Reference Document
For Session 1 of the Senior Officials' Meeting
October 2016

Energy Sector Progress Report

Senior Officials' Meeting
Central Asia Regional Economic Cooperation
25–26 October 2016
Islamabad, Pakistan

I. EXECUTIVE SUMMARY

1. This progress report describes CAREC activities undertaken in the energy sector since the September 2015 Senior Officials' Meeting (SOM) and 14th Ministerial Conference (MC) held in Ulaanbaatar, Mongolia.

2. In 2015–2016, the Energy Sector Coordinating Committee (ESCC) initiated actions to align the strategies of the region's energy sector with the global energy mega trends—a huge reduction of renewable energy prices, development in new energy technologies and the international commitments to take action on climate change.

3. The ESCC was able to determine the need to diversify from fossil fuel dependency and identified options to integrate renewable energy, energy efficiency and other new technologies in country development plans. The reasons for new technology interests are different: countries with large dependence on fossil fuel revenue despite long term contracts are exploring diversification options because of low hydrocarbon prices and their long term impact, whereas the energy importing countries are exploring new technology options to build better with increased energy security.

4. The meetings and programs in 2015–2016 revitalized the activities of the Energy Sector Steering Committee. Much of this could be attributed to the new strategy and the work plan, which the senior officials approved in September 2015, in Ulaanbaatar, Mongolia. The work plan among others, introduced a new element to support mainstreaming of new technology and encourage technology leap-frogging in the CAREC countries. Throughout the year members were exposed to knowledge events of custom designed technology transfer trainings—two such events were in Tokyo (April 2015) and Kuala Lumpur (September 2015).

5. A Regulators Forum was also conducted in April 2016 on the sidelines of the 21st ESCC meeting as part of the efforts to establish a CAREC regional regulators network and provide capacity development support for regulators.

6. Parallel to the new technology projects, 2016 also saw significant progress on existing energy projects to further increase regional energy market and economic diversification. The main elements were the financing roadmap work and its long lists of projects, progress in Turkmenistan-Uzbekistan-Tajikistan-Afghanistan-Pakistan (TUTAP) and (Central Asia–South Asia Electricity Transmission and Trade Project (CASA 1000).

7. Considering that there are about 80 million people with no access to power in the South Asia region, projects strengthening the energy sector from Central Asia to South Asia were expanded to link to East Asia with its huge energy surplus.

8. This year also saw the funding for the next phase of the Turkmenistan-Afghanistan-Pakistan-India (TAPI) natural gas pipeline: on 7 April 2016, the shareholders signed an investment agreement that will pave the way for the delivery of long-term natural gas supplies to Pakistan, helping it address energy shortages.

9. In the 21st ESCC meeting, members highlighted the need to tackle the theme "Tackling Climate Change" in their future strategy and work plan and to build capacities to identify activities that will better prepare CAREC members for tackling the impacts of climate change.

II. KEY DEVELOPMENTS

A. Sector Implementation

10. This progress report describes CAREC activities undertaken in the energy sector since the September 2015 Senior Officials' Meeting (SOM) and 14th Ministerial Conference (MC) held in Ulaanbaatar, Mongolia. During the 21st ESCC Meeting, progress in the implementation of the 2016–2020 Energy Work Plan (EWP) was noted to include (a) developments and challenges in the implementation of the initiatives to enhance the Central Asia-South Asia-East Asia energy corridor; (b) results of the study on regional power trade in Central Asia; (c) recognition of the impacts of climate change on the water-energy nexus; (d) next steps in the Power Sector Financing Roadmap to mobilize funds for investments in energy assets; (e) identification of future capacity building activities in the areas of regulation, energy efficiency, and renewable energy; and (f) identification of pilot projects in selected new technologies.

