



Ministerial Conference
& the Eighth International Forum on Energy for Sustainable Development
MEETING THE CHALLENGE OF SUSTAINABLE ENERGY
11-14 June 2017, Astana, Kazakhstan



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Ministerial Conference
MEETING THE CHALLENGE OF SUSTAINABLE ENERGY
and Eighth International Forum on Energy for Sustainable Development
11-14 June 2017, Astana, Kazakhstan

Summary

The Energy Ministerial Conference and Eighth International Forum on Energy for Sustainable Development were held in Astana, Kazakhstan from 11-14 June 2017. The Forum was held against the backdrop of EXPO 2017 “Future Energy”, taking place from 10 June to 10 September 2017 in Astana. The annual Forum, organized by the five UN Regional Commissions since 2010, provides an opportunity to explore how the UN system can help countries and the business sector to achieve the objectives of the 2030 Agenda for Sustainable Development. The Eighth Forum was jointly organized by the Government of Kazakhstan and the United Nations Regional Commissions and supported by the United Nations Development Programme (UNDP), United Nations Industrial Development Organization (UNIDO), UN Department on Economic and Social Affairs (DESA) and other international organizations, including the International Energy Agency (IEA), International Renewable Energy Agency (IRENA), Sustainable Energy for All (SEforALL), the World Bank, the Copenhagen Centre on Energy Efficiency, and the Renewable Energy Policy Network for the 21st Century (REN21).

The objective of the Eighth Forum was to enhance the understanding of sustainable energy and possible policy drivers to achieve a common goal on sustainable energy, promote policy dialogue and provide awareness-raising of different outcomes. It aimed to explore how the UN system can help implement or pursue sustainable agendas within the regional context. The Forum opened with an Energy Ministerial Conference on “Meeting the Challenge of Sustainable Energy,” and followed by a high-level plenary session with parallel workshops. Over 1200 delegates from more than 80 countries attended the Eighth Forum.

Ministers, high-level delegations and leading energy experts shared their visions for the future energy, discussed the role of and need for regional cooperation and planning, and the imperative for nexus solutions as part of implementing the 2030 Agenda for Sustainable Development. At the closing of the conference, ministers and heads of delegations adopted Astana Ministerial Statement on Sustainable Energy (http://energyministerial.kz/906/uploads/2016/10/declaration_eng_print_ADOPTED.pdf), which reaffirmed the importance of energy collaboration among countries for tackling common energy challenges and shaping a sustainable energy future for all.

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History of the International Forum on Energy for Sustainable Development

The International Forum on Energy for Sustainable Development has been held annually since 2010, organized by the five UN Regional Commissions to provide the opportunity to explore how the UN system can help countries and the business sector to implement or pursue sustainable agendas in the energy sector.

The **first four forums** (initially International Energy Efficiency Forum, organized by UN Economic Commission for Europe (UNECE) and Economic and Social Commission for Asia and the Pacific (ESCAP) and the Governments of respective host countries) took place in Astana, Kazakhstan, on 28-30 September 2010; in Dushanbe, Tajikistan, on 12-14 September 2011; at the Issyk Kul Lake, Kyrgyzstan, on 12-14 September 2012; and in Tbilisi, Georgia, on 17-19 September 2013. The first Forum was held in parallel with the sixth Ministerial Conference on Environment and Development for Asia and the Pacific.

At the **Fifth International Forum on Energy for Sustainable Development** in Hammamet, Tunisia, on 4-7 November 2014, the Executive Secretaries of the five UN Regional Commissions signed the joint statement, the Hammamet Declaration, affirming that the objectives of energy sustainability are attainable if the world embarks on a determined, collective effort. This joint statement has since been referred to as the Hammamet Declaration.

The **Sixth International Forum on Energy for Sustainable Development**, held in Yerevan, Armenia, on 29 September - 2 October 2015, considered practical ways to implement the Hammamet Declaration and to attain the SEforALL initiative objectives of, by 2030, ensuring universal access to modern energy, doubling the global rate of improvement in energy efficiency, and doubling the share of renewable energy in the global energy mix. The Forum adopted the Yerevan Statement of Common Action to initiate implementation of the provisions of the Hammamet Declaration.

The **Seventh International Forum on Energy for Sustainable Development** was held in Baku, Azerbaijan, on 18-21 October 2016. The Forum also included the International Renewable Energy Conference and the annual sessions of the UNECE Group of Experts on Renewable Energy and the Group of Experts on Energy Efficiency for the first time. The objective of the Forum was to explore how to deliver on the national commitments in support of achieving the climate change mitigation and adaptation goals outlined in the Paris Agreement. These potential solutions formed the basis of the Energy Ministerial discussions at the outset of the Eighth International Forum on Energy for Sustainable Development, as a major stepping stone in the history of this international forum process.

Ministerial Conference
MEETING THE CHALLENGE OF SUSTAINABLE ENERGY
11 June 2017

Opening Ceremony and Special Addresses

The opening ceremony of the Energy Ministerial Conference “Meeting the Challenge of Sustainable Energy” was chaired by Timur Kulibayev, Chairman, KAZENERGY Association. Noting the important role of energy in the quality of life, he lamented the Kazakh reliance on fossil fuels, and said the country has prioritized a transition to renewable and clean forms of energy, particularly in the long term.

Bakhytzhan Sagintayev, Prime Minister of Kazakhstan, welcomed all participants and thanked the supporters of the conference. He described Kazakhstan’s strategy on sustainable development, highlighting that Kazakhstan is committed to the Paris Agreement. He noted that there is immense potential nationally and globally for growth in GDP and employment through growing the green economy, and expressed hope that the Ministerial Conference with its outcome Declaration would further promote long-term cooperation of all sustainable energy stakeholders.

Shamshad Akhtar, Executive Secretary, UN ESCAP, highlighted that the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change, together with market, infrastructure and technology advancements, have great potential to shape a future powered by clean, sustainable energy; and urged addressing the many challenges of the renewable energy transition. She applauded recent technological advances and, stressing the role of cross-border cooperation in the energy sector, called for harmonizing legal frameworks that enable connection across international borders.

Olga Algayerova, Executive Secretary, UNECE, highlighted the gaps between current actions and current commitments on the 2030 Agenda for Sustainable Development and the Paris Agreement, and between current commitments and what is truly needed to achieve the agreed objectives. She noted the need to use “all available tools” and reminded that urgent action is needed. She acknowledged that national circumstances vary significantly, but stressed that countries’ approaches should share common elements, including: the ultimate objective to enhance quality of life; a carbon price; and understanding that security does not mean self-sufficiency. She called for reinventing energy as a services industry, rather than a commodities industry and reminded of the importance of innovation and flexibility to move forward.

Cihan Sultanoğlu, Assistant Administrator and Director of the Regional Bureau for Europe and the Commonwealth of Independent States (RBEC), UNDP and UN Commissioner-General for EXPO 2017, identified “a unique era” at present where a major effort is being made to put the world on a new development path through the 2030 Agenda and the Paris Agreement. She highlighted energy production as enablers of these agreements in the form of Sustainable Development Goal (SDG) 7 on energy, since energy production currently contributes two-thirds of the world’s greenhouse gases (GHGs).

The session concluded with a video presentation on renewable energy developments globally and in Kazakhstan.

Ministerial Dialogues

1. Meeting the Challenge of Sustainable Energy

Li Yong, Director General, UNIDO chaired this session.

Maroš Šefčovič, Vice-President for Energy Union, European Commission, described the increasing energy cooperation between the European Union (EU) and Kazakhstan, noting the importance of the EU's eastern neighboring countries in the energy transition and in future energy security. He stressed the importance of inclusive partnerships between countries and the energy industry in the stocktaking process under the Paris Agreement, and supported the ministerial statement. He confirmed the commitment of the EU to lead a sustainable energy transition.

