Workshop Report

MAINSTREAMING AND IMPLEMENTING THE WATER-ENERGY NEXUS FOR SUSTAINABLE DEVELOPMENT IN THE AFRICAN REGION

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Organized by the United Nations Office for Sustainable Development(UNOSD), United Nations Economic Commission for Africa(UNECA), UN Environment and Ethiopian Ministry of Water, Irrigation and Electricity

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Acronyms

ECA	Economic Commission for Africa
MOWIE	Ministry of Water Irrigation and Energy
SE4All	Sustainable Energy for all
SDGs	Sustainable Development Goals
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNOSD	United Nations Office for Sustainable Development
UNU-INWEH	United Nations University Institute for Water, Environment and Health

Executive Summary

The UN 2030 Agenda for Sustainable Development and the bigger African Union's Agenda 2063 encapsulate the development objectives of African countries. An integrated approach to the implementation of these agenda is essential to ensure coherence and optimal use of resources. Given the centrality of energy and water resources to sustainable development - and the vital role that improved access to both water and energy play in advancing progress in other areas, including health, education, and poverty eradication–the Sustainable Development Goals (SDGs) relating to water and energy provide important entry points for integrated approaches to implementation of the SDGs. An integrated approach to water and energy development is recognized to increase energy efficiency, decrease water pollution, reduce costs of energy and water delivery, increase access to services, reduce greenhouse gas emissions and improve food production systems. Hence the water, energy and food nexus has emerged in recent years as a key integrated approach framework for sustainable development.

The workshop "Mainstreaming and Implementing the Water-Energy Nexus for Sustainable Development in the African Region" is part of the process of enhancing the mainstreaming and implementation of the nexus concept to achieve the SustainableDevelopmentGoals (SDGs) and the water and energy targets. Furthermore, the workshop aimed to enhance understanding of the nexus approach, as well as share the related challenges and learn lessons in its implementation across Africa

The workshop was organized from 4-6 September 2018 at the UN Conference Center of the Economic Commission of Africa (ECA) in Addis Ababa, Ethiopia. About 74 of 100 invited participants were from different African sub-regions - mostly officials and practitioners from the water and energy sectors - together with experts from UN Environment, UN-Water, SE4All, the African Union Commission, the United Nations Economic Commission for Africa (UNECA), the International Water Management Institute (IWMI) and other international organizations.

The workshop was organized into 7 sessions:

- Opening Session
- Session 1: Setting the Context
- Session 2: Water Statistics and Indicator Efforts
- Session 3: Energy Statistics and Indicator Efforts
- Session 4.1: Water and Energy Nexus
- Session 4.2: Water and Energy Nexus
- Session 5: Challenges and Opportunities in Mainstreaming and Implementing the Water and Energy Nexus: Regional Cases

- Session 6: Challenges and Opportunities in Mainstreaming and Implementing the Water and Energy Nexus: Country Cases
- Session 7: Closing the Gaps on Water-Energy Nexus in Achieving the SDGs
- Wrap-up and Closing Remarks

The workshop recognized the following challenges and gaps of water and energy development in Africa.

1. The participants highlighted that access to water and energy access is a challenge and sometimes a dream in many parts of rural Africa. Water shortages and rationing are regular phenomena in many urban centers of the continent.
2. The rate of water and energy services provision is undermined by a rapid population growth, urbanization, economic growth and climate change.
3. The data and information scarcity in the continent undermines evidence and knowledge-based policy-making and development.
4. The lack of political will and cross boundary resources development and management, lack of common protocol for regional data collection and sharing mechanism undermines regional harmonization of policies and implementation strategies.
5. The mainstreaming and implementation of the water and energy nexus is at the beginning stage in Africa due to limited capacity, financial resources and information.
6. It was recognized that gender composition of the workshop is not optimal. Out of 74 participants, only 14 were women, indicating a persistent gender imbalance. Water and energy issues directly affect women in Africa. Therefore, there is a need to ensure gender balance to reach the SDGs and in any future water-energy-nexus activities.

The key recommendations of the Workshop are:

1. Moving from preparation phase of mainstreaming water and energy nexus approach to action was emphasized as key to achieve water and energy access by 2030 SDG target year. Strong political will, continuous and targeted capacity building are needed to mainstream the nexus approach and boost water and energy development across the continent.
2. The water-energy nexus needs to include the food, gender, climate, poverty, education and health dimensions
3. It is paramount to see the water and energy nexus as an *entry point* to trigger the achievements of SDGs.
4. Countries and regional blocks need to act in harmonizing policy and legislation in line for the efficient and cost-effective implementation of the water and energy nexus development in the continent. The importance of developing enforcement mechanism at regional and national level was emphasized. The experience of the Economic Community of Western African States (ECOWAS) and the European Union

was mentioned as effective regional organizations with a better enforcement mechanism of regional strategies. In addition, the importance of modeling tools for driving knowledge-based policy reform and sustainable development were underlined.

5. The workshops underlined the need for immediate mainstreaming of the SDGs into their national plans and develop monitoring mechanisms. Some African countries have already taken initiative towards mainstreaming the water-energy nexus, but the process still need substantial support for the implementation on the ground.
6. Finance needs to be mobilized to support the implementation of the water-energy nexus across the continent. Each year, the national governments should allocatea certain amount of their budget to mainstream and implement the water-nexus. International financial mechanisms supporting the mainstreaming and implementation of the water-energy nexus need to be scaled up. Appropriate incentives need to be provided for the private sector participation in financing and co-development. Local and national banks need to be partners in this endeavor.
7. Coordination, partnerships and building alliances need to be enhanced and communication platforms established for knowledge and experience sharing.
8. Urban water and energy provision need to be reformulated through sustainable urbanization and water and energy nexus context integrating appropriate urban planning, resources conservation and green growth approach.
9. Across the continent, experience of development of mall-scale, single and multipurpose infrastructure for agriculture, energy, water supply was shared. Knowledge platform for sharing current and emerging experiences and knowledge needs to be established.
10. There is an urgent need to develop innovative financing mechanisms in partnership with global and local partners to address the issues related to water and energy in Africa.
11. There is a need to harmonize national policies with regional ones, as well as with the SDGs.
12. Solid scientific knowledge, substantive data, technology transfer, capacity building, and sharing of best practices are needed to support the implementation of the water-energy nexus across the continent.
13. It is also vital to strengthen or establish a monitoring mechanism with regards to the water-energy nexus at the national level.
14. Partnerships and political dialogue are essential to implement and mainstream the nexus approach in Africa.
15. It is critical to ensure that the gender dimension is adequately reflected in the mainstreaming and implementation of the nexus approach.

1. Introduction

The UN 2030 Agenda for Sustainable Development was adopted by UN General Assembly in September 2015. The UN General Assembly acknowledged the limits of our current economic growth-based model of development and commits to the principle that human prosperity can only be achieved through sustainability. All nations seeking economic prosperity committed to the resolutions that address the needs of all people with well-defined social objectives without compromising ecological stability. It was recognized such a change requires strategies and public policies to move from sectoral to holistic planning and interventions, using integrated, systemic analysis that connect all relevant stakeholders and institutions. This change also requires coherent policies between sectors and regions, and across scales to be in place.

The 17 Sustainable Development Goals (SDGs) are the world's best plan to build a better world for people and our planet by 2030. They recognize that ending poverty must go hand-in-hand with strategies that build economic growth and address a range of social needs including education, health, equality and job opportunities, while tackling climate change and working to preserve our ocean and forests (https://sustainabledevelopment.un.org/). These goals are a collection of interlined 17 global goals set as part of Resolution 70/1 of the United Nations General Assembly: "Transforming our World: the 2030 Agenda for Sustainable Development. To deliver on those objectives, the Resolution of the 2030 Agenda explicitly mandates the UN System to support all UN Member States in closing the implementation gap, notably for reaching the SDGs. In line with that, the United Nations Office for Sustainable Development (UNOSD)– in collaboration with the United Nations Economic Commission for Africa (UNECA), UN Environment and Ethiopian Ministry of Water, Irrigation and Electricity -organized an Africa-wide induction workshop on how to support member countries to implement national SDG agendas.
While addressing the Agenda 2030, water (SDG 6)and energy (SDG7) are identified as a key driver for sustainable development. The SDG 6targets ensuring the availability and sustainable management of water and sanitation for all. This cannot be achieved without energy and the infrastructures necessary to provide such services. The SDG 7addresses ensuring access to affordable, reliable, sustainable and modern energy for all. Thus, SDG 7 cannot be achieved without the water needed to generate energy to fill the energy demand-supply gap.

Africa and developing parts of Asia are the regions with the highest number of people without access to electricity. Agriculture is an important sector in these regions and a key source of water demand. For example, agriculture accounted for more than 80% of water

withdrawals in sub-Saharan Africa[1]. As countries in Africa gain increased access to electricity, it is key to develop and implement policies that support the efficient consumption of water in countries that are already facing water stress. With the increasing demand for water and energy in developing countries, particularly in Africa, it is important to understand the interlinkages between these two resources andtheircost-effectiveutilization. The 2030 Agenda for Sustainable Development recognizes the centrality of energy and water resources to sustainable development, and the vital role that improved access to both water and energy play in advancing progress in other areas, including health, education, and poverty eradication. An integrated approach to water-energy nexus can increase energy efficiency, decrease water pollution, reduce costs of energy and water delivery, increase access to services, and reduce greenhouse gas emissions. As shown in the concept note (Annex 1a), this workshop was intended to discuss how to mainstream and implement the water-energy nexus in Africa. It also discussed the water and energy indicators, the challenges and implementation gaps as well as lessons learned from the African and other regions on mainstreaming and implementing the water-energy nexus. . The workshop was organized at the UN Conference Center of Economic Commission of Africa, Addis Ababa, Ethiopia, and 4-6 September 2018.

2. Workshop Objectives

With the increasing demand for water and energy in developing countries, particularly in Africa, it is important to understand and assess the interlinkages between these two vital resources, as well as the potential for the nexus approach to effectively contribute to meeting the water and energy demands. The 2030 Agenda for Sustainable Development recognizes the centrality of water and energy for sustainable development, as well the key role that improved access to water and energy play advancing progress in other areas, including health, education and poverty eradication. An integrated approach to water and energy can increase efficiency, decrease water pollution, reduce costs of energy and water delivery, increase access to services, and reduce greenhouse gas emissions.

Theworkshop was organized to inform government officials and relevant stakeholders from the African continent on how to effectively manage the water-energy nexus and interlinkages with other SDGs for sustainable development and to facilitate the implementation of the Agenda 2030 and Agenda 2063 at the national level. The workshop also discussed the cross-sectoral mainstreaming challenges and gaps for nexus approach. Furthermore, it was intended to enhance knowledge management and sharing of best practices on the water-energy nexus, interlinkages with other SDGs, and for showcasing success stories and challenges in the implementation of water and energy nexus. The

[1] (http://www.fao.org/nr/water/aquastat/water_use/index.stm, accessed, November 2018)

workshop was also aimed at strengthening advocacy and outreach in the areas of energy and water and their interlinkages (Annex 1a).

4. Workshop Methodology and Schedule

The workshop was organized into four different formats to maximize interaction and learning. t consisted of keynote presentations by resources persons, followed brief contribution from expert panelists and discussions. The panel sessions served as a platform to share experiences from specific countries and regions. Finally, the group discussion and plenary session concluded the workshop and presented the outcomes and recommendations(*see*, the Schedule, Annex 1b). Sessions one to three consisted in a keynote presentation followed by contributions of experts and panelists on pertinent issues. Sessions four, five and six (Annex 1b) saw experts and regional/country representatives presenting on water-energy nexus issues, and related challenges. The last session (Annex 1b: Session 7) consisted in a group discussion and deliberation. It served as an opportunity for participants to identify additional issues, as well as gaps, and challenges related to mainstreaming the water-energy nexus, and the way forward for countries.

In terms ofworkshop flow, the first session was intended to present a broad view of water and energy development. The second and third sessions dwelled on the water and energy statistics in Africa. Session 4 aimed at sharing the experts' view of the water-energy nexus. Session 5 and 6 focused on the challenges related to mainstreaming the water-energy nexus respectively from a regional and country specific context. The last session was a group discussion and deliberation. This part of the workshop was intended for participants to add any remaining issues, identify gaps, challenges and the way forward to mainstream and implement the water-energy nexus across Africa.

5. Participants

More than 100 participants mainly from African countries and international experts were invited to participate in the workshop, of which 74 attended the workshop. Participants from Africa were officials and practitioners from water and energy sectors. International participants included representatives from UN agencies, the private sector, NGOs, academia, regional and country representatives from Europe, Australia and Middleeast. These participants were present in the workshop as expert speakers, moderators, panelists, sharing regional and country experiences. Expert from UN Environment, UN-Water, UNU-INWEH, the African Union Commission (AU), United Nations Economic Commission for Africa (ECA),and other international organizations (Annex 2, List of active participants).

Figure 1: Photo view of Participants

6. Opening Session

The opening session consisted in introductory and welcoming remarks from the master of ceremony, representatives of the organizing agencies. This was followed by the official opening of the workshop made by the Guest of Honour, the State Minister from Ministry of Water, irrigationand Energy in the following order.

- **Welcome speech: Mr. Semu Moges,** Consultant on the Water-Energy Food Nexus and University of Connecticut, USA**/**Addis Ababa University, Ethiopia
- **Mr. Jong Soo Yoon**, Head of United Nations Office for Sustainable Development (UNOSD)
- **Mr. Samba Thiam,** Head, UN Environment Liaison Office to AUC, UNECA and Representative to Ethiopia
- **Mr. Linus Mofor,** Senior Natural Resources Officer, United Nations Economic Commission for Africa (UN ECA (representing Fatima Denton, Head of ECA, ACPC).
- **H.E. Mr. Abraha Adugna,** State Minister of Water, Irrigation and Electricity of Ethiopia(Representing H.E. Dr.Ing Seleshi Bekele Awulachew, Minister of Water, Irrigation and Electricity of Ethiopia).

Figure 2: Opening Session Speakers from left to right - Mr. Linus Mofor, Mr. Jong Soo Yoon, H.E. Mr. Abraha Adugna, Mr. Samba Thiam

The master of ceremony of the workshop, Mr. Semu Moges, welcomed all the participants to the Addis Ababa, the capital of Ethiopia and Africa, and appreciated their keen participation in the workshop. He also introduced the Guest of Honor and opening session speakers. Mr. Moges provided an overview of the composition and origin of the participants representing more than 20 African countries. He also recognized and thanked participants coming from Canada, France, Germany, Netherlands, Iraq, Italy, Republic Public of Korea, and Spain for sharing their experience and knowledge.