11. Achievements in the energy sector are currently measured through five indicators, intended to capture the contribution of CAREC's physical infrastructure expansion and rehabilitation operations to energy security, energy efficiency, and the CAREC region's ability to enhance power trade as a result of completed projects. The indicators were first assessed in 2013, and they will be evaluated annually in the CAREC Development Effectiveness Review (DEfR) process. Collection of data from all members on a consistent basis has not been achieved, and reporting data for the indicators is voluntary. The energy sector output indicators and the energy sector results framework are presented in the following tables:

Table 1A: Energy Sector Output Indicators

Indicator	Unit	2013 (Baseline)	2014[1]	2015[2]
Transmission lines installed or upgraded	Km	612	1,150	2,073
Increased energy generation capacity	MW	300	600	736
Rehabilitated generation capacity	MW	0	520	585
New substations	MVA	250	4,200	4,629
Upgraded substations	MVA	400	5,200	5,551

[1] Based on data received from AFG, KAZ, MON, PAK and UZB, as of 11 September 2015.
[2] Based on data received from AZB, MON, and UZB as of 11 April 2016.

Table 1B: New Energy Sector Output Indicators

Indicator		Unit	2014 (Baseline)[2]	2015[2]
Wind Power Installed	Capacity	MW net	61	111
	Generation	MWh	122.5	122.5
Solar Power Installed	Capacity	MW net	24	44
	Generation	MWh		
Electric vehicle Adoption[1]		Nos.[1]		20,000[4]
LED public lighting[1]		Km of roads[1]	987	1,188
		No. of Units[3]	500,294	733,502
Energy Efficiency Savings		MWh	23,824	9,965

[1] Targets will not be set initially for these indicators. The ESCC will instead monitor progress against these indicators in the coming years and decide whether targets should be set in the future.
[2] Based on data received from AZB, MON, and UZB as of 11 April 2016.
[3] Based on data received from UZB as of 11 April 2016.
[4] Mongolia has about 200,000 hybrid cars and about 20,000 was added in 2015

Table 2: Energy Sector Results Framework

Intervention	Sector Outputs	Sector Outcome
Develop programs to enhance regional energy trade and cooperation	• Targeted levels for domestic and cross-border energy projects reached by 2020	• Impact of uneven distribution of energy resources among CAREC countries overcome
	• Central Asia-South Asia energy corridor developed	• Existing energy interrelationships optimized
	• Cleaner energy mix	• Emissions reduced
	• Efficient power systems	• Longer carbonized economy
Undertake analytical work on the linkages between energy and water resources		
Complete the financial road map and mobilize funds		
Strengthen institutional capacity of CAREC- member countries and share knowledge with them		
Introduce new technology, clean energy, and energy efficiency in Central Asia		

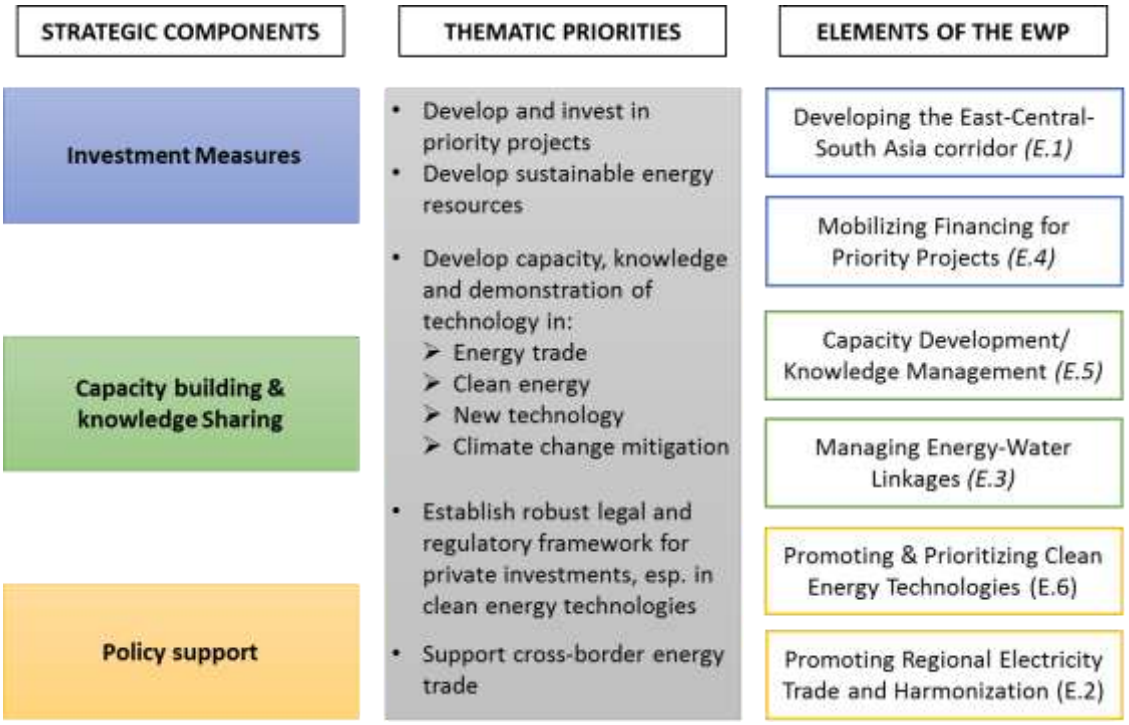
B. Priority Actions, Progress and Challenges in the CAREC Program for the Energy Sector