Kanat Bozumbayev, Minister of Energy, Kazakhstan, highlighted that the main objectives of the Ministerial Dialogues are to provide better insight into current global processes, investigate the role and place of traditional energy in the world's future energy system, and share political incentives to implement national strategies. He identified several of Kazakhstan's contributions to realizing SDG7, such as the fact that Kazakhstan has embraced the transition to a green economy.

Alexander Novak, Minister of Energy, Russian Federation, highlighted the challenge of providing secure, clean and affordable energy supply. He noted positive trends, including: robust development of new energy technologies; the growing use of gas; the revolutionary role of technology; accessibility of infrastructure; and affordability of financing.

Khalid Al-Falih, Minister of Energy, Industry and Mineral Resources, Saudi Arabia, identified four principles when considering renewable energy developments, including inclusiveness of access to all energy sources, flexibility, affordability for all, and innovative technology development. Saying "there is no switch we can turn on," he highlighted some challenges of the required ongoing transformation, including: the small base and scale from which new developments start; rapid urbanization rates, population growth and demographics; and the slow pace of the transformation.

Rachel Kyte, Chief Executive Officer, SEforALL, noted the importance of long-term goals for allowing policymakers to withstand political fluctuations and the private sector to understand the direction of travel. She highlighted steps needed to move "at speed and scale", including: clear price signals; managing subsidies to avoid perversity; maximizing energy productivity; closing the energy access gap; and creating a level playing field for renewable energy alongside other energy sources.

2. Energy Security, Regional Trade and Infrastructure

Kairat Abdrakhmanov, Minister of Foreign Affairs, Kazakhstan, chaired this session.

Lamberto Zannier, Secretary General, Organization for Security and Co-operation in Europe (OSCE), delivered the keynote address and outlined OSCE contributions to a more conducive framework for enhancing energy security regarding cybersecurity, good economic governance, and fostering regional cooperation. He emphasized that the future of energy security relies on effective cooperation.

Urban Rusnák, Secretary General, Energy Charter Secretariat, outlined the Energy Charter Treaty, the Energy Charter Declaration and work done by the Energy Charter Secretariat to

strengthen energy security. He stressed the need for effective cooperation to achieve energy security, and described progress regarding global interest in the Energy Charter process.

Mihály Varga, Minister for National Economy, Hungary, provided information about Hungary's economy and its energy sector. He highlighted the importance to Hungary of energy security and diversification of sources, including renewable energy alongside fossil and nuclear sources. Regarding natural gas, he said Hungary is investigating all possibilities to ensure stability of supply in the long term.

Ali Ahmad Osmani, Minister of Water and Energy, Afghanistan, explained that energy trade between Central and South Asia is increasing due to rapid economic growth and increase in energy demand. He discussed challenges and lessons learned in the Afghanistan context, and highlighted the potential of transborder connectivity opportunities.

Vadim Zakrevsky, Deputy Minister of Energy, Belarus, discussed energy security and independence in the Belarus context. He explained the main elements of the Belarus energy framework, including diversification of energy resources, energy independence, energy efficiency, economic accessibility and integration into the world energy supply market.

Natiq Abbasov, Deputy Minister of Energy, Azerbaijan, spoke about his country's situation regarding energy security, regional trade and renewable energy. Noting that Azerbaijan has always been an energy producing country, he described the Caspian field and pipeline arrangements and outlined large-scale projects in progress.

3. Energy-Climate-Food Nexus: Towards a Circular Economy

Scott Foster, Director, Sustainable Energy Division, UNECE, chaired this session.

In a keynote speech, Graeme Maxton, Secretary General, Club of Rome, outlined the challenges of climate change, and associated societal impacts and financial costs. He said climate change is a symptom of the bigger problem of the economic system, and explained the potential of the circular economy as an alternative economic system. In response to a question about whether the 1.5°C target can be achieved, he said that countries need to work together to address this target.

Maximus Johnity Ongkili, Minister of Energy, Green Technology and Water, Malaysia, shared commitments, initiatives and policies from his country. On interlinkages, he highlighted that water is used in energy production, and that water is also essential for food security. He stressed several proposals regarding the circular economy, including: the need to create green banks to provide finance; the development of curricula and research centers in universities; investment in nexus infrastructure, incentives and subsidies across the three sectors; and the need for robust data.

Regilio Dodson, Minister of Natural Resources, Suriname, outlined his country's vulnerabilities to the effects of climate change and called upon the world to act on climate. He also supported the concept of the circular economy, and noted the need for buy-in by multiple stakeholder groups at all levels of society.

Ilia Eloshvili, Deputy Minister of Energy, Georgia, addressed issues of energy supply and demand, noting that demand will inevitably grow, which is "right and fair" due to the natural desire of the country to develop. On supply, he opined that fossil fuel producing countries will not cease production, because of their motivation to economically develop their country.

Seyed Jalaledin Alavi Sabzevari, Deputy Secretary-General, Economic Cooperation Organization (ECO), outlined the impacts of climate change faced by ECO member states. He stressed the need for partnerships between countries, and UN agencies and other international organizations, and noted that the SDGs offer an opportunity to address problems holistically.

4. Renewable Energy in Central Asia

Sakari Oksanen, Deputy Director-General, IRENA, chaired the session, and urged Central Asian countries to aim for ambitious targets to increase renewable energy uptake, since they possess large potential renewable energy sources.

Mohamed El-Farnawany, Director, Strategic Management and Executive Direction, IRENA, described the regional consultative process initiated by IRENA to discuss the challenges and opportunities of unlocking renewable energy potential, and to identify areas for priority action in addressing them. He said this will lead to the elaboration of a regional Action Plan for guiding IRENA's future support.

Kanat Bozumbayev, Minister of Energy, Kazakhstan, elaborated on the renewable energy transition in Kazakhstan including plans to: deploy renewable energy throughout the country, while considering unique geographic features; have a 50% share of renewable energy sources in the total power generation mix by 2030; and promote energy efficiency throughout the energy chain.

Sulton Rakhimzoda, First Deputy Minister of Energy and Water Resources, Tajikistan, noted his country's potential for solar energy development compared to other Central Asian countries, but lamented current limited development due to lack of investment. He highlighted a new law regulating the renewable energy sector in Tajikistan.

Nurali Yusifbayli, Deputy Chairman, State Agency on Alternative and Renewable Energy Sources, Azerbaijan, said by 2020, 20% of electricity consumption of Azerbaijan must be from renewable sources, noting that in 2016, this figure was 9.7%, thus saving almost 1 million tonnes of CO₂ emissions. He said Azerbaijan has great potential for developing all renewable energy sources.

Azamat Omorov, Deputy Chairman, State Committee of Industry, Energy and Subsoil Use, Kyrgyzstan, said that although there has been great progress in renewable energy development, the country can increase this substantially, including through hydropower. He called for general awareness on saving energy and greater innovation in his country.

Aida Sitdikova, on behalf of the Managing Director, Energy and Natural Resources, European Bank for Reconstruction and Development, described opportunities in Central Asia to reduce the carbon footprint and GHGs through renewable energy, and said, given the potential for renewables, developing a robust legal framework is essential.

Arthouros Zervos, Chair, REN21, citing the Global Renewable Energy Status Report, said installed capacity has increased by 9 % in 2016 but investments reduced by 23% compared to the previous year. He suggested the energy transition pace is too slow to meet the Paris Agreement objectives, and said the world needs to increase investments in renewable energy, while eliminating fossil fuel subsidies, which continue to slow down progress in renewable energy and energy efficiency.

