



Central Asia Regional Economic Cooperation Program

Reference Document
For Session 2 of the Senior Officials' Meeting
June 2013

Energy Sector Progress Report and Work Plan (October 2012–June 2013)

**Senior Officials' Meeting
Central Asia Regional Economic Cooperation
27–28 June 2013
Almaty, Kazakhstan**

I. KEY DEVELOPMENTS IN THE ENERGY SECTOR

A. Sector Implementation

1. Progress of work in the energy sector is reflected in the overall CAREC Results Framework 2011 by two indicators: (i) “increased energy generation capacity (megawatt)”; and (ii) “transmission lines installed or upgraded (kilometers). These indicators seek to capture how CAREC’s physical infrastructure expansion and rehabilitation operations contribute to energy security, energy efficiency, and the ability to enhance power trade in the CAREC region, reflecting the results of completed projects. Regarding power trade, for example, statistics are available for such trade among Central Asian countries, and also trade between certain Central Asian countries and Afghanistan, for the period 2006 to 2012.

2. In 2012, the ESCC reviewed the above concept and agreed to expand the monitoring scope with the addition of the following three indicators, with a view to more fully capturing activities in the energy sector: (i) rehabilitated generation capacity (megawatt); (ii) new substations (megavolt-ampere); and (iii) upgraded substations (megavolt-ampere). The baseline for these indicators will be a 2013 and they will be included in the 2014 CAREC Development Effectiveness Review (DEFr) process. The current energy sector output indicators for 2012 are presented in the table below:

Energy Sector Output Indicators

Indicator	2009 Baseline Value	2010	2011	2012	Projected Outputs for 2013–2015	Progress
Transmission lines installed or upgraded (km)	850	...	1,150	322	755	
Increased energy generation capacity (MW)	820	...

B. Addressing Actions Proposed to Implement CAREC 2020 and Ongoing Key Issues

1. Priority Actions in the CAREC Program for the Energy Sector

Action Initiated:

3. The September 2012 ESCC meeting held in Bangkok endorsed the:

- Completion report of the Energy Action Plan Completion Framework (2010-2012); and
- Energy Work Plan 2013–2015 (EWP).

4. The EWP was subsequently endorsed and approved, respectively, by the CAREC Senior Officials Meeting (SOM) and 11th CAREC Ministerial Conference (MC) in October 2012, held in Wuhan (People’s Republic of China), as part of the *Wuhan Action Plan*, to ensure effective and timely achievement of the strategic objectives laid out in CAREC 2020. This progress report will be updated to track implementation of the EWP, and reviewed at the SOMs and the MCs. The EWP has six actionable elements to implement sector operational priorities.

Element 1: Developing the Central Asia – South Asia Energy Corridor

5. The Central Asian Republics¹, with large energy resource potential relative to their domestic needs, have been pursuing energy export-led growth strategies since their independence. While significant progress has been made in oil and gas trade, electricity trade with South Asia² is yet to pick up. The development of a Central Asia South Asia Regional Electricity Market (CASAREM) aims to realize the goal of increased electricity trade among the countries of the two regions, through a set of projects and concomitant investments, underpinned by the relevant institutional arrangements and legal agreements. At present, the implementation of Element 1 is supported by three complementary projects, namely CASA-1000, TUTAP and TAPI.

CASA-1000 Project

Action Initiated:

6. The preparation activities for CASA-1000 project, the first phase of CASAREM, were initiated in 2006, following the ministerial meeting of four countries (Kyrgyz Republic, Tajikistan, Afghanistan and Pakistan). CASA-1000 project aims to set the stage for a much greater degree of energy trade between Central Asia and South Asia, eventually linking energy supplies between the Urals and South Asia; establishing Afghanistan's role as a viable transit country, leveraging a key comparative advantage and enhancing the country's growth prospects; ensuring a steady source of revenue from power exports for Tajikistan and Kyrgyz Republic, which could help alleviate the existing acute winter energy shortages; and alleviating electricity shortages in Pakistan during the peak summer season and reducing the country's dependence on costly oil-based generation.

