



Reference Document
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Diagnostic Study on Pillar 3 of the CAREC Energy Strategy: Energy–Water Linkages

Executive Summary

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DIAGNOSTIC STUDY ON PILLAR 3 OF THE CAREC ENERGY STRATEGY: ENERGY–WATER LINKAGES

EXECUTIVE SUMMARY

I. INTRODUCTION

1. The overall aim of the ESCC Pillar 3 energy-water linkages is to build regional energy and water security through enhanced regional cooperation in energy and water resources development and management.¹ The conceptual approach to the implementation of Pillar 3 is to develop a decision support system (DSS) to understand energy-water interactions and dependencies.

2. The DSS combines the relevant physical, infrastructure, economic, social and environmental data and suitable analytical tools including models to support dialogue among key policy makers and technical specialists in the region, both at the national and regional levels. The DSS is a critical element in the approach because it serves two key purposes: first, to illuminate the value and options among a wide range of alternative approaches to managing energy and water; and second, to inform the dialogue across countries to sustain energy and water security and economic growth. Moreover, such a DSS is an essential tool for determining vulnerabilities and risks associated with global warming (changes in temperature and precipitation) and to evaluating alternative adaption options. The DSS would be based on an integrated river basin approach (across national boundaries) that reflects the unique basin hydrology of the region, energy supply and demand, the large existing and potential water storage capacity in the region, the uneven distribution of energy resources and agriculture potential across the region as well as the needs of other sectors that depend on water resources, including natural ecosystems.

3. As part of the CAREC ESCC Pillar 3 Energy Water Linkages, Phase 1A: Analytical and Modeling Architecture, a World Bank team visited Central Asia from August 21 to September 27 with the objectives to meet with national energy and water technical specialists in each of Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan as well as regional institutions and begin formulating the technical and institutional framework for an energy and water analytical framework for Pillar 3.² Meetings were held with individual national technical institutions (including planning, design and research institutions, national Hydromets, and water basin organizations) and in some cases ministerial counterparts. A consistent and open approach for discussion was maintained with each counterpart. The preliminary outcomes from the discussions are summarized below.

¹ The intense interest in what is called the Region's "energy-water nexus" stems in part from the degree to which peak demand for water for irrigation (in summer season) is out of synch with the peak demand for energy (in the winter months), and the uneven distribution of storage and energy generation potential (mainly in the upper basin particularly Tajikistan and Kyrgyzstan) and irrigated agriculture (mainly in the lower basin on the arid plains in Uzbekistan, Turkmenistan and Kyrgyzstan) and the dilemmas this causes for the development and operation of necessary water storages to support both of these economically vital water uses. The "region" or "regional approach" refers to the Aral Sea Basin, which includes the Amu Darya and Syr Darya basins, and to a basin approach that encompasses the main river and all tributaries in each of these basins. Note that the closed Zarafshan basin, which lies between the Amu Darya and Syr Darya rivers in Uzbekistan and Tajikistan, and northern Afghanistan are a part of the "region" and the Amu Darya region.

² Regional institutions included EC-IFAS, SIC-ICWC, and CDC. Meetings with the Government of Turkmenistan were not possible. The team did not travel to Afghanistan; however, one of the Bank's consultants has extensive experience in Afghanistan and recently completed a DSS system for Afghanistan water sector.

A. Overall objectives and direction of energy water linkages

4. The countries uniformly welcomed the initiative, but their optimism was tempered by their recognition that numerous “initiatives” and “models” have already been undertaken in and for the region. They did note that none have addressed the critical questions of energy and water together at a transboundary scale, and none have involved all the concerned countries directly. The countries agreed with the goal to develop an independent, more transparent and technically acceptable integrated energy-water mathematical model as the core analytical framework on which to base a dialogue on options to resolve current and future problems. There are numerous difficulties and issues from counterparts’ perspective as explained individually and in detail to the Bank team. Nevertheless, they suggested that the effort had to be made and suggested the World Bank facilitate the process.

B. ESCC’s Pillar 3 analytical and modeling approach

5. All counterparts emphasized the need to build a comprehensive and transparent decision support system (DSS) upon which the countries technically agree; the DSS should enable a clear exposition of the facts and alternatives, linkages, options and opportunities; it should be seen to be representative of the physical and economic relationships and linkages; and it should foster a high level of technical cooperation. While details of the mathematic modeling systems that might be used were not discussed at these meetings, the discussions about developing and using models indicated that a basin model that represents all the relevant energy and water linkages can and should be developed. While some advocated using specific models already developed, others agreed that there is significant modeling experience to build on, should it be decided to develop a new model. In principle, data for the model is available, but accessibility varies as does the completeness of the data. The lack of confidence in and acceptance of some data was apparent. The team emphasized any approach towards defining the regional transboundary model architecture and output variables will involve national level engagement and ownership.