5. Promoting New Technologies and Innovations

This session was chaired by Cihan Sultanoğlu, Assistant Administrator, UNDP.

Paul Simons, Deputy Executive Director, IEA, in a keynote address, reported on progress in energy technologies that reduce carbon emissions, saying the energy sector remains key to sustainable economic growth in a world where 1.2 billion people lack access to electricity and 2.7 billion lack access to clean cooking. He underlined that achieving carbon neutrality by 2060 would require unprecedented technology-enhancing policies and investments.

Sergiy Savchuk, Head of the State Agency on Energy Efficiency and Energy Saving, Ukraine, presented his country's energy efficiency and renewable energy development plans, highlighting progress made in reducing gas consumption and building retrofits.

Mohamed Jameel Al Ramahi, Chief Executive Officer, Masdar, described investments in renewable energy projects of USD 3 billion in the United Arab Emirates (UAE), saying without new technology, their power generation and large-scale storage capabilities cannot be improved.

Kairat Kelimbetov, Governor, Astana International Finance Center, recalled recent events in the oil industry which negatively impacted oil-producing countries, saying traditional views on fossil fuels have changed dramatically, creating opportunities to transition to clean and renewable energy sources. He described Kazakhstan's urge to become a renewable energy sector pioneer in Asia, and emphasized the role of dialogue with other countries, companies and finance mechanisms.

József Tóth, President, World Petroleum Council, said the petroleum industry prioritizes new technology and innovation to improve productivity and efficiency, since oil will remain part of the energy mix, depending on different country contexts. He identified nano- and biotechnology, and sustainable chemical solutions, as possible candidates in innovation, and emphasized the role of international cooperation and strategic alliances with national companies to unlock the potential.

Barry Worthington, Executive Director, US Energy Association, noted that although technology development is important initially, it should be followed by large-scale deployment of these technologies. Worthington called for carbon capture and storage innovations, and prioritizing energy efficiency, since "coal will still be with us for some time."

Insights from the Ministerial Dialogues

This session was chaired by Benoît Revaz, State Secretary, Federal Office of Energy, Switzerland, who invited the chairs of the Ministerial Dialogues to provide insights from their respective dialogues.

On energy security, regional trade and infrastructure, Li Yong called for reduced carbon-intensive developments, coherent policies for the medium and long term stimulated by market dynamics, greater investment in research and development, and greater efforts for inclusive and flexible approaches suitable to countries' diversity.

Scott Foster reported on the ministerial dialogue on the energy-climate-food nexus. He highlighted the need for, *inter alia*: good data; the acceleration of subsidies removal; effective technology transfer, assistance and investment; and an engaged conversation with all parts of society.

Yerzhan Ashikbayev emphasized that the main message from his session was centered on international partnerships and creating win-win solutions for the different challenges, having rules-based cooperation, and the pivotal role of energy security in achieving the SDGs by 2030.

Sakari Oksanen identified opportunities and challenges facing Central Asian countries in their uptake of renewable energy, and outlined the efforts of IRENA and other regional partners in supporting those countries to meet national and international goals.

Cihan Sultanoğlu reported on progress made in new technologies, noting that most innovations are not on track and need to be accelerated using integration of systems, and that achieving carbon neutrality would require unprecedented innovation.

Ceremony – Adopting the Ministerial Declaration

The final session of the day was chaired by Kanat Bozumbayev. He presented the Ministerial Declaration, which contains seven voluntary actions outlining ways to accelerate the transition to a sustainable energy system, including establishing national sustainable energy action plans, developing internationally recognized minimum energy performance standards in all sectors, and advancing methods for public data collection and indicators on energy for sustainable development.

Shamshad Akhtar noted the challenge of making sure the discussions at this Ministerial Conference lead to change on the ground. She called for redoubling of efforts to transition to sustainable energy. She emphasized the need for, *inter alia*, long-term policy commitments to provide incentives, reduce risk and encourage renewable energy projects at small, medium and large scales.

Olga Algayerova, welcoming the implementation of the voluntary actions put forward by ministers, urged further support and progress from the regional commissions, and suggested energy ministers convene regularly in future to assess progress on energy targets.

Heads of delegations were invited to adopt the joint declaration. The Declaration was adopted, and heads of delegations were invited to make statements.

Nataliya Boyko, Deputy Minister of Energy, Ukraine, noting that implementation of SDG7 remains important to her country, committed to forging deeper relations with other partners and achieving 11% of renewable energy in the country's energy mix by 2020. She welcomed the Declaration and announced the intention of Ukraine to host the Ninth International Forum on Energy for Sustainable Development and an energy ministerial conference in 2018.

Jiří Koliba, Vice Minister for Industry and Trade, Czech Republic, expressed support for the Ministerial Statement and highlighted the need to decrease GHG emissions.

Kanat Bozumbayev closed the Ministerial Conference, which was followed by a gala reception hosted by the Government of Kazakhstan.

Eighth International Forum on Energy for Sustainable Development

12 June 2017

Opening Session

Roula Majdalani, Director, Sustainable Development Policies Division, UN Economic and Social Commission for Western Asia (ESCWA), chaired the opening session. She underscored the collective effort of the regional commissions in hosting the International Energy for Sustainable Development Forum and ensuring the regional dimension is captured in international debates.

Shamshad Akhtar focused on the Asia-Pacific region's achievements in transitioning to a green and low-carbon economy and putting development on a sustainable trajectory. She stressed the impact of Western Asia, which consumes half of the world's energy resources while also contributing almost half of global renewable energy, and urged regional cooperation to share the technological expertise needed to fast-track the transition.

Olga Algayerova, urging improving energy efficiency quicker and redesigning renewable energy policies, said "there is much work to be done to move from words to immediate action – the world sits at ten past midnight!"

Cihan Sultanoğlu noted that addressing the barriers to sustainable development creates enormous potential for new developments, employment opportunities, and advancing the lives of women and children. She pledged UNDP's support for integrated approaches and called for innovative and inclusive business models, smart use of public finances through enhancing capacities, and adopting enabling policies and regulatory frameworks.

Hard Talks on "Sustainable Energy of the 21st Century – Government Meets Industry"

Hard Talk 1: Energy Transition for Sustainable Development

Kaveh Zahedi, Deputy Executive Secretary for Sustainable Development, ESCAP, moderated the session.

Vivien Foster, Global Lead, World Bank, addressed global and regional trends affecting sustainable energy initiatives, saying these are not on track to meet any of the energy targets. Illustrating progress in the form of "clock dials," she showed that progress falls short of what is needed to meet the 2030 targets on access to electricity, access to clean cooking, energy efficiency, and renewable energy.

Henning Wuester, Director, Knowledge Policy and Finance Center, IRENA, cited an IRENA study that shows that the energy sector's objectives can be met by mid-century if investments in renewables are scaled up three times, and said introducing private electric vehicles at scale could revolutionize economies.

On the capacity challenges and significantly engaging the private sector, Marcel Alers, Head of Energy, UNDP, said increasing energy sources contributes to increasing complexity in grid management, while most utilities still operate along traditional lines. He called for changing from centralized power distribution to decentralized smart grids, and investing in education at all levels to build capacity for handling the complexity.

On resistance from power utilities, Mohammed El-Khayat, Vice-Chairman, New and Renewable Energy Authority, Egypt, lauded substantial transformation in his country, and noted the drop in renewable energy costs with improvement in technology.

