policy Coordinating Committee Meeting		PRC

	<u>Energy-Water Linkages (Pillar 3)</u>		
Oct- Nov 2012	National Discussions on national-level Road Map activities	Governments of Central Asia and Afghanistan	Central Asia
Dec 2012	Consolidated two-year basin-level Road Map (work program) prepared for IFI endorsement	World Bank	Washington, DC
Jan 2013- Dec 2015	Regional/basin-level and national-level Road Maps implementation	Governments of Central Asia and Afghanistan	Central Asia