Draft Summary and Proceedings of the Second Meeting of the Expert Working Group on Energy Connectivity 12-14 December 2018, Beijing

Summary

The Second Meeting of the Expert Working Group on Energy Connectivity (EWG-EC) was held in Beijing from 12 to 14 December 2018. Views and suggestions of the Expert Working Group members were sought on challenges and opportunities in each sub-region. The EWG-EC members discussed how to develop a roadmap for energy cooperation and grid interconnectivity in the Asia Pacific region.

Under the overall guidance of ESCAP member States, the roadmap aims to propose a strategy towards an integrated power market with focus on sustainability. This will include the development of a regional framework and appropriate institutions to support and coordinate the regional framework under the objective of advancing cross-border electricity trade. By building upon existing sub regional initiatives, it will enable coordination among various institutions and serve to eventually remove barriers to energy interconnection. Thereby unlocking its multiple benefits including economic development, poverty reduction, increased environmental quality, climate change mitigation and achievement of SDG7. It can further ensure an optimal allocation of regional resources, efficient use of clean energy and improved regional energy security.

The discussions reiterated that political consensus and government support remain central to achieving increased energy connectivity. Increased financing and harmonization of technical standards, policies and regulations with respect to cross border electricity trade is also needed. intergovernmental organizations and development banks can expedite this process by facilitating continuous dialogue, promoting signature of agreements, providing capacity building, technical assistance and mobilizing resources.

The meeting also received insights from each sub-region, highlighting respective challenges, opportunities in capacity building and data sharing. Existing mechanisms that regional connectivity initiatives can build upon were also discussed. It was recommended to set up a dispute resolution mechanism for each sub-region to help advance energy cooperation given existing and future trade relationships between two or more countries.

Asia and the Pacific can also draw on experiences from both within and outside the region. Strengthening the networks between intergovernmental institutions that work to promote energy connectivity, including with multilateral institutions will help tap into the wider knowledge base,

technical know-how and cooperation opportunities. Coordinated capacity building or training program on the available best practices and lessons learnt will further benefit all the member countries.

Building upon the outcomes of ESCAP's 72nd annual Commission to establish an EWG under the objective of promoting grid interconnectivity, as well as the recommendation of the 2nd Asia Pacific Energy Forum 2018 to develop a regional roadmap for energy connectivity, the Second EWG meeting resulted in an agreed structure of the regional roadmap. ESCAP will continue to coordinate with the experts and prepare the initial draft of the regional roadmap for review in 2019. ESCAP will further continue its efforts to facilitate intergovernmental processes and draw upon regional and global expertise in energy connectivity to promote energy cooperation and connectivity. Through this process, ESCAP aims to address the region's economic and social needs, supporting the achievement of SDG7 and meeting climate change targets.

Overview

The deliberations covered the following issues:

(a) common challenges at the sub regional level (South and South-West, East and North-East, South-East Asia and North and Central Asia);

(b) good practices in addressing some of the challenges;

(c) strategic issues that cross-border electricity connectivity need to address, such as the possible contribution to climate change actions and the implementation of SDG7;

(d) approaches towards developing the regional roadmap on energy connectivity within each sub-region and for the Asia-Pacific as a whole.

The Meeting reaffirmed the benefits of developing a regional roadmap on energy connectivity. The regional roadmap will identify a pathway that will eventually lead the region towards a more integrated market through several stages. The regional roadmap will propose a strategy towards this integrated market, which will include components that need to be developed by member States in advancing cross-border electricity trade. These components include development of a regional framework and appropriate institutions to support and coordinate the regional framework. The regional framework is expected to initially provide additional impetus to the existing subregional initiatives and enable coordination among various institutions.

The Meeting also benefited from presentations by organizations and agencies which are implementing cross-border electricity connectivity including the Asian Development Bank, SAARC Energy Centre, Greater Tumen Initiative, Belt and Road Energy Partnership, Global Energy Interconnectivity Development and Cooperation Organization and China Electricity Council.

The Meeting discussed and agreed on the following structure of the regional roadmap.

1. Introduction: background in developing the regional roadmap
2. Objectives: vision, principles
3. Building blocks
    a. Regional framework
    b. Institutional arrangements
4. Steps and actions

It was also agreed during the meeting to prominently feature the need to position cross-border electricity connectivity as a means to contribute to action on climate change as well as the Sustainable Development Goals in particular SDG7.

ESCAP in close consultation with experts and the consultants will prepare the initial draft of the regional roadmap for the review by experts in 2019. Further information regarding the review process will be provided the secretariat. Experts have also agreed to review the subregional documents and provide the feedback to the secretariat.