Ram Prasad Dhital, Executive Director, Alternative Energy Promotion Centre, Nepal, lamented that remote areas lack attention from the central government, noting challenges to increasing access including high initial investment costs, fragmented policies, heavy subsidy dependence, low maintenance of infrastructure, and a dearth of innovative business models.

On the renewable energy experience in Ukraine, Sergiy Savchuk related many difficulties in oil and natural gas supply following the recent political crisis, after which the government committed to reducing the country's natural gas dependence through reducing gas consumption by 9% from current levels by 2020.

On energy security, Ralf Ernst, Deputy Coordinator and Head, Environmental Activities, OSCE, said this requires a comprehensive approach across different sectors, including the environment. Referring to the links with climate change impacts on water management, he emphasized reducing emissions as an objective; and identified new and emerging risks from the energy transition.

Hard Talk 2: Interplay between Renewable Energy and Fossil Fuels

Radia Sedaoui, Chief of Section, Sustainable Energy, ESCWA, chaired the session. She invited the members of the panel to a dialogue on the interplay between renewable energy and natural gas by addressing synergies and partnership from technology, policies and best practices.

Malek Kabariti, former Minister of Energy and Mineral Resources, Jordan, while noting that increasing the share of renewable energy offers a potential pathway toward decarbonization of the energy system and meeting most energy needs, highlighted the need to be much more realistic about the timeframe. He described natural gas as a “good technology partner” in this respect, and urged cooperation between the two sectors.

Barry Worthington described the “miraculous revolution” in the US natural gas industry. He stated that the US anticipates using fossil fuels, including oil and coal, for “a very long time”, and indicated that during coming years population is expected to rise, which calls for diversifying energy sources to include more renewable energy and natural gas. Worthington urged the development and deployment of carbon capture and storage.

Vyacheslav Mischenko, Head of Commonwealth of Independent States (CIS) Office, Argus Media, Kazakhstan, emphasized the role of price levels in determining the development of new technology, renewable energy projects, and fossil fuel projects. He stressed uncertainty regarding oil price stabilization.

Igor Kozhukhovskiy, Deputy General Director, Russian Energy Agency, described Russian energy policy as geared towards supply to the domestic market and to the country's partners. He explained the developing trend towards natural gas, as well as reforms to make the Russian electricity sector fully competitive. Citing an example of a hybrid system in the power generation sector between natural gas and renewables, he urged nurturing such synergies and partnerships.

Hamid Sherwali, Chairperson of the Executive Board of Renewable Energies, Renewable Energy Authority, Libya, noted the high potential for renewable energy development in

Libya, and discussed the large increase of the natural gas share in the power generation mix. He explained that fossil fuels will be phased out and that Libya needs to learn from best practices on the way to increase the penetration of renewable energy, thus leaving the natural gas industry unharmed.

Matthew Sagers, Managing Director, IHS Energy, United States, discussed Kazakhstan's National Energy Report and the nationally determined contributions (NDCs). He explained energy efficiency, reduction in coal consumption and a corresponding increase in natural gas, and an increase in renewable energy as three interrelated elements, which must all be present.

Torstein Indrebø, Honorary Secretary General, International Gas Union, emphasized that natural gas is a reliable source of energy which can be stored close to the market, and is therefore a necessary supplement to renewable energy that is much cleaner than oil or coal.

Mostefa Ouki, Vice President Energy & Chemicals, Nexant, UK, stated that natural gas is a backup fuel to renewable energy, and stressed the need for dialogue between the fossil fuel industry, the renewable energy industry and financial institutions.

Aida Sitdikova noted that although natural gas is a transitional or backup fuel, it is necessary to factor in its externalities as it still has half the carbon intensity of coal. She noted the potential of storage technology to contribute to solving renewable energy's intermittency issues.

Sessions and Workshops

Track I *Renewable Energy*

Session Findings of UNECE Renewable Energy Status Report 2017

The panel was moderated by Gianluca Sambucini, Secretary of Group of Experts on Renewable Energy, UNECE.

The UNECE Renewable Energy Status Report 2017 was produced in partnership with United Nations Economic Committee for Europe (UNECE) and the Renewable Energy Policy Network for the 21st Century (REN21).

The report provides a comprehensive, up-to-date overview of the status of renewable energy and energy efficiency markets, industry, policy and regulatory frameworks, and investment activities in the region. It draws on information from national and regional sources to present the most up-to-date summary of sustainable energy in 17 UNECE regions: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Montenegro, Russian Federation, Serbia, Tajikistan, the former Yugoslav Republic of Macedonia, Turkmenistan, Ukraine and Uzbekistan. The report is intended to support the countries of the region as they work to attain the objectives of the 2030 Agenda for Sustainable Development.

Main findings of the report suggest that, despite the effort from the countries to continue adopting new policy measures that help to remove barriers for development, attract investment, foster energy security and increase the flexibility of power systems, these policy frameworks have not resulted in the widespread adoption of renewable energy. Energy subsidies for fossil fuels persist in the region, presenting an additional obstacle for the deployment of both renewable energy sources and energy efficiency measures. Low oil prices

in the Russian Federation further hinder uptake. Countries of South East and Eastern Europe, the Caucasus and Central Asia continue to face challenges in improving the efficiency of their electricity supply, despite ongoing modernisation of their aging electricity infrastructure. And even with more than 2 GW of renewable power was added in 2016 (581 MW for non-hydro renewable energy), the full renewable energy potential in the region is still far from being reached.

Gianluca Sambucini, delivered a welcome address, followed by an overview on UNECE Group of Experts on Renewable Energy (GERE). He pointed out the key activities carried out by GERE during 2016 and 2017, including the REN21 UNECE Renewable Energy Status Report, Hard Talks in Georgia and Ukraine, and the matchmaking events in Baku and Astana. He then mentioned the future work direction for GERE, where the group of experts will continue to increase the uptake of renewable energy in the energy mix.

Arthouros Zervos, Chair of Renewable Energy Policy Network for the 21st Century, introduced the mission and accomplishment of REN21.

Martin Hulin, Senior Project Manager from Renewable Energy Policy Network for the 21st Century presented key findings from the REN21 UNECE Renewable Energy Status Report. He pointed out two main findings: 17 UNECE countries in South-Eastern and Eastern Europe, the Caucasus and Central Asia represented only 0.2 percent, or USD 0.4 billion, of global renewable energy investment in 2015; and despite the fact that the region is home to over 300 million inhabitants and representing 4.9 percent of the world's GDP, attracting investment remains a major challenge in these countries, even with numerous advanced support schemes and policies for renewable energy present.

Main topics of the panel discussion in this session include what information can be delivered to the policy-makers from the countries of interest in this report, what can be done to boost the collaborations between countries, and what can be done to further boost investment in the renewable energy sector in the UNECE region.

Session The Socio-economic Benefits of Renewable Energies

The socio-economic benefits of renewable energy have become a key consideration in building the case for its wide deployment. Increasingly, governments see immense opportunities in the development of a renewable energy sector, with a potential to fuel economic growth, create employment opportunities, enhance welfare and contribute to the achievements of the Sustainable Development Goals (SDGs).

This session, co-organized by IRENA and UNECE, explored the socio-economic benefits of transitioning to a sustainable energy future, and how these findings can apply to specific countries in the UNECE region.

Alvaro Lopez-Pena, Program Officer of Policy Advisory, IRENA, delivered a scene-setting presentation from IRENA on its extensive work on the topic, including the global macroeconomic impacts of an energy transition in line with the Paris Agreement, the most recent analysis on employment in the renewable energy sector, and the analysis of how the development of domestic value chains for PV and wind can create economic opportunities for existing industries and workforce. He pointed out that IRENA has estimated that such effort to reduce CO₂ emissions by significantly increasing the uptake of renewable energy

deployment would boost GDP by 0.8 percent in 2050 and generate around 26 million jobs in the global renewable energy sector by 2050.