The master ceremony of the workshop acknowledged and thanked the United Nations Office for Sustainable Development (UNOSD)the United Nations Economic Commission for Africa (UNECA), UN Environment, and the Ministry of Water, Irrigation and Electricity of Ethiopia for co-organizing the workshop. He also acknowledged the tireless work of Ms. Eun Hae Jeong and Ms. Hye Kyung Choi from UNOSD, Mr. Adeladay Solomon, Mr. Linus Mofor and his team from UNECA , Ms. Efrata Zegeya, Mr. Wubeshet Demeke, and Mr. Tesfaye Fichala from the Ministry of Water, Irrigation and Electriicty (MOWIE). Finally, he acknowledged the moderators, Dr. Birguy Lamizana, Dr. Meseret Zemedkun, Mr. Riccardo Zennaro (UN Environment), Dr. Manzoor Qadir (United Nations University Institute for Water, Environment and Health, UNU-INWEH), and Mr. Tom Ogol. After briefly presenting

the main objectives of the workshop (see, Section 4), Mr. Moges invited the opening session speakers to deliver their remarks.

The following are the key highlights from the opening session speakers;

As the lead organizer of the workshop, Mr. Yoon, representing UNOSD (Annex 3a)welcomed the participants. He underlined UNOSD is established to support U.N. Member States in planning and implementing sustainable development strategies, through knowledge sharing, research, training and partnerships, specifically mentioned the *primary role is supporting the national sustainable development planning processes in the South* through drawing numerous world-leading institutions and experts, and filling identified gap in the SD knowledge, bringing together and fueling synergies between researchers and capacity-building institutions. Mr. Jong Soo Yoon underlined water is the key driver for sustainable development hence the need for such a workshop.

Mr. Yoon took the opportunity to thank the Minister for Water, Irrigation and Electricity of Ethiopia, Honorable, Dr. Seleshi Awalachew who actually proposed this event. In addition he thanked UNECA and UNEP and the organizing team for their partnership and tireless effort to bring this workshop into a successful start. He also reminded the success of SDG implementation and ultimate water, energy and food security of the continent hinges on the participants and the many of experts and policy makers determined to change the profile of the continent by 2030. He also alluded on the importance of an integrated approach to the water-energy nexus can increase energy efficiency, decrease water pollution, reduce costs of energy and water delivery, increase access to services, and reduce greenhouse gas emissions. Finally, he said, together, we can push the boundary of performance challenges and realize the UN motto of 'No one will be left behind' in Africa. Wishing a successful workshop deliberation and fruitful recommendation, He once again welcomed the participants.

The next speaker was Mr. Linus Mofor, a Senior Environmental Affairs Officer at the ECA, representing UNECA, remarks African countries are already experiencing catastrophic climate change and variability impacts in inter-related ways across many sectors - including water, energy and agriculture. He also emphasized the importance of integrated approaches in responding to increasing energy and water demand to enhance livelihoods and sustain economic growth and rising population pressures on the continent under a changing climate. He said, this workshop will elaborate on implementation challenges and lessons learned from the African Region and other regions will be shared during the workshop to mainstream and implement water and energy nexus to achieve the sustainable development goals (Annex 3b).

Samba Thiam, Head of the UN Environment Liaison Office to the African Union Commission, ECA and Representative to Ethiopia, said that with the increasing demands for water and energy on the continent, it is important for experts to understand their interlinkages as well as potential water-energy nexus options that can effectively contribute to meeting Africa's water and energy demands. The 2030 Agenda for Sustainable Development recognizes the centrality of energy and water resources to sustainable development, and the vital role that improved access to both water and energy play in advancing progress in other areas, including health, education and poverty eradication. "An integrated approach to the water-energy nexus can increase energy efficiency, decrease water pollution, reduce costs of energy and water delivery, increase access to services, and reduce greenhouse gas emissions," said Mr. Thiam. He also underlined the importance of learning and experience sharing workshops like this one (Annex 3c).

The workshop was formally opened by H.E. Abraha Adugna, State Minister of Water, Irrigation and Electricity. In his remarks (see Annex 2), H.E. Excellency Mr. Abraha Adugna Ashenafi, emphasized water and energy are closely interlinked and interdependent and need not be addressed in isolation or at the expense of each other, He added managing resources, planners and decision makers need to consider ways to maximize the supply of one while minimizing the over use of the other, adding understanding of the water-energy nexus and the associated driving forces for efficient and sustainable use of these resources is critical.

Dr. Adugna underlined the importance of nexus approach as future water and energy planning and implementation approach. He stated that in spite of the nature of water and energy problems are intrinsically connected, our planners and managers still continue making decisions in 'silo' without adequately understanding the impacts of one sector on another. Mindful of this, the State Minister disclosed the Government of Ethiopia through the Ministry of Water, Irrigation and Electricity, currently embarked on refining the interface between the policies and strategies for water and energy, to better capitalize on that nexus approach view water and energy nexus an 'entry point' rather than 'priority' to trigger the the SDGs. He welcomed the learning opportunity of the workshop as his Ministry has initiated mainstreaming strategy based on this concept of entry point approach. Wishing a successful deliberation, the State Minister opened the workshop officially (Annex 3d).

7. Workshop Sessions

This section presents summaries, key messages and the way forward provided at each session. The detailed workshop interactions and deliberations of each session are provided in Annex 4. Figure 3, provides partial view of the workshop during one of the sessions.

Figure 3: Partial view of the workshop sessions

7.1 Session 1 – Setting the Context, Moderated by Ms. Birguy Lamizana

The first session is intended to set the workshop tone by providing context to the status of water and energy in Africa and introduce the benefits of nexus approach to water and energy development in the continent. The session consists of keynote speech and panel discussants.

Summary and key outcome of the session:

- The water-energy gap in Africa is still significant and requires enhanced political commitment and institutional arrangement consistent with water and energy nexus approaches
- Capacity Building, evidence-based policy making, building horizontal relationships between the water and energy sectors, and sectors dealing with other SDGs is emphasized.

- Implementation and monitoring of SDG targets is complex and there is urgent need for collaboration, alliance building and partnership.
- Application of appropriate nexus scientific tools can help identify constraints, trade-offs, opportunities and synergies between sectors and institutions. These tools are useful to minimize cost and maximize benefits.
- It is recognized that our environment and water sources are deteriorating, lack of sufficient data and future prediction uncertainties require complicatesmanagement of the resources
- It is noted that 3year into the SDGs, the world at large is lagging behind in all targets related to SDG 6.
- Climate variability is significant in Africa and it is suggested to take note of this while mainstreaming the nexus approach for sustainable development of water and energy in the continent.

7.2 Session 2 - Water statistics and indicator efforts, Moderated by Mr. Tom Ogol

This session alluded to the important of water statistics to measure the progress of SDG achievement in all aspects. Eighty percent of human activities are discharged to water bodies, 16% of electricity production is from hydropower & 70% deaths occur from water related disasters and 1.4 billion people live in river basins where water use is exceeded. It is suggested that realistic political will from policy and decision makers is required to achieve SDGs in Africa.

The main outcomes of the session include:

- Thorough assessment of resources, identification gaps and challenges, constraints and opportunities need to be launched before mainstreaming and implementing the SDGs.
- Harmonization of national and regional targets and indicators to the global SDG targets and indicators needs to be done.
- Water is very central to all SDGs and the broader development agenda. It needs to be considered as an *entry point* to start implementation of SDGs. Immediate harmonization of the universal water access plan to the water SDG (SDG 6) at the national may help trigger implementation of other SDGs plans.
- Addis Ababa Action Agenda 2030 is pushing countries for local financing; countries need to start investing from government treasury sources if the SDG plans are to be achieved.
- African countries need to work hard to access funds available from different sources including the GCF.

7.3 Session 3 - Energy Statistics and Indicators Efforts, Moderated by Ms. Meseret Zemedkun

In Africa about 51% of the energy is supplied from fossil fuel, 48% from bioenergy and the rest of 1% from other renewable energy sources (hydropower, nuclear, etc)[2]. There is a huge energy access gap in the continent ranging from less than 25% access in some part of the continent to more than 75% in another part of the continent. Energy investment gap and energy efficiency are key issues of concern in the continent. In addition, some of the energy development impediments identified in the continent are absence of coherent policy, regulatory framework, capacity, financing and investment, data, poor transmission and distribution infrastructure. The session also identified the presence of both renewable and non-renewable energy sources, policy commitment, improved technologies, and the presences of various global, continental and regional programs as opportunities for energy development

The main outcomes of this session include

1. The achievement of the SDG7 targets is *unlikely with business as usual approach* considering the current level of access to energy in Africa and the required commitment in all aspects: political, institutional, technical, human and financial capacity
2. In order to go in the right direction towards achieving SDG 7 strong political will and commitment by National Governments is key through improvement of the governance system to attract substantial private investment through strict regulatory framework that brings confidence on investors.
3. Based on strong national policies, strategies and goals regional harmonization and integration is required in order to have a unified power system with agreed standards for data, indicators, energy appliances and even definition of access to energy
4. It is not sufficient to have good policies and strategies and goals and through them begin implementation, to achieve SDGs there should continuous and periodic monitoring and evaluation to see where we are and get lessons and improve performance.
5. Involving communities while setting targets and goals rather than top down approach is key to success of intervention in the energy sector too.
6. Utilizing recent technology advances and being led by science and knowledge is key to achieve SDGs target

[2] An African Energy Industry Report, 2018 (accessed November, 2018, https://www.futureenergyafrica.com/media/1751/1-mir-africa-mir-18-2-es_685804715-05-2018.pdf)

7.4 Session 4: Water and Energy Nexus, Moderator by Riccardo Zennaro

Session 4 consisted of two sub-sessions (4.1 and 4.2). This session encompassed expert presentations and a panel debate on the practical solutions to the gaps and challenges in mainstreaming and implementation the water-energy nexus in Africa.

i) Session 4.1

In this session, alternative sources of affordable and innovative water and energy technologies were highlighted. These encompassed for example energy generation from municipal wastewater, the use of saline water (returned from agriculture) biomass energy, decentralized wind and solar energy systems, off-grid micro-hydro turbines for remote communities, energy neutral water for water collection green projects. These technologies all contribute to reaching the SDGs. .

The importance of access to water and energy in developing countries was highlighted also considering the gender perspective. It was emphasized that when there is shortage of water and energy or food, women are the first line victims. They must fetch water from distance, use firewood and expose themselves to health risks.

Another issue raised in this session was that the population in Africa is growing faster than the access to water and energy rate. It was also stressed that the future present uncertainties with regards to water and energy. An innovative mix of affordable energy solutions is therefore required. Furthermore, it was suggested that we may need to codify the water-energy nexus as a way better understand the challenges and propose feasible solutions

The take on message from this session is:

- There are multiple decentralized and innovative water and energy solutions.
- Start the codification of the water-energy nexus. The concept needs to be un-packed and re-packed, so as to understand the challenges, and propose feasible solutions.

ii) Session 4.2

This session was a continuation of session 4.1. It aimed to further elaborate on the topic of innovation and application of the water-energy nexus as well as on the solutions from different perspectives, including private companies and NGOs.

In this session the abundant nature of the renewable energy in Africa and the lack of infrastructure to harness it werediscussed. The role of the privatesector and banks to bridge the infrastructure development gap was underlined, especially in the development of small scale off-grid infrastructures.

It was also emphasized that the participation of private sector to mainstream and implement the water-energy nexus requires a new approach and business model. The private sector needs to be viewed as a partner in a new business for promoting water and energy access. New supporting policy and business models that encourage private participation in water and energy development are needed across Africa.

It is also recommended that Governments and Community Based Cooperation (COBs) engage in developing scalable and bankable projects for attracting private funds as one means of financial source for water and energy development. Furthermore, it was suggested that large scale projects should go in hand with small scale development.

Another important issue raised in this session was the financing of SDGs. It was noted that about 334 billion dollars (about 30 billion USD/year) may be needed to achieve the SGDs by 2030. It was highlighted that innovative financial mechanisms from public and private companies need to be raised, including working closely with micro-finance institutions (MFIs) and banks for financing water and energy access.

NGOs and support groups were encouraged to support community initiatives that are able to self-finance their projects. Building trust with thebanks is a key step for supporting self-initiated water and energy development projects by the communities. NGOs and CBOs can help in bridging the trust gap.

Finally, the role of the United Nations was discussed. Among other, the UN should convene actors and foster dialogue and partnerships across the world and with multiple stakeholders. An example is the creation of a platform specifically focusing on the water-energy nexus. It was also highlighted that the UN could help facilitate three main aspects related to the SDGs:

- Institutional and human resources capacity building for the implementation of the nexus approach.
- Knowledge management, sharing case studies of best practices, and codifying the nexus approach.
- Advocacy on the nexus through its multiple, high-level channels and global forums.

7.5 Session 5: Challenges and Opportunities in Mainstreaming and Implementing the Water and Energy nexus: Regional cases, Moderated by Ms. Eunhae Jeong

The session was moderated by Ms. Eunhae Jeong from UNOSD. It aims to learn lessons from existing regional water and energy incorporate the regional perspectives on water and energy nexus. Three regional representations from Africa (Northern, Sothern and Eastern) and one from Europe is presented and discussed.

Key messages from Europe include

- There is a challenge to enforce the policies. Even in situations where laws and regulations exist, people don't follow them. Awareness creation from bottom up is necessary
- The need to for better communication of policies and regulations in easily understandable ways for the general public.
- Networking and partnership are the new strategic resources for moving into water-energy nexus action.
- Improving energy access through mini-gridsfor better livelihoods where energy is not available or scarce.

7.6 Session 6: Challenges and Opportunities in Mainstreaming and Implementing the Water and Energy Nexus: Country Cases, Moderated by Linus Mofor

Gaps

- Skilled labour and finance to invest at scale on nexus.
- Lack of strong and proper sectoral integration and coordination
- Insufficient supply of services both in Water and Energy as compared to the growing demand.

Take away messages

- The need for paradigm shift matching with the growing population increase and rapid urbanization
- Investing on mega projects taking in to account of sustainable solutions to people.
- Encouraging micro investments which in total will add value to the national targets.
- Collaboration, networking and partnership between countries
- The need for human resources development (capacity building)

7.7 Session 7: Group Discussion - Closing the Gaps on Water-Energy Nexus in achieving the SDGs, Moderated by Manzoor Qadir

This session was intended to consolidate the deliberations through group discussions over the past two days. The focus of discussion centered on the following four points.

1. Deliberate on any additional key dimensions to be covered during the group discussion.
2. Discuss and report at least one inspiring example of water-energy nexus implementation from an African country.

3. Identify potential gaps in implementing water-energy nexus in SDG era in Africa.
4. Suggest country-specific strategies and how to implement such strategies.

The following summary provides the outcomes of the group discussions relevant to the water and energy dialogue in Africa.

Additional Issues

- Water-energy nexus needs to consider geopolitical and transboundary resourcesas significant water resources in Africa are transboundary in nature.
- As youth constitutes 70 % of the continent's population, the role of gender and employment of youth need to be factored into the water and energy nexus.
- Strategies and mechanisms addressing water-energy nexus need to be developed for south-south cooperation along with technology transfer and development initiatives.