Proceedings

Day 1 - 12 December 2018

1. Opening Session

Mr AN, Fengquan, Deputy Director General, International Cooperation Department, National Energy Administration, China in his opening remarks welcomed all the participants and highlighted that Asia and the Pacific has diverse energy resources (coal, gas, hydro, renewables), but is less interconnected. In 2017, total energy consumption in the Asia-Pacific region was more than 40% of the world's total consumption. Though Asia-Pacific region is the fastest growing economy in the world, however more than 400 million people lives without electricity in the region, which is about 40% of world's population. Asia and the Pacific is facing challenges such as large population, poor access to electricity, low per capita consumption and high CO2 emissions. He noted that power interconnectivity in the region will help to promote the economy, reduce poverty, enhance access to electricity and protect our ecological environment by combating climate change as well as achieving the goal of SDG7. He also shared the international experience of other power pools including the Greater Mekong Subregion and the tangible benefits realized. He highlighted that Asia and the Pacific as whole can also draw on international experiences in interconnectivity which will help the region to enhance economic growth and development and optimal utilization of energy resources.

Mr XU, Xiaodong, Vice President, Electric Power Planning & Engineering Institute (EPPEI) in his opening remarks as host for the meeting welcomed the members and mentioned that in recent past, the Asia-Pacific region has experienced strong economic growth and is an important engine

for world economic growth. ESCAP as an important branch of United Nations can influence the Asia Pacific region to enhance energy cooperation and connectivity which will help the region's economic and social development. Energy interconnection is conducive to promoting the optimal allocation of regional resources, efficient use of clean energy and improving regional energy security. Several interconnection transmission lines have been established to carry out cross border power trade and the results of regional power cooperation have become increasingly prominent. He said that the General Electric Power Planning and Design Institute, China will continue to strengthen communication and docking with all parties, conduct in-depth research on roadmaps for energy interconnection in the Asia-Pacific region, actively coordinate cooperation in project development, technology exchange, capacity cooperation etc.

Mr Hongpeng Liu, Director, Energy Division, United Nations ESCAP in his opening remarks welcomed all the participants representing different countries of the four sub-regions, sub-regional intergovernmental institutions and consultants. He mentioned that to promote grid interconnectivity in the Asia-Pacific region, a decision was taken in the ESCAP's 72nd annual Commission to establish this Expert Working Group. Further, Asia-Pacific energy ministers meeting at the Asian and Pacific Energy Forum in April 2018, emphasized the need to develop a regional road map for energy connectivity to achieve the realization of the 2030 Sustainable Development Goals. He said that demand for electricity in Asia will double by 2050. He expressed that about 400 million people in Asia-Pacific region are without access to electricity. Enhancing the share of renewable energy will help in reduction of carbon emissions, and for this purpose cross-border energy/electricity interoperability will be good for both the energy suppliers and consumers to connect those countries that have a surplus in energy to the countries that have shortages.

He mentioned that in the first meeting of Expert Working Group, various challenges and issues in promoting cross-border grid inter connections were discussed. An ESCAP study on energy connectivity shows that we need to promote grid interconnectivity at the Asia-Pacific region level. He expressed that "Belt and Road" is a good example of our regional cooperation and we can draw lesson for grid interconnectivity which will help the countries to enhance economic growth and development, increase in access to electricity, reduce poverty and above all will help to achieve goal of sustainable SDG7. He hoped that this meeting will help ESCAP to develop a Regional Road Map for grid interconnection in the Asia and the Pacific and will be submitted to the second meeting of the Energy Commission for consideration scheduled to be held in Bangkok in October 2019.

The first meeting of the EC-EWG elected **Ms WEI, Xiaowei, Director, International Cooperation Department, National Energy Administration**, China as the chair of the EWG-EC in December 2017 and will continue to chair the EWG-EC until the Second Committee on Energy meets in October 2019. The Chair expressed her expectations towards completing the development of the regional roadmap that would eventually facilitate removal of barriers in advancing cross-border electricity connectivity through an open and transparent process with experts from the region.

2. Keynote Speaker: Trends and challenges of global energy transition and energy connectivity development:

Mr. HE Zhao, Director, International Business Development (EPPEI) delivered the keynote address highlighting the trend and challenges of global energy transition and energy connectivity in the Asia and the Pacific. He noted that in the Asia Pacific, there are 49 countries but least interconnected. The population is around 4.3 billion, accounting for 59% of the global population, and its GDP is more than 26 trillion US dollars. In 2016, energy production reached 6.5 billion tons of oil equivalent, accounting for 47% of world energy production. Its energy consumption reached to 4.5 billion tons of oil equivalent, accounting for 48% of the world's total consumption. The total power generation in the Asia-Pacific region in 2017 was about 13 trillion kWh, mainly from coal and oil based generation.