Bo Libert delivered a presentation on behalf of UNECE on how renewable energy eases some of the trade-offs appearing between the energy, water and energy systems. He presented an overview on the work of the water-energy-food-ecosystems nexus under the UNECE Water Convention. He used three examples to showcase the benefits of the Nexus approach: the development of hydropower and other renewable synergies in Sava and Drina area; the impact control of the hydropower in Alazani/Ganykh area; and the promotion of energy efficiency and vitalization of the energy market in Syr Darya Basin. He introduced some recommended tools for promoting intersectoral coordination in the field of renewable energy sources.

Vyacheslav Sovetskiy, CEO of Astana Solar, provided a presentation on the emerging PV industry in Kazakhstan and how important education and skill development is for such industries. He gave an overview of the status quo of the deployment of solar power in Kazakhstan. He pointed out how important solar power is, not only in the infrastructure of human settlements, but also at social and cultural facilitations.

The open discussion reinforced the importance of analysing the topic of socio-economic benefits of renewables, where there is indeed a big knowledge gap. Renewables are more than just supplying energy; they come with many associated benefits (reduced health and climate impacts, economic development, synergies with water and food supply, important development implications etc.) The debate on RE should evolve from a narrow view on costs to a holistic conversation of its wide impacts on society.

Track II *Energy Efficiency*

Workshop Energy Efficiency in Buildings: Framework Guidelines

The workshop focused on the need to improve drastically energy efficiency in buildings and the role that standards can play in achieving this. Buildings are central to meeting the sustainability challenge. Buildings are responsible for 40% of CO₂ emissions through the energy services they and the activities within them require. By 2050 developing countries will need to accommodate 2.4 billion new urban residents, whereas in the developed world 75-90% of buildings standing today are expected to remain in use. Renewable energy alone cannot meet those requirements, despite recent improvements.

The session was moderated by Scott Foster, Director, UNECE Sustainable Energy Division, who described the context for the framework guidelines. The energy performance of buildings must be managed. The capability to meet this challenge exists. At costs equal or close to those of traditional buildings, it is possible with today's technology to transform buildings to align with the highest standards of health, comfort, well-being and sustainability, including improving energy productivity and reducing CO₂ emissions. The energy required by buildings can be reduced to a level that can be supplied largely, perhaps exclusively, by non-carbon-based energy.

Ksenia Petrchenko, Researcher, Copenhagen Centre on Energy Efficiency, described numerous projects that have demonstrated the ability to design, build and operate high performance buildings in dozens of countries throughout the world. Analysis of these

projects, which range from individual buildings to neighbourhoods to cities, indicate a common set of eight action steps that can accelerate the transition to this new paradigm. These include: 1) implementing building efficiency codes and standards; 2) efficiency improvement targets; 3) performance information and certifications; 4) incentives and finance; 5) government leadership by example; 6) engaging building owners, managers and occupants; 7) engaging technical and financial service providers, and 8) working with utilities. The first among these action steps is codes and standards, which have been repeatedly proven to be an effective instrument for addressing energy efficiency in buildings. When properly designed and enforced, building standards provide a structure that motivates the key actors responsible for building construction and operation to change from traditional modes of practice to a new plateau of quality and performance. The concepts set forth in the UNECE Framework Principles for Energy Efficiency Standards in Buildings go well beyond the incremental, components approach of existing building standards. Rather, they represent a principles-based performance guidance for building energy standards that is outcome-based, anchored in energy actually consumed, and designed to project a vision of holistically designed and operated, ultra-high performance buildings as part of an integrated sustainable energy system.

As described by Tom Richard, Penn State University, throughout the world there is a great diversity of building design, function, patterns of use, materials, and climate. To address this diversity effectively, the framework will need to be implemented in different ways for different locations. Thus a first stage in localizing standards is to work with policymakers, architects and engineers, the construction trades and project developers to develop consensus on what local implementation means. Where local examples do not yet exist, regional demonstration projects can serve as case study examples, training sites, and platforms for education of the entire sector. Regional Centers of Excellence can host and leverage these demonstrations for practical training and learning-by-doing for a broad spectrum of business, government and building owners. These Centers of Excellence will be supported and connected by a global consortium of leading universities with expertise in building science as well as the finance and management. The universities and centers will develop educational programmes for multiple audiences, with both on-line and hands-on training and experiences to transform traditional business practices in the building sector, certify current professionals, and develop the next generation of building professionals.

Vitaly Bekker, Project Manager, UNDP Russian Federation, provided specific examples of efficient buildings from the Russian Federation, and added a number of cases of retrofits as examples of the challenges.

Ivonne Higuero, Director, UNECE Forests, Land and Housing Division, described in detail a joint task force examining the range of energy efficiency standards in the UNECE region and developing a network of energy efficiency experts.

The key message from the workshop is that improving energy efficiency in buildings can make a substantial near-term contribution to both climate change and quality of life. Wide deployment of the Framework Guidelines for Energy Efficiency Standards in Buildings is an important step. Immediate actions include dissemination of the guidelines, education and training, and research and consultation, while engaging all relevant networks and stakeholders.

Session Aligning Renewable Energy and Energy Efficiency Policies

In the session, Ute Collier, IEA, presented how, according to IEA analysis, renewable energy and energy efficiency together will have to deliver three quarters of the emission reductions needed to reach global 2050 climate targets. This will be challenging to achieve but will provide many other benefits such as job creation, reduced energy bills, improved energy security and reduced air pollution. Progress is being made with the share of renewables in electricity generation growing rapidly, although less so in heat and transport which are two key sectors for decarbonisation. Energy efficiency has also been improving, although globally, energy demand is still growing. At the same time, the costs of many renewables and energy efficiency measures such as LEDs for lighting have been coming down.

There are a number of best-practice examples of policy measures that promote both energy efficiency and renewables, especially in the buildings sector. However, there is a need to optimise policies further and to cover other sectors. This was discussed at a roundtable at the Clean Energy Ministerial in Beijing in June, with participation of a number of government ministers and private sector actors. The role of an energy service approach was highlighted at the roundtable.

Three panellists then brought perspectives from two countries in the region, as well as the European Bank for Reconstruction and Development (EBRD) as a key financing institution in the region.

Natalia Jamburia, Ministry of Energy, Georgia, explained how Georgia's reliance on imported resources was an important driver for both energy efficiency and renewables in the country. The Energy Ministry has established a division that deals with alternative energy (i.e. non-hydro renewables) and energy efficiency together. Georgia has an initiative to make the public sector an exemplar for this, focusing on public sector buildings. The importance of good data for both energy efficiency and renewables was also highlighted.

Energy independence has become a key aim of energy policy in Ukraine, according to Valeriy Pysarenko, a member of the Verkhovna Rada (Parliament) of Ukraine. 2020 targets have been set for energy efficiency, renewable electricity and renewable heat. With Ukraine being one of the top 10 most energy-intensive economies in the world, it is essential to reduce consumption first to be able to achieve higher share of renewables.

Russell Bishop, EBRD, stressed the need to apply a green economy transition approach. For renewables, this means refocusing current levels of investment away from fossil fuels, while for energy efficiency there is a need for a significant upscaling of investment. The EBRD aims to bring more investment to the region but trying to reduce the high interest rates priced in by the market. This also needs to be accompanied by more effective policies, in particular carbon pricing, energy efficiency standards and better design of cities.

Key messages from the session were that renewables and energy efficiency policies need to work together to achieve carbon reductions and greater energy security. Effective energy pricing, joint governance, good data and public sector exemplars are important tools for achieving this.

