

# Central Asia

## Water & Energy Program

Working for Energy and Water Security

## Development Aspirations of Central Asia



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Central Asia is a dynamic and geographically diverse region enjoying steady economic growth and new development opportunities. A key element in the continued growth, prosperity, stability, and well-being of the population is the smart management of the region's energy and water resources.

Although Central Asia is increasingly globalized, national aspirations, such as food security and reliable energy services, still drive development decisions. The competition for energy markets and the anticipated

scarcity of water resources have strained relations among the countries of the region. Climate change and population growth have the potential to strain resources and relations further.

The Central Asia Water and Energy Program (CAWEP) recognizes that strengthened water and energy resources management at the national and regional levels can lead to increased incomes, poverty reduction, sustainable development, shared prosperity, and climate resilience across the region.



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## The Benefits of Smart Management of Natural Resources

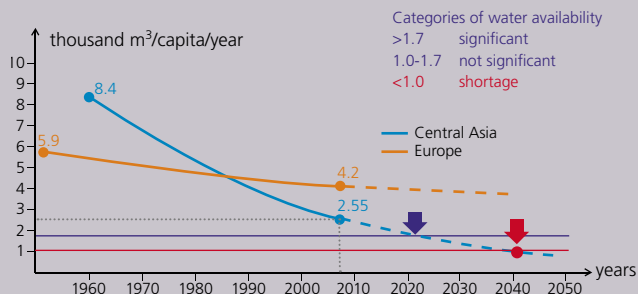
Central Asia is endowed with water and varied energy resources—fossil fuels: oil, gas, and coal, and even more abundant renewables: hydro-power, wind and solar. These resources can support increased agricultural production and have the potential to exceed domestic energy demand to supply export markets.

However, water and energy resources are unevenly distributed across the region and access varies. In some cases there is a lack of physical infrastructure and the outdated systems that exist are unreliable and inefficient. Some communities cannot meet citizens' electricity needs during certain times of the year, while others lack adequate water supply.

**Working at the national and regional levels to manage water and energy resources can bring:**

- Reliable energy supply and reduced winter energy shortages
- Higher earnings generated by exporting and trading energy
- Greater agricultural productivity through more reliable access to water
- Improved water quality and reduced land degradation
- Better adaptation to climate change and water/hydrological variability
- Cost-effective infrastructure development
- Enhanced environment for international and private investment for both water and energy

## Change of Water Availability in Central Asia



Over the past 40 years, water supply in Central Asia declined from 8.4 th. m<sup>3</sup>/person/year to 2.5 th. m<sup>3</sup>/person/year. By 2030, at the current rate of population growth in Central Asia, this reduction will reach a critical value of less than 1.7 th. m<sup>3</sup>/year. And it is still necessary to annually provide an additional 500-700 million m<sup>3</sup> of water to sustain the population of Central Asia even at very low levels of consumption.

Source: EC IFAS



Source: *Energy Supply/Demand balances and Infrastructure Constraints in Central Asia*. Asian Development Bank. 2009



## Water

Melting snow from high mountain peaks and precipitation provide the seasonal flows to the two major rivers that feed the Aral Sea Basin: the Amu Darya and the Syr Darya. The origins of the Syr Darya are the snow-covered slopes of the Tien Shan Mountains in Kyrgyz Republic. The Amu Darya originates from the glaciated northern slopes of the Hindu Kush and from Wakhan in the Pamir Highlands in Afghanistan and the Pamirs in Tajikistan.

## Water Resources in Central Asia

Water is a vital resource across the region. Both the Syr Darya and the Amu Darya river systems have the potential to provide abundant low-carbon hydropower. At the same time, these and other rivers are vital arteries for livelihoods—providing water for agriculture and local fisheries, and sustaining environmental ecosystems, human health, and electricity generation across Central Asia.

However, the water sector faces many challenges: 50 percent of irrigated lands are affected by salinization and waterlogging as a result of poor irrigation and drainage systems. In Turkmenistan that number is 96 percent, compromising both agricultural productivity and water quality.

### Improvements to Increase Efficiency

National governments are struggling to rehabilitate aging irrigation and drainage infrastructure and implement innovative irrigation technologies to address these problems and improve food security and resilience to hydrologic variability. Looking ahead, population growth and the need for increased agricultural production will continue to strain the region's water resources, making smart water management both nationally and regionally a key factor for the livelihoods of farmers and agriculture. Across Kazakhstan, Turkmenistan, and Uzbekistan, over 10 million hectares of agricultural land depend on these waters for irrigation, where agriculture on average contrib-



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utes 11 percent to these economies' GDP. Proposed improvements in irrigation efficiency could begin to alleviate the problem. For example, in Uzbekistan, a 1 percent increase in water pumping efficiency would result in savings of \$10 million per year; and a 10 percent increase in water pumping efficiency would result in regional savings of \$188 million per year.