Country specific examples

- Many countries in Africa use solar powered water pumps for agriculture, electricity, and water production for livestock and domestic water supply. Multipurpose dams are also common in the continent. Expanding access to water and energy requires rethinking towards the nexus approach and its linkages with other resources.
- The institutional setup of Ethiopia in reforming the institutions to reflect the water, energy and irrigation sectors are good examples to implement nexus approach (Ethiopian Ministry of Water, Irrigation and Electricity).

1. Potential Gaps

- Misalignment of policies at sectoral, country and regional levels in relation to addressing water-energynexus
- Lack of Integration of the global climate policies and agreements at national levels (e.g. the Paris Agreement, Nationally Determined Contributions (NDCs).
- Regional cooperation dialogue in the continent is skewed toenergy sector. There are limited regional cooperation dialogues on integrating other sectors such as water, environmental, social and economic aspects.
- Weak institutional and human capacities at national and regional levels are challenge to data collection, analysis and sharing. There is a need to create data acquisition, management and sharing policies at national and regional levels.

2. Partnerships

- There are weak partnerships among key stakeholders (e.g. the government, private sectors, etc.). There is a need to development partnerships between

government and private sector to develop and implement clear and coherent policies.

3. **Finance Mechanism**
   The funding mechanism for SDGs and water-energy nexus is week. It is suggested that governments, donors, private sector and NGOs step up collaboration for partnerships aiming at financing SDGs.
   Some of financing example from the continent includes:
   - In Ghana, the Civil Society Organizations are encouraged to engage with private sector financiers,
   - Zimbabwe opened electricity sector for private producers, and Uganda is also engaging private sectors.
   - The Corporate Social Responsibility (CSR) is also mentioned as means of expanding financing of water-energy sectors in Kenya

Overall Recommendation

- Leverage on declining technology cost and blending financing to deliver water-energy projects.
- Looking within the region for examples -Ethiopia's renaissance dam (raising funds to locally to finance major project)
- Build capacity of MFIs and Commercial Banks on water-energy-food nexus and creating specific portfolios, products and services; e.g. water loans, etc.
- Enhance cooperation through building regional power pools based on the resources endowment of the continent and integrate at continental scale. For instance, developing solar and wind powers in the north and south and hydropower in the east and central part of Africa.
- Enhance cooperative transboundary water resource management.
- Create regional centres of excellences addressing water-energy nexus.
- Continue dialogue to bring all stakeholders together for fuller representation of views.

7.8 Workshop Closing Session

The workshop was closed with high remarks from Mr. Yoon the head of UNOSD and H.E. Mr. Frehiwot , State Minister of MOWIE.

Mr. Yoon congratulated participants for the successful completion of this very important workshop. He declared the workshop as big achievement to him and UNSOD. As UNOSD, we learnt shared issues and gaps of the continent including the importance of data, capacity

building, finance, partnership and alliance for successful implementation of water and energy nexus. In this regard, Mr. Yoon alluded, it help shape UNOSD to shape our support. We, as UNOSD will continually engage with the continent for a successful implementation of SDG and be part of a solution through enhancing the continents capacity, and bridging the knowledge gap, building partnerships and alliances.

Mr. Yoon recognized his understanding that the regional and national processes to mainstream and implement the SDGs into national plans in the continent is underway, the existence of political will in the continent, examples of self initiated NGO facilitated bank loans for communities to take their matters on their own hands. Hoping this is a journey just started towards capacity building and knowledge sharing, UNOSD is committed to take further in similar direction. He also wished the participants safe trip back home.

The closing session was graced by H.E. Dr. Frehiwot Weldehana, the State Minister for Energy of the MOWIE. The State Minister hoped the deliberation sent clear message on important issues pertaining to resources scarcity, policy and institutional gaps, partnership and cooperation and financing issues for mainstreaming water and energy nexus in Africa. He also highlighted the challenges of 'silo' approach to planning and implementation of shared and interlinked resources such as water and energy, the enormous capacity and training needs for understanding and successful implementation of nexus approach, the need for evidence based policy changes. He also shared his Ministry's institutional setup and attempt to merge the water, energy and irrigation sectors in one umbrella Ministry as a means of enhancing joint planning and implementation of the resources. The State Minister gave his words to be an advocate to the outcome of this workshop and push the implementation of the recommendations of the workshop in his Ministry and to his African colleagues for water and energy nexus implementation. The State Minister acknowledged the important continued engagements of the UNOSDS and UN agencies to support successful implementation of the SDGs to our national goals and targets and its critical nature at this early stage of mainstreaming and implementation. Finally, wishing the safe trip back home, he declared the workshop is officially closed.

8. Evaluation

The total invited participants were about 100 of which 74 (74%) attended the workshop. The rate of attendance of international participation was high. Fifty five of the 60 (91.6%) invited participated attended the workshop. While 20 of the 40 (50%) invited local participants participated partially or fully, some participants requested official excuse due to official business travel. In general, full attendance of host city participants were also a challenge in past workshops. We started addressing such issue by holding the workshop in a retreat location, outside of Addis Ababa. Overall participants from all the regional blocks of

the content attended the workshop. Fifteen participants from Eastern Africa (excluding more than 20 from Ethiopia), 8 from Sothern Africa, 4 from Central Africa, 10 from Western Africa and 2 from Northern Africa were represented in the workshop. In terms of gender composition, out of 74, only 14 women attended the workshop, indicating a continued problem of significant underrepresentation of women hence gender imbalance. Water and energy issues directly affect women in Africa. Thereis need for a special attention to improve gender balance in the future water and energy nexus activities. Special communication format need to be developed while communicating countries to consider gender balance in such type of capacity building workshops.

Evaluation of the workshop by participants is conducted to identify strengths and weakness to be improved in future activities. A questionnaire form (Annex 5) consisting of 6 questions on relevance of the opening speeches and topics presented, quality of the PowerPoint, composition of participants and overall organization and workshop experience were distributed to participants present at the end of the Workshop. The score for relevance varies between 1 (little) to 5 (high). The score for quality ranges between 1 (low) to 5 (high). The score for workshop organization ranges between 1 (poor) to 5 (high).

A total of 47 participants filled-up and returned the evaluation forms at the spot. Compiled results for the evaluation of content-related questions show the following (see details in Figure 2):

- Almost 87% of the respondents agreed the opening speech was highly relevant. Only 13% of the respondents agreed the speeches were moderately high. None responded the speeches have little relevance.
- Almost 98% of the respondents agreed that the workshop topics were highly relevant.
- Almost 89% of the respondents agreed the PowerPoint presentations were of high quality.
- Almost 81% of the respondents agreed the workshop organization has very good and above (excellent) format and the other 17% responded the organization format was average.
- Almost 87% of the respondents agreed the opening speech was highly relevant. Only 13% agreed the speeches were moderately high.
- Almost 85% of the respondents agreed they have very good and above (excellent) experience of the workshop.

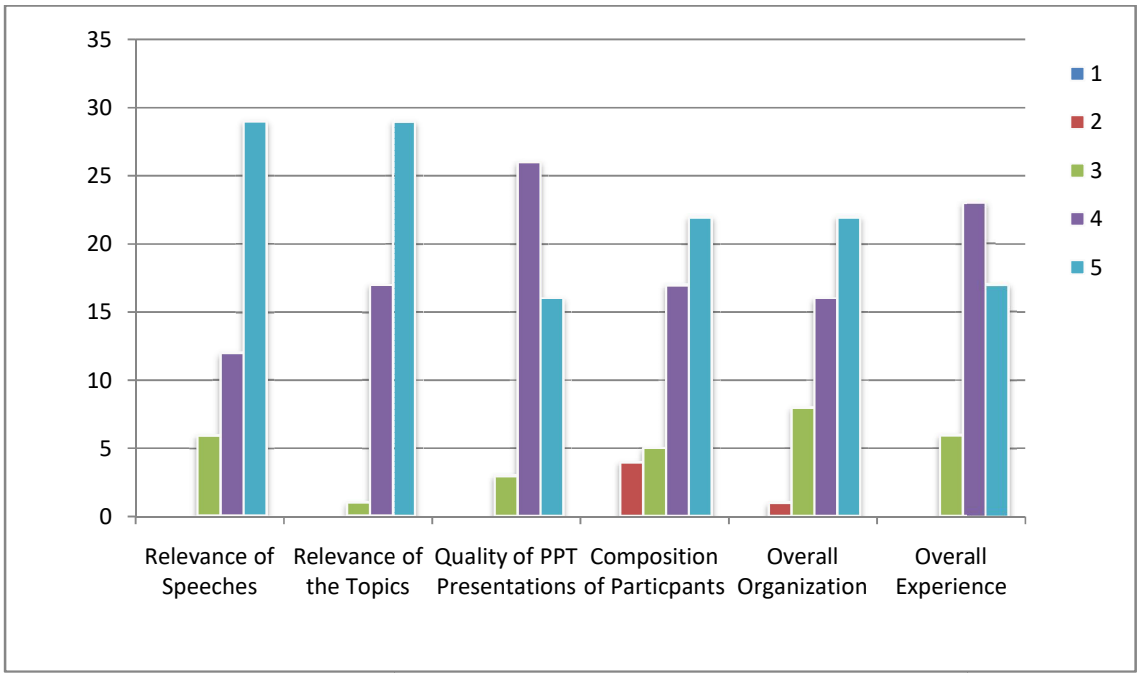

Figure 4: Workshop Evaluation Results

Annex 1: Final Concept Note and Programme

Annex 1a: The Workshop Concept Note

Workshop on Mainstreaming and Implementing the Water-Energy Nexus for Sustainable Development in the African Region

4-6 September 2018, Addis Ababa, Ethiopia

Organized by the United Nations Office for Sustainable Development(UNOSD), United Nations Economic Commission for Africa(UNECA), UN Environment and Ethiopian Ministry of Water, Irrigation and Electricity

Background

Water and energy are closely interlinked and depend on each other. 90 percent of power generation being water-intensive and about 8 percent of energy is used for pumping, treating and transporting to the various consumers. Water is especially important and used in large volumes in generating electricity, whether through green energy (hydroelectric power), heat exchange (steam systems), or for cooling (nuclear). In addition, waste streams such as urban wastewater and saline drainage water also offer energy generation opportunities. Water is required for fossil fuel extraction and production of biofuels. Energy, for example, is required for desalination of seawater and highly brackish groundwater. Despite close linkages, water and energy have been part of two independent sectors with a lack of communication and information sharing between the two when it comes to operational and management aspects.

Specific energy sources, such as hydropower, tend to be underdeveloped in different regions of the world. For example, only about 10% of hydropower potential in Sub Saharan Africa is currently utilized. Offshore wind power and equatorial solar energy are equally underdeveloped. Barriers include ecological footprints, capital costs and socio-environmental costs. Shifts in priority and investments are essential and can be driven by water and energy scarcity, particularly in regions poised for rapid economic growth.

While addressing the 2030 Global Sustainable Agenda, water is the key driver for sustainable development. Sustainable Development Goal 6 (SDG 6) targets ensuring the availability and sustainable management of water and sanitation for all. This cannot be achieved without energy and the infrastructures necessary to provide such services. In addition, it is equally important to achieve SDG 7, which addresses ensuring access to affordable, reliable, sustainable and modern energy for all. Thus, SDG 7 cannot be achieved

without the water essentially needed to generate energy to fill the energy demand-supply gap.

Africa and developing part of Asia are the regions with the highest number of people without access to electricity. Agriculture is an important sector in these regions and a key source of water demand. For example, agriculture accounted for 80% of water withdrawals in sub-Saharan Africa. As countries in Africa region gain increased access to electricity, it will be important to put in place policies to ensure that it does not result in inefficient water consumption in countries that are already facing water stress.

With increasing demands for water and energy in developing countries, particularly those in Africa, it is important to understand their interlinkages between as well as potential water-energy nexus options that effectively contribute to meeting the water and energy demands. The 2030 Agenda for Sustainable Development recognizes the centrality of energy and water resources to sustainable development, and the vital role that improved access to both water and energy play in advancing progress in other areas, including health, education and poverty eradication. An integrated approach to water-energy nexus can increase energy efficiency, decrease water pollution, reduce costs of energy and water delivery, increase access to services, and reduce greenhouse gas emissions. This workshop will discuss Water and Energy targets and indicators including cross-sectoral mainstreaming and water-energy nexus and other goals. Implementation challenges and lessons learned from the African Region and other regions will be shared to mainstream and implement water and energy nexus to achieve sustainable development goals.

Timeline, duration, and venue

This 3-day workshop will be organized from 4-6 September 2018 at the UN Conference Center of Economic Commission of Africa.

Meeting language

This event will be conducted in English.

Participants

Around 100 participants from African Region will join this workshop. Audience will be officials and practitioners from water and energy sectors. The workshop will also include expert inputs from UN Environment, UN-Water, SE4All, World Bank, African Union Commission, United Nations Economic Commission for Africa (ECA), African Development Bank and other international organizations.

Outputs

This workshop will contribute to 1) developing the capacity of governmental institutions and relevant stakeholders in the African region to effectively manage the water-energy nexus

and interlinkages with other SDGs for sustainable development to facilitate the implementation of the 2030 Agenda at national level; 2) enhancing knowledge management and best practices' sharing on the water-energy nexus and inter-linkages with other SDGs; 3) strengthening advocacy and outreach in the areas of energy and water and their interlinkages.