7. The preparation progress has significantly advanced with substantial completion of Project Implementation Structure, draft Power Purchase/Sale Agreements designed for CASA-1000 operating conditions, Avian Risk and Management Study, Community Benefit Sharing Scheme, Security of Transit and Risk Assessment Study, Grid Strengthening Options in Tajikistan. Study of Open Access Rules to use spare capacity of the line is in progress.

8. The creation of a dedicated working group on CASA-1000 by the countries in November 2011 has helped in setting up a good process for collective decision making by the countries for this complex and challenging project. The Joint Working Group has finalized the commercial framework and formed a Legal Subcommittee to negotiate the actual contract language and deal with related technical issues. The Joint Working Group is now working closely with the IFC to prepare bidding documents for procuring engineer/procure/construct/operate services for the project. The project preparation activities are being funded by Aus Aid, DFID, PPIAF, UK, US State department, USAID and the World Bank.

9. USAID-funded RESET program, largely focused on energy trade issues, provided capacity building and knowledge activities, as well as organized and sponsored Joint Working Group meetings of CASA 1000 Project and Legal Subcommittee meetings.

Next Steps:

10. CASA-1000 project preparation activities, including negotiation of commercial agreements; selection of a Developer and an Operator are expected to take place in the coming months. ADB and WB will explore opportunities for coordination between the CASA-1000 and TUTAP projects to maximize benefits for the countries from both initiatives.

¹ Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan

² Afghanistan, Pakistan, India

Turkmenistan, Uzbekistan, Tajikistan, Afghanistan, Pakistan (TUTAP) /Afghanistan Power Sector Master Plan

Action Initiated:

11. Under the \$1.5 million technical assistance provided by the Asian Development Bank (ADB), Fichtner (Germany) has completed a Power Sector Master Plan for Afghanistan (APSMP). The objective of the APSMP was to identify priorities, timeframe, and costs associated with Afghanistan's power sector development goals. A power demand forecast has been prepared, which indicates an annual demand growth rate of about 8.5 per cent, over the 20-year time horizon for the APSMP. It is projected that, over this period, the connection rate in rural and urban areas will reach 65 and 100 percent, respectively. The APSMP has established a total investment requirement of \$10.1 billion, including \$7.3 billion for power generation and \$2.8 billion for power transmission. Four distinct investment "stages" have been identified in the APSMP, with the bulk of the investment being in the last stage for hydropower development. Certain major projects have been identified for immediate implementation.

12. The Afghanistan electric system is comprised of ten electric islands supplied either by imports or domestic generation. The APSMP recommends that Afghanistan construct an integrated grid to allow it to develop grid-scale domestic power plants and enjoy lower per unit costs with increased system reliability. Meanwhile, the APSMP identifies that Afghanistan will need to continue its high dependency on electric imports (today, about 75% of supply) over the medium term pending construction of domestic thermal and hydro plants. High Voltage Direct Current Back-to-Back convertors are proposed to allow imports from neighboring unsynchronized systems to a unified grid. The APSMP identifies that existing 220kV interconnections with Tajikistan and Uzbekistan, taken together with planned 500kV interconnection with Turkmenistan, will allow Afghanistan import power in excess of its domestic needs, thereby allowing Afghanistan to utilize its planned grid to wheel power from Central Asia to Pakistan.

13. The TUTAP will support the implementation of APSMP and link Turkmenistan, Uzbekistan and Tajikistan with the proposed Afghanistan electricity grid, which in turn will be linked to Pakistan.

Next Steps:

14. To continue working on implementing incremental steps of TUTAP, while ensuring coordination with the CASA-1000 project to maximize benefits of both initiatives.