### Kazakhstan

Population (millions) **18**  
 GNI per capita (US\$) **\$7,970**  
 GDP (billions US\$) **\$162.9**  
 % rural population w/access to an improved water source (2010) **86%**  
 Land area (1,000 sq. km) **2,725**



### Kyrgyz Republic

Population (millions) **6.2**  
 GNI per capita (US\$) **\$1,130**  
 GDP (billions US\$) **\$7.6**  
 % rural population w/access to an improved water source (2010) **82%**  
 Land area (1,000 sq. km) **192**



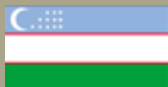
### Tajikistan

Population (millions) **8.9**  
 GNI per capita (US\$) **\$990**  
 GDP (billions US\$) **\$7.1**  
 % rural population w/access to an improved water source (2010) **64%**  
 Land area (1,000 sq. km) **141**



### Turkmenistan

Population (millions) **5.8**  
 GNI per capita (US\$) **\$6,380**  
 GDP (billions US\$) **\$37.9**  
 % rural population w/access to an improved water source (2010) **54%**  
 Land area (1,000 sq. km) **488**



### Uzbekistan

Population (millions) **32.4**  
 GNI per capita (US\$) **\$2,000**  
 GDP (billions US\$) **\$49.7**  
 % rural population w/access to an improved water source (2010) **81%**  
 Land area (1,000 sq. km) **447**

Source: World Bank 2017



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# WATER RESOURCES OF THE ARAL SEA BASIN



# Energy

Central Asia is rich with diverse energy resources. In the downstream countries of Kazakhstan, Uzbekistan, and Turkmenistan there are significant reserves of oil, gas and coal, as well as wind and solar potential. The upstream countries, Tajikistan and Kyrgyz Republic, are particularly rich in undeveloped hydropower potential. The diversity of such a mixed energy system offers an opportunity to meet all countries' electricity needs on

a seasonal basis in the most cost-effective and environmentally friendly manner—taking maximum advantage of abundant low-cost hydropower in the summer, and having the reliability of thermal resources in winter when the cold climate limits hydropower supplies; while at the same time building capacity to exploit the vast wind and solar potential in the future.





## Updating Infrastructure to Meet Needs

Current energy systems are becoming less reliable as the Central Asia power system deteriorates. The region is trading 90 percent less energy than in the early 1990s. Although new transmission lines linking north and south in Kazakhstan and Tajikistan improve the distribution situation, these plentiful resources do not always meet domestic needs and around 2 million households across the region used to be affected by winter heat and power shortages per year.

The countries are working to rehabilitate existing facilities, provide new generation infrastructure for energy-hungry, growing economies, and explore new models for energy trade—both within and outside the five-country community.