Track III *Modernizing Energy Industry*

Roundtable *The Role of Gas in Achieving the Sustainable Development Goals*

This roundtable was moderated by Torstein Indrebø.

Rafael Huarte, Director, International Gas Union, described gas as a “destination energy” rather than a transition energy, explaining that it will be the main fossil fuel used in the future. He stated that gas is the “best partner” for renewables due to its flexibility, and low capital investment and maintenance requirements, and is also a good solution for transport in large cities as it does not produce particulate matter.

Nazir Ramazanov, Chair, UNECE Group of Experts on Renewable Energy, stated that renewable energy is “the energy of today and of the future,” because although once unpredictable and expensive, prices are decreasing every year. However, he acknowledged that natural gas is needed as a more reliable energy source.

Nikita Lomagin, Vice-Rector for Development, European University at St Petersburg, presented a historical view on natural gas including its development as a solution for energy diversification after the first collapse in oil prices during the 1970s. He stated that natural gas still mainly benefits rich and prosperous states, rather than contributing to solutions to energy poverty, and called for good governance to attract finance for gas projects.

Alan Lau, Managing Director, Anglo Euro Developers Ltd, spoke about the unrealized potential of liquefied natural gas (LNG) for small-scale distribution to small communities such as islands and inland villages. He discussed technology developments in Floating Storage Regasification Units which enable marine transfer of LNG. He described the fast-growing Asian demand for natural gas, and opined that coal is still “king” in South Asian countries.

Branko Milicevic, UNECE, identified gas as an “enabler” which affects all 17 SDGs. He described the renewable energy goal of 36% of total energy supply by 2030 as very difficult to meet, and stated that “in all likelihood it will not be met.” He called for raising awareness of natural gas, and stated “there is always a future for fossil fuels – there is no way around it.”

Roundtable *Coal Mine Methane (CMM) as an Under-valued Energy Source and the Role It Can Play in the Transition of the Coal Industry*

Raymond Pilcher, Chair of UNECE Group of Experts on CMM, chaired this roundtable. During the introductory part of the session it was observed that over the last years the coal industry has been experiencing many difficulties that lead to the closing of many mines around the world. The view was expressed that the situation is not likely to change due to the significant environmental pressures and low prices of coal.

Richard Mattus, UNECE expert, argued that reducing major sources of methane emissions would cause rapid and positive results. He provided data showing that one ventilation shaft from a coal mine emits as much methane per year as one million cows or 500 000 cars. He stated that reducing CMM emissions is a very cost-effective way to reduce GHG emissions. He explained that the GHG abatement cost of ventilation air methane amounts to only 3-4 Euro per tonne, as compared to e.g. forestation, which costs 15 Euro per tonne, and constitutes the second best option in this regard.

Sergazy Baimuhametov, Vice-Chair, UNECE Group of Experts on CMM, spoke about the economic aspects of reducing CMM from the perspective of Kazakhstan. He discussed problems regarding financial feasibility of CMM projects in the country, and lamented the lack of any meaningful local financial and regulatory incentives. He pointed to the fact that both preliminary degasification and methane capturing process are very costly, and therefore are not prioritized by companies, which in many cases operate at the verge of profitability.

Lukasz Kroplewski, Vice-President for Development, Polish Oil and Gas Company (PGNiG), stated that in Poland there is a sufficient economic case for CMM projects. He indicated that greater involvement in CBM and CMM projects could bring very tangible benefits to the Polish economy by helping the country to lower the volumes of imported gas. He also emphasised a safety aspect of such projects, explaining that capturing methane reduces exploration and extraction hazards in coal mines. Finally, Kroplewski discussed the strict environmental policy of the European Union, and underlined the need for a more balanced approach to the coal and coal mine methane issues.

Evgeny Alexeyev, Deputy Director, Methane Center PA, Kazakhstan, spoke about the significant potential for better CMM utilization in Kazakhstan. He observed with regret that there is currently a lack of both, financing options and regulatory incentives for development of CMM projects. By way of contrast, he described the situation in the Czech Republic, stating that the recent introduction of green tariffs for emitting methane effectively motivated local emitters to capture and use CMM. Juxtaposing this example with situation in Kazakhstan, Alexeyev observed that while the latter country has experience in degasification of mines, a market for heat and power, and a roadmap for trading carbon emissions, it still lacks the appropriate regulatory measures and financing mechanisms that would allow for upgrading CMM to the level that can be used for generating power.

Jacek Skiba, Vice-Chair, UNECE Group of Experts on CMM, reported on the process of restructuring coal mines in Poland. He indicated that the newly adopted approach gives greater focus to the efficient use of collocated resources, such as coal and methane. He observed that despite the fact that over the last decade a number of mines in Poland has fallen threefold, methane emissions associated with coal extraction have actually grown. He pointed to a high potential for CMM projects in the country and explained that utilising CMM would result, among other things, in better temperature management in mines, thus translating into longer operating hours and increased profits. He stressed that the miners in Poland have finally understood that utilising CMM could reduce fixed costs of mining operations, and therefore started to perceive methane not only as a threat but also as an economic opportunity.

Clark Talkington, Vice-Chair, UNECE Group of Experts on CMM, discussed the trends in the US coal industry over the last decade. He observed that major restructuring is to a large extent due to low prices of coal. He pointed to the significant drop-off in coal production, especially in underground mines, many of which had to be closed as a result. In this context, he remarked that although half of underground mines have closed in the last 6-7 years, methane emissions have fallen by only 8%. He also pointed to the fact that despite good infrastructure that allows for putting the captured methane into the pipeline system and selling it to the natural gas grid, big quantities of the gas are still simply vented to the atmosphere. Criticising such situation, Talkington argued that methane gives an excellent economic opportunity to reinvest the funds earned by its capture into mining operations.

The session closed with two presentations on the International Centres of Excellence in Coal Mine Methane, in Poland and in China.

Track IV *Regional Cooperation*

Session *The Regional Technology and Investment Center*

Gani Sadibekov, Vice-Minister of Energy, Kazakhstan, delivering welcome remarks, emphasized the important role of regional centers of excellence, and said the creation of the Astana Center represents a historic moment in the renewable and green clean energy trajectory. He underscored green economy as one of the most important aspects of Kazakh development.

Sanjar Kettebekov, General Director, Almaty Tech Garden, sharing his experience on green financing, described the special economic zone in Almaty comprising innovative business hubs. On energy and industry efficiency, he reported on a plan to digitize 10 plants by 2020, with four pilots already underway, and announced a recent agreement to have a representative office in Silicon Valley.

Jacek Skiba, International Centre of Excellence on Coal Mine Methane (ICE-CMM), Poland, provided highlights from the recently established center and the process leading to its establishment. He outlined major goals, including: to solicit and collect case studies and best practices in CMM, and to conduct research. On the benefits of cooperating with the UN, he highlighted access to experts, worldwide visibility of work undertaken and resulting accomplishments, and cooperation with various institutions and governments.

On energy security, Daniel Kroos, OSCE, identified the success factors when establishing a center, including: finding the right people; defining the right products and services that are realistic for implementation; and finding strong partners and institutions. On steps to build effective and enduring partnerships, he suggested definition of goals, identification of areas for cooperation and potential synergies, and definition of a cooperation model.

Providing an overview of the ESCWA region and its Technology Center, Roula Majdalani said the region faces three distinct major challenges: job creation, acquiring scientific technological capabilities, and benchmarking and mainstreaming science and technology development.

