Work Stream 1:
Infrastructure Connectivity and Energy Security

Discussion Paper:

Draft concept and implementation roadmap for a new regional association – The Central Asia Transmission Cooperation Association (CATCA)

April 2021

EXECUTIVE SUMMARY

The objective of this report is the delivery of a concept and implementation roadmap for a new regional association – the Central Asia Transmission Cooperation Association (CATCA) of which all CAREC member countries are eligible to become members, if they wish so.

Why CATCA

There are several existing regional agreements and institutions in Central Asia that are carrying out important technical day-to-day operations of the regional electricity grid. While these institutions focus on daily grid operations, there is currently no organisation in the Central Asian region that is responsible for strategic planning of the future expansion of the regional grid including the identification of new projects of common regional interest and their effective and systematic implementation.

To date, regional energy projects are mostly planned as individual national projects which are then linked together and require the establishment of ad-hoc agreements and tailored project companies to be implemented. To date, there is also no systematic approach to regularly develop and update regional energy masterplans. Energy Ministries and Transmission System Operators (TSOs) have been mostly dependent on IFI support to develop these masterplans, following no specific time pattern and often without ensuring sufficient knowledge transfer to allow countries of the region to establish such plans independently on their own.

Therefore, CATCA shall function as a new regional association responsible for strategic regional network development including long-term network expansion planning and centralized implementation of identified new cross-border projects. This is considered timely, especially in the face of global energy developments moving towards cleaner and more variable renewable energy sources that can be more successfully integrated through robust regional interconnections and provide regional energy security.

The establishment of CATCA was envisaged by the CAREC energy minsters in adopting the CAREC Energy Strategy 2030 and corresponding Ministerial Declaration during the 1st Central Asia Energy Ministers Dialogue in September 2019 in Tashkent, Uzbekistan.

Objective

CATCA will complement existing regional structures without affecting the mandate of existing organizations responsible for technical daily regional grid operation. CATCA will focus on future-oriented and strategic expansion of the regional network and thus bring network expansion planning from a purely domestic to a regional level. The new association shall be composed of Energy Ministers from the CAREC region and allow for a participatory process to jointly approve and identify new energy projects of common regional interest and develop region-wide rules and standards for operating the grid with a view to increasing regional energy connectivity, market transparency and expanded trade.

The key benefits to forming CATCA are:

1. regional transmission projects can be planned and developed without the need to form special groups and enter into special agreements between countries,

2. regional transmission projects implementation is coordinated, priority projects are ranked and implemented,
3. beneficiaries of regional transmission projects are identified, and
4. harmonized regional regulations are produced.

It is proposed to initially establish CATCA as an organisation for the electricity sector. If members wish, CATCA can equally be established as a platform for the gas sector, either from the start or at a later stage.

Role of CATCA

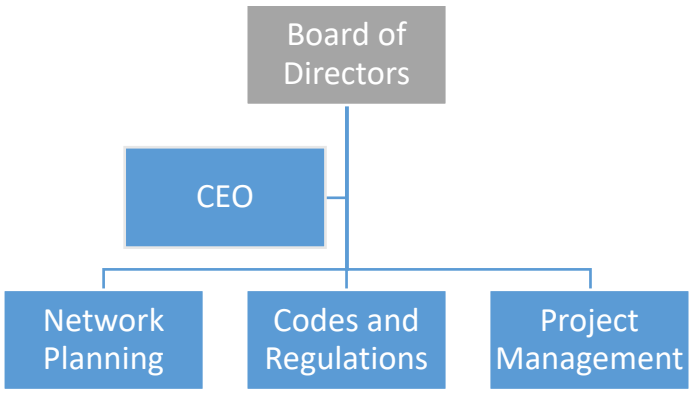
CATCA is proposed to perform the following three strategic development roles:

1. Develop transmission network expansion plans and update them,
2. Develop harmonized network codes and regulations such as rules for project ranking, generator connection conditions, open access rules, metering rules and transmission pricing rules for third party wheeling, and
3. Manage regional transmission projects including the management of detailed design, commissioning and erection stages of the projects.

Organisational set-up

CATCA is proposed to be a legal organisation with a board of directors composed of the Energy Ministers from member countries. Operations shall be structured into 3 main divisions including (i) network planning, (ii) network codes/regulations development and (iii) project management.

The organisation shall consist of both permanent staff and seconded personnel from member countries. During the establishment phase, it is proposed to install a CEO and 1 Head Coordinator for each division as a minimum permanent staff.



Implementation Roadmap

The implementation of CATCA is proposed in four phases. These phases are equal for electricity and gas cooperation and may either run concurrently or at a different time depending on the decision of CAREC members. It is proposed to start with electricity and introduce gas, if need be, at a later stage.

Phase 1 – Establish CATCA, nominate key staff and start initial coordination

In phase 1, CATCA is established as a legal organization. The physical location is to be agreed on by CAREC members. The Board of Directors composed of the Energy Ministers from the member countries shall be formed and first staff shall be nominated. CATCA membership is voluntary and open to all CAREC countries who wish to join. Two working groups, composed of relevant qualified staff from member countries' energy ministries, national TSOs or other relevant organisations, shall be established to assist with regional transmission planning and regulations development.

Phase 2 – Conduct regional project planning and develop regional codes and regulations

In phase 2, the first two pillars of work (network expansion planning and development of regional codes and regulations) are launched. New regional projects are planned and ranked and presented to the Board for approval. Energy ministries, national TSOs or other relevant organisations shall consider seconding permanent staff to CATCA to provide continuous support to the CATCA staff.

Phase 3 – Project manage regional transmission projects

In phase 3, it is proposed to add a project management mandate to CATCA to facilitate implementation of approved regional transmission projects. At this stage, each regional transmission project is managed as a single project, which is a more efficient approach from financing, implementation and management perspective as compared to the approach of splitting cross-border projects into a series of national projects.

Phase 4 – Establish and regularly update a regional masterplan

Phase 4 is increasing the CATCA organisation to have a department that is responsible for producing the regional masterplan and update the plan regularly (annually or bi-annually). Traditionally, masterplans have been produced every 5 or 10 years but, with increasing variable renewable energy power plants and significant annual decrease in capital costs, a more frequent update of the masterplan has become the modern trend. Having a section that is dedicated to updating the masterplan has the advantage of maintaining a consistent plan with consistent data and a consistent message.