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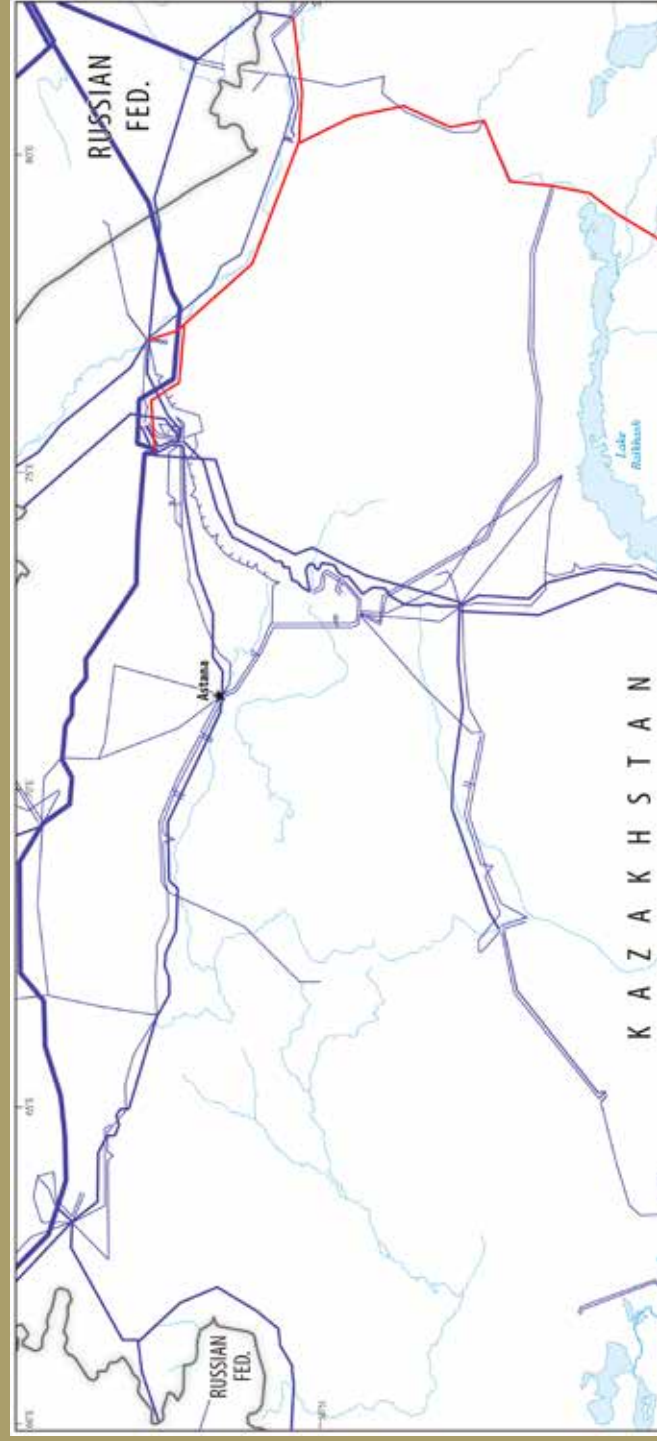
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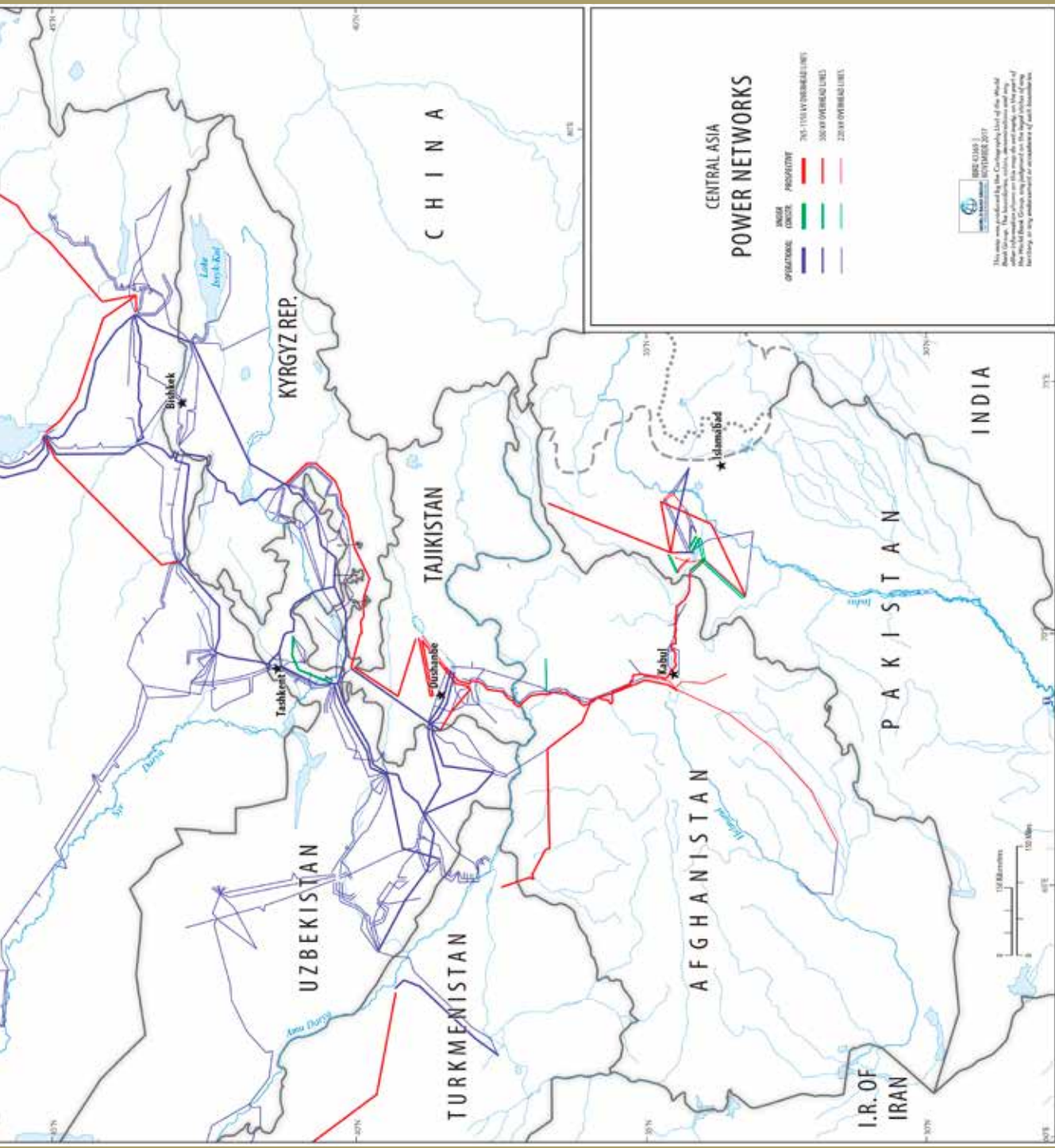
## CENTRAL ASIA ENERGY INFRASTRUCTURE