Annex 1b: The Workshop PROGRAMME

Tuesday, 4 September 2018	
9:00 – 9:30	*Registration*
9:30 – 10:00	**Opening Session** • **Welcome speech: Mr. Semu Moges,**Consultant on the Water-Energy Food Nexus and University of Connecticut, USA**/**Addis Ababa University, Ethiopia • **Mr. Jong Soo Yoon**, Head of United Nations Office for Sustainable Development (UNOSD) • **Mr. Samba Thiam,** Head, UN Environment Liaison Office to AUC, UNECA and Representative to Ethiopia • **Mr. Linus Mofor, a Denton**, **,**Senior Natural Resources Officer, United Nations Economic Commission for Africa (UN ECA) • **H.E. Dr. Abraha Adugna,** State Minister of Water, Irrigation and Electricity of Ethiopia(Representing **H.E. Dr.IngSeleshi Bekele Awulachew**, Minister of Water, Irrigation and Electricity of Ethiopia)
10:00 – 10:30	**Group Photo and Coffee Break**
10:30– 12:00	**Session 1:Setting the Context:** **Moderator: Ms. Birguy Lamizana,** Programme Management Officer, UN Environment • **Keynote speech:** Water and Energy for Sustainable Development **Ms. Birguy Lamizana,** Programme Management Officer, UN Environment **Panel Discussion:** • *Water and Energy Development as Entry Point to Major the SDGs Success* ***Ms. Isabel Raya****, Sustainable Energy Consultant, United Nations Department of Economic and Social Affairs (UN DESA)* • *Water and Energy Nexus Scientific Framework* ***Mr. Mark Haowells, Director, Division of Energy Systems Analysis, KTH, Sweden*** • *Water and Climate nexus and data availability* ***Mr. Solomon Gebrechorkos****, Programme Officer, Stockholm International Water Institute (SIWI)* • *Challenges and Opportunities in Mainstreaming and Implementing the Water and Energy Nexus* ***Mr. Manzoor Qadir****, Assistant Director, United Nations University Institute for Water Environment and Health (UNU-INWEH)*
12:00 – 13:30	*Lunch Break*
13:30 – 15:15	**Session 2:Water Statistics and Indicators Efforts** **Moderator: Mr. Tom Ogol,** Research Associate, Stockholm Environment Institute (SEI – Africa)

	• Water and Sustainable Development in Africa **Mr. Tom Ogol**, Research Associate, Stockholm Environment Institute (SEI – Africa) **Panel Discussion:** - *Water Indicators for Sustainable Development* ***Mr. Paul Yillia**, Research Scholar, International Institute for Applied Systems Analysis (IIASA)* - *Water Statistics in Africa* ***Ms. Olfa Mahjoub**, Assistant Professor, National Research Institute for Rural Engineering, Water, and Forestry (INRGREF), Head of the Chemistry Laboratory for Water-Soil-Biosolids Tunisia*
15:15 – 15:45	*Coffee Break*
15:45 – 17:30	**<u>Session 3:</u>Energy Statistics and Indicators Efforts** **Moderator: Ms. Meseret Zemedkun**, Programme Management Officer, UN Environment • Energy and Sustainable Development in Africa **Ms. Meseret Zemedkun**, Programme Management Officer, UN Environment **Panel Discussion:** • Energy Indicators for Sustainable Development ***Mr. Linus Mofor**,* Senior Natural Resources Officer, United Nations Economic Commission for Africa (UN ECA) • Energy Statistics in Africa ***Mr. Seth Mahu**, Deputy Director, Ministry of Energy of Ghana* • *NEPAD Regional Energy Trade and Challenges (?)* ***Mr. Mosad Elmissiry**,Professor, New Partnership for Africa's Development (NEPAD)* • *Energy Access Statistics in Eastern Africa* **Mr. Michael Kiza**, Programme Management Expert, Eastern Africa Centre for Renewable Energy and Energy Efficiency (EACREEE)
18:00 – 19:00	*Reception*
Wednesday, 5 September 2018	
9:00 – 9:30	*Registration*
9:30 – 10:15	**<u>Session 4.1:</u> Water and Energy Nexus** **Moderator: Riccardo Zennaro,** Associate Programme Officer, UN Environment • The Water-Energy Nexus under Water and Energy Scarcity ***Mr. Manzoor Qadir**, Assistant Director, United Nations University Institute for Water Environment and Health (UNU-INWEH)* • Water Nexus with Other Development Factors: Energy, Food Security, Gender, Poverty, Ecosystem and Climate Change ***Ms. Birguy Lamizana**, Programme Management Officer, UN Environment* • Energy Nexus with Other Development Factors: Water, Food Security,

	Gender, Education, Poverty and Health ***Mr. Alan Nicol,*** *Strategic Program Leader, International Water Management Institute (IWMI)*
10:15– 10:45	*Coffee Break*
10:45– 12:00	**Session 4.2: Water and Energy Nexus** **Moderator: Riccardo Zennaro,** Associate Programme Officer, UN Environment • New partnership to explore sustainable water and energy solutions ***Ms. Isabel Raya****, Sustainable Energy Consultant, United Nations Department of Economic and Social Affairs (UN DESA)* • Alternative and Low-Cost Technology in the Water and Energy Sectors ***Mr.Marco Aresti****, Access to Energy Senior Manager, RES4Africa* • New and Alternative Financial Mechanisms in the Water and Energy Sectors ***Mr. Salfiso Kitabo****, Country Director Ethiopia, Water.org*
12:00 – 14:00	*Lunch Break*
14:00 – 15:15	**Session 5:Challenges and Opportunities in Mainstreaming and Implementing the Water and Energy Nexus: Regional Cases** **Moderator: Ms. Eunhae Jeong,** Senior Development Management Expert, United Nations Office for Sustainable Development (UNOSD) • *Region 1: Northern Africa* **Ms. Rana El-Guindy**, Senior Specialist, Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) • *Region 2: Southern Africa* **Ms. Karin Reiss**, Energy Efficiency Expert, Southern Africa Development Community (SADC) Centre for Renewable Energy and Energy Efficiency (SACREEE) • *Region 3: Eastern Africa* **Mr. Michael Kiza**, Programme Management Expert, Eastern Africa Centre for Renewable Energy and Energy Efficiency (EACREEE) • *Region 4: Europe* **Mr. Jens Leibe**, Senior Programme Expert & Regional Focal Point for Europe, United Nations Educational, Scientific and Cultural Organization (UNESCO), International Centre for Technical and Vocational Education and Training (UNEVOC)
15:15 – 15:45	*Coffee Break*
15:45 – 17:30	**Session 6: Challenges and Opportunities in Mainstreaming and Implementing the Water and Energy Nexus: Country Cases** **Moderator: Mr. Linus Mofor,** Senior Natural Resources Officer, United Nations Economic Commission for Africa (UN ECA) • *Country 1: Ethiopia* **Mr. Mandefro Nigussie**, Director General, Ethiopian Institute of

	Agricultural Research • *Country 2: Ghana* **Mr. Seth Mahu**, Deputy Director, Ministry of Energy of Ghana • *Country3: Sierra Leone* **Mr. Paul Saffa**, Deputy Director, Ministry of Energy of Sierra Leone **Mr. Mohamed SahrJuanah**, Head of Water Resources, Ministry of Water Resources of Sierra Leone • *Country 4: South Korea* **Mr. Eun Namkung**, Professor, Seoul National University
Thursday, 6 September 2018	
9:30 – 11:30	**<u>Session 7: Closing the Gaps on Water-Energy Nexus in achieving the SDGs</u>** **Moderator: Mr. Manzoor Qadir**, Assistant Director, United Nations University Institute for Water, Environment and Health (UNU-INWEH) • Summary of 1st and 2nd Day • Group Discussions • Discussions of the Key Findings • Plenary Discussions
11:30 – 12:00	*Coffee Break*
12:00 – 12:30	**Wrap-up and Closing Remarks by the Ministry of Water, Irrigation and Energy of Ethiopia and United Nations Office for Sustainable Development(UNOSD)**
12:30 – 14:00	*Lunch Break*

Annex 2: List f Workshop Participants

No.	Title	First Name	Middle Name	Last Name	Title and Organization	Phone	Email	Country
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Annex 2: List f Workshop Participants (continued)

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Annex 2: List f Workshop Participants (continued)

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** Rapprteurs*

Annex 3: Welcome Remarks and Opening Speech

Annex 3a: Opening Remarks by the Head of UNSOD, Mr. Jong Soo Yoon

Honorable State Minister, Your Excellency , Dr. Abraha Adugna,
The Ministry of Water, Irrigation and Electricity of Ethiopia
Ms. Fatima Denton,
Director of Special Initiatives Division, United Nations Economic Commission for Africa (UNECA)
Mr. Samba Thiam,
Head, UN Environment Liaison Office to AUC, UNECA and Representative to Ethiopia

Distinguished participants, Ladies and Gentlemen

As a head of the UN Office for Sustainable Development, it gives me a great pleasure to witness such a big crowd on this important workshop for the continent of Africa.
UNOSD is established to support U.N. Member States in planning and implementing sustainable development strategies, through knowledge sharing, research, training and partnerships. UNOSD is part of UNDESA and located in Incheon, Republic of Korea.

Our core guiding principle includes promoting systems approach for sustainable development emphasizing the inter-linkages among the environment, economy, and society, *primarily supporting the national sustainable development planning processes in the South*. We do it through drawing numerous world-leading institutions and experts, and filling identified gap in the SD knowledge, bringing together and fueling synergies between researchers and capacity-building institutions.
As you are well aware, energy and water resources are central to sustainable development, and improved access to both water and energy can play a vital role in advancing progress in other areas such as health, education and poverty eradication.

Integrated approach to water-energy can increase energy efficiency, decrease water pollution, reduce costs of energy and water delivery, increase access to services, and reduce greenhouse gas emissions.

Against this backdrop, UNOSD in association with the UN partner agencies and the Ministry of Water irrigation and Electricity of Ethiopia organized this important and technically viable continental workshop in the African city of Addis Ababa, Ethiopia.
I would like to take this opportunity to thank the Minister for Water, Irrigation and Electricity of Ethiopia, Honorable, Dr. Seleshi Awalachew who actually proposed this event. I also thank UNECA and UNEP for their partnership and tireless effort to bring this workshop

into a successful start. I also extend my appreciation for the organizing team, and the facilitators and moderator on the ground.

Distinguished participants, Ladies and gentlemen,

This workshop will discuss primarily the *Water and Energy targets* and *indicators of the SDG* including cross-sectoral mainstreaming and nexus approach to water and energy goals. The workshop will also share implementation challenges and lessons learned from the African region and other regions in the world.

As over 100 officials and practitioners from water and energy sectors from African Region participate in this workshop, we are convinced the knowledge and experiencegained from the workshop will be widely applied and disseminated across sectors, and institutions in Africa.

The success of SDG implementation and ultimate water, energy and food security of the continent hinges on you and the many of experts and policy makers determined to change the profile of the continent by 2030. Together, we can push the boundary of performance challenges and realize the UN motto of **'No one will be left behind'** in Africa.

We and the partner agencies of the UN are behind you for this noble motto. We highly expect this workshop to contribute to capacity development for effective management of the water-energy nexus and understand the interlinkages with other SDGs at national level and embolden the advocacy and outreach capacity of the African experts in the areas of energy and water.

Wishing you a successful workshop deliberation and fruitful recommendation, I wish to welcome you all.
Thank you

Annex 3b: Opening Statement by the Head of UN Environment Liaison Office to AUC, UNECA and Representative to Ethiopia, Mr. Samba Thiam

Workshop on Mainstreaming and Implementing the Water-Energy Nexus in Africa

4-6 September 2018 – Addis Ababa, Ethiopia
Opening Statement by Mr. Samba Thiam – Head, UN Environment Liaison Office to AUC, UNECA and Representative to Ethiopia

Minister, Excellencies, Distinguished participants,
Dear colleagues,

It is a great honor to be together with you today at this **Workshop on Mainstreaming and Implementing the Water-Energy Nexus in Africa.**
Let me start by expressing our gratitude to our hosts, the **United Nations Commission for Africa**, for giving us the opportunity to meet here and benefit from the experiences and contributions of the participants on how to mainstream and implement the water-energy nexus in the African continent.

I would also like to extend my appreciation to the **Ministry of Water, Irrigation, and Electricity of Ethiopia.** Special thanks go to our colleagues of the **United Nations Office for Sustainable Development**, for the opportunity to co-organize this workshop, and for the excellent co-operation and support, which made it possible for all of us to convene here today.

Distinguished participants,
Access to water and energy is a **crucial issue** in our daily life. Water and energy are **key factors** of sustainable development and are inextricably linked. For example, water is used for producing and distributing energy into the grids, while energy is necessary for treating and delivering water to our homes. We tend to forget how the two are **strictly related to each other**. On the contrary, we are aware of this linkage when access to water or energy is limited, and there are consequences for human beings, especially vulnerable and poor communities, and the environment too.

This is the reason why the water-energy nexus is a **key enabler** of sustainable development and crucial to reach the targets of Agenda 2063 and the Sustainable Development Goals under Agenda 2030. Two are the SDGs that directly relate to the nexus: **SDG 6**, namely "Clean Water and Sanitation" is about ensuring access to water and sanitation for all, while **SDG 7**, "Affordable and Clean Energy" focuses on access to affordable, reliable, sustainable and modern energy for all. These SDGs are highly

dependent on the success of one another, and this is something that cannot be ignored. To provide current and future generations with drinking water services and affordable and sustainable energy, we need, therefore, a **comprehensive approach** when managing these two, vital resources.

Furthermore, the water-energy nexus is more than just water and energy alone. It also encompasses the **social, economic, and environmental dimensions**. In the African continent, **population growth** and **urbanization** are driving the water and energy demand to unprecedented records. Also, key sectors such as agriculture and industries are growing fast and contribute to putting additional pressure on the existing water and energy resources.

Despite the **economic growth**, in some areas of the African continent, the livelihoods of many are threatened by the already tangible effects of **climate change**: water scarcity, pollution, higher electricity demand, lower energy efficiency, is just a few of the many consequences of this global phenomenon. This highlights that the choices we make in the water or energy sector will inevitably have consequences, regardless if positive or negative, in the other sector, and on multiple aspects of our daily lives.

Distinguished participants,
UN Environment is the **leading authority** setting the global environmental agenda, and our mission is to provide **leadership and foster partnerships** among people and nations for protecting and restoring our environment, and for achieving the 17 Sustainable Development Goals. Our organization also acts as an **authoritative advocate** for the global environment, making sure that the environmental dimension is well integrated into all aspects of sustainable development.

In the field of **water**, UN Environment works together with partners and governments to promote the sustainable management, protection, and restoration of aquatic ecosystems in an integrated manner. This encompasses, for example, monitoring water quality, tackling global water pollution, and building resilience against conflicts and disasters, such as floods and droughts.

Together with water, **energy** is another a crucial part of our work. We work together with governments and key partners to ensure that sustainable energy practices become the paradigm in Africa, and globally. To do that, it is key to enhance the use of renewable energy and improve energy efficiency in our countries and cities.
This is the reason why UN Environment focuses on creating the **enabling conditions** that drive these changes in the water and energy sectors, including producing **solid scientific knowledge**, **sound policies**, **catalyzing investments** and **supporting technology transfer and**

sharing of best practices. In these efforts, we also **collaborate** closely with partners, such as UN-Water, Sustainable Energy for All, and other key stakeholders.

Dear Colleagues,

The **composition of the participants** for this workshop highlights the relevance of the water-energy nexus, as well as the importance of building knowledge and raise awareness on this subject throughout the Africa region. In addition to members of the Ministries, we are pleased to have with us representatives of UN organizations, research institutes, and academia, think-tanks, and NGOs. Before concluding, I would like to underline that this workshop is key to **develop the capacity of governmental institutions and relevant stakeholders** from the African continent. These days are an opportunity to meet and work together to identify the challenges, solutions, and opportunities related to mainstreaming and implementing the water-energy nexus in Africa. The workshop will also serve as a platform to **share good practices**, **build knowledge**, and **strengthen advocacy** around the nexus. Overall, the discussions will also help identify the **way forward**.

With this, I would like to conclude my remarks, and I look forward to benefiting from the concrete results of this workshop.
I wish you all a fruitful meeting.
Thank you.