Implementation of the 2016–2020 Energy Work Plan

12. The long term vision for the region's energy sector is to ensure energy security, energy markets integration, and energy trade-driven growth. The CAREC Energy Strategy and Work Plan 1 (2016–2020), which was adopted in 2015, sets thematic objectives to (a) develop and invest in priority projects, (b) develop sustainable energy resources, (c) develop capacity, knowledge and demonstration of technology, (d) establish robust legal and regulatory frameworks for private investments, and (e) support cross-border energy trade.

13. These priority areas are translated into six elements of actions: (i) developing the East-Central Asia-South Asia regional energy market (E-CASAREM), (ii) promoting regional electricity trade and harmonization, (iii) managing energy-water linkages, (iv) mobilizing financing for priority projects, (v) capacity development and knowledge management, and (vi) promoting and prioritizing clean energy technologies.

Figure 1: Strategic Components, Thematic Priorities and EWP Elements



Note: The *corresponding element in the Energy Work Plan: element one is indicated as "E.1"*

14. The first year of the implementation of the Energy Strategy and the Energy Work Plan (EWP) 2016–2020 went smoothly and key efforts implemented were in securing technical assistances and identify new partnerships, especially for adoption of new technology.

15. Progress implementing the EWP is tracked and reported during the biannual ESCC meetings, and reviewed at the SOMs and MCs. The section below provides updates on the implementation status of the six elements and describes next steps agreed upon during the recent 21st ESCC Meeting.

Element 1: Developing the Central Asia – South Asia Energy Regional Energy Market

16. **Action Initiated.** Central Asia–South Asia Regional Electricity Market (CASAREM) has two complementary initiatives: (i) Central Asia–South Asia Electricity Transmission and Trade Project (CASA-1000) supported by the World Bank; and (ii) Turkmenistan-Uzbekistan-Tajikistan-Afghanistan-Pakistan Interconnection Project (TUTAP) supported by the ADB. Recent progress for each initiative is discussed below.

17. **CASA-1000.** In the 21st ESCC, Mr. Omer Rasul, Additional Secretary, Ministry of Water and Power of Pakistan, reported on the progress of the different segments of the CASA 1000 project. The presentation highlighted procurement challenges, barriers to regional connectivity and the new initiatives on power import options. Given the current issues being resolved, the expected completion is moved to 2020.

18. An official ceremony launching the CASA-1000's implementation phase was held on 12 May 2016 in Dushanbe, Tajikistan.

19. **TUTAP.** The Tajikistan-Afghanistan and Uzbekistan-Afghanistan 220kV interconnections are operational and are currently supplying the Afghanistan network with 650 GWh from Tajikistan and 1500 GWh from Uzbekistan. Implementation of the Turkmenistan-Afghanistan 500 kV interconnection, which will initially operate at 220 kV, has begun.