More effective energy and water management, including at the regional level, could accelerate investment, promote economic growth and stable livelihoods and improve environmental quality:

- Unrealized benefits from regional power trade in Central Asia were estimated at around US\$5.2 billion in the period 2010-2014.
- \$200 million per year in new revenues from energy exports to South Asia from the initial phases of the CASA 1000 project.
- In one Central Asian country, comprehensive energy efficiency measures could reduce energy costs by \$12.3 billion by 2030, avoiding investments in new generating plants and reducing fuel consumption.

Source: World Bank 2017





### CENTRAL ASIA POWER NETWORKS

- |             |                          |                      |
|-------------|--------------------------|----------------------|
| INDIA       | CORREL                   | PROSPECTIVE          |
| OPERATIONAL | 705-110KV OVERHEAD LINES | 330KV OVERHEAD LINES |
|             | 500KV OVERHEAD LINES     | 220KV OVERHEAD LINES |



IBRD/IDA/IFAD  
OCTOBER 2017

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# Climate Change in Central Asia

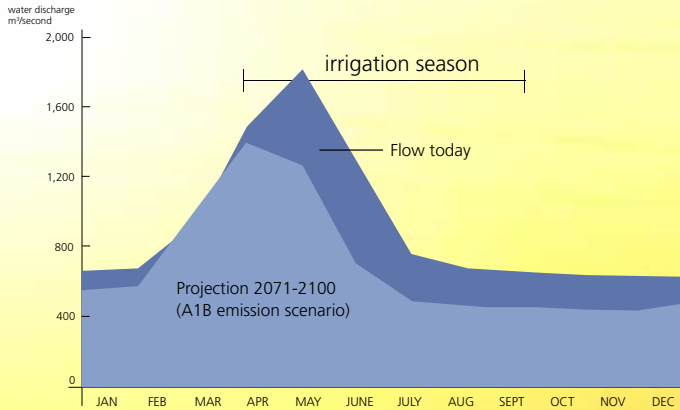
Central Asia is one of Europe and Central Asia's most vulnerable regions to climate change. The World Bank's 2009 report, *Adapting to Climate Change in Central Asia*, notes that average temperatures in the region have already increased by 0.5°C and are projected to increase by 1.6° to 2.6°C by 2030-50. The cumulative effects of climate change and the near-depletion of the Aral Sea are further increasing water-related stress. Increasing temperatures lead to earlier snowmelt, shifting runoff into spring and reducing water flows in the irrigation season by up to 25 percent. Rapid glacier melt is increasing water flows for the time being. However, it is expected that once the Central Asia region reaches "peak water" by around 2050, this effect will be reversed, and river flows will decrease markedly.

Climate change affects all sectors vital to economic growth and development in the region, not least of which are energy, agriculture, and disaster risk management that also cut across national borders. Weather-related disasters are currently estimated at 1% of GDP per year in Tajikistan and Kyrgyz Republic. Adaptation will be a requirement, rather than an option, for the region.