This report further describes in detail the proposed CATCA governance structure, organisational structure, founding documents and implementation roadmap.

Questions to the members of Work Stream 1: Infrastructure connectivity and energy security

1. Do you agree that CATCA should first focus on the electricity sector and incorporate the gas sector at a later stage if it will be deemed necessary?

2. Do you agree with the proposed phased approach to the formation of CATCA?

3. Do you agree with the approach of seconding staff to CATCA to support the regional transmission planning effort?

4. Are you interested in becoming a founding member of CATCA?

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ACRONYMS

ADB	Asian Development Bank
CAREC	Central Asia Regional Economic Cooperation
CATCA	Central Asia Transmission Cooperation Association
CAPS	Central Asia Power System
CDC	Coordination Dispatch Centre Energiya based in Tashkent, Uzbekistan
MOU	Memorandum of Understanding
SOE	State-Owned Enterprise

1 INTRODUCTION

1.1 CENTRAL ASIA REGIONAL ECONOMIC COOPERATION (CAREC) PROGRAM

The Central Asia Regional Economic Cooperation (CAREC) Program was founded by ADB in 2011 and is a partnership of 11 countries seeking improved and sustainable economic growth through shared prosperity in the region (Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic, Tajikistan, Uzbekistan, Turkmenistan, Pakistan, Afghanistan, China and Mongolia). At the end of 2019, CAREC members adopted the CAREC Energy Strategy 2030 to achieve a reliable, sustainable, resilient and reformed energy market in Central Asia.

Over the past decade, interconnections between CAREC countries have improved but national electricity grids and gas pipeline networks are still planned in relative isolation on a domestic level. One of the objectives of the CAREC Energy Strategy 2030 is to lay the foundation for a new regional platform that will provide transmission system operators from CAREC countries a forum to cooperate and strategically plan new cross-border projects and region-wide long-term network development plans.

1.2 OBJECTIVES

The objective of this report is the delivery of a concept and implementation roadmap for a new regional association – the Central Asia Transmission Cooperation Association (CATCA). CATCA should complement existing regional cooperation structures and bring network expansion planning from a purely domestic to a regional level. The association shall allow for a participatory process of energy ministers from participating countries, with support from their national transmission system operators (TSOs), to jointly identify new projects of common interest and develop region-wide rules and standards for operating the grid with a view to increasing regional connectivity, transparency and expanded trade. The detailed tasks and/or outputs of this report are to:

1) Establish a clear mandate and role for CATCA taking the roles and responsibilities of existing institutions into account
2) Develop organizational structure, mission statement, working arrangements, decision making bodies, governing rules, responsibilities and procedures within CATCA
3) Elaborate relevant founding documents for the establishment of CATCA
4) Prepare a roadmap detailing the necessary actions and steps to establish CATCA
5) Draw up a formal agreement on the concept for CATCA to be endorsed by the founding members

2 BACKGROUND

2.1 CAREC ENERGY STRATEGY 2030

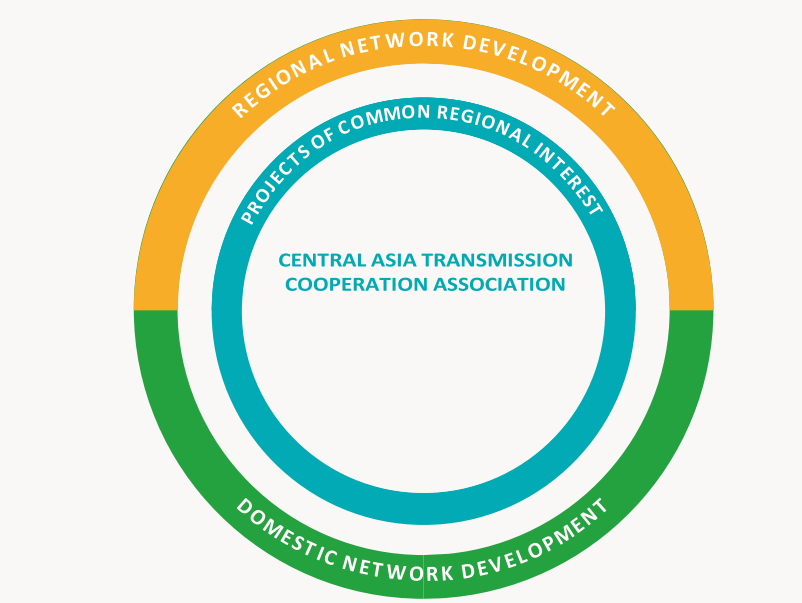
At the first CAREC Energy Ministers Dialogue Meeting in Tashkent in September 2019, the CAREC energy minsters signed a historic declaration endorsing the CAREC Energy Strategy 2030[1]. Pillar 1 of the Strategy is the focus of this concept paper. Pillar 1 is defined as Better Energy Security through Regional Interconnections. It specifically addresses the need to work together not only in building and operating physical interconnections but also in creating appropriate regional governance structures for deciding on strategic issues related to grid expansion, modernization of energy infrastructure, and other operational issues such as data sharing.

CAREC members shall therefore strive to develop a concept for a regional body—the Central Asia Transmission Cooperation Association (CATCA)—bringing together all national transmission system operators from the region to plan the development of the regional grid (as opposed to their national grids alone) and to develop region-wide rules and standards for operating the grid. The energy ministers of the participating countries shall steer the organization and approve CATCA's strategic planning decisions. CATCA shall ideally have the following functions:

1) elaborating a long-term regional network development plan including projects of common regional interest and centrally implementing these projects;
2) providing regular information on electricity and gas supply and demand for the market; and
3) developing harmonized region-wide rules for system operation.

This body shall provide appropriate structures for building consensus in the decision-making process (Figure 2-1). It shall also be established with a view to fostering energy trading on a longer-term horizon.

[1] CAREC Energy Strategy 2030, Common Borders. Common Solutions. Common Energy Future, November 2020, ISBN 978-92-9261-859-9.