3. Sub-Regional Perspectives: Current Status, Challenges and Outlook of energy connectivity development:

The meeting benefitted from four presentations covering each Sub-region's perspectives, current status, opportunities, challenges and outlook for energy connectivity. These presentations also included suggestions for road map elements. Presentations were made by the following experts:

a) South-East Asia	**Mr. Xunpeng Xi**
b) South and South-West Asia:	**Mr. Vijay Kharbanda**
c) North and Central Asia	**Mr. Bakhtiyor Shamsiev**
d) East and North-East Asia:	**Mr. Sergi Podkovalniknov**

After each presentation, there were detailed discussions, along with questions and answers on the issues in each sub-region. These covered the challenges being faced for interconnectivity, sharing of data, capacity building, assessment of renewable energy and road map for interconnectivity in each sub-region and the Asia-Pacific as a whole.

Day 2 - 13 December 2018

4. Open Discussions: Developing a regional Road map to promote regional energy connectivity

This session was moderated by Mr. Michael Williamson, ESCAP. The floor was opened for discussions and participants were requested to share their views on common challenges in each sub-region, opportunities to interconnect different sub-regions and the need for a regional mechanism to address these. Members shared their views on sustainable development of renewable energy and hydro power development to reduce emissions and achieve SDG7, to continue economic growth and development. The benefits of grid interconnectivity, the optimal utilization

of resources, sharing of data within each sub-region and at the Asia-Pacific level, capacity building, development of new technologies were other issues discussed. Members from different sub-regions also shared their views and suggestions on road map for interconnectivity.

5. **Good Practices in addressing some of the common challenges: Consolidating political will, innovative financing, developing economic and power market, harmonization of technical and legal standards:**

Representatives from following regional intergovernmental institutions/associations working in different sub-regions presented on their roles and functions in energy cooperation and integration and offered perspectives to take forward energy cooperation and integration within the sub-regions as well as on Asia Pacific as a whole:

a) **Representative from International Business development, General Electric Power Institute, China:** shared good practices from Europe and America.
b) **Representative from ADB**: Shared status of cross border interconnection projects and highlighted that energy cooperation and connectivity in each sub-region and Asia Pacific as whole is their top priority.
c) **Representative from SAARC:** Shared the role that SAARC and the SAARC Energy Center are playing in South Asia in grid connectivity and signing of SAARC framework agreement on energy cooperation by the eight member countries.
d) Representative from "Belt and Road Energy Partnership": Shared that during the "Belt and Road" international cooperation summit, the National Energy Administration and the National Development and Reform Commission issued an action plan on "Belt and Road Energy Partnership". Building such a platform will help to achieve common growth, development and prosperity in the field of energy through consultation and cooperation.
e) Representative from GTI: GTI is a platform combining 3 countries in Northeast Asia (People's Republic of China, Mongolia, Republic of Korea and Russian Federation). GTI noted that there is strong political consensus to promote grid interconnectivity.
f) Representative from GEIDCO: Shared GEIDCO's goal to promote the construction of global energy Internet - to provide clean energy, enhance access electricity and to promote sustainable development.
g) **Representative from CEC:** Shared that political will and government support is important for interconnectivity.

6. **Open Discussions on Cross Border electricity trade as a vehicle to increase uptake of renewable energy: contributing the climate change mitigation and social issues and coordination mechanism development for promoting energy connectivity in Asia and the Pacific.**

This session was moderated by ESCAP. This session focused to increase the uptake of renewable energy to address climate change mitigation and social issues and to achieve SDG7 as well as to promote connectivity in the sub-region and Asia Pacific as whole. ESCAP moderated the open

discussions and members shared their suggestions on the need of renewable energy to address the climate change in the Asia Pacific region.

7. Way Forward

The participants agreed that the roadmap will identify a passage that will eventually lead the Asia Pacific region towards a more integrated market in several stages. The regional roadmap will propose a strategy towards this integrated market, which will include components that need to be developed by member countries in advancing cross-border electricity trade. These components include development of a regional framework and appropriate institutions to support and coordinate the regional framework. The regional framework is expected to initially provide additional impetus to the existing sub regional initiatives and enable coordination among various institutions. ESCAP will develop a focused and action-oriented road map for energy connectivity in the Asia Pacific region based on the deliberation of this meeting. Based on the two days' extensive discussions, the following points emerged for developing regional road map for energy connectivity in Asia Pacific region:

a) Develop a master grid network plan for power connectivity in Asia Pacific region.