20. In the 21st ESCC, Mr. Qudratullah Delawari, Chief Executive Officer of Da Afghanistan Breshna Shirkat presented the Afghan perspective on unified grid and power synchronization challenges in the region, and shared updates on CASA and TUTAP Power Interconnection Projects. The presentation highlighted the benefits that can be derived for Afghanistan by transit fees and higher electrification rate, through energy trade between the energy rich and energy deficient countries from the Central Asia-South Asia Connectivity. A number of options were discussed to further strengthen the regional power market by bulk power transfers from Turkmenistan into Afghanistan and Pakistan by building interconnections along the TAPI route as well as new off-shoot lines from the TUTAP transmission backbone into northern and western Pakistan.

21. A tripartite technical working group will look into various options adopting a phased approach, and recommend a priority list of such interconnection by October 2016. A short summary of the progress of the TUTAP (Turkmenistan-Afghanistan) components is in Table 3.

Table 3: Timeline of Turkmenistan-Afghanistan Power Interconnection

No	Project / Component	Implementation Progress as of 31 May 2016
1	**Component 1**: 500-kV Transmission line between Andkhoy and Sheberghan + 220-kV transmission line between Seberghan and Mazar Sharif + 220/110/20-kV Substations at Andkhoy, Sheberghan, and Mazar Sharif.	ADB approved the project financing in December 2012. Substations contract has been awarded to Siemens and Transmission line contract is awarded to Gammon India in early 2016, upon signing of the PPSA between both countries in November 2015. Both contractors have been mobilized at site. Both components are expected to be commissioned by October 2018. The 500-kV transmission line will have a transmission capacity of up to 1000-MW.
2	**Component 2:** 500-kV line between Pule Khumri and Kabul + 500/220/20-kV substations in Pule Khumri and Kabul.	ADB approved the project financing in 2013. 500-kV line contract awarded to Kalpataru India and signed in June 2016. Contractor will be mobilized in July 2016 and transmission line project will be commissioned in end 2018. The 500-kV substation at Pule Khumri was awarded to KEC International of India in January 2016, and contractor is mobilized. Work is expected to finish by June 2018. The 500-kV substation in Kabul will be awarded in end July 2016 and work is expected to be completed in end 2018. The 500-kV transmission line will have a transmission capacity of upto 1000-MW.
3	**Component 3.** 500-kV line from Sheberghan to Pule Khumri.	ADB approved the project financing in 2015. Bidding documents will be issued in end June 2016 and contract award is expected in end December 2016. Project is expected to be commissioned in mid-2019. The 500-kV transmission line will have a transmission capacity of up to 1000-MW.

4.	**Component 4:** 300-MW back to back HVDC Convertor Station at Pule Khumri to enable asynchronous power interconnection with Turkmenistan.	ADB will consider project financing in November 2016. Bidding documents are under preparation and contract is expected to be awarded in mid-2017. Project expected to be commissioned in end 2019.

22. In addition, a 500-kV Turkmenistan-Afghanistan-Pakistan power transmission interconnection project (TAP Project) using the southern Afghan corridor (Mary-Serhetabad-Herat-Hemand-Kandahar-Chaman-Quetta) is under preliminary survey. If found technically feasible and agreed upon by the three countries during the CAREC Ministerial Conference in October 2016, ADB could finance project design and facilitate a PPSA among the three countries. The transmission line component in each country will be financed by ADB, utilizing the respective country's allocation and ADB funding.

23. The implementation will be synchronized and aligned for simultaneous completion and commissioning. The 500-kV transmission line will have a transmission capacity of up to 2000-MW using the TAPI natural gas pipeline corridor. The project design could be ready by the end of 2017 and upon conclusion of the PPSA, the project could be approved (for each country) in 2018.

24. **TAPI.** The planned 1,600 km Turkmenistan-Afghanistan-Pakistan-India (TAPI) Natural Gas Pipeline stretches from the Turkmenistan-Afghanistan border to the Pakistan-India border and will export up to 33 billion cubic meters of natural gas per year from Turkmenistan to Afghanistan, Pakistan, and India over a commercial operations period of 30 years. Although currently expected to exceed $10 billion, the total project cost will be determined upon completion of the detailed design and the arrangements for the procurement of long-lead items, construction and other services.