Turkmenistan-Afghanistan-Pakistan-India (TAPI) Natural Gas Pipeline Project

Action Initiated:

15. TAPI will provide an opportunity to land-locked Turkmenistan to diversify its gas exports to the east, where there is growing demand for energy. The TAPI project aims to export up to 33 billion cubic meters per year of natural gas, through a proposed 1800 km pipeline, from Turkmenistan to Afghanistan, Pakistan and India. Project cost was estimated at \$7.6 billion in 2008. TAPI will be operated by a special purpose consortium company, TAPI Limited, which will build, own and operate the natural gas pipeline from the Afghanistan-Turkmenistan border to three offtake points in Afghanistan, Pakistan and India. At the request of the four countries, ADB has been TAPI's secretariat since 2002. TAPI is being implemented in four phases. Phase1 was completed in December 2010 with the signing of the gas pipeline framework agreement (GPFA), inter-governmental agreement (IGA), and heads of agreement (HOA) relating to the gas sale and purchase agreement (GSPA). Phase 2 largely ended in May 2012 when Turkmenistan concluded GSPAs with Pakistan and India.

Next Steps:

16. At the request of the four countries, ADB is now involved in Phase 3 that entails establishment of TAPI Limited and selection of the consortium lead, as envisaged in the GPFA. Phase 3 kicked-off in September 2012 with the preliminary market sounding road shows in financial and oil and gas hubs in Asia North America and Europe. During the road shows, representatives of the four countries met with prospective consortium leads and financiers.

Element 2: Resolving Regional Energy Dispatch and Trade Issues

17. Two studies completed under the ESCC Energy Action Plan Framework (2010-2012)³ highlighted substantial potential benefits of enhancing the electricity trade among the Central Asian countries. However, numerous constraints and concerns of countries have impeded exploitation of these opportunities leading to declining electricity trade. To address those constraints, two core activities will be implemented: Central Asia Electricity Trade Development Program; and capacity building under USAID RESET program.

1. Central Asia Electricity Trade Development Program**Action Initiated:**

18. Building on the diagnostic studies in the Energy Action Plan, the World Bank will implement a program in support regional power trade in Central Asia. The program, reviewed and approved at the ESCC meeting on June 6-7, 2013, will consist of two phases:

- *The first phase* will undertake a series of fact-finding interviews and data analyses among the various operating entities (including energy firms, CDC Energia, etc) and relevant Ministries. The objective is to obtain a baseline of documented data / facts related to today's operating issues and to collect and synthesize views about what initial steps might be taken in order to make incremental improvements. In this phase, business cases would also be prepared for benefits from regional trade for the interested countries to help build supporting opinions among policy makers for increased trade and cooperation. It will also involve bilateral or multilateral discussions or presentations to clarify issues and options.
- *The second phase* will detail specific proposals, including example contracts or rules related to new arrangements or proposals; and lay a way forward with a medium term vision. The knowledge and capacity gap in implementing suggested steps will also be identified and implemented.

Next Steps: Terms of Reference/work program will be prepared, taking into consideration the suggestions made by CDC, and presented at the next ESCC meeting.

2. USAID RESET program**Action Initiated:**

³ "Load Dispatch and System Operation Study for Central Asian Power System" by Mercados, and Central Asia Regional Economic Cooperation: Power Sector Regional Master Plan" by Fichtner

19. National Training: RESET completed various seminars regarding energy information systems, their security and integration for electric market support. These seminars were tailored to the specific requests and needs of the countries and included six for Kyrgyz Republic, four for Turkmenistan, two for Tajikistan, and one for Kazakhstan. RESET held one seminar on the role of an Independent System Operator in Tajikistan. It also held three seminars at Karaganda State Technical University, in Kazakhstan, on the design, operation and support systems for power markets.

20. Curriculum on Power Markets: RESET commissioned the development of a full university level curriculum on the design and operation of power markets.

21. Automatic Meter Reading (AMR) and SCADA: With the decision to institutionalize AMR and SCADA systems in most countries, RESET offers seminars to provide a good understanding of the AMR and SCADA systems and their integration. RESET held seven such seminars in Kyrgyz Republic, and one each in Kazakhstan, Tajikistan, and Turkmenistan.