Annex 3c: Welcome and opening remarks on behalf theDirector of Special Initiatives, UNECA, MsFatima Denton (Mr. Lunus Mofor)

Workshop on Mainstreaming and Implementing the Water-Energy Nexus for Sustainable Development in the African Region

4 – 6 September 2018
Conference Room 3, UNCC, Addis Ababa, Ethiopia

Welcome and opening remarks on behalf Fatima Denton

Your Excellency **Dr. Abraha Ashenafi**, State Minister for Irrigation Sector, Ministry of Water, Irrigation and Electricity of Ethiopia,

Mr. Jong Soo Yoon, Head of United Nations Office for Sustainable Development

Mr. Samba Thiam, Head, UN Environment Liaison Office to AUC, UNECA and Representative in Ethiopia

Distinguished delegates, Ladies and gentlemen

Good morning.
It gives me great pleasure, on behalf of **Dr Fatima Denton, Director of Special Initiatives** here at the United Nations Economic Commission for Africa, to welcome you to this very important meeting on **Mainstreaming and Implementing the Water-Energy Nexus for Sustainable Development in Africa.** We thank the United Nations Office for Sustainable Development and the Ethiopian Ministry of Water, Irrigation and Electricity for inviting us to partner with them, UN Environment and UNDESA to organise this meeting.

This meeting comes at a very apt time.

The **2018 High Level Political Forum** of the United Nations held in July 2018 under the theme "**transformation towards sustainable and resilient societies**".

The Forum reviewed six of the **Sustainable Development Goals**, including**SDG 7 on Affordable and Clean Energy** and **SDG 6 on Clean Water and Sanitation**.

Although all the SDGs are interlinked, the nexus between water and energy is particularly strong, especially against a background of changing climate.

African countries are **already experiencing catastrophic climate change and variability impacts** in inter-related ways across many sectors - including water, agriculture, energy, ecosystems and infrastructure.

Yet, African economies are strongly dependent on these climate sensitive sectors.

Therefore, building **sustainable and resilient economies** in support of Africa's transformation - as encapsulated in the UN 2030 Agenda for Sustainable Development (**leave no one behind**) and Africa's bigger Agenda 2063 (**the Africa We Want**) - does require climate-informed and integrated strategies and approaches, especially given the **megatrends such as population growth, rapid urbanization, industrialization and climate change that will have huge impacts on the demand for water and energy**.

Climate change is a consequence of how we have globally **configured our economies and usedour natural resources**.

Rethinking our development models and resource efficiency requires **holistic thinking** – a nexus approach.

That is why for us at the ECA the nexus work is of high importance, especially in view of**how we support our member States with the implementation of their nationally determined contributions (NDCs)** to climate change under the framework of the Paris Agreement.

This is particularly important given that most African countries have **NDC actions related to energy and water**. A nexus approach is thus crucial for efficient and effective **implementation of the Paris Agreement**.

That is why we are **conducting pilot country studies on integrated climate, land, energy and water strategies approach**, including Ethiopia, Sierra Leone and Cameroon.

We are also looking at the **climate, energy, food and trade nexus**, especially in view of the Africa Continental Free Trade Area – the biggest trading zone in the world when it becomes operational to assist member States capitalise on climate change and trade to strengthen their economies.

The importance of the nexus approach to **building resilience** cannot be over-emphasised.

The case of hydropower – which is key in Africa's energy mix – illustrates this well.

Through our studies with the World Bank on enhancing the climate resilience of Africa's infrastructure it was shown that **in some river basins under certain climate scenarios, power production could drop by as much as 60% and energy costs increase three-fold to consumers**.

Of course, we know what happened to the Kariba Dam two years ago when the drought induced by an **unusual El Nino almost shut down hydropower production**, with huge economic and social consequences for Zimbabwe and Zambia - who depend very much on the electricity from the Kariba.

Yet, many African countries will be investing **100s of billions of dollars in hydropower development**. Those investments could become stranded assets if resilience is not build into their planning and implementation. This calls for strong nexus approaches.

That is why together with the World Bank, the African Union Commission and the African Development Bank, we have established the **Africa Climate Resilient Investment Facility (AFRI-RES)** with initial funding from the Nordic Development Fund.

AFRI-RES aims to **strengthen the capacity of African institutions and project developers to plan, design, and implement investments resilient to climate variability and change in selected sectors – particularly the water and energy sectors**.

We look forward to **building more partnerships** to promote the **nexus approach to building resilience in Africa**, and to **learning from our member States** here present about their experiences with **mainstreaming the nexus approach in the implementation of their national development plans**.

We wish you great deliberations and hope that over these next three days we will come up with **strong messages and action orientation** for better support to member states on implementation of the SDGs.

But, we also hope that during all that hard work you will also find time to enjoy our beautiful city of Addis Ababa and all the rich culture and experiences it has to offer.

Thank

Annex 3d: Opening Speech by H.E. State Minister of MOWIE, Abraha Adugna

Distinguished participants of the continent,
Dear heads and representatives from UN agencies OSD, ECA and EP
Distinguished keynote speakers, session moderators and panelists of this workshop
Ladies and Gentlemen

I am honored to be among you today, and deliver the opening speech on behalf of H.E. the Minister of Water Irrigation and Electricity, Dr. Seleshi. I wish to apologize for him not being able to come today. He has left to china for similar pressing agenda to participate china-Africa economic cooperative forum.

First and for most I would like to thank and congratulate the organizing committee from UNOSD, UNECA, UNEP and my Ministry to bring together a successful technical workshop that helps as a market place for mainstreaming ideas and promote dialogue and experience sharing.

Secondly, I would like to extend my humble appreciation to all participants for your keen interest to participate in such important and timely workshop to discuss and share thoughts on the linkages between these inseparable items water and energy.

Distinguished guests, Ladies and Gentlemen

Water and energy are indeed closely interlinked and interdependent. Energy generation, in its many variants, requires utilization of water resources. Conversely, considerable amount of energy generation is used for pumping, treating and transporting water to various consumers.

Water and energy problems are also intrinsically connected to the extent that they cannot be addressed in isolation, at the expense of each other. Despite that inherent connection between the two sectors, energy and water planners tend to routinely make decisions that impact on each other without adequately understanding the scientific or policy complexities both entail.

Solutions should not consist of promoting alternatives intended to sort out the energy problems at the expense of aggravating water scarcity; and on the other hand, improving access to water at the expense of aggravating energy problems or, even worse, promoting alternatives attempting to improve access to water and energy at the expense of the environment.

Distinguished guests, ladies and gentlemen

It is critical to better understand the water -energy nexus and the driving forces of the water and energy cycles; feedback relationship for efficient and sustainable use of these resources.

In order to manage both water and energy, planners and decision makers need to consider ways that can maximize the supply of one while minimizing the over use of the other.

The smart grasp of the water-energy nexus becomes even more imperative as we have to face the rapidly growing effects of climate change which acts as a stressor of the already -intense competition over water and energy resources.

Mindful of those strong energy and water linkages, the Government of Ethiopia through the Ministry of Water, irrigation and Electricity, has currently embarked on the protection of catchments critical for energy production and water supply, and we are planning to do more during the next years as highlighted in our GTP and SDGs, relevant to water and energy resources.

Beyond the necessary quick wins, we will be refining the interface between the policies and strategies for water and energy, to better capitalize on that nexus, not forgetting other sector that is equally interdependent with them that is food security to nexus water-food-energy.

Distinguished guests, Ladies and Gentlemen
In September 2015, the 2030 Agenda for Sustainable Development was adopted by UN General Assembly. The Agenda consists of 17 SDGs, each goal is organized with a series of targets and corresponding indicators that help measure the achievements. The General Assembly acknowledged the limits of our current economic growth based model of development and commits to the principle that human prosperity can only be achieved through sustainability.

It is also acknowledged this sustainable model of prosperity needs to be the product of a universal endeavor, comprehensive stakeholder collaboration, and systemically interacting changes in economic*, social and environmental dimensions.* As a result, all nations seeking economic prosperity commit to resolutions that address the needs of all people with well-

defined social objectives without compromising ecological stability. Such a change requires *strategies and public policies* to move from *sectoral* to *holistic* planning and interventions, using *integrated, systemic* analysis that connects all *relevant stakeholders and institutions*, and *threads coherent policies* between sectors and regions, and across scales.

To deliver on those objectives, the Resolution of the 2030 Agenda explicitly mandates the UN System to support all Member States in *closing the implementation gap*, notably for reaching the SDGs. "Mainstreaming and Implementing the Water-Energy Nexus for Sustainable Development in the African Region" is one of these series of workshops intended to contribute to

1) developing the capacity of governmental institutions and relevant stakeholders in the African region to effectively manage the water-energy nexus and interlinkages with other SDGs for sustainable development to facilitate the implementation of the 2030 Agenda at national level;
2) enhancing knowledge management and best practices' sharing on the water-energy nexus and inter-linkages with other SDGs;
3) Strengthening advocacy and outreach in the areas of energy and water and their interlinkages.

Distinguished guests, Ladies and Gentlemen

The 17 SDGs are interconnected goals with clear targets, indictors and measurement tools. As much as the SDGs are interconnected and indivisible, understanding the underlying interlinkages and concurrent planning to the implementation of all agenda items is far from achievable to many countries if not to all countries. How countries prioritize development objectives and initiate implementation strategy is left up to the objective reality of each country.

However, as of recent, there has been much debate on the wisdom of selecting *priorities* among the SDGs, fearing a neglect of other SDGs, and relapse into isolated sectoral approaches. Such relapse would defeat the very purpose of integrated policy strategies by obfuscating system dynamics of interlinkages, feedback loops and collaborative institutional arrangements. For this reason, more and more stakeholders recognize an approach of *SDG entry points* instead of *priorities*. Since all SDGs are likely to have one- or two-degree connections to at least one entry point, the approach not only highlights major system drivers, but also anchors them within the overall system dynamics. In My Ministry of Water, Irrigation and Electricity, we have initiated mainstreaming strategy based on this concept of entry point approach. I also believe this workshop is organized in this spirit of initial entry point.

Dear participants, ladies and gentlemen,

I expect the workshop will deliberate pertinent issues of capacity development, resources mobilization and the way forward to mainstream the water, food and energy nexus approach in the context of Africa.

The challenge of implementation of SDG and the Water-Energy Nexus is far more difficult and daunting in developing countries. Ninety five percent of the urban development occurs in developing countries, rapid population growth occurs in the developing countries and climate change/variability may harshly affect developing. More than any other continent, the reference baseline of Africa is highly dynamic like a moving target in time and space. This circumstances calls for collaborative approach. Policy and Decision makers from Africa are required to create an army of youths with sufficient technical skills and knowledge. Without home grown capacity and knowledge, success in SDG becomes difficult to achieve.

Distinguished guests, Ladies and Gentlemen

Allow me to conclude my remarks by once again thanking you for turning up for this activity. I was informed that you will be exchanging on a number of important topics relevant to Water-Food-Energy nexus. I am with no doubt that your contributions will enrich our approach to harnessing the linkage I highlighted above and, how they can further influence our water and energy management systems.

It is my convection that your deliberation on this timely subject will enlighten and pave ways if developing this concept to reach the defined level of utilization of our resources in sustainable basis and catching all advantage. I believe you are aware of your complex topic and its associated challenge. Your general subject is to enable the survival of human kind.

With this few words I once again, welcome to Ethiopia and let me also thank the organizer of this event and all our partners for their invaluable support to the water, food and energy nexus.

I wish you successful deliberations

Annex 4: Detailed Workshop Sessions

Session 1 – Setting the Context

The first session is intended to set the workshop tone by providing context to the status of water and energy in Africa and introducesthe benefits of nexus approach to water and energy development in the continent. The session consists of keynote speech and panel discussants.

Moderator and Keynote Speaker:

- **Ms. Birguy Lamizana,** Programme Management Officer, UN Environment

Panelists:

- ***Ms. Isabel Raya****, Sustainable Energy Consultant, United Nations Department of Economic and Social Affairs (UN DESA)*
- ***Mr. Mark Howel****l, modeling tools*
- ***Mr. Solomon Gebrechorkos****, Programme Officer, Stockholm International Water Institute (SIWI)*
- ***Mr. Manzoor Qadir****, Assistant Director, United Nations University Institute for Water Environment and Health (UNU-INWEH)*

Keynote Speech:

Ms. Birguy Lamizana,the Programme Management Officer at UN Environment delivered a keynote speech entitled *Water and Energy for Sustainable Development.* Ms. Birguy highlighted the following key issues for water and energy in Africa;

- Access to clean water and energy for many developing countries is still a dream and emphasized lack of access is challenging to women. In many parts of sub-Saharan Africa, girls are still responsible for firewood (energy) and water collection as a result they are vulnerable to attacks and health problems (firewood smoke). Almost 85% of the estimated 2 million deaths is related to cancer and lung disease linked to firewood smoke/non-clean energy.
- Water and Energy access gap is compounded by the growing population, urbanization and climate change.
- She recognized lack of data as one of limiting factor for decision making in the continent
- Subsidies in the continent were recognized as less incentive to save water

Panel discussion:

The first panelist ***Ms. Isabel Raya,*** energy policy consultant at the United Nations Department of Economic and Social Affairs (UN DESA) provided information about the role of UN DESA, as secretariat to the 17 SDG goals, to promote and facilitate the global processes and forums related to SDGs. Secondly, she underlined the importance of the

High-Level Political Forum (HLPF), the main platform for follow-up and review of the SDGs, as well as its voluntary review mechanism through which countries can report on the status of implementation of the SDGs of respective countries. In the 2018 edition of the HLPF, voluntary reviews have been submitted from 46 countries,12 of themfrom Africa. Each SDG is reviewed every four years at the HLPF. In 2018, the technical review of SDGs 6 & 7 took place. She invited the participants to visit the UN DESA website (https://sustainabledevelopment.un.org/vnrs/)to find out more about the voluntary national reviews and outcomes of the HLPF. Despite the positive global efforts taken towards implementing the SDGs, Isabel alluded the important challenges related to governance, institutional framework and capacity. She finally highlighted a few recommendations towards accelerating the implementation of the SDGs, particularly those on water and energy (SDG6 and SDG7):

- enhance the political and Institutional aspects taking into account the local context and capacity building
- Continue using evidence-based knowledge, build knowledge and rely on science and scientific research outputs.
- Build alliances and partnership between the water and energy sectors, as well as with other SDGs. Strengthen partnerships with stakeholders from all sectors and constituencies, including financial aspect.

The next panelist was MR. Mark Howell. He joined the meeting from Sweden by Skype Mr. Howell summarized his contribution in three points

- The reality is the systems/resources water & energy, land& climate are interlinked. The demands for these resources are growing. Nexus understanding helps to analysis these interactions and his group established a nexus modeling framework known as CLEWS for this purpose.
- The nexus tools provides understanding of resources from policy maker perspective other than pure academic exercise. He gave evidence from Nubian aquifer where solar power is used for irrigation without batteries. It is shown that pumping water during the day to reservoirs and during the night uses that water. *Storing water is cheaper than energy storing.*
- Mr. Howell also indicated some common challenges in Africa that may be analyzed and solved through nexus approach. In Zimbabwe, $1/4^{th}$ of economy can't work because of upstream extraction of water in hydropower and drought issues. In Uganda, hydropower is expanding and the risk of future climate change is not well addressed.
- Mr. Howell informed the participants to use the nexus models his team developed. The following open source tools and training materials are available online:
    - CLEWS online – interaction modeling
    - osmosis online - energy modeling platform
    - onset online – electrification modeling

The third Panelist was Mr. Manzoor .MR. Mansoor emphasized on the importance of stepping up implementation of the SDGs.He pointed out that after 3year into the SDG, we are lagging behind in all SDG targets. He also viewed his concern to the human aspect of SDGs. He mentioned that during Obama era water was googled more than Obama showing the importance of water. He also eluded the importance of transforming institutions to respond to the nexus requirements of SDG.