If current water management policies persist, water scarcity could lead to a significant slowdown in economic performance. At the same time, more efficient use of water in the economy could significantly contribute to increased agricultural production, green energy production and the health of the region's

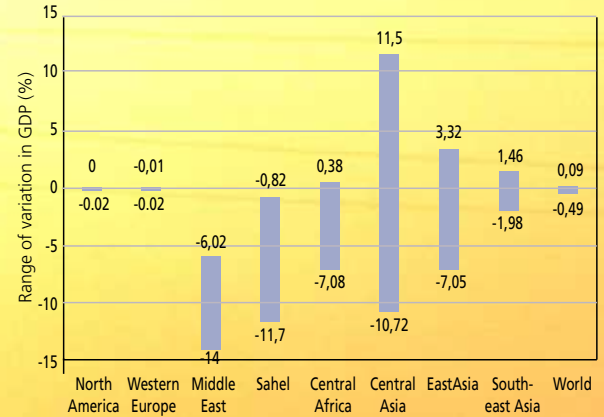
environmental assets. Of all the world's regions, the impact of future water consumption patterns has the greatest impact on economic growth in Central Asia; the region has the most to gain (or to lose) from (not) properly managing water resources under climate change compared to other regions.

## Seasonal Flow of the Syr Darya Projected to Decrease?



Source: Shiklomanov 2009

## Climate-related impacts on GDP in 2050 (ranges of impacts determined by policies)



Source: World Bank. 2016. High and dry: climate change, water, and the economy (English). Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/862571468196731247/High-and-dry-climate-change-water-and-the-economy>

# Central Asia Water and Energy Program

The Central Asia Water and Energy Program (CAWEP) strengthens the enabling environment to promote energy and water security at regional level and in the beneficiary countries by leveraging the benefits of enhanced cooperation. CAWEP promotes water and energy security working at the national scale to strengthen national institutional capacities and sector performance, while at the same time keeping regional cooperation on the dialogue agenda to create an enabling environment for achieving national and regional energy and water security. The Program is

anchored in partnerships with governments to ensure that program activities address national priorities. CAWEP cooperates with other development and financing partners to enhance the impact in meeting its objectives and to leverage investments by others. As the Program entered its third funding phase in 2018, the Program added Afghanistan as a sixth direct beneficiary country of CAWEP funds. This formalizes the ongoing practice of Afghanistan's participation in multiple CAWEP activities, in particularly those focused on regional consultations.






## The three pillars of the Central Asia Water and Energy Program



### Energy Security

Promote and study high-value energy investments that focus on energy security, energy efficiency, trade, infrastructure planning, accountability and institutional development.

#### Focus



-  Energy security including infrastructure planning;
-  Energy trade;
-  Energy accountability;
-  Energy efficiency;
-  Hydropower development



### Water Security

Enhance the productive and efficient use of water in agriculture and energy sectors through capacity strengthening, institutional strengthening, and investment planning

#### Focus





-  National water sector strengthening, Improved regional water management;
-  Sub-basin water management, Agriculture modernization Introduction of new technologies and efficient delivery of water supply services