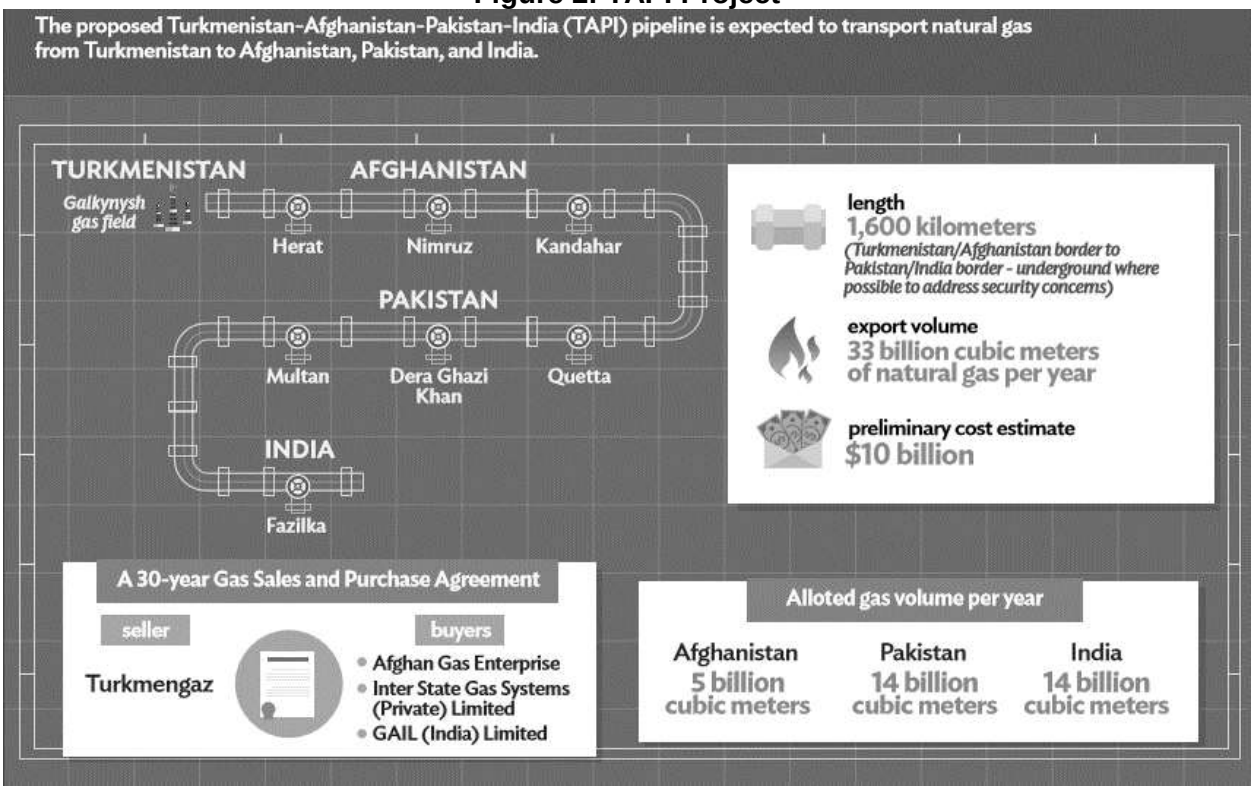
25. On August 2015, Turkmengas was unanimously endorsed as Consortium Leader for TAPI Pipeline Company Ltd. Four months later, the Shareholders Agreement was signed in Ashgabad, Turkmenistan at a groundbreaking ceremony to commemorate the beginning of the construction of the Turkmen portion of the planned TAPI pipeline. An Investment Agreement which provides for an initial budget for each Party and cost estimates for pre-construction activities was endorsed on 7 December 2015 immediately after the conclusion of the 24th Steering Committee Meeting.