On how to allocate capital more efficiently, John O'Brien, UNDP Regional Hub for Europe and CIS, Istanbul, outlined the de-risking approach through removing barriers to access, efficiency and renewables. He cited three UNDP case studies, including a small hydropower station in Georgia, energy management information systems in Croatia, and introducing minimum energy efficiency standards for lighting in the Russian Federation.

Astrid Schneider, Austrian Institute of Technology, outlined the goals needed to advance the green innovation cycle, including: a strong vision; updating the legal framework; research and technological policies and budgets; and participation and publication.

Natalia Alexeeva, Head, Central Asia Office, UNEP, shared the experiences of the International Environmental Technology Centre in Japan in demonstrating study results through pilots, providing technological support and capacity building, and establishing the Secretariat of the Global Partnership for Waste Management.

Roundtable Tracking Progress in Sustainable Energy: Global Tracking Framework Regional Reports

Stefanie Held, Chief of Section, Sustainable Energy Division, UNECE, moderated the roundtable.

Vivien Foster, remarking that it is the first time the regional commissions have collaborated on their respective reports, said the report now has regional chapters, and regional companion reports, giving a perspective from the regional stories. She showed that progress falls short of what is needed to meet the 2030 targets on access to electricity, access to clean cooking, energy efficiency, and renewable energy.

Monga Mehlwana, Economic Affairs Officer, Regional Integration, Infrastructure and Trade Division, UN Economic Commission for Africa (ECA), highlighting key messages from the African region, noted that Africa is not homogenous in terms of policies, implementation rates, participation, technical expertise, and local investment. More than half of Africa will not reach the access target by 2030 for either electrification or clean cooking fuels. Countries' policies and strategies tend to focus on increasing generation capacity and grid networks instead of improving efficiency. He also pointed out inability of indicators to capture the complexity of the renewable energy mix, ignoring traditional biomass fuels.

Hongpeng Liu, Director, Energy Division, ESCAP, elaborated on the Asia-Pacific progress in sustainable energy, citing: 93.1 million people have gained access to electricity with the rate of electrification rising from 89.8% to 90.3%; a rise of 1% in access to clean cooking fuels where affordability, accessibility and utility of options remain key barriers; energy intensity has fallen rapidly, although it remains the highest among the global regions; and the share of renewable energy has not increased significantly.

Radia Sedaoui reported on vulnerabilities for the Arab Region, including: interlinked water and food security concerns; growing energy demand over the next decade; rising urbanization; costs of energy imports and losses to economies; climate change vulnerabilities; inclusive national developments; and conflict potential in the region. She cited significant progress in modern energy access, with important remaining sub-regional gaps in the Arab least developed countries, and said it is the only region where energy intensity has been increasing, although it should accelerate more to achieve SDG 7.

Scott Foster, reporting on the UNECE region, observed that the numbers for access to electricity capture neither quality of service nor affordability; the dependence of human comfort on heating services in the region; and significant challenges to upgrade and renew older uninsulated housing stock with locked-in fossil fuel dependence. He suggested that a broader set of indicators is required to include less tangible aspects, such as quality of life and carbon intensity, and that existing indicators should be reviewed to move beyond physical access to quality of access and affordability.

Two reports on tracking progress were presented on Monday. The UNECE/REN21 Renewable Energy Status Report was launched. Preliminary results and initial key messages of the Global Tracking Framework Regional Reports were also discussed, with the launch of the reports to follow in the coming months.

13 June 2017

Sessions and Workshops

Track I *Renewable Energy*

Workshop *Developing a Regional Renewable Energy Investment Pipeline*

The workshop was jointly organized by ESCWA and UNECE as an activity in the framework of implementation of the joint United Nations Development Account (UNDA) project “Promoting Renewable Energy Investments for Climate Change Mitigation and Sustainable Development”.

ESCWA and UNECE representatives introduced the objectives and activities of the project and outlined the work already accomplished by the two UN Regional Commissions in facilitating improved investment environment for renewable energy (RE) projects in countries of their respective regions.

The first session of the seminar on Developing of ESCWA Renewable Energy Investment Pipeline considered National Case Studies from selected ESCWA member States as part of two panel discussions.

The session included several keynote presentations. It started with a presentation on Global Technical-Economic Trends for RE technologies and relevance for developing countries by Martine Hullin, Project Manager, REN21. Deployment of Renewable Energy technologies in the market continues to be constrained by low fossil fuel prices and lack of policy support. Auctions are the most rapidly expanding form of RE policy support. The RE auctions doubled in 2016 compared to 2015. Year 2016 is the fifth consecutive year when the investment in new RE capacity was roughly double that in fossil fuel capacity. The REN 21 is a global multi-stakeholder network tracking 155 countries covering 96% of global GDP. In this presentation, the REN 21 2017 global report outcomes were presented, including the global technical-economic trends. For instance, in 2016 the global RE capacity was increased by 9% compared to 2015 where the most installed RE capacities were focused in Solar and wind technologies. Finally, an outlook on the UNECE RE status report was highlighted during the presentation, where the UNECE countries only represented 0.2% of new RE investment, showing that the investment attraction remains an issue for the RE development in the region.

Mongi Bida, Sustainable Development Policies Division, ESCWA presented the ESCWA project development portfolio. In the framework of the ESCWA Project Development Portfolio, ESCWA provided technical assistance for the RE project development. A call for RE proposals was sent to relevant parties in the ESCWA member States, where 12 RE project proposals from six ESCWA countries were received. The project developers were invited to attend a training workshop on RE project development in Rabat Morocco in May 2016, where four ESCWA member States confirmed their interest and completed a technical assistance process for a total of nine RE projects. These countries are Libya (1 project), Mauritania (2 projects), Palestine (4 projects), and Sudan (2 projects). Different milestones have been completed in the project, and the progress has been broken down as the following: 1) input data collection and analysis has been completed, 2) feasibility studies development

has been completed; and 3) RE bankable proposals are under progress as the next step to be executed.

Case studies on RE investment pipeline in ESCWA member States were presented and used as elements of two panel discussions.

- **Panel discussion 1** on the ESCWA RE project portfolio and case studies from Sudan, Libya, Palestine and Morocco. This panel discussion was moderated by Mohammed El-Khayat, Vice Chairman for Studies, Research, and Technical Affairs, New and Renewable Energy Authority (NREA), Egypt. Panellists included project developer representatives Hazir Farouk (Sudan), Khaled Dadesh (Lybia) and Wafa Qutaiana (Palestine), Dhamir Manai, Regional Director for Africa and the Middle East, Climate Parliament, and Taoufik Laabi, RE Expert, Morocco.

Many financial barriers and challenges are hindering the deployment of RE projects in many of the Arab countries (Sudan, Libya, and Palestine). In Sudan, solar and wind projects will increase the country's electricity production and heat generation in the future. However, many challenges are still present: 1) lack of financial model and 2) the inflation rate is high in the country and 3) and the currency of the country value is low, not leading to promoting such RE projects. Libya is still considered an exporting country in oil and gas sectors and the government has subsidized the cost for electricity. The transition to sustainable clean energy is occurring at the country level where Libya has contracted 14 MW PV grid connected projects, and 40 MW and 60 MW wind farms contracts has been initiated. In Palestine, various RE projects are being developed. However, the deployment of these projects is being delayed due to the occupation, lack of RE governmental supporting laws and the payback for RE projects is too long which is reducing the interest of the investors. The Arab region depends mainly on fossil fuel. The share of RE in the Arab region is only 4% coming mainly from solar, wind and hydro. The current drop in the RE prices in many of the Arab countries increases the competition of RE technologies versus fossil fuel (e.g. 4 cents/kWh PV in Egypt, 3 cents /kWh in UAE). Most of the RE financing in the Arab countries comes from international financial institutions. In addition, transition toward RE is already occurring in many of the Arab countries and it is part of their future plans. However, the challenge remains in providing a suitable environment for a constant growth rate that will guarantee a reasonable share of RE in the total energy mix.