The Last Panelist, ***Mr. Solomon Gebrechorkos***, from Institute for Integrated Management of Material Fluxes and of Resources, UNITED NATIONS UNIVERSITY (UNU-FLORES) briefed on the need and challenges of getting good quality data for nexus modeling, and understanding of the impact of climate change on these resources. Lack of long term observations on climate, hydrology, and other data sources impends our drive to understand the long term nexus and climate change issues. Mr. Solomon highlighted the strong link between water and energy with climate in Africa. Mr. Solomon remarked climate variability is more important than climate change in Africa. In terms of climate change, he discussed the seasonal shifts in short-term rainfall is projected in the east Africa area.

Key messages from this panel discussion are

- The human aspect of nexus is either missing or not properly understood in the context of water and energy security. This need to be incorporated.
- Implementation and monitoring of SDG targets is complex and there is urgent need for collaboration and partnership.
- Application of nexus tools need to be identified and used. These tools are helpful to minimize cost and maximize benefits.
- Our environment and water sources are deteriorating, lack of sufficient data and future prediction uncertainty requires enhancing management of the resources and our capacity to manage resources utilization.

Session 2 - Water statistics and indicator efforts

Moderator and Keynote Speaker:

- **Mr. Tom Ogol,** Research Associate, Stockholm Environment Institute (SEI – Africa)

Panelists:

- ***Mr. Paul Yillia****, Research Scholar, International Institute for Applied Systems Analysis (IIASA)*
- ***Ms. Olfa Mahjoub****, Assistant Professor, National Research Institute for Rural Engineering, Water, and Forestry (INRGREF), Head of the Chemistry Laboratory for Water-Soil-Biosolids Tunisia*

In his speech, ***Mr. Ogol*** reminded us the water goal (SDG 6) has 7 targets to be achieved by 2030 and 11 monitoring indicators. He emphasized the importance of mainstreaming in national plans and achieves the targets by 2030. He alluded to the important water statistics to measure the progress of SDG achievement. Eighty percent of human activities are discharged to water bodies, 16% of electricity production is from hydropower& 70% deaths occur from water related disasters and1.4 billion people live in river basins where water use is exceeded. He also alluded on the importance of the nexus tools to understand and build scenarios under such circumstances. He challenged our conventional understanding of the relationship between water and water use in Africa need to change. For instance, the conventional thinking that *'plants need rain'* needs to be changed *'plants need water.* The burden of taking water to plants and other uses need to fall on us.

Panel Discussion:

The first Panelist, ***Mr. Paul's*** contribution was on the importance of moving from advocacy to mainstreaming and implementation of nexus approach to water and energy development targets in Africa. He cautioned lack of data, shortage of finance, knowledge and skill limitation for integrated monitoring and understanding of nexus issues will become daunting . He emphasized the importance of targeted training and capacity development, building centralized national databases and political will for research and development and innovative financing mechanisms in the continent.

The next panelist, Ms. Olfa, brought her experience from North Africa (specifically from Tunisia) and raised the importance of resource recovery as a strategy for water and energy security. She elaborated integrating the resources recovery as one of the recommendation of water security. A report is published in 2014 by AfDB supporting a resources recovery approach in Africa. She also emphasized on the importance of research and development to generate evidence based decision and policy making in the continent. She calls for policy

makers to be willing to invest in research and development. She is cautiously pessimistic on the success of nexus approach without concerted research and development efforts in the continent.

Q & A session

Key Messages and way forward:

- *There should be a realistic political will from policy and decision makers for achieving SDGs.*
- *Identification of the real problems and challenges should be identified through an assessment before we go for planning to implement the SDGs.*
- *We need to harmonize our efforts with the global standards and indicators.*
- *Water is very central to all SDGs and the broader development agenda. Water need to be considered as entry point and start implementation of universal access.*
- *Addis Ababa Action Agenda 2030is pushing countries for local financing, countries need to start investing from government treasury sources if the SDG plans are to be achieved.*
- *African countries need to work hard to access funds available from different sources including the GCF.*

Session 3 - Energy Statistics and Indicators Efforts

Moderator and Keynote Speaker:

- **Ms. Meseret Zemedkun**, Programme Management Officer, UN Environment

Panel Discussion:

- ***Mr. Linus Mofor,*** Senior Natural Resources Officer, United Nations Economic Commission for Africa (UN ECA)
- ***Mr. Seth Mahu****, Deputy Director, Ministry of Energy of Ghana*
- ***Mr. Mosad Elmissiry****, Professor, New Partnership for Africa's Development (NEPAD)*
- **Mr. Michael Kiza**, Programme Management Expert, Eastern Africa Centre for Renewable Energy and Energy Efficiency (EACREEE)

Keynote Speech:

Ms. Meseret presented her keynote speech on 'Energy and Sustainable Development in Africa.' She stated how Africa is addressing the energy development issue from policy perspective. She mentioned Africa is trying to address the energy agenda through its Continental Agenda 2063, Global Agenda, the SDG 2030, Paris Agreement 2015, UN Sustainable Energy for all (UNSE4ALL) and regional policy process coordinated by AMCEN mainly implemented by National Governments.

*1. Energy security in Africa is highly interrelated with poverty and has multi-dimensional implications.*Ms. Meseret iterated poverty and energy security is interrelated and has a multidimensional social, economical and environmental implication in the continent. The social dimension is reflected in that energy poverty leads to food and water insecurity and that leads to poor health and wellbeing. Thisis heavily reflected in gender inequality and inadequate education. The economic dimension are reflected energy insecurity resulting in blackouts, load shedding, power surges leading to low economic productivity, high utilization of fossil fuels and generators resulting in price hicks and poor performance of the economy. The environmental dimensions of energy poverty are reflected through various forms of environmental degradation as people tend to depend on firewood (depleting forest coverage) as their energy sources.

2. *Energy security in Africa will likely face enormous development and energy access challenges due to rapidly increasing* population growth, urbanization, sustained economic growth, climate change. Though the continent is estimated to have vast non-renewable energy sources, its use may be limited by environmental concerns. In the flip side, the continent can tap into the enormous renewable energy sources available through tapping into finance, and technology from different sources including the government. There is a need for firm commitment by governments to tackle the energy problem in Africa.

3. Developing energy security and meeting sustainable development Agenda for Energy by 2030 (SDG7) requires massive investment in energy sector. The African Energy Atlas2017 shows an estimated 600 million has access to electricity, Over 730 million Africans rely on traditional fuel sources. An estimated amount of $34.2 Billion/year investment is required to be able to meet the SD Agenda 2030 energy targets. If we move with the current trend of Business as usual (BAU) scenario, universal access to electricity could only be attained by 2080. In addition to energy investment, energy efficiency and overall energy sector management is important.

Current Energy Supply status

Currently 51% of energy is supplied from fossil fuel and 42% of the energy is supplied for industry followed by 32% household and there exists about 90 thousand km power transmission line but there is no unified or standardized specification for the transmission line. There is a huge energy access gap in the continent ranging from less than 25% access to greater than 75% access. Energy investment gap, energy efficiency are also issues of concern. If one can save energy with available saving opportunities and increasing efficiency this is an advantage for the sector.

Energy Development Challenges

Absence of coherent policy, regulatory framework, capacity, financing and investment, data, poor transmission and distribution infrastructure

Energy Development Opportunities

The presence of both RE and NRE sources, policy commitment, funding sources, improved technologies,…are opportunities. The presences of various global, continental and regional programs are also opportunities

In summary

Ms. Meseret summarized her presentation by emphasizing on the need for i) harmonized policies, institutional and regulatory framework and paradigm shift towardsa *Decentralized, Decarbonized, Digitalized and Democratized (4Ds) Energy Services"* to achieve Universal access by 2030 and continue with Agenda 2063; ii) capacity and skill development for effective implementation of the 4Ds for improving access to energy, iii) strong regional integration and partnership to jointly and effectively pool resources and capacity to enhance access to sustainable energy and mitigate climate change impacts.

Panel Discussion

Prof. Mosad Elmissiry from NEDPAD elaborated the continental energy target for Africa by 2063. The Africa Power Vision (Agenda 2063) targets to achieve 90% and 80% energy access to industry/commerce and domestic services respectively by 2063 in contrast to 100% universal access presented in the energy SDG (SDG 7) Agenda 2030.

1. What is Africa doing to achieve SDG7 targets? Prof. Mosad Elmissiry alluded the existence of initiatives at continental level such as i) Program Infrastructure Development Africa (PIDA), which focuses both on power generation and transmission, and ii) NEPAD Africa Transmission Network Master Plan which divides Africa into 5 regions but eventually link all the 55 African countries. Some countries are already linked to Europe. and already Morocco is linked with Europe and Egypt with Jordan (Asia) and the ultimate vision is to export energy.

At the end the idea is the demand for energy is satisfied frommore competitive source and might not be necessary to generate power where it is not economical.

Policy harmonization

Each country should develop their own policy which is clear / focused / and transparent and then harmonize theirs with others

Based on their policies they should develop projects which are bankable / financially feasible and then one could exploit available funding avenues and request support.

Regional Level

Eastern Africa

Inititatives

At Eastern Africa level :

There is Power pool which includes Ethiopia and Power Master Plan to increase generation and transmission as a result Kenya Power access increased from 24% in 2013 to 60% currently and Uganda from 15% to 27%.

There is also an initiative to use improved stove for people using biomass (90% of population) and regional strategy to improve energy efficiency and there is a lot of investment based on existing policies and initiatives.

Challenge

East Africa has common market with customs union. The big challenge is absence of common standard andcurrently there is project for harmonizing standard for energy products and required minimum energy efficiency supported by SIDA.

Country Level

Ghana

Situation / Status

There were policies that would ensure sustained growth in energysectorbutimplementation of policies is in Silos no integration for all SDGs. Inter ministerial committee that would inform policy formed and efforts made to bring all political parties to avoid starting from zero when political power changed.

Currently the electricity access is about 85% in urban and 60% in rural and Ghana has a plan to achieve Universal Access by 2030 with a number of initiatives and partnership.

Financing

All avenues of funding donors, development partners and government budget is going to be usedand the percentage of RE should increase by 2030.

Regional Integration

Harmonization of the market instruments, tax regime and promoting regional integration is expected from ECOWAS.

Mr. Sahle – Ethiopia

Situation

Ethiopia is a country where there is the lowest electricity coverage. But there are plans based on which the economy is led GTP 1 and 2.

However in a country where 70% of the population is youth how to engage them should be an issue.

Moreover the key is it is not sufficient to have plans but one has to mobilize fund both from local and abroad and frequently monitor and evaluate implementation and make remedial measures timely.

Sera Leone

Situation

There is West African Power Pool 4 pools and also there is power purchase agreement. Special feature is in the transmission line rural electrification is improved from shield system technology that can extract up to 3 MW from major transmission line.

Clean cooking stove utilizing LPG was also raised but its practicality considering economic reasons is challenged and was also raised ECOWAS has the best cooking stove program.

Linus/ UN

Day dreamer's concept with appropriate policy, institutional and human capacity and finance above all political will and commitment like in SA/Zambia/ Sudan and Ethiopia is required. But not political will only frequent monitoring and evaluation.

There should also be enabling environment to attract private investment. But an injection from the participants: Clear regulatory framework that will ensure delay in execution and the loss due to that is compensated. Investors need to invest and get return in time and need a guarantee that is the rule of the game.

Other points raised

- There should be program on industrial energy efficiency and energy audit and the necessary capacity should be built in this regard as there is capacity limitation
- Neglect of community and top to bottom approach if it were bottom up approach starting from administrative council SDG targets could have been different hence community participation is key for setting all targets whether SDG or Agenda 2063.
- A best practice of SDG involving youth in COP and also monitoring local activities towards various targets (Age 9 to 25)
- Another key challenge is income poverty which leads to energy poverty. But as energy is an enabler you need to tackle income poverty with energy access

Panelists last remarks / Presented as solutions

- Political will is key for achieving SDG7
- Focusing only transmission is not sufficient it should be coupled with generation
- Solutions come from the country itself with their own target and achieving SDG7 goal is not realistic
- Harmonizing countries and regional energy statistics data/ data quality/ access definition is necessary as it varies from country to country
- Industrial energy efficiency and minimizing distribution losses (technical and non-technical will save energy and should be priority

- In the current situation as energy prices/ tariffs are heavily subsidized there in incentive to be efficient
- There is no shortcut there should be right structure and investment to achieve targets
- Data collection for energy planning is key
- Promotion of decentralized planning and implementation is necessary
- Integration of energy social and environmental aspects with community is necessary
- To materialize goals members states should be legal accountability.
- Policy harmonization and implementation continuous monitoring is necessary
- There is a need to have National strong champions to achieve SDG7 who plan /implement and closly monitor
- We have to exploit current technology advance – cheaper solar power for example recent inventory in Ethiopia
- Supporting SME and standardization is key

Final Summary

- Africa should have been interconnected already we are late
- SDGs are aspirations and Paris agreements are action plans but we have to be wise on how to use our governance system to see Paris Agreement a donor optimistic ring to make our day dream a reality and ask always are we doing it in NEXUS.

Key Messages

1. The achievement of the SDG7 targets is unlikely with business as usual approach considering the current level of access to energy in Africa and the required commitment in all aspects: political, institutional, technical, human and financial capacity
2. In order to go in the right direction towards achieving SDG 7 strong political will and commitment by National Governments is key through improvement of the governance system to attract substantial private investment through strict regulatory framework that brings confidence on investors.
3. Based on strong national policies, strategies and goals regional harmonization and integration is required in order to have a unified power system with agreed standards for data, indicators, energy appliances and even definition of access to energy
4. It is not sufficient to have good policies and strategies and goals and through them begin implementation, to achieve SDGs there should continuous and periodic monitoring and evaluation to see where we are and get lessons and improve performance.

5. Involving communities while setting targets and goals rather than top down approach is key to success of intervention in the energy sector too.
6. Utilizing recent technology advances and being led by science and knowledge is key to achieve SDGs target

Section 4.1 Water and Energy Nexus

Moderator:

- **Riccardo Zennaro,** Associate Programme Officer, UN Environment

Presenters:

- ***Mr. Manzoor Qadir****, Assistant Director, United Nations University Institute for Water Environment and Health (UNU-INWEH)*
- ***Ms. Birguy Lamizana****, Programme Management Officer, UN Environment*
- ***Mr. Alan Nicol,*** *Strategic Program Leader, International Water Management Institute (IWMI)*

This session consists of expert presentation on pertinent topics of water and energy nexus.