Next Steps:

22. As a pilot, the Almaty University of Power Engineering and Communications is introducing the RESET curriculum on Power Markets in the fall of 2013. It will be made available to other universities in CAREC countries upon request.

23. More training seminars are planned until the conclusion of the RESET program in September 30, 2013, including a proposed power markets-themed capacity building regional seminar for late June.

Element 3: Managing Energy-Water Linkages

24. The objective of this element is to improve understanding of the linkages between energy and water resources. The preceding Energy Action Plan established a draft roadmap to strengthen analytical tools and knowledge coordination. The World Bank has initiated several activities emerging from its report at the September 2012 ESCC meeting.

The Roadmap

Action Initiated:

25. Prepared at the July 2012 *Knowledge Exchange Workshop on Strengthening Analysis for Integrated and Adaptive Water Resources Management in Central Asia*, and presented at the ESCC Meeting held in September 2012, the draft Roadmap framework was distributed to participants for their comments in November, 2012. The workshop report is now finalized. It identifies eight (8) agreed upon principles to establish a new paradigm for future energy-water analysis in the region and proposes a multi-year (2013-2015) regional work program (on data, modeling, institutional strengthening, and capacity development) with complementary activities at the national level.

26. At the CAREC Ministerial Conference in Wuhan, in October 2012, the Council of Ministers noted the effort as "...a key breakthrough" in which "by and large, the CAREC countries, acknowledged the importance of resolving the regional water agenda". A joint ministerial statement stated "...to strengthen energy-water linkages, a common understanding has been reached on the initial need to develop the analytical tools for water management at the national and regional levels". Several early activities in the Roadmap have been initiated, as outlined below.

Next Steps:

27. A set of activities was presented and approved at the June 6/7 ESCC meeting. Some have been initiated (see following paragraphs) and will be accelerated, others will be initiated.

The BEAM and AralDIF Models

Action Initiated:

28. The AralDIF demonstration model was prepared as part of the Energy Action Plan; the Central Asia BEAM ("Basin Economic Allocation Model") was developed by the Executive Committee of the International Fund for Saving the Aral Sea (EC-IFAS) in 2011/12. Both models were presented at the July 2012 workshop noted above and at which participants expressed a desire to better understand both tools. In January 2013, two Training-of-Trainers Workshops were held in Almaty to introduce these new technologies and approaches of resource modeling to Central Asia experts. Specifically, participants received hands-on training on BEAM and were introduced to AralDIF. Subsequently the AralDIF was showcased at a Sustainable Development World Bank Global Meeting in February 2013.

Next Steps:

29. Additional workshops will be held to better understand the range of modeling that is available for energy and water linkages, encompassing both Central Asia as well as international tools. Building on the requests of participants of the July 2012 workshop, these workshops will provide insights into the usefulness of the models to each country, and identify gaps in establishing an agreed set of analytical tools for basin-wide planning and management.

Central Asia Energy-Water Knowledge Portal (CAEWP-KP)

Action Initiated:

30. The CAEWP-KP is a multi-phased effort to provide an open, readily accessible and user friendly node of information, data and reports on energy and water in Central Asia. Proposed and supported in the draft roadmap, the first phase focuses on collection and consolidation of existing information from global data sets on a range of issues such as climate variables, groundwater, forest cover, etc. The activities have been initiated, building in part of the AralDIF model's Dynamic Information Framework.

Next Steps:

31. The first phase of the portal will be completed and the site made live by October 2013. A second phase will explore the possibility of adding publically available information from Central Asia sources (regional and national) to explore the use of the portal to connect "top down" and "bottom up" data, modeling and decision support across countries. In addition, capacity building sessions will be planned to enable energy and water specialists to become familiar with and critically assess the global data sets.