26. Acting as TAPI secretariat since 2003 and as transaction advisor since 2013, ADB has been instrumental in the progress of the TAPI pipeline to date. In the latter role, ADB helped establish the TAPI Pipeline Company Limited (TPCL) and managed the due diligence activities, leading to the production of the technical and financial feasibility studies. Concurrently, ADB helped facilitate the appointment of State Concern "Turkmengas" as Consortium Leader in August 2015, and facilitated the negotiations of the Shareholders Agreement, which was signed in December 2015. The signing took place at the groundbreaking ceremony to commemorate the beginning of construction of the Turkmen portion of the TAPI pipeline. More recently in April 2016, the TAPI shareholders signed the Investment Agreement which includes TPCL's Initial Business Plan and Budget for the necessary Project development activities, enabling the shareholders to take the project's final investment decision (FID). The planned pre-FID activities comprise, among other things, the project's detailed design, environmental and social safeguards due diligence, preparatory procurement and debt raising activities.

27. TAPI will help bring in 13.8 billion cubic meters of gas from Turkmenistan to meet Pakistan's growing energy demand and will boost the country's energy security, bring economic benefits to our people through job opportunities, and provide and upgrade associated infrastructure. TPCL will build, own, and operate the TAPI pipeline, which once completed, will transport up to 33 billion cubic meters of natural gas annually from Turkmenistan to the 3 other countries for the next 30 years. The pipeline stretches about 1,600 kilometers from the Afghan/Turkmen border to the Pakistan/Indian border.

28. TAPI exemplifies ADB's key role in promoting regional cooperation and integration over the past 20 years. It will unlock economic opportunities, transform infrastructure, and diversify the energy market for Turkmenistan, and enhance energy security for the region. The following infographic shows the TAPI project at a glance:

Figure 2: TAPI Project



29. **Next Steps.** World Bank and ADB will continue to provide updates on these key projects in the next ESCC meeting.

Element 2: Promoting Regional Electricity Trade and Harmonization

30. Action Initiated. During the 21st ESCC, The World Bank presented the results of the study on "Regional Power Trade Development in Central Asia" that would help promote power trade in Central Asia. This study initiated the evaluation of the current condition of the power market models, pricing rules, and tariff regulation mechanisms in the power sector. The World Bank hired AF Mercados to prepare the study. The consultant developed a draft model for computing financial benefits from trade for each Central Asian country.

31. According to the study, a total of USD 6.4 Billion in total benefits can be derived from efficient energy trade for 2010–2014. The study also confirms that the current situation is costly for the four countries (Kazakhstan, Kyrgyz Republic, Tajikistan and Uzbekistan). It was also raised during the discussion that only 2,500 GWh is being traded currently compared to the 25,000 GWh that was traded in the 1990s.

32. **Next Steps**. The study also proposes near-term, medium-term and longer-term steps leading to an efficient energy trade. The World Bank will share the final report with the ESCC.

Element 3: Managing Energy-Water Linkages

33. Action Initiated. A discussion of issues surrounding energy-water linkages and future areas for cooperation was conducted during the 21st ESCC. Members also highlighted the need to address the theme of "Tackling Climate Change" in its future strategy and work plan and build capacities to prepare CAREC members. It was agreed that to further increase the capacity of members, the group who implemented studies on the Aral Sea will be invited in future meetings to serve as providers of information for water resource management.

34. ESCC members: (i) highlighted the need to discuss the theme "Tackling Climate Change" in its future strategy and work plan and build capacities to identify activities that will better prepare CAREC members for tackling the impacts of climate change. The need to explore simulation models to create climate impact map for the region and to understand mitigation and adaptation training programs to meet each countries commitment for the Intended Nationally Determined contributions (INDCs) in Paris was also discussed.

Element 4: Mobilizing Financing for Priority Projects

35. Action Initiated. In the 21st ESCC, ADB-funded consultants, Pricewaterhouse-Coopers, presented the initial results of the Study for Power Sector Financing Road Map financed through a technical assistance (ADB RETA-8727). The study aims to assess the capacity and willingness of CAREC countries to finance power infrastructure from their own resources, and from other potential sources of financing, for both national and cross-border projects. The results presented include the priority projects selection criteria; investment requirements for the priority projects and potential funding sources; and barriers to private investments and mitigation measures. According to the study, the estimated investment requirement of CAREC member countries (excluding PRC) between 2017 and 2023 is USD 118 Billion.