The first presenter of this session, Mr. Mansoor Qadir, touched upon the challenges of water and energy access in resources scarce areas of the world. He indicated currently2.5 Billion and 2.8 Billion people are without electricity access and live in water stressed areas respectively. He pointed out that if implemented appropriately, water and energy nexus approach is a sensible approach in these areas as it advocates efficiency and cost effectiveness and maximizing benefits. He provided important salient features to be considered;

- By 2035 Energy and water consumption will rise by 35% and85% respectively
- Consider municipal wastewater for energy generation. It consumes less energy than it produces in some cases 3 times less indicating the wastewater potential as energy resource
- Saline water capturing from agriculture drainage to grow 'Euphrates Poplar' and use it for biomass energy. 'Euphrates Poplar' can grow in saline soil
- Decentralized solar and wind energy systems are potential in developing countries
- Micro-hydro turbines for decentralized energy for off-grid areas for poor communities
- Energy neutral fog water collection projects a green technology- no energy need to collect fog water – but very small scale
- In his conclusive remarks, Mr. Qadir emphasized on with appropriate intervention such as initial subsidies, capacity development and full support from stakeholders, energy generation from used water can decrease water energy scarcity.

Ms Birguy's presented on mainstreaming water and energy nexus with other development factors such as food security, gender, education, poverty and health. Ms Birguy, underlined the important linkages between water and energy and other sectors as water cuts cross all sectors including food production, health, access to education and gender. She emphasized the cross cutting nature of water by quoting Mr. Mandela who said, "water is central in social, political and economic affairs of the country, the continent and the world." She also cautioned the scientific understanding of water consumption rates of each sectors is important and needs to be assessed. For instance, in the water and energy nexus dynamics, agriculture is high water consuming activity. Nearly 70% of the global water is consumed by agriculture. This implies subsequent understanding of how much water is needed for *zero hunger* target of Agenda 2030 of the SDG.

She alluded that in developing countries, gender is key for water and agriculture. If there shortage of water and energy or food, the women are the first line of victims. They have to fetch water from distance; they have to use firewood and expos themselves to health risks. The FAO water-energy and food nexus framework is touted as a good nexus model.
Questions were raised on nexus is a complex approach that looks into the interplay of multiple sectors and issues and hence management of the nexus may be difficult. Mr. Birguy responded to start from simple, learn to create more with less consumption in the water and energy nexus system.

Second presenter, Mr. Alan Nicol, focused his presentation on challenges of considering nexus thinking into actions in the continent. Population is Africa is growing faster than access to water and energy grows, a compound challenge for access expansion and resources stress. He alluded to the fact that when access to electricity is low and power generation per capita is very low, people resort to natural resources that has a direct impact on soil, agriculture and environment.

Mr. Nicol reminded the audience that Energy is not neutral from politics. It is important to note that energy demand has consequences . Given the energy options are diversifying globally, development and consumption of responsible mix of energy is emphasized. In Africa, there is evidence that innovative energy options are growing in Africa. Solar energy expansions in Uganda, dry season solar pumping for irrigated agriculture are examples of such innovation.

Mr. Nicol concluded the future climate-energy-water mix is embedded with high- level uncertainties. So no or low regret solution approach needs to be devised through innovative mix of affordable energy solutions, energy blending, carbon energy relationships (soils).He also suggested assessing and codifying the benefits across the water-agriculture-energy

spectrum as important part of the nexus. Continuous understanding and engagement is required to develop systemic links and relationships and tradeoffs.

Solar energy can be utilized for irrigated agriculture through transforming the energy storage requirement into water storage. That is to say - pumping water into storage reservoirs during the day time and irrigating from storage reservoir in the night time. this maximizes both energy utilization as well as water loss through evaporation.

A question was raised about cost implication of solar panel for irrigation and subsidy needs. Mr. Nicol replied on the evidence he knows best. As he stated, due to import tax levied on solar panels, the cost of solar energy has become costly in Ethiopia. Innovative solar energy can be even profitable. In Gujarat, the state and private sector intervention collectively produces large amount of solar energy and feeds into the grid system.

Session 4.2: Water and Energy Nexus

Moderator:

- **Riccardo Zennaro,** Associate Programme Officer, UN Environment

Presenters:

- ***Ms. Isabel Raya**, Sustainable Energy Consultant, United Nations Department of Economic and Social Affairs (UN DESA)*
- ***Mr. Marco Aresti**, Access to Energy Senior Manager, RES4Africa*
- ***Mr. Salfiso Kitabo**, Country Director Ethiopia, Water.org*

This session is a continuation of session 4.1 intended to further elaborate on innovation and application of the water and energy interlinkages and solutions to water and energy access.

The first presenter in this session was Mr. Marco. Mr. Marco represents private company. His contribution is mainly on infrastructure for fast access to water and energy. He highlighted the abundant nature of the renewable energy in Africa and lack of infrastructure to harness it. The drawback of renewable energy due to its intermittent nature is cautioned and elaborated a better solution of blending renewable energy with energy sources that provide firm power consistently.

Small scale off-grid infrastructures are affordable means of energy access to reaching the continent. From his companies experience, Mr. Marco conformed renewable energy in Africa is cheapest and the fastest form of energy to reach out remote areas without the need to construct long transmission lines. He shared his experience that diesel generators are everywhere and can affordable be replaced with solar energy facilities.

As representing private company, he emphasized the importance of private sector participation in the water-energy nexus planning and implementation. The private companies needs to be viewed as new business partners promoting water and energy access. A new policy premises and business model that encourages private participation in water and energy development is needed for the continent.

Mr. Marcos recommends Governments and Community Based Cooperation (COBs) to engage in developing scalable and bankable projects for attracting private funds and developers as one means of financial source for water and energy development. For instance, private companies may be encouraged to raise funds independently or jointly and develop integrated mini-grid water-energy for sale.

Many questions were raised from participants regarding whether all renewable energy is sustainable for a country? What is the maximum percentage of renewable that we can connect? How do you cope with the intermittent nature of renewable energy? Whether mixing fossil and renewable energy is a possibility?

It was suggested that nations need to develop long term power master plan based on their resources and sustainability criteria. For instance, It was mentioned that Kenya diversification of energy master plan indicatesgeothermal energy as abaseload (firm power) and bringing in less costly and high capacity solar into the system.
it was also suggested to interlink the national power master plan development with water master plan development. Furthermore, it was suggested that large scale projects should go in hand with small scale development. The experience of Italy was shared. Italy started power development with small scale, decentralized mini-grid options and when demand increases, the mini-grid systems are integrated with national grid network. It was also suggested to expand both off and on-grid mix of energy for achieving universal access through decentralized

The Next Speaker was Mr. Salfiso Kitabo from Water.org on financing water and energy access in Africa. His presentation started with critical assessment of the SDGs. He stated that SDGs are ambitions with no money or expectation of funding from either public or private or NGO or partnerships. He showed the need to fulfill Agenda 2030 SGDs requires about 334 Billion dollars (about 30 Billion USD/year). The total amount of globally mobilized fund for financing WASH issues is about 1 Billion USD.

He suggested the importance of working with micro-finance institutions (MFIs) and formal banks for financing the water and energy access endeavor. More than 30,000 banks exist worldwide and building trust and encouraging for joint investment or facilitating loans for effective community organizations is well recognized and experience shared from Ethiopia.

Provide policy support and encouragement to help self initiated communities for fianncining their projects. Mr. Salfiso shared the experience of some communities in Ethiopia who their matters on their hand and built village latrines themselves through facilitated loan from MFIs. Mr. Salfiso indicated these scheme so far raised about 14 million Birr and currently expanding model. This schemes is helpful not for the bottom poor but for communities who can afford to take loan and return the money. The bottom poor needs subsidies for improving water and energy access.

As a take on message, it was emphasized that building trust between the communities and the banks should be seen as important step for initiating self initiated water and energy development y communities. NGOs and CBOs can help in bridging the trust gap. Mr. Salfiso mentioned the experience of Water Orgin Ethiopia that they helped prepare a bankable document to communities and negotiated with the banks to enable communities receive loans.

- Blending private and public finance should be also encourage in the continent.

The last presenter in this session was Ms. Isabel Raya, who underscored the importance of multi-stakeholder partnerships to accelerate the implementation of the 2030 Agenda and its SDGs.. She emphasized that all stakeholders have a role to play to contribute for targeted action. The Building on an already existing partnership between UN DESA and Itaipu Binacional (the "Sustainable Water and Energy Solutions" initiative), UN DESA and Itaipu will shortly launch a global multi-stakeholder network on water and energy interlinkages. The network will focus on three main categories of activities:

- Institutional and human resources capacity building for nexus implementation, facilitation and identifying gaps.
- Knowledge management, sharing case studies of best practices and codifying the possible impacts of the nexus.
- Advocacy on the NEXUS, including at relevant intergovernmental dialogues such as the UN conferences on Climate Change, the UN General Assembly or the High-Level Political Forum.

As key message, the following was emphasized;

- A combination centralized and decentralized mini grid energy supply system is necessary to reach the Universal access program
- Involvement of banks and private sector is key for achieving SDG targets
- Multi-stakeholder partnerships can be important for scaled-up action and impact on the water-energy nexus.

Session 5: Challenges and Opportunities in mainstreaming andimplementing the water and energy nexus: regional cases

The session was moderated by Ms. EunhaeJeong from UNOSD. The main aim of this discussion is to incorporate the regional perspectives on water and energy nexus. Three regional representations from Africa (Northern, Sothern and Eastern) andone from Europe is presented and discussed.

1. The experience of Regional Centre for Energy and Energy Efficiency (RCREEE)

Ms. Rana El-Guindy, a Senior Specialist in the centre presented the experience of the RCREEE. RCREEE is the technical arm of 17 Arab States (Middle east and north Africa countries) based in Cairo. It was established in 2008.Some of the salient features of the region include i) access to energy is above 90% (except Sudan), ii) the agriculture sector massively depends on energy, iii) the natural gas is the most important sources of energy and the use of solar energy is growing, iv) the centre has more sectorial strategies that integrated (or nexus based), v) There is lack of coordination among strategy implementation.

Ms. Rana shared some of good practices from the region, the experience of Tunisia and Morocco. In Tunisia, a cross-sectoral agreement was reached between APIA (Ministry of Agriculture) and ANME (Ministry of Energy). ANME promotes sustainable energy use in the agriculture field and ANME (Ministry of Energy) will provide APIA with necessary technical support. A well functioning financing and incentive mechanism is in place. Implementation of water and energy nexus approach can be mainstreamed through such existing collaboration in Tunisia. Similarly, financing mechanism for solar energy is well in place and functioning in Morocco.

Ms. Rana provided some regional implementation challenges such as shortage of budget, Standardization and integration of methods and lack of regional enforcement mechanisms. She outlined some recommendation for water and energy nexus to effectively work in the region;

- Regional capacity development
- build strong regional institutions based on the existing ones
- tap on the threat of increasing energy intensity and use it as regional opportunity for collaboration and effective coordination and enforcing mechanism.

2. The experience of SADC Centre for Energy and Energy Efficiency (SACREEE)

Mr. Karin Reiss, Sustainable Energy Expert in the centre, presented the experience of the SACREEE. SACREEE was established in 2015 by the SADC Energy Ministers and endorsed by

35th SADC Council of Ministers Meeting with the mandate to promote increased access to modern energy services and improved energy security across the SADC Regionthrough the promotion of market based adoption of renewable energy and energy efficient technologies and energy services. The short to medium term focus of SACREEE include policy formulation, capacity building, knowledge management, financing. The programs currently run by SACREEE include i) zoning study for the Africa clean energy corridor, gender and sustainable energy, industrial energy efficiency and minimum energy standards. The centre also focuses on global and regional network, operationalizing nexus approaches in SADC region

3. The experience of East Africa Centre for Energy and Energy Efficiency (EACREEE)

EACREEE is a very young collaboration as compared to other regions. It consist six-East African member states. The region has ample water resources including the lakes and the Nile River. However it is highly water, energy and food insecure region. The region highly relies on biomass energy. Electricity provision is mainly for lighting not for cooking. The urban middle class uses private cars and consequently fossil fuel usage is increasing. The region also produces its own hydropower energy, started integrating wind energy (e.g. Kenya and Tanzania) and solar energy is on rise.

EACREEE is a new grouping and provides three recommendation for the region: i) East Africa needs to explore the implementation of nexus approach for water and energy in the region, ii) work towards stronger and more coherent regional policies and plans and iii) plan for comprehensive needs of the poor consistent with the SDG motto, *'live no one behind.'*

4. The experience of Europe Water and Energy Nexus

Jens presented the main water and energy trends in Europe. Main trends in Europe aremore to renewable. Europe's energy targets are hinged on decarbonization and climate change goals. Currently the Renewable energy overtook nuclear energy. As of 2016, 90% of energy access in Europe is coming from renewable energy in Europe in 2016. Water is relatively abundant in Europe. Water consumption rises during summer where the heat wave increases. Europe water concern is related to pollution and water use efficiency.
Policy issues include engaging with water polluters such as agriculture polluting groundwater, saving water used for cooling; choose energy that doesn't consume a lot of power (e.g the regular light bulb is banned 10 years ago)

- *The Motto in Europe is 'greening the campus, greening the raining curriculum, greening the research, greening the institutional culture and greening the workplace and community and networking and partnership are the new strategic resources*

Key messages from Europe include

- There is a challenge to enforce the policies. Even in situations where laws and regulations exist, people don't follow them. Awareness creation from bottom up is necessary
- The need to for better communication and messaging of of policies, regulations easily understandable way and in a way they relate to the population.
- Networking and partnership are the new strategic resources
- The need to move to action
- Improving Energy Access and Livelihoods through Mini-Grids

Session 6 - Challenges and Opportunities in Mainstreaming and Implementing the Water and Energy Nexus: Country Cases

This session was moderated by Mr. Linus Mofor of African Climate Policy Centre (ACPC), ECA. In this session country specific attempts and challenges to mainstream water and energy nexus in the continent is presented.

Ethiopia

The first presenter of this session was from Ethiopia. Mr. Madefro Nigussie, shared his experience in developing the water-energy-food nexus for Ethiopian along with Mr. Semu Moges (the consultant of this workshop). He presented the results of Water-Energy-Food modeling.

Mr. Madefro Nigussie said, despite enormous progress achieved in growth transformation program, Ethiopia water access is not more than 50% and only one-third of Ethiopians have access to electricity. the Climate change, population growth, change in living standards have contributed to increased demand for water and energy in Ethiopia. His presentation alluded;

- The vast spatial distribution of fluoride concentration from north east to south east of the country has also limited water availability to clean water in the long stretch of the rift valley area in Ethiopia.

- Several plans and program are rolled out by the government such as Growth and Transformation Plan II (GTP II), National Electrification Program Implementation Road Map (NEP-IRM), the One WASH for water and energy sectors by the MOWIE. This needs to be coordinated in Nexus approach.

- The process of mainstreaming Water Energy and Food Nexus in the national plan has started in the Ministry and three working groups have been established to work.