Energy Vulnerability to Climate Change

32. Several studies have been completed on the vulnerability of the energy sector to climate change; studies in each of Kyrgyz Republic, Turkmenistan and Kazakhstan were led by EC-IFAS in 2012, funded by USAID. The studies, which applied a World Bank methodology piloted in Albania and Uzbekistan, identified climate risks and possible adaptation measures. Among the adaptation measures cross-sectoral issues (energy-water) were emphasized. Preparation for a fifth study for Tajikistan is underway, as is development of a methodology to consolidate all five studies to explore adaptation measures at a regional scale.

Next Steps:

33. An international consultant will be competitively selected to begin work in early Fall 2013

Central Asia Energy Water Knowledge Network**Action Initiated:**

34. Consistent with the draft roadmap, the World Bank and the World Bank Institute (WBI) have initiated an effort to identify a core Community of Practice of energy and water sector specialists. In February 2013, the first of several planned exchanges with institutions/institutes -- governments, institutes, academia, and other groups/agencies -- from across the region identified the opportunities to establish centers of excellence and the means and mechanisms (virtual and physical) for future activities. The goal is to create a consistent community to deepen knowledge sharing across sectors and countries, help build capacity within a wider range of interested professionals, and provide strategic guidance on implementation of this element of the EWP.

Next Steps:

35. The mechanisms for creating centers of excellence will be further developed as members of the community of practice are identified. Countries are invited to propose specialists.

Element 4: Mobilizing Funds for Building Energy Assets**Action Initiated:**

36. A 10-year (2013-2022) investment plan was developed for the Central Asian Power System (involving Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan) under the Power Sector Regional Master Plan completed in October 2012. The investment plan has determined an investment requirement of \$36 billion over the 10-year period. TOR have been prepared for a study to determine the capacity and appetite of the Central Asian countries to finance priority power sector infrastructure projects from their own resources. The study will examine other potential sources of finance for power sector development in these countries, covering both national and cross-border projects, and will identify projects with a public-private-partnership potential. Historically, private sector involvement in the development of energy infrastructure in the CAREC region has been minimal. In this context, the study will critically examine the enabling environment in each country for private investment in the power sector. Further, the study will formulate recommendations for the establishment of project development facilities (PDFs) in these countries, and the transitioning of these national PDFs into a sub-regional PDF.

Next Steps:

37. A RFP for the proposed study will be issued after endorsement of the TOR at SOM.

Element 5: Implementation of Energy Sector Priority Projects**Actions Initiated:**

38. Preparation of a medium-term priority projects list for the energy sector was initiated in 2011 as requested by the Ministerial Meeting. Several project selection criteria were discussed. In 2012, ESCC agreed that the list of Energy Sector Priority Projects should only include projects in interconnected countries which satisfy the following criteria: (i) transmission projects of 220 kV or above; and (ii) generation projects of 50 MW or above. A list of projects has been

created according to these criteria, circulated to the countries, and extensively discussed at several ESCC meetings. However, unanimous agreement on the list could not be reached as some countries had reservations regarding certain projects in other countries.

Next Steps:

39. It was agreed that a draft list, with the agreed CAREC project section criteria, will be circulated once again. Each country will (i) update their planned project list; and (ii) indicate, where needed, its concerns regarding projects identified by other countries. Comments from the countries will be consolidated and an updated list will be presented at next ESCC in September 2013 and later to SOM and MC in October 2013.

Element 6: Capacity Building and Knowledge Management

Action Initiated:

40. Topics for the capacity building activities have been discussed at a number of ESCC Meetings. The ESCC meeting on June 6/7, 2013 further discussed the list of activities and made additional suggestions. One of the capacity building topics requested by members was legal and regulatory implications of the regional power trade. Suggestions have been integrated into a revised plan for capacity building under the EWP (2013-2015) which is presented in Annex 1.

41. Several members expressed a desire for the CAREC Institute to support project and feasibility studies, although it was recognized that this is currently outside the scope for the Institute, as agreed by Ministers.

42. A presentation on the Energy Charter Treaty and World Trade Organization was made on June 7, 2013. A number of CAREC countries have already joined World Trade Organization (WTO) while others are getting close to acquiring membership. WTO membership has implications on the trade of all commodities including electricity and other energy sources.