b) As political consensus and government support for energy connectivity is a key enabler of interconnection within each sub-region and for the Asia-Pacific region as whole, it is important to build this through continuous interactions and dialogues for energy cooperation and grid interconnectivity by signing agreements, MOUs and treaties on energy cooperation and connectivity as part of their commitment. Learnings from successful power pools in world also suggest that agreements as a part of political commitment are important for energy cooperation and enhancing connectivity in the region.

c) Where agreements on energy cooperation have been signed, the intergovernmental bodies working in sub-regions need to expedite their ratification and implementation**.** At the same time, it is also important for other sub-regions in the Asia Pacific to learn from the experiences within the region and from international experiences to follow a strategic approach by creating intergovernmental associations and signing of agreement/MOUs/Treaties to enhance energy cooperation and integration in each sub-region.

d) To promote connectivity of the Asia and the Pacific as a whole, it is important to ensure networking of sub-regional intergovernmental institutions such as SAARC, GTI, ECO, BIMSTEC, GMS, ASEAN and SCO, including with multilateral institutions such as the World Bank and the ADB to enhance economic, social and environmental benefits of the cross border electricity trade**.** ESCAP, with the support of multilateral institutions, can develop a strategy to promote networking of intergovernmental institutions.

e) While it is important to continue to promote power grid connectivity on a bilateral basis, as is the case presently, there is a need to encourage member countries to promote trilateral/multilateral trade of electricity in each sub-region.

f) It is important to align, coordinate and harmonize standards, policies and regulations with respect to cross border electricity trade. As each country operates their own standards, policies and regulations for cross border grid interconnectivity and trade, it is important to identify and remove any regulatory barriers to promote energy cooperation and enhancing connectivity in the region.

g) International experience shows that it is important to create a forum or association of regulators in each sub-region. As electricity is a highly regulated sector this is important for coordination, knowledge sharing and capacity building, which will also help in moving from bilateral connectivity to multilateral and sub-regional connectivity. Forums or associations of regulators can facilitate in developing common set of regulations and standards for cross border electricity trade such as licensing, open access, deviation settlement mechanisms or grid codes harmonization.

h) Establishing competitive, transparent unified power markets is prerequisite for the success of multilateral trade of electricity in each sub-region and the Asia Pacific as a whole. An association or forum of regulators can develop standard contractual documents such as Power Purchase Agreements (PPA), Transmission Service Agreements (TSA), transit fee frameworks, Regional Tariff Mechanism, common Payment Security Mechanism, sub-regional Market Rules, trade of electricity on Power Exchanges, as well as issues related to tax regimes and currency exchange.

i) For wheeling of electricity, physical implementation of the transmission interconnection system network between countries is one of the important requirements. For safe and reliable grid connectivity and operation of the system, technically two power systems need to be harmonized and coordinated. International experience shows that for smooth and reliable operation of the power systems, it is important to institutionalize this coordination by creating an association of transmission and system operators in each sub-region for coordinated scheduling, grid code harmonization, planning codes and metering codes.

j) Mobilizing investment for capital-intensive power projects and associated infrastructure projects is crucial as they are associated with large risks and long gestation periods. The private sector is investing and willing to invest more, given the right investment policies and incentives are in place. It is therefore important to develop and frame supportive investment policies and guidelines in each sub-region to promote private investment in the power sector.
There is also needed to evolve innovative financial instruments and mechanisms for mobilizing finance at a competitive rates to fund infrastructure power projects. Instruments like green bonds, blend financing or renewable energy certificates can be tailor made for financing of specific cross border projects including development of renewable energy projects.

k) Considering existing and future trade relationships between two or more countries, it is necessary to have strong and clearly defined dispute resolution mechanisms. It is important to

establish a common platform or institution for dispute resolution in each sub- region, instead of resolving in a third country. This will provide added confidence for developers to invest in the region.

l) For the sustainability of the power sector in the long run, it is desirable for the governments of the Asia Pacific to take initiatives for transforming all the three segments - generation, transmission and distribution into financially viable entities. Further, for the ongoing viability of sector, it is important that government should rationalize the subsidies and provide them upfront.

m) For the sustained growth and development of the Asia Pacific as a region, it is important that there should be sharing of sectoral information and data among the member countries. Asia Pacific has rich learnings, it is therefore important to organize capacity building or training program on the available best practices and lessons learnt for topics such as sharing of new technologies, efficiency improvement, smart grids, EV charging infrastructure, or competitive bidding, among the member countries. This will benefit all the member countries to improve the efficiency and system operations and support the interconnection process.

Day 3 - 14th December 2018

Participants visited GOLDWIND, a global leader of wind turbines manufacture to examine the hardware and software developments for wind energy systems and mini grids. Members appreciated the visit organized by ESCAP and learnt from the innovative technologies the company is pioneering.