Source: ADB.

Figure 2-1 New governance Structure for regional Network Development Planning

2.2 CENTRAL ASIA INTERCONNECTIVITY (ELECTRICITY)

Cross border energy interlinkages in CAREC have improved in the past decade and have led to large scale connectivity projects, more economic energy prices and improved security of supply.

The Central Asian Interconnected system is shown in Figure 2-2. The main backbone for the interconnection is 500 kV and the transfer limits between the countries is over 1000 MW.

Figure 2-2 Central Asian Interconnected Network[2]

The actual measured power flows for the peak in 2019 on 14 December 2019 are shown in Figure 2-3.

Figure 2-4 shows the total power flows between Central Asian Power System (CAPS) countries for 2018 in millions kWh (GWh)[3].

[2] 29th CAREC ESCC meeting, Current status and development prospects of the Central Asian Unified Energy System, CDC Energiya Director, Dr. Shamsiev H.A., Tashkent - April 2019.

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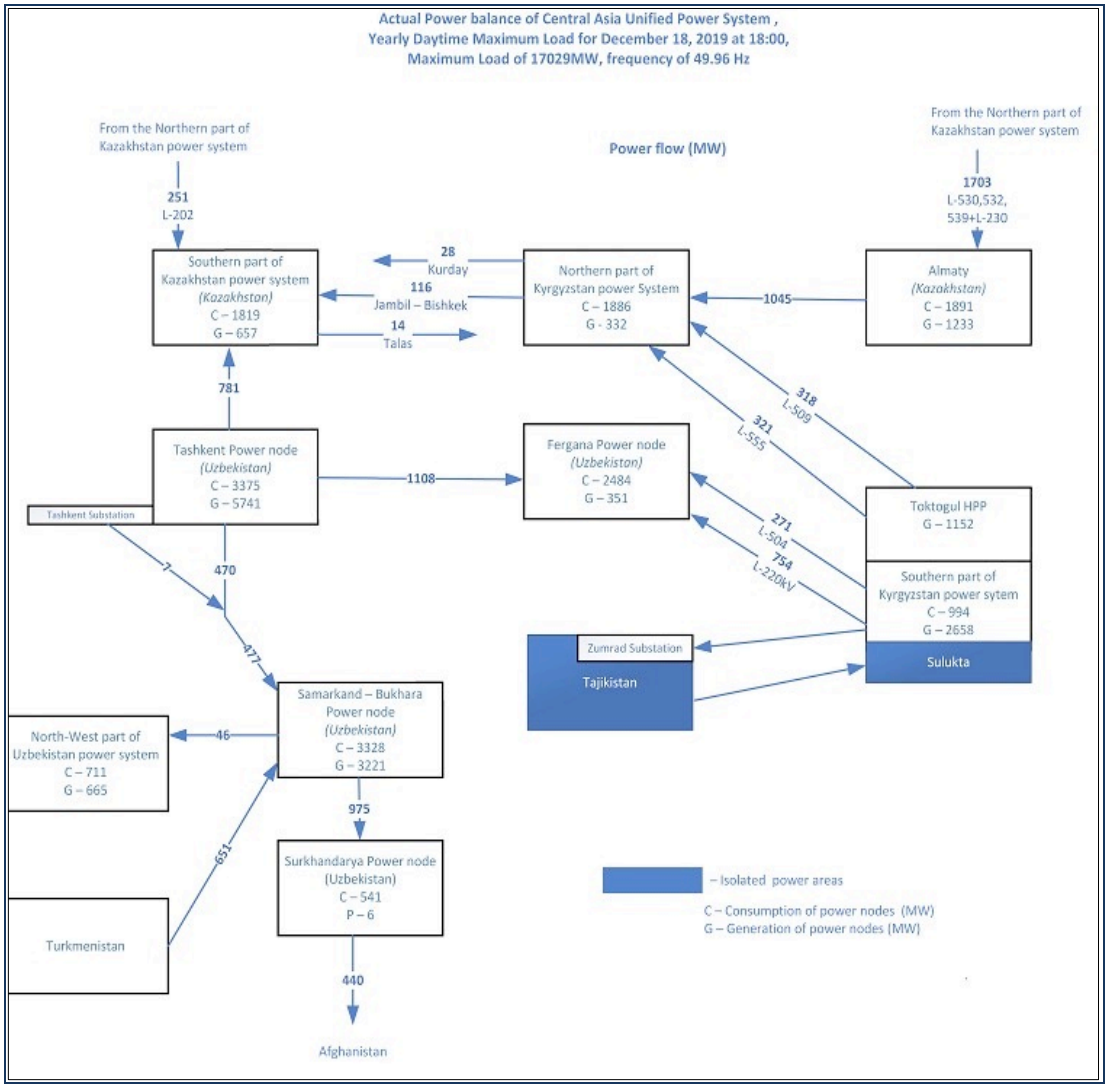

Figure 2-3 Factual power flows [MW] in CAPS in winter maximum loading conditions (18 December 2019 @ 18:00): G-generation, C - consumption[4]

mln.kW*h

	Year 2018	Central Asia Power Systems Import						
		Kazakhstan	Kyrgyzstan	Tajikistan	Turkmanistan	Uzbekistan	Afghanistan	Sum:
Export	Kazakhstan		6,1	12,1				18,2
	Kyrgyzstan	3,3		24,8		754,9		783,0
	Tajikistan	12,1	2,8			1480,9		1495,8
	Turkmanistan					356		356,0
	Uzbekistan		6				2591,7	2597,7
	Sum:	15,4	14,9	36,9	0,0	2591,8	2591,7	5250,7

Figure 2-4 Interchange power flows in CAPS for 2018 in million kWh (GWh)[5]

[4] ADB TA 9717 & TA 9823 REG, Regional Cooperation on Increasing Cross Border Energy Trading within the Central Asian Power System, Interim Report, 03 August 2020

[5] 29th CAREC ESCC meeting, Current status and development prospects of the Central Asian Unified Energy System, CDC Energiya Director, Dr. Shamsiev H.A., Tashkent - April 2019.