C. Institutional approach and capacities

6. From the discussions it became apparent that the regional institutional framework, policies and rules of the former Soviet period for water and energy management are breaking down in some important collaborative and technical aspects. There appears to be a widespread view that the current institutional arrangements should be reformed and strengthened, and made more transparent and effective. Even at the national level, important changes in how water resources are planned and managed are changing with the attendant transition of roles and responsibilities. A specific regional institutional framework was not discussed; instead, the team’s approach was to listen to national counterparts, discuss current structures and explore possible future structures for bilateral and transboundary collaboration. Discussions revealed the need to renew institutional arrangements to ensure the confidence of all parties and the effectiveness of any analytical tool or model.

D. Broader issues raised during discussions

7. The rise of national aspirations and development needs, the emergence of new and distinctive political cultures, as well as the drive for energy and water self-sufficiency have promoted a stronger focus on national security rather than a regional and transboundary perspective. Bilateral agreements are not respected; rules are not followed between upstream and downstream riparians, and between downstream riparians.

8. Though water allocation and energy supply issues are in the forefront of tensions, there was also great concern expressed about increased variability of managed flows, extreme conditions and debilitating risks from floods, recurring drought, and the increased frequency of these events (i.e. most recently the drought of 2008 and the summer floods in 2010).

9. The balance between water allocation priorities for agriculture and energy appears to be shifting, but without an agreed means to analyze options that would ease this shift and ensure security and growth in each of the region's countries. Moreover, present water allocation and mechanisms are largely based on plans devised during the Soviet era that do not readily reflect the ongoing and potentially important changes in water demand (primarily for energy and agriculture).

10. Development and effective management of storage in the upper basins appears to be an option to address water problems, but there is little confidence either in predictions of the consequences of different modes of operation of these reservoirs or that they would be operated as agreed, taking into account upstream and downstream demands. A mechanism must be found to rebuild this confidence so that the countries of the region can agree on where and when to build storage, its size and characteristics, and how to operate and manage these reservoirs.

11. There were repeated calls for increased openness and verification. This includes improving the transparency and sharing of both models and data, and in the latter case verifying existing data (not only on streamflows and streamflow forecasts, but also water and energy demands and other vital characteristics of the water-energy system).

12. The World Bank team consistently heard that analysis under Pillar 3 must describe the economic and commercial viability of options. No country can afford uneconomic choices that do not promote growth and contribute to the solution of national development issues and priorities.

13. The model and tools must be able to show the widest range of alternatives, even though they are not presently favored by all countries. These alternatives must be described in terms of core aspirations and needs of each country and show the impact on each country.

E. ESCC workshop, Bishkek – September 22–24, 2010

14. The consultants presented the above findings at the ESCC meeting in Bishkek, Kyrgyz Republic on September 24, 2010. Scope of effort, perceived needs, data sharing and transparency, effective resource management, understanding the range of options and opportunities, understanding the economic and commercial aspects, and national aspirations and regional benefits were described. The Committee appreciated progress on Pillar 3 and found the summary to be interesting and useful. Main comments from the Committee's discussions were³:

- (i) Agreement with the proposed next steps, with the modification to begin the model overview in November (rather than October), and an offer by SIC-ICWC to provide additional information for national workshops;

³ Uzbekistan indicated that they would provide written comments.

- (ii) Support for working at national levels as well as at the regional level. Model indicators (output variables) should reflect priorities of each country;
- (iii) A review of existing models is important to see how they fit together; in addition, it was recommended that the model be built from smaller sub-regional analysis;
- (iv) Basins of all transboundary rivers and their tributaries are included in the model;
- (v) The institutional platform for modeling and analysis will require further discussion amongst all countries; and
- (vi) The energy-water analysis should be linked to an understanding of the role and functioning of all energy resources (it was noted that Pillar 1 will provide such an analysis, to be coordinated with Pillar 3).

F. Next Steps

15. November 2010:

- What: Confirm inventory of existing national and regional models
- Why: Better understanding of the benefits and limitations of available national and regional models in Central Asia; identify and possibly build upon base models/modules for regional energy-water model

16. January 2011:

- What: National cross-sectoral workshops and begin engagement with Phase 1B model
- Who: National technical specialist and policy makers from water, energy, environment, agriculture, others.
- Why: discuss (a) model architecture and focus on output variables, (b) user interface, (c) possible institutional platforms, and (d) scenarios from first-generation model (Phase 1B). Also, explore national participants for the proposed regional sub-committee and capacity building priorities.
- How: Input from preparatory work prepared by participants followed by an interactive workshop

17. Spring 2011:

- What: Regional Workshop
- Why: Formulate common understanding of desired model architecture, output variables and institutional platform. Draft Roadmap for energy-water model development

18. Late Spring 2011:

- Complete Terms of References for Phase 2 Analytics and Model Development and Institutional Strengthening, based on the Roadmap