Next Steps:

43. The updated list of topics will serve as a guide to capacity building activities, to be coordinated with similar activities by USAID.

II. KEY ISSUES FOR GUIDANCE BY THE SOM

Action Initiated:

44. The following actions are proposed for endorsement by the SOM in June 2013:
- (i) **Resolving Regional Energy Dispatch and Trade Issues:** Terms of Reference/work program will be prepared, taking into consideration the suggestions made by CDC; it will be presented at the next ESCC meeting.
 - (ii) **Energy-Water Linkages:** The proposed set of five activities to strengthen the key elements of a knowledge platform and decision support system was supported by ESCC, with the addition of topics on hydropower development.

- (iii) **Mobilizing Funds for Building Energy Assets:** Terms of Reference for an investment study to identify pragmatic solutions and emerging opportunities were approved by the ESCC meeting on June 6-7, 2013.
- (iv) **Implementation of Energy Sector Priority Projects:** A draft list with CAREC criteria will be circulated for comments as follows: each country will (i) update their planned project list; and (ii) indicate, where needed, concern with projects identified by other countries.

45. The ESCC membership list is outdated. The Members are requested to revise appointments in coordination with National Focal Points by July 31, 2013. The following considerations should be taken into account while making new appointments:

- a. Two appointments are required – a policy maker at Deputy Minister level, and a technical expert at energy company management level
- b. The appointees should be able to regularly attend ESCC meetings during implementation of EWP 2013-2015.

III. CHANGES TO SECTOR ACTION PLAN

46. The name of Element 1 is to be changed to 'Developing the Central Asia – South Asia *Energy Corridor*' and of Element 2 to 'Resolving Energy Dispatch *and Trade Issues*.'

Table of Planned Activities and Subject Areas under CAREC Institute Work Plan
(2013-2015)

Activities and/or Subject Areas Based on Sector Work Plans
Central Asia-South Asia Energy Corridor. Study of interconnection options; cost-effective solutions for efficient energy resource utilization; elimination of summer/winter deficit; meeting of energy demand.
Design of legal and regulatory frameworks for energy trade in the CAREC region. An assessment of existing policies and institutions for promoting energy trade in the CAREC region and implications and issues for the design of a regional framework.
Technical operation of regional dispatch systems and alternatives
National and regional grid codes
Energy-water management: issue-based regional analysis (e.g. flood management)
Renewable Energy. Alternative energy sources; balancing CAREC's energy portfolio; RE potentials in CAREC; successful RE projects.
Cross-border Metering and Control. Regional energy dispatch issues; technical and financial principles; legal and institutional implications.
Regional power trade models and case studies. Power trade models; lessons for CAREC
Commercial operations of regional energy grids. Negotiations, contracting, dispatch and systems control, tariff setting, utility accounting and audit, operational efficiency, regulatory framework.
System Planning and Optimization Software. Software application for informed decisions on technical and commercial viability, as well as prioritization.
Regional Transmission Organizations. Institutional implications of energy trade; institutional models in other regions; competencies needed for these organizations.
Demand side management; energy efficiency; and energy conservation
Loss reduction methods in <u>transmission and distribution networks</u>
Modernization of combined heat and power systems
Governance, tariff adjustments and operational efficiency

Activities and/or Subject Areas Based on Sector Work Plans
PPPs in energy
Cross-border Clean Development Mechanism
Management of multipurpose water reservoirs
Hydropower development in international rivers
Database on Energy Expertise and Knowledge Products in the CAREC Region Data and information on expertise (experts) as well as knowledge products (studies, master plans, models (e.g. forecasting, optimization), and software).
Database of energy projects in the CAREC region
International experience in transboundary river management and protection
<u>Modern technologies for operation of hydro and thermal power plants</u>
<u>Study tours to national dispatch centres and modern generation units</u>

Note: New Capacity Building topics added at ESCC meeting in June 2013 are underlined.