2.3 EXISTING REGIONAL INSTITUTIONS AND GRID OPERATION ARRANGEMENTS

All central Asian power systems apart from Turkmenistan are signatories[6] to the 'Parallel Operation Agreement' which allows for a coordinated operation of the Central Asia Power System (CAPS). Central Dispatch Centre (CDC) is the regional coordination control centre that provides the day-to-day dispatch and manages security of supply for electricity. Another body, the Coordination Electric Power Council of Central Asia meets every 6 months and functions as the board of directors for CDC and as such approves all CDC activities. The CIS power council makes recommendations on improving the power sector in Central Asia and the wider CIS region including Russia and is based in Moscow.

There are bilateral trading arrangements between Central Asian countries and first steps are taken to develop a Central Asian Regional Electricity Market (CAREM) to operate a regional electricity market. The development of the electricity market has just started but is envisioned to coordinate existing bilateral trading arrangements, settle imbalances and in the future operate a centralised electricity market.

A regional Master Plan for electricity is also currently being updated through an ADB funded project. This will be the first update since the development of the 2012 regional master plan.

The forthcoming paragraphs will describe the various mandates of existing institutions and grid operation arrangements to clearly distinguish the envisioned role of CATCA.

2.3.1 Parallel (joint) operation agreement[7]

All central Asian power systems that remain signatories[8] to the 'Parallel Operation Agreement' (signed in 1998) are members of the CIS Power Council and participate in CIS Power Council activities. They adhere to concepts and principles formulated by the Council, in particular they agree to:

- Maintain a common set of rules for the operation of the electricity market based on bilateral contracts, centralized trading, real-time balancing energy market and ancillary services market.
- Follow a set of technical rules to maintain safe and reliable operation of national and the regional power system. Including maintaining reserves – or financially supporting others for maintaining reserves. Each country appoints a system operator for technical operations and for the coordination of cross-border power flows.

[6] Turkmenistan withdrew from the CAR Parallel Operation Agreement in June of 2003. This made Turkmen base load capacity unavailable for the CAR Unified Power System, and forces Turkmenistan to regulate their system on their own without access to high speed hydropower regulation systems in Kyrgyz Republic and Tajikistan. It also limited the potential for any power trade with Turkmenistan, as every PPA now requires lengthy transit negotiations with the Uzbeks.

[7] Mercados report 98830, Load Dispatch and System Operation Study for Central Asian Power System, October 2010.

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- Maintain a high level of system reliability in cross-border trading and flows.
- Maintain open access to the transmission system and transparency in monopolistic services (transmission and system control), including transit flows for power exchange.

2.3.2 Basic documents and methodologies for CAPS joint operation[9]

The main documents that regulate the power system operation in the region are:

- Agreement on coordination of intergovernmental relations in the CIS power sector (1992) signed by all the CAPS countries. This is the foundation for the operation of the regional power system.
- Parallel operation agreements in the CIS (1998) signed by all the CIS countries.
- Agreement on energy transit in the CIS (2000) that was signed by all the CAPS countries, except Turkmenistan and Uzbekistan.
- Agreement on mutual assistance in the CIS in the case of power system failures (2002) signed by all countries except Turkmenistan.

Among other documents, the next set of methodologies determines the rules for parallel CAPS operations in detail:

- Rules and recommendations on frequency and flow regulation for CIS and Baltic countries (2007). According to established rules, the Russian power system regulates the frequency, the rest of the CIS countries must agree on net power flows.
- Methodology for determining the required reserve for frequency and power flow regulation (2006). The step-by-step methodology provides the calculation of the primary, secondary and tertiary reserve for CIS countries.
- Methodology on evaluation of the transit services (2001). The transit tariff calculation was developed for CIS countries.
- Methodology for calculation of monthly energy deviations. At the end of each month, all the commercial metering data is reported to CDC.

The power exchange in CAPS is based on bilateral agreements where agreed regimes are determined. Agreed regimes include two payment components: energy and generation capacity.

2.3.3 Operational Coordination in the CAPS[10]

Operational coordination and control over Unified Electric System of USSR (UES) was based on the three levels of dispatch hierarchy:

1) the Central Dispatch Centre of UES (now System Operator of UES of Russia) was the first level of dispatch hierarchy. It was responsible for the overall UPS operations.
2) United Dispatch Centres (UDCs) acted as a second level of dispatch hierarchy. In Central Asia, the UDC of Central (Middle) Asia, called the

[9] Mercados report 98830, Load Dispatch and System Operation Study for Central Asian Power System, October 2010.

[10] Mercados report 98830, Load Dispatch and System Operation Study for Central Asian Power System, October 2010.

Coordinating Dispatch Centre – Energy, was and still is in Tashkent, Uzbekistan.

3) National dispatch centres constituted the third level in the hierarchy.

2.3.4 Regional System Operator[11]

Coordination Dispatch Centre Energiya (CDC) in its role as a regional system operator, ensures principles of joint operation are implemented in the day-to-day operations of CAPS. The role of CDC is to:

- Evaluate the impact of new and altered transmission and generation facilities on the interconnected grid; identify potentially adverse effects and to suggest preventative or mitigating measures.
- Review the bilateral schedules provided by the national system operators to ensure there are no transmission or other problems. This is done using a power flow model. If problems are identified, changes to the schedules are suggested.
- Operate an Automatic Generation Control (AGC) system to control frequency and provide any necessary balancing power (i.e. not already provided by the individual national system operators).
- 'After the fact billing' is the process used to allocate the amounts of balancing power provided and consumed. This process provides market participants/national utilities with the ability to settle on a bilateral basis (CDC does not perform any settlement or billing). There are no specific payments for AGC capability or for the operating reserves, only for balancing electricity and for the regulating capacity.
- Monitor real and reactive power:
    - flows on the 220 kV and 500 kV transmission system
    - output on the larger hydro and thermal units
    - demand at certain nodes, and
    - schedule deviations

CDC collects this data and sends it to the national system operators. CDC also monitors voltages at certain control points via analogue telemetry.

- Directs the national system operators to increase or decrease their aggregate generation in response to schedule deviations (they are not generation specific). Also directs contingencies and, when necessary, coordinates system restoration efforts.
- Coordinates maintenance outages for transmission and generation.
- Coordinates planning for regional transmission expansion.