Element 5: Capacity Development and Knowledge Management

36. **Action Initiated**. In the 21st ESCC, member countries highlighted their learnings from the previous capacity building activities and recognized CAREC as a venue for sharing of ideas. Key learning areas noted include energy efficiency initiatives and policies, tariff regulation, implementing and promoting renewable energy, demand management and energy efficiencies, power metering, power storage and financing energy projects. Kazakhstan and Uzbekistan representatives also shared their experience and status of renewable energy fixed tariffs and advanced metering, respectively. ESCC also discussed an idea of Regional/CAREC level efficiency standards.

37. A Regulators Forum was also conducted after the 21st ESCC as part of the efforts to establish a CAREC regional regulators network and provide capacity development support for regulators. Representatives from the Central Dispatch Center, Kazakhstan and Pakistan shared respective best practices and challenges in energy regulation. For the capacity development support, representatives from Azerbaijan and Uzbekistan presented their experiences in digital smart metering devices and automated metering and control system, respectively. The two presentations are complemented by a private energy company presentation on smart grids, smart meters and renewables integration.

38. **Next Steps.** The ESCC has defined the following as possible learning areas for future capacity development activities: energy efficiency and conservation on both supply and demand sides; regulatory issues; tariff setting; and knowledge sharing on high voltage transmission design. The ESCC also supported two planned capacity building activities on energy forecasting and battery and renewable energy integration.

Element 6: Promoting and Prioritizing Clean Energy Technologies

39. **Action Initiated**. In the 21st ESCC, ADB presented details of two Regional Technical Assistance proposals for approval to finance pilot new technology projects, studies, workshops, financial and technical packages and capacity building activities on new technology planning and forecasting.

40. **Next Steps.** The proposed investment projects by each country based on brainstorming session on July 2015 in Tokyo, Japan and updated on September 2015 in Kuala Lumpur, Malaysia were highlighted and used as reference in the identification of possible pilot projects on new technology adoption. New interests were raised from Kazakhstan (off-grid solar kit) and Pakistan (electric tricycle with solar charging stations). Overall the country summary for the pilot is:

Pilot Component	AFG	AZB	KAZ	MON	PAK	TAJ	TKM	UZB
Off-grid solar kits	✓		✓	✓	✓	✓		
Public Lighting	✓				✓	✓		
E-buses and E-cars	✓	✓	✓		✓		✓	✓
High voltage transmission design					✓			

(PRC and KGZ were not able to attend the 21st ESCC in Islamabad, Pakistan.)

III. KEY ISSUES FOR GUIDANCE BY THE SOM

Energy Investment Forum

41. The EIF which is being organized by the ESCC will be held in conjunction with the 15th CAREC Ministerial Conference, to be hosted by Pakistan in October 2016. The event is envisioned as a "high-level, invitation only" event that seeks to bring together project developers, financiers, equipment manufacturers and EPC contractors to showcase investment opportunities in CAREC. The event will cover the potential opportunities in the power sector and it will specifically highlight opportunities for clean energy.

42. The EIF aims to showcase successes realized and identify needed improvements in the energy sector; (ii) attract interest of national and foreign private sector to invest in the region; and (iii) develop possible partnerships, with assistance from the Asian Development Bank (ADB) and other multilateral development agencies, to maximize potential investments.

43. Three main sessions for the EIF will be (1) CAREC high-level officials presenting on incentives in their countries to promote investments and specific opportunities for investment, (2) investors who have made successful investments in the CAREC countries highlighting their experiences, and (3) project financiers discussing what their investments products and what they look for in projects for financing.

44. The ESCC seeks the necessary support of the Senior Officials. It is hoped that the EIF will be a well-attended event that will facilitate the creation of more investments for the CAREC countries and the region as a whole.