- Three Working Groups established by MoWIE to identify key challenges and opportunities in water and energy sectors by answering the following questions:
  - What are the key challenges that Water and energy sectors are likely to face in the coming 15 years (2016-2030)
  - What are the key opportunities for advances in water and energy sectors?
  - What fundamental knowledge and skill gaps exist that limit the ability of MoWIE staff to respond to these challenges and take advantage of the opportunities?
  - What are the areas of support to fill these knowledge and skill gaps?

Gaps and results of mainstreaming efforts Goal 6& 7:

- Gaps include the scope & depth of Goals and Targets set by SDGs 6 & 7 vs. Growth and Transformation plan-II (GTP-II) of Ethiopia
  - GTP-II is from 2016-2020 while SDGs are from 2016-2030
  - GTP-II indicators are different from the SDG indicators
- GTP-II and IV are identified to extend the national program to SDG Agenda 2030
- Modeling study was undertaken for Ethiopia to understand the importance of Modeling Food-Energy-Water Nexus under Increasing Demand Scenarios:
-

Mr. Semu Moges showed a follow up resented on the results of Water-Energy-Food modeling activity done for Ethiopia.

- Key insights from the modeling shows :
  - Growth in Urban Population and Climate Change have shown to little impact on sustainability at annual Scale
  - Economic Growth represented by Energy Demand increase significantly affects power generation, crop production and water balance
  - Ethiopia Need to re-consider exporting Power or Increase the supply side if it fulfills the vision 2025 of middle income country.

- Home take messages:
  - Academic Institutions should be Visible and Relevant through Involving in Global/Continental and National Agendas
  - Sustainable Development is not a fancy Term for NGO/GO/UN, it is a real Societal Challenge that Universities have to work on and advocate
  - Graduate students should also contribute towards such global/national agenda through Tool Development, Evaluation and Publication

Ghana

The second presenter was Mr. Seth Mahu from Ghana. Mr. Mahualluded, only 30% of the population of Ghana has access to water and the SDG target is another opportunity to be pursued. Due to emergig global engagements in water and energy issues such as the SDGs, Paris Agreement, UN Agreements, Ghana and many countries are re-thinking the past *'solo'*sector based development agendas. In 2011, Ghana set up the national inter-sectoral committee for water, energy, agricultural, fishing, and transport and attempted to mainstreamed implementation agendas. Furthermore, regional cooperation are also growing in West Africa based on cooperative development of shared resources like tranboundary rivers basins. He stated that there is understanding to implement water and energy nexus approach at regional level to improve both accesses efficiently.

Due to local capacity challenges, Ghana relies on external support/expertise for development of water and energy sector, specifically the hydropower sector. The country needs to embark on smaller scale water and energy projects that will encourage micro business enterprises to flourish and create jobs to youths.

Sierra Leone

Another country presentation was from Sierra Leone by Mr. Paul Saffa. Mr. Saffa explained that Sierra Leone has abundant water with 7 major rivers flowing in to Atlantic Ocean. The annul rainfall is 3000-4500mm/year with annual renewable resources of 160 Billion million cubic meter (BCM) with low ground water potential.

Sierra Leone is strongly convinced to implement the SDGs 7 to tap into the international platform and increase generation of electricity. Both delegates from Sierra Leone alluded on the understanding created of the linkage between land, water and energy is very critical. However, like many other African countries, population growth, rate of economic and industrial development, deterioration of land and soil, limited water management regulation.

Mr. Saffa highlighted the ongoing debate and initiatives in Sierra Leone to transform abundant water availability into abundant water access.

South Korea

Mr. Eun Namkung from South Korea shared the of water and energy nexus implementation in South Korea. He begun by introducing how South Korea transformed its economy over the last 40 years. Though population jumped from 35to 52 million, the per capita income of increased from US $1,000 to US $30,000 and urbanization from 50% to 93%. South Korea has a total of about 17,491 dams and reservoirs. The first Drinking Water Treatment Plant (DWTP) was built in 1908 and currently the country has 499 DWTPs. The country moved from Sand Filtration to advanced Membrane treatment process plants. The Operation and

Maintenance (O & M) is 100% by the Municipal Government. The first Sewage Treatment Plant (STP) was built in 1976 as of 2016, it has about 625 STPs in Korea. The country moved from Conventional STP Process to Tertiary STP Process and the O&M of STP is partly covered by the Municipal Government (35%) and partly by Privatesector (65%).

He also provided evidence of ongoing water energy food nexus implementation in South Korea.

- Multipurpose Use of Hydropower Dams
- Floating Photovoltaic Solar Power
- Water Cooling (Dam or Reservoir water)
- Smart Farms (Water-Energy−Food Nexus)
- Water − Heat Pump System (Piped water)
- System of Rice Intensification(SRI)

South Korea is faced with some challenges related to aging of infrastructure, the standard guidelines for development getting stringent and lack of self-sufficient energy system. However, opportunities related to improving efficiency of distribution and utilization of Water &Energy exists in the following areas.

1. Water Efficiency (Urban, Industrial, Agricultural)
2. Energy Efficiency in Water & Sanitation (W-E Nexus)
3. 4 Rs(Reduce, Reuse, Recycle, Recovery) in Water & Sanitation
4. Smart Water Management(IOT, Big Data, AI, Cloud)

Key messages

- The need to invest on multipurpose projects and programs to bring multiple impacts
- Resources are limited and need to focus on smart management initiatives as like in Korea
- Many opportunities of natural blessing exists to many countries and it should be wise enough to use them.

Overall message from the African country presentation is

- Lack of skilled labor and finance is limitation to proper mainstreaming and implementation of water and energy nexus.
- Lack of strong and proper sectoral integration and coordination is hindering the nexus approach implementation
- Incompatible demand growth with slow pace of infrastructure development and services provision both in water and energy.

The take away messages from this session was

- The need for paradigm shift matching with the growing population increase and rapid urbanization

- Investing on multipurpose mega projects without compromising sustainability needs to be pursued.
- Encouraging micro-scale investments to supplement mega scale projects.
- Collaboration, networking and partnership between countries
- The need for human resources development (capacity building)

Session 7: Closing the Gaps on Water-Energy Nexus in achieving the SDGs

This session is intended to consolidate on the past two day's discussion through group discussion with country representatives and experts. The session was moderated by Mr. Manzoor Qadir, the Assistant Director, United Nations University Institute for Water, Environment and Health (UNU-INWEH). He outlined the process of the group discussion and highlighted key issues for group discussion. The moderator announced the formation of three groups consisting of country representatives and participants from UN, international, and regional institutions. He emphasized to focus the discussion 4 issues outlined below.

- Discuss any additional key dimensions to be covered during the group discussion
- Discuss and report at least one inspiring example of water-energy nexus from each country
- Identify potential gaps in implementing water-energy nexus in SDG era in Africa
- Suggest country-specific strategies and how to implement such strategies

Group1: Represented African Countries (Cameroun, Sudan, Ethiopia, Mauritius and Uganda)

4. **Additional dimensions to be considered**
    - Consider the Water and Energy nexus in the context of geopolitical and cross boundary resources issues
    - The focus in the role of gender and youth and employment strategies
    - Ways to enhance data collection, monitoring and evaluation approaches for implementing water and energy nexus approach
    - Strategies for south-south cooperation, technology transfer and development

5. **Country Specific examples**
    - Many countries in Africa use solar powered water pumps for agriculture, electricity, water production for livestock and domestic water supply. Multipurpose dams are also common in the continent. Expanding access to water and energy may require the nexus approach to water and energy development.

- Sudan and Ethiopia provided good examples of how sector (water and energy) strategies are being mainstreamed into national and regional strategies. In Ethiopia, the water, energy and irrigation sectors are under one institution.
- In many countries, sector institutions cooperate and collaborate through signing Memorandum of Understanding (MoU).
- South Korea already aligned the water-energy nexus into national and regional plans (SDGs and government development plans).

6. **Potential Gaps**
   - Misalignment of policies at sectoral, country and regional levels in relation to nexus
     - Need for harmonization of Policies and regional integration and cooperation -
   - Lack of Integration of the global climate policies and agreements at national levels (e.g. the Paris Agreement, National Determined Contributions (NDCs).
     a. Need to align and integrate the national development stragies vis-à-vis global climate policies

7. **Data, knowledge sharing and Capacity**
   - Lack of right data and sharing policies at regional and national levels
   - Inadequate data to support policies and planning processes.
   - Weak institutional and human capacities at national and regional levels responsible for data collection, analysis and sharing.
   - Institutions such are IRENA have to depend on data extrapolation which is not good enough for effective planning and development.
   - Create data acquisition, management and sharing policies at national and regional levels

8. **Partnerships**
   - There is still weak partnership among key stakeholders (e.g. the government, private sectors, etc.)
     - Partnership between government and private sector to develop clear and coherent policies.
9. **Institutions**
   - Institutional instability, weak institutional and human capacities to implement policies.
   - Lack of coordination and collaboration among institutions.
     - Address institutional instability issues, build right capacities and support coordination and collaborations among institutional at national and regional levels.
10. **Finance Mechanism**

Weak funding mechanism for SDGs and Water and Energy nexus

It is suggestedthat Governments, Donors/DP, Private Sector and NGOs step up collaborative and partnership efforts for financing SDGs.

Some of financing example from the continent include,

- Leverage on declining technology cost and blending financing to deliver water-energy projects
- Looking within-Ethiopia's renaissance dam (raising funds to locally to finance major project)
- Build capacity of MFIs and Commercial Banks on water-energy-food nexus and creating specific portfolios, products and services. E.g. Water loans, etc.

Group 2: Represented African Countries (Ethiopia, Ghana, South Africa, Madagascar, Sierra Leone, Gambia, Gabon, Lesotho, Sudan, South Sudan, Kingdom of Eswatini, Cameroon, Zambia, Kenya, Central African Republic)

1. **Gaps**
   - The regional cooperation benefits are understood in the continent but the implementation is limited.
   - Countries want to be self sufficient by themselves as a result member country often create silos instead of regional cooperation.
   - Regional cooperation dialogue in the continent is skewed toenergy sector. There is a limited regional cooperation dialogue on integrating other sectors such as water, environmental, social and economic aspects.

   Recommendations
   - Enhance cooperation through building regional power pools based on the resources endowment of the continent and integrate at continental scale. For instance, developing solar& wind powers in the North and South and hydropower in the east and central part of Africa
   - Enhance cooperative Transboundary water resource management
   - Create regional centres of excellences
   - Continue the dialogue to bring all stakeholders together for fuller representation of views.

2. **Energy and Resources efficiency**
   - The importance of efficiency of energy and waterdistribution systems in all serviceareas needs to be given attentions
   - Most of water and energy discussion is skewed to the supply side(access) however it should also focus strongly on curbing the demand-side

- There is mismatch between affordability to pay and the cost of production and delivery of water and energy to the community. This needs to be reconciled for better provision of services to the continent.
- Appliance labelling and even banning incandescent lamps

3. Gender Issues

- Large centralised energy-water projects often don't have mechanisms to incorporate gender.
- Women issues are usually discussed from the perspective of end-users not expanding their role from the top as policy makers to managers and public servants along the chain. Recent advances of women participation in parliaments and public services need to be enhanced and their role increased. For instance, some countries like Rwanda have achieved much better gender representation in their parliament and while South Africa leads the continent by having more women representation in public services in the continent.
- Some countries now have specific ministries focusing on gender issues:E.g. Ghana, South Sudan, Sierra Leone, Madagascar, etc. This should be encouraged at all level of public services.

4. Data, Reporting and Monitoring

- Major challenges for water and energy nexus analysis would be conflicting data originating fromdifferent ministries and agencies.
- Mechanisms need to be in place for collection, quality control and assurance and release of nationally accepted data. As an example, this activity can be done by National Statistics Authority.
- Encourage to have more decentralised data-collection on the ground
- Some have energy commissions fully responsible for energy data
- using decentralised approaches for data collection and feeding up to the higher levels through public statistical organisations
- Lesotho has had a lack of data however is being assisted by IAEA
- Harmonize definitions and measurement approaches (codifying)

5. Country Specific Action Plans and Solution

- Madagascar: established inter-ministerial committeeto coordinate multiple ministries for the nexus mainstreaming that includes energy, water, food, economy, agricultural, finance
- Zambia: adopted a similar approach as Madagascar by including other ministries and Zambezi river authority responsible for management of power generation

- South Sudan: the water, energy, agriculture and finance are still handled in the line ministries.
- African power pools interconnection master plans well linked to the water energy nexus

Conclusive remarks

- Discussion revealed some progress has been made to mainstream water and energy nexus approaches in some countries, however, a lot of effort is needs to actually implementation the approach on the ground.
- Countries are at very different levels of water and energy nexus implementation progress, countries are still focused on energy sector and centralized supply-side

Group 3: Represented African Countries (Angola, DRC, Ethiopia, Ghana, Uganda, Sierra Leone, Kenya, Tunisia, Zimbabwe)

Policy reforms

- Countries are harmonizing policies with SDGs
- Coordination in the development of sectorial policies and budgeting is necessary
- Gap between international and regional/national goals - coordination is important
- Enforcement of policies is lagging

Country examples

Tunisia has a national development plan – built on 5 pillars

SDGs are incorporated already / Pillar on green energy for example corresponds to SDG 7

Ghana – 3 approaches were used to meet the SDGs (Alignment, Adaptation and Adoption)

New policy framework - Assessment, and then policy framework built on the results and all policies are linked to the SDGs

Identified GAP on Capacity building for data collection and analysis

Uganda

Domestication of SDGs to local conditions – into national policy

Interministerial Committee on SDGs

Gaps were identified

Iraq

There is a high committee on water and energy

Strategies on energy are mainly on fuel

Financing and Partnerships

- Can some of the services on water and energy be privatized?
- Policies and incentives in place for the private sector to come in
- regulation is required for tariff setting
- Water is more complex than power sector regarding private sector engagement
    - For Ghana they have a CSO for each sector to work with private sector
    - Zimbabwe has opened electricity sector to private producers
    - Uganda is also engaging private sector (example: private companies supporting schools)
    - Kenya / CSR programs

Awareness Rising and Gender

- Disparities in costs and wealth are vast – poor areas are much more vulnerable and have disproportional high costs for water

Examples in energy and water in Angola

- Rural zones - solar systems for pumping
- Ministry of agriculture works with energy and water for irrigation

Tunisia decided to go for solar pumping where the costs exceeds a certain amount

- Farmers between 1-2 hectare will be supported by government

DRC

- National commission/observatory where all the experts of the sectors are represented and it is coordinated by the Ministry of Environment and Foreign Affairs
- NEXUS projects require a high level of gender responsiveness in the project planning/implementation

  Tunisia has set up a committee on Gender

  The role of NGOs is also very crucial

Recommendations

- Coordination is crucial between regional and national level and also between sectors within the country
- Financing needs to be available
- Strong Political will
- Capacity building is important for country readiness to implement projects
- Good urban planning is important
- Model NEXUS villages should be implemented