2.3.5 Coordination Electric Power Council of Central Asia[12]

The Coordination Electric Power Council of Central Asia meets every 6 months and is represented by the CEO's of the public utilities in Central Asia. The Coordination Electric Power Council of Central Asia is the board of directors for CDC and its main

[11] Mercados report 98830, Load Dispatch and System Operation Study for Central Asian Power System, October 2010.

[12] https://kegoc.kz/en/node/37517

function is to support CDC to ensure reliable parallel operation and development of the Central Asian power system.

The meeting in December 2020 discussed:-

- cooperation between the Unified Power System of Kazakhstan (UPS) and the Integrated Power System of Central Asia (IPS),
- reliability of the power systems of the participating countries in the current autumn-winter peaking period,
- proposed power and frequency control system is designed to maintain a balance between the production and consumption of electricity automatically, and
- develop unified technical requirements for the integration of renewable energy sources in power systems.

2.3.6 Economic Council of the Commonwealth of Independent States (CIS)[13]

The Electric Power Council comprises heads of power bodies of the Agreement signatories and heads of national power companies. The nine members of CIS are Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan and Uzbekistan[14].

The main objectives of the Electric Power Council are:

- to prepare proposals on the principles and trends of the CIS member-states integration in energy, inter alia, with the aim of providing integrated energy security;
- to prepare proposals on economic and legal framework of the integrated activities of the CIS member-states power systems interconnection;
- to establish and provide functioning of the CIS common electricity market jointly with the government management bodies and relevant intergovernmental bodies of the CIS;
- to establish the common information space in energy.

2.3.7 Bilateral agreements[15]

Since 2008, only bilateral agreements between CAPS countries are the following:

- for transit of electric power of the Kyrgyz Republic with the Republic of Uzbekistan through the 500 kV network of the CAPS from the southern part of the power system to the northern part;
- export of electric power from the Kyrgyz Republic to/from the Republic of Kazakhstan to the Kyrgyz Republic and parallel operation of the Kyrgyz power system with the Kazakh power system;
- capacity (frequency) regulation by the Kyrgyz power system for the Kazakh and Uzbek power systems;

[13] EPC_regulations 11.03.2005, http://energo-cis.ru/wyswyg/file/Main/EPC_Regulations%2011.03.2005.pdf

[14] https://en.wikipedia.org/wiki/Commonwealth_of_Independent_States

[15] ADB TA 9717 & TA 9823 REG, Regional Cooperation on Increasing Cross Border Energy Trading within the Central Asian Power System, Interim Report, 03 August 2020

- Interchange of electricity between the Kyrgyz power system and the Tajik power system on 110 kV grids.

2.3.8 Imbalance arrangements[16]

Unscheduled energy flows between countries is the difference between planned energy flow and actual energy flow. This is also known as Imbalance energy.

The volumes of unscheduled electrical energy supply associated with emergency situations are determined by CDC and distributed in accordance with agreements on mutual assistance between the power systems in emergency situations. Mutual payments are carried out in accordance with agreements on mutual assistance in emergency situations.

Other unscheduled flows of electricity are subject to return by the power system-initiator of these flows in the following months after billing month in the amounts of:

- in the first month after the billing month - in the same amount;
- in the second month after the billing month – with a coefficient of 1.2;
- in the third month after the billing month – with a coefficient of 1.5;

If the unscheduled electricity is not returned (taking into account the increase coefficients) within three months after the billing month, the non-returned volume is subject to payment with the conclusion of relevant purchase and sale contracts, unless otherwise agreed between the power systems.

2.3.9 Transmission Pricing arrangements[17].

Each power system has the right to conclude contracts for electrical energy supply to third countries by transit through the electric networks of other countries if there are available transfer capacity reserves of selected overhead transmission. Each contract for electrical energy supply between the Parties (Sellers or Buyers) should be coupled with separate contracts for electrical energy transit with wheelers whose networks are used for rendering transit services for this contract. The electrical energy transit Contracts shall be agreed with CDC.

The tariff for electrical energy transit in the 500 kV network of CAPS is set at the rate of 0.417 US cents (without VAT) per 1 kWh on 1000 km length of allocated transit network. When exceeding the transit length of 1000 km, the cost of transit is limited by the tariff cap of 0.417 US cents (without VAT) per 1 kWh. In case of 500 kV networks unavailability and requirement to carry out transit through 220 kV lines, the tariff for electrical energy transit through 220 kV networks shall be agreed separately between the Parties.

2.3.10 Electricity market development

A central market is in the process of development and is known as CAREM. The central market rules being developed by USAID.

[16] ADB TA 9717 & TA 9823 REG, Regional Cooperation on Increasing Cross Border Energy Trading within the Central Asian Power System, Interim Report, 03 August 2020

[17] ADB TA 9717 & TA 9823 REG, Regional Cooperation on Increasing Cross Border Energy Trading within the Central Asian Power System, Interim Report, 03 August 2020

The role of CAREM is proposed to cover:

1. Transactions of existing agreements;
2. Day-ahead scheduling;
3. Identification and settlement of deviations;
4. Day Ahead Market;
5. Balancing energy trading;
6. Wheeling charges for transit compensation;
7. Auctions for Transmission rights;
8. Settlement and payment mechanisms; and
9. Data information needs and reporting.

2.3.11 Regional Electricity master plan

The development of the regional Master Plan identifies the best generation plan for the next 10 to 20 years for the Central Asian region and identifies the related transmission projects to the regional generation. The 2012 master plan[18] also identified regional transmission projects and ranked them. The electricity master plan is being updated under the auspices of the ADB. The master plan leaves the actual implementation of the projects to the individual countries. For generation and associated transmission projects with only one off-taker this is relatively easy to implement. When a project involves more than just a single buyer and single seller then a Special Purpose Vehicle (SPV) is typically set up or the role is passed to a regional organisation.