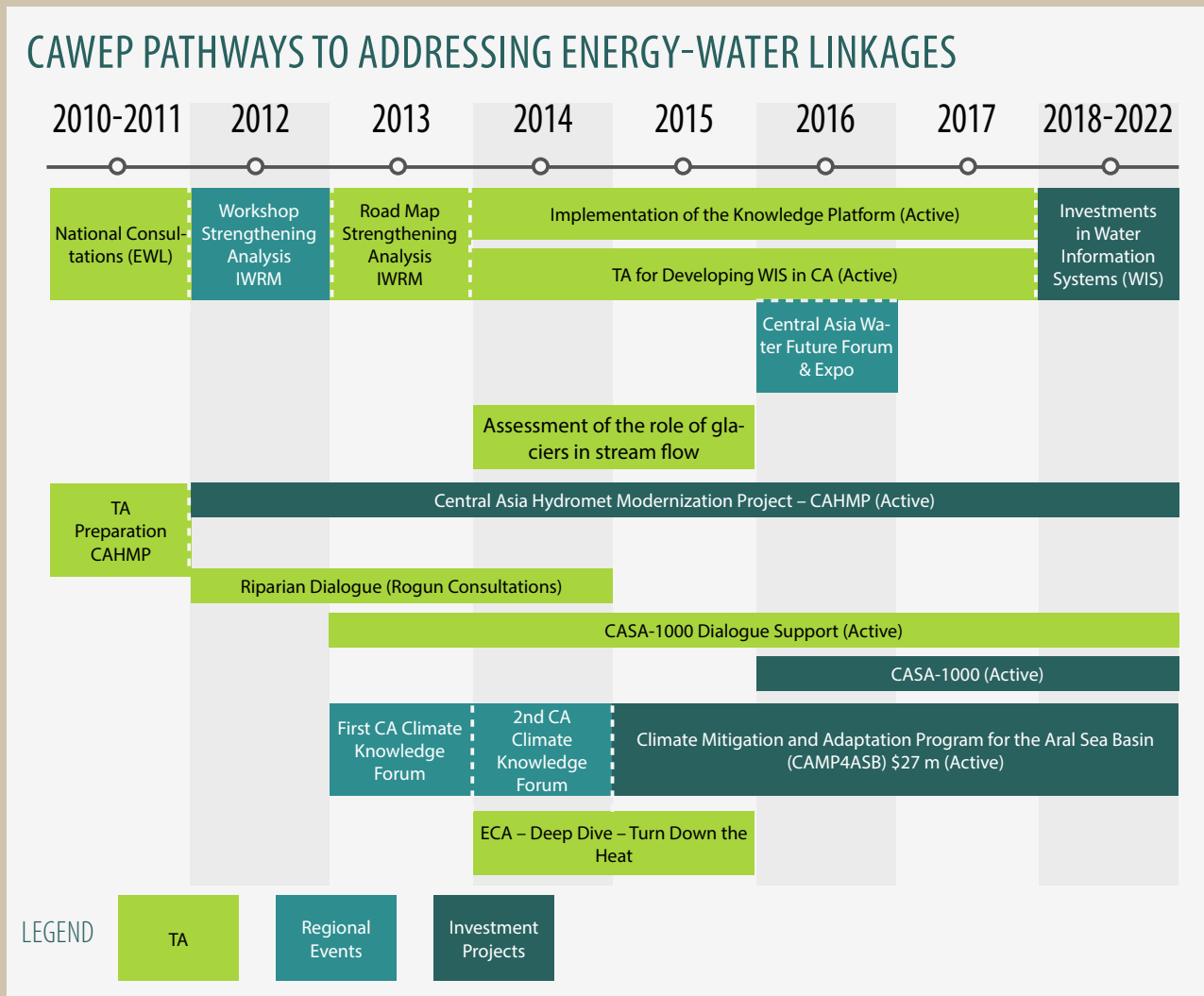
### Energy-Water Linkages

Improve the understanding of linkages between energy, water and the environment at the national and regional levels through dialogue, energy-water modeling, regional hydrometeorology investments and exploring the future impacts of climate change.

#### Focus

-  Regional hydrometeorology and water information systems;
-  Climate resilience;
-  Regional coordination and capacity building;
-  Knowledge Network and Youth Engagement, Regional Energy and Water Data Portal (web-based open access data), Landscape management

With a number of regional projects and programs successfully underway, CAWEP has established important “building blocks”. These activities identify critical infrastructure, institutional and analytical constraints, and help establish long-term priorities for the program.



# Partnerships are critical to the rational use of water and energy in Central Asia

Regional dialogue and cooperation are necessary to manage energy and water resources in Afghanistan, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan. CAWEP brings together national and regional governments, civil society organizations and youth, as well as bilateral development partners, international organization and financial institutions such as the World Bank.

The program is founded on partnerships with governments so that program activities reflect national aspirations and priorities. CAWEP welcomes cooperation among the development and financing communities to meet program goals, collaborate on methodologies, provide technical assistance, or contribute funds for core program activities.

A Multi-Donor Trust Fund, managed by the World Bank, was established in 2009 to help the Central Asian republics better address the energy-water nexus challenges. The third financing phase will be implemented between January 2018 and December 2022. The third phase financiers include the European Union (EURO 7 million), Switzerland (US\$ 3.5 million) and the United Kingdom through DFID (US\$ 1 million) for a total program amount of around US\$ 12.7 million dollars. An Advisory Committee of the Fund provides strategic guidance to program. CAWEP has worked jointly with other development partners on specific activities and projects, in both water and energy, including the Swiss Development Corporation (SDC), the United Nations Centre for Preventive Diplomacy (UNRCCA), the Asian Development Bank (ADB), the Islamic Development Bank (IsDB), the United Nations Development Programme (UNDP), the United Nations Economic Commission for Europe (UNECE), Germany (GIZ), the United States Agency for International Development (USAID), and the Aga Khan Foundation.

The World Bank welcomes other potential partners to support livelihoods, economic growth and climate resilience in this important region of the world.

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