2.4 CONCLUSION

The current regional electricity sector governance in Central Asia is very much centred around daily technical operation of the regional grid. It focuses on physical dispatch and bilateral trade arrangements while there are first steps trying to configure a regional market setting. However, there is no strategic regional cooperation mechanism in place deciding on the future design and expansion of the regional network with new cross-border projects of common regional interest that may be necessary to ensure future regional security of supply, especially in the face of a changing global energy landscape moving towards the integration of cleaner and more variable renewable energy sources. At present, the existing organizations also do not offer membership to all countries of the CAREC region and are very closely tied to CAPS. This gap is envisioned to be filled with CATCA.

[18] Central Asia Regional Economic Cooperation: Power Sector Regional Master Plan, ADB, 2012, https://www.adb.org/sites/default/files/project-document/74195/43549-012-reg-tacr-01.pdf

Regional Organizations Comparative Table

	Mandate	Decision Power	Outputs	Membership
CATCA	*Strategic/ Future operations*	*High level political decision makers*	• *Plans and approves regional masterplans and projects of common regional interest* • *Centrally Implements projects of common regional interest through professional Project Management Office* • *Develops and approves harmonized regional grid operation rules*	*Open to all CAREC countries*
CDC	*Daily operations*	*Technical level decision makers (TSOs)*	• *Power flow monitoring and management of balancing payments* • *Impact assessment of new transmission and generation on the grid* • *Review of bilateral agreements* • *Management of centralised Automatic Generation Control*	*CAPS members only*
Coordination Electric Power Council of Central Asia	*Daily operations*	*Technical level decision makers (TSOs)*	• *Approves CDC activities and budget* • *Provides assistance to CDC through working groups*	*CAPS members only*
CIS Power Council	*Daily operations*	*Technical level advisory/Russia based*	• *Advisory body providing recommendations on various issues including principles and trends in the CIS energy sector, economic and legal framework issues as well as common electricity market* • *Establishment of a common information space in energy*	*CIS countries only*

3 INTRODUCTION TO CATCA

3.1 RATIONALE FOR CATCA

As described in the previous chapter, there are several regional agreements and institutions in Central Asia that are carrying out important technical day-to-day operations of the existing regional electricity grid. While these institutions focus on daily grid operations, there is no organisation in the Central Asian region that is responsible for strategic decisions regarding the future expansion of the regional grid including the identification of new projects of common regional interest and their effective and systematic implementation. To date, regional energy projects are mostly planned as individual national projects which are then linked together and often require the establishment of ad-hoc agreements and tailored project companies for their implementation. Moreover, there is currently no systematic approach to regularly develop and update regional energy masterplans. Energy ministries and Transmission System Operators (TSOs) have been mostly dependent on IFI support to develop these masterplans, following no specific time pattern and often without ensuring sufficient knowledge transfer to allow regional energy ministries and TSOs to establish such plans independently on their own.

Therefore, CATCA shall function as a new regional association responsible for long-term strategic network expansion planning and central implementation of identified new cross-border projects. This was envisioned by the CAREC energy minsters in adopting the CAREC Energy Strategy 2030 and corresponding Ministerial Declaration during the 1st Central Asia Energy Ministers Dialogue in September 2019 in Tashkent, Uzbekistan.

3.2 BENEFITS IN FORMING CATCA

Based on the rationale provided above, the main benefits to forming CATCA are:

1. Projects can be planned and developed without the need to form special groups and enter into special agreements between countries,
2. Regional transmission projects implementation are coordinated,
3. All Transmission System Operators who are members of CATCA are represented in the transmission planning and implementation,
4. Regional transmission projects can be ranked on an agreed methodology. Priority projects are clearly identified and funding for the projects can be arranged. All countries in the region know the priority projects and there is no competition for funding,
5. Regional transmission projects beneficiaries are identified and costs are fairly allocated to the correct party,
6. Regional regulations governing the planning and operation of the transmission system can be drafted and agreed to. These regulations make the system planning and trading of electricity simpler. There is no need in bilateral agreements and other market rules to define the rules for open access, transmission wheeling charges, transmission losses, and connections, and

7. There is an organisation that can settle regional transmission related disputes.
8. The organization is steered by decision makers ensuring effective and politically supported outcomes

3.3 PROPOSED ROLE AND FUNCTIONS OF CATCA

CATCA is proposed to perform the following three strategic development roles:

1. Develop Transmission Network Expansion Plans and update them,
2. Develop Harmonized Network Codes and Regulations, and
3. Manage Regional Transmission Projects

The detailed functions for each of these roles is described below:

3.3.1 Develop Transmission Network Expansion Plans and update them

CATCA is proposed to coordinate all regional transmission expansion projects. The regional master plan as currently updated with support from ADB identifies regional transmission projects which shall be studied, ranked and approved by CATCA to take according investment decisions and bring them to financial closure.

CATCA is also proposed to take on the function of maintaining and continuously updating the regional master plan.

3.3.2 Develop Harmonized Network Codes and Regulations

CATCA shall develop a regionally harmonized network code and other regulations for regional cooperation in planning, operation and achieving regional security of supply and reliability, covering topics such as:

a. Regional network planning rules including methodology to rank projects,
b. Network connection conditions including HVDC connections,
c. Generation connection conditions including for DC connected power plants,
d. Open access rules,
e. Information exchange,
f. Transmission pricing rules for third party wheeling,
g. Metering connection standards, meter installation, meter database and meter access, and
h. Balancing and imbalance energy charges

3.3.3 Manage Regional Transmission Projects

Besides identifying and ranking new regional cross-border projects, CATCA shall also take the role of a regional project manager to ensure systematic and streamlined implementation of regional projects covering the following functions:

a. Detailed project design and relevant safeguard studies
b. Tendering and awarding contracts,

c. Erection, and

d. Commissioning

3.4 Organisational Set-Up

It will be important that the CATCA has the correct reporting point into ministers of energy and other national decision makers as well as CAREC. This will ensure good alignment with the other regional initiatives. To get an efficient internal governance structure of the CATCA organisation, the internal reporting structure is proposed to be:

1) **Executive Board of CATCA:** Energy Ministers are proposed to head the CATCA Executive Board. The Executive Board shall approve Regional Transmission Plans and other recommendations and outcomes produced by CATCA and its staff and subcommittees, appoint the CEO of CATCA and provide guidance to the CEO.

2) **The CEO of CATCA**: The CEO will be the person having the overall responsibility for the operation and management of CATCA. The CEO shall report to the Board of Directors and be CATCA's legal representative, prepare recommendations for the CATCA Board of Directors, manage all CATCAs activities and its staff and subcommittees.

3) **Thematic Managers:** Managers for transmission planning, network code development, project management and masterplan establishment shall form the key managerial staff of CATCA. They shall work and coordinate with nominated, qualified staff from the CATCA members which can be seconded to CATCA or take part as members of CATCA's working groups.

4) **Working Groups/seconded staff:** Working groups for each thematic focus of CAREC shall be formed and composed of nominated qualified staff from Energy Ministries, national TSOs or other relevant organisations who work under the lead of the relevant thematic manager to achieve the goals of each work stream.

3.5 Funding of CATCA

For discussion – once the basic structure of CATCA has been agreed.

A possible funding model could be:

- *Annual membership fee to be paid by each country with partial funding support from IFI in the initial establishment phases*
- *Any other established best practices in the region – for discussion with members*

3.6 Interactions with Existing Regional Organisations and Programmes

3.6.1 Central Dispatch Centre (CDC)

CDC will be able to provide CATCA information pertaining to the operation of the network, specifically:

1. Known bottlenecks in the transmission system,

2. Operational concerns that require regional transmission enhancement such as lack of voltage support and transmission incidents due to lack of infrastructure.
3. Data from SCADA and metering to ensure planning models are correct, and
4. Models of the current transmission network.

3.6.2 Electricity master plan development

The master plan is a once off indication of the regional transmission requirements. The role of CATCA is to develop these high-level plans into implementable transmission projects. The working group studies these projects in detail and does all the analysis required to be able to develop the specification that will go out on tender.

3.6.3 Electricity market development

The development of codes and regulations are required to ensure the electricity market can operate fairly and transparently, thus allowing equal access to all market participants. Key to this is the development of codes and regulations to cover at least:

1. transmission open access rules,
2. available transmission capacity determination,
3. transmission wheeling and losses compensation methodology,
4. minimum system planning criteria, and
5. minimum connection conditions to the transmission system.

4 CATCA PHASES AND IMPLEMENTATION ROADMAP

This section provides a proposed implementation roadmap detailing the necessary actions and steps to establish CATCA.

CATCA is proposed to be developed in 4 phases (after concluding an initial phase 0 consisting of concluding an agreement to found CATCA):

- Phase 1: Establish CATCA, nominate key staff and start initial coordination
- Phase 2: Conduct regional project planning and development of regional regulations
- Phase 3: Project manage regional transmission projects
- Phase 4: Establish and regularly update a regional masterplan

The above phases are equal for electricity and gas cooperation and may either run concurrently or at a different times depending on the decision of CAREC members. It is proposed to start with electricity and introduce gas, if need be, at a later stage.

4.1 PHASE 1: ESTABLISH CATCA, NOMINATE KEY STAFF AND START INITIAL COORDINATION

In phase 1, CATCA is established as a legal organization. The physical location is to be agreed on by CAREC members.

In this phase, the first CATCA organigram shall be established as portrayed below and staff nominated accordingly. It is proposed to establish a Board of Directors which shall be composed of the Energy Ministers from the participating countries. CATCA membership is voluntary and open to all CAREC countries who wish to join. A CEO of CATCA and 2 key managers, i.e. one electricity planning manager and one codes and regulations manager shall form the core staff of the organization in Phase 1. Two working groups, composed of relevant qualified staff from the participating countries' energy ministries, national TSOs or other relevant organisations, shall be established and headed by the appointed managers.

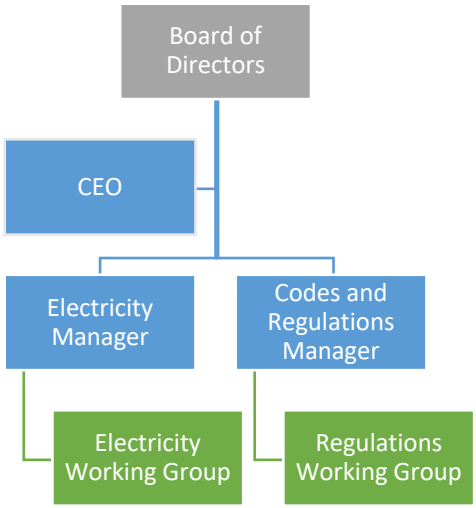

Figure 4-1 Proposed CATCA organisational structure for Phase 1.

4.2 Phase 2: Conduct Regional Project Planning and Develop Regional Codes and Regulations

In phase 2, the working groups (established in phase 1) shall meet on a regular basis and carry out CATCA's main operations, i.e. regional transmission network planning and development of harmonized regional regulations and network codes. The groups shall plan and rank projects, identify beneficiaries and recommend to the board which projects to progress. Proposals for necessary harmonized rules to facilitate the implementation of cross-border projects shall also be forwarded to the Board for approval.

In phase 2, energy ministries, national TSOs or other relevant organisations shall also consider seconding permanent staff to CATCA to provide continuous support to the Electricity and Regulations Manager and their working groups during this crucial phase, see Figure 4-2. Depending on the members' preferences and in agreement with CATCA, seconded staff shall work full or part-time for CATCA, either at the CATCA office or otherwise from the home base with regular missions to the CATCA office. All expenses related to seconded staff (salary, missions, other expenses) are shouldered by the member country.

In phase 2, the Board shall also approve the proposed projects and network codes.

Any project management activities that may arise in phase 2 for the implementation of the regional projects is performed by individual countries in each country where the project is implemented. Each regional transmission project is effectively split into two or more 'national' projects depending on the number of countries involved.

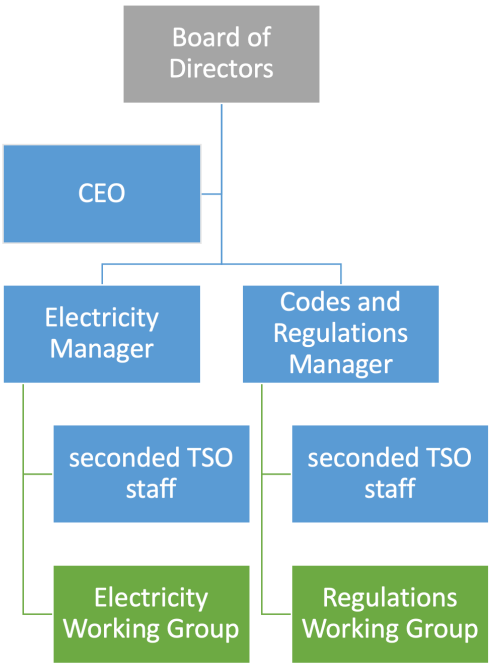

Figure 4-2 Proposed CATCA organisational structure for Phase 2.

4.3 PHASE 3: PROJECT MANAGE REGIONAL TRANSMISSION PROJECTS

In phase 3, it is proposed to add a project management mandate to CATCA to facilitate implementation of approved regional transmission projects. To this end, CATCA shall nominate a project manager who shall be assisted by staff seconded from members and/or permanent CATCA staff, Figure 4-3.

At this stage, each regional transmission project is managed as a single project, which is a more efficient approach from financing, implementation and management perspective as compared to the approach of splitting cross-border projects into a series of national projects.

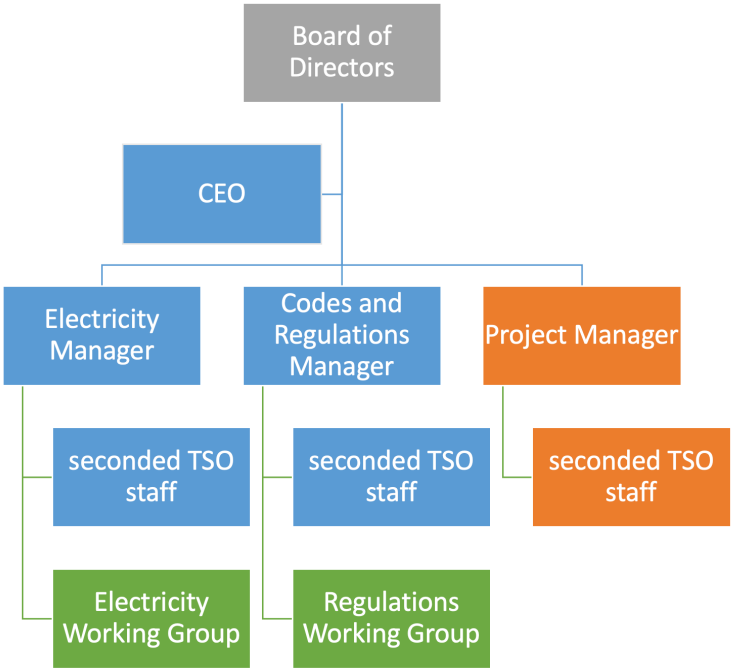

Figure 4-3 Proposed CATCA organisational structure for Phase 3.

4.4 PHASE 4: ESTABLISH AND REGULARLY UPDATE A REGIONAL MASTERPLAN

Phase 4 is increasing the CATCA organisation to have a department that is responsible for producing the regional masterplan and update the plan regularly (annually or bi-annually), Figure 4-4. Traditionally, masterplans have been produced every 5 or 10 years but, with increasing variable renewable energy power plants with significant annual decrease in capital costs, a more frequent update of the masterplan has become the modern trend. Having a section that is dedicated to updating the masterplan has the advantage of maintaining a consistent plan with consistent data and a consistent message.

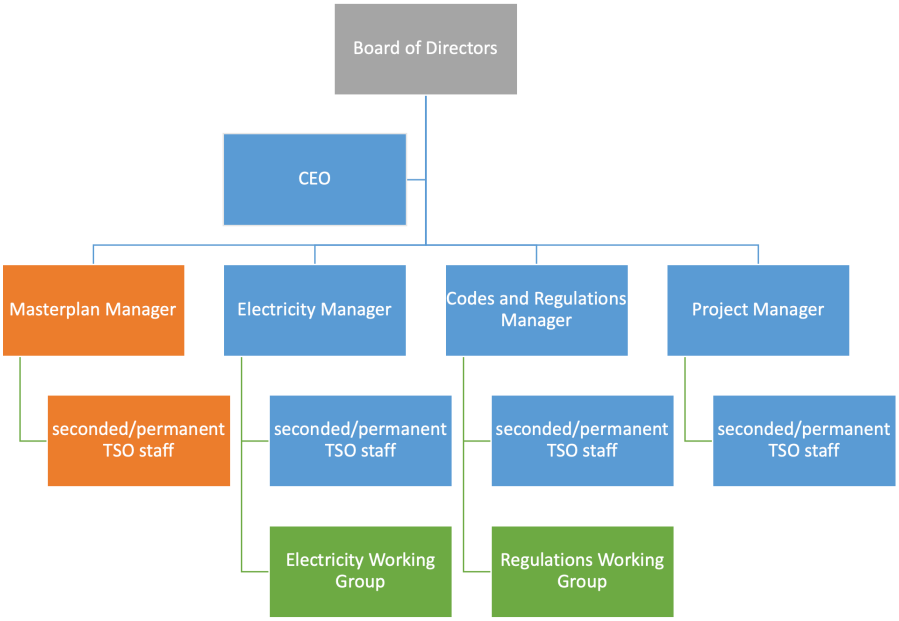

Figure 4-4 Proposed CATCA organisational structure for Phase 4.

5 CATCA FOUNDING DOCUMENTS

5.1 FOUNDING AGREEMENT

The key principles of CATCA shall be captured in a suitable cooperation agreement or memorandum to be adopted by the founding members of CATCA.

All the key paragraphs for the formation and operation of CATCA shall form part of the agreement including but not limited to:

1. Main functions of CATCA
2. Organisational set-up
3. Responsibilities and powers
4. Funding of CATCA
5. Decision making rules
6. Other necessary cooperation commitments to fulfil the goals of CATCA

The agreement may be discussed and approved by the CAREC Energy Sector Coordinating Committee and its Work Stream 1 on Infrastructure Connectivity and Energy Security and finally sent for approval to the energy ministries.