- **Panel discussion 2** on defining regulatory and policy requirements for promoting RE investments at the national level: adopted frameworks in selected Arab countries (Mauritania, Libya, and Tunisia). Gurbuz Gonul, Senior Programme Officer – Regions, IRENA, made introductory presentation. RE potential in the Arab region is very high particularly in wind and solar. However, the RE penetration still very limited, where it only accounts for 4% of the total installed capacity. However, the investment in RE has been greatly increasing in the past few years (e.g. in 2016 USD 11 billion were invested in RE across the Arab countries, up nine-fold since 2008). In addition, 5.8 GW of RE (excluding hydro) were operational or under construction since 2008, with a target of 80 GW of RE capacity to be reached by 2030. To achieve this target, there is a need to

enhance policy, regulatory, technical and economic frameworks to scale up the deployment of RE. Furthermore, RE auctions in the region have recorded some of the lowest prices for solar PV and wind projects worldwide (e.g. PV prices: USD 24.2/MWh in Abu Dhabi). Countries such as Algeria, Egypt, Kuwait and Saudi Arabia are targeting the largest tenders in the region.

Panel Discussion 2 was moderated by Malek Kabariti, former Minister of Energy & Mineral Resources, Jordan and included panellists Sidi Mohamed Maadh, Director General, APAUS, Mauritania, Hamid Sherwali, Chairman, REAOL, Libya, Nfaa Baccari, Deputy Director, RE Division, ANME, Tunisia, and Toufic Mezher, Professor, Masdar, UAE. It was highlighted that renewables have been present in the Arab countries since the 1970s. However, today the transition toward RE is occurring at a faster rate than before, where many Arab countries are trying to meet the goals set in the 2030 Agenda. In this panel discussion, several Arab countries (Mauritania, Libya, and Tunisia) shared their case studies and experience in RE area. Mauritania has started developing RE projects during the 1990s because the country has high potential in wind, solar and hydropower. However, these projects are facing many problems during the maintenance phase. Furthermore, in rural areas different actions have been taken to develop capacity in Mauritania. In Libya, there are different challenges that are preventing investment in RE. For instance, lack of good RE policies, high taxes, and the absence of regulatory framework to promote RE are blocking RE investors from coming to Libya. In Tunisia, due to the increase of energy demand and low investment in RE, a plan for RE deployment has been developed (plan of 2020), where many local goals that apply directly to the country demands were developed in order to move forward and achieve the goals set in the 2030 Agenda.

Henning Wuester, Director, Knowledge, Policy and Finance Centre, IRENA presented the IRENA Marketplace web platform. This keynote presentation covered the major trends on projects and investments in RE technologies, which are still facing many barriers. These barriers are mainly manifested in: 1) lack of bankable investment in mature RE projects; 2) high capital cost, due to perception of political, counterparty and currency risk; and 3) small size of RE investment deals, which are inadequate for large-scale investors. IRENA has taken many actions to unlock RE investment and provide a sustainable energy marketplace. These actions include: 1) Global Solar Energy standardization initiative, with the purpose of developing and financing process for solar PV projects; 2) Global RE Guarantee scheme, to offer guaranteed investments for RE projects and piloting solar PV. To scale up the RE and EE investments in developing countries, IRENA, at COP21, launched the development and financing of sustainable energy projects by:

- Improving market transparency
- Offering relevant tools and databases for market players
- Supporting and facilitating projects in the development stage

The coverage of the IRENA marketplace is expanding to Asia, Southern and Eastern Europe and the Pacific region. It includes 152 RE projects, USD 7 billion investment opportunities, 39 financing institutions, and 93 financial instruments. Many milestones have been achieved by the marketplace including: 1) development of outreach; 2) building a strong pipeline of RE investment; 3) attracting a wide range of investors; and 4) accelerating project

facilitation activities to support mature projects. For more information on IRENA marketplace platform, please visit the link [IRENA Marketplace](#).

The session was wrapped up with a presentation on the development of RE investments in the absence/lack of adequate policy and regulatory environment by Nour Mousa, Chief Executive Officer, Desert Technologies (DT). DT is a private sector company that works on integration of renewable energy and clean water business, starting from the development stage, to manufacturing and assembling, engineering procurement and construction and finally operation and maintenance. DT has many solar PV projects spread in various locations in Jordan and Egypt. These projects are financed by the International Finance Corporation (IFC). The absence of policies and adequate regulations makes the work for the project developers harder since there is no reference to check for compliance with the standards. The key challenges that are prohibiting the development of RE are: 1) lack of policy instruments for promotion of RE, such as lack of fiscal interventions, financial incentives for carbon mitigation, and lack of a state policy framework to encourage RE investments; 2) lack of regulations on RE tariff, which includes putting a target for RE share in power generation, facilitation of development of RE plants, and flexibility in RE generation and sale of electricity. However, these challenges are pushing stakeholders to collaborate without having a set framework. Such collaboration are initiating great opportunities in technology innovation to find the best solutions in many developing countries, in particular in Africa.

The second session of the workshop on Development of UNECE Renewable Energy Investment Pipeline included keynote presentations, considered UNECE project development portfolio and a panel discussion on UNECE RE project portfolio.

John Woods, Vice President “Minas Energy”, Canada made a keynote presentation on “Adopting international best practices to reduce project risk and secure the foreign investment required to achieve the transition to the Green Economy in Kazakhstan”.

Representatives of the Czech Republic shared advanced international experience through presentations on “Development and implementation of advanced RE technologies in the Czech Republic”.

Deltcho Vitchev, training facilitator, opened the panel discussion on UNECE RE project portfolio with an overview of the UNECE project development portfolio. He presented analysis of selected UNECE investment project proposals and concluded that many of the projects are financially viable and show good returns. At the same time, financing structures of many projects are biased towards equity and grant finance. He described the status of renewable energy in Central Asia, the Caucasus and Eastern Europe, various programmes and financing facilities existing to support renewable energy project development in this region, country’s experiences and lessons learnt of renewable energy project development as well as support mechanisms and investment incentives to upscale renewable energy uptake.

Panellists included project developer representatives Olimjon Saidmamatov (Uzbekistan), Mykola Shlapak (Ukraine), Nicolae Zaharia (Republic of Moldova), and Azamat Omorov, Deputy Chairman, the State Committee of Industry, Energy and Subsoil Use, Kyrgyzstan.

Project developers described their projects and discussed risks, potentials and opportunities in their countries for renewable energy upscaling and regulatory and policy requirements for promoting RE investments at the national level. Representative of the Government of Kyrgyzstan presented existing frameworks in the country and key regulatory

and policy options. He described effectiveness of policies, government institutions and incentive mechanisms. It was noted that while existing legislation stimulates RE projects in Kyrgyzstan, the real level of wind and solar projects is still low due to competition from the hydropower projects.

Session From Renewable Energy Pipeline Projects to Matchmaking

This was **the first matchmaking session** for the project pipeline programme. The event, also called ***Renewable Energy Investment Show Cases and Prospects (REISCP)*** was organized on 13 and 14 June by the UNECE and the European Union's Technical Assistance Facility (EU-TAF). The objective of the REISCP Event was to facilitate a process that leads to the identification, financing and implementation of viable renewable energy investment projects. It included country presentations and panel discussions. The REISCP Event also offered face-to-face meetings (B2B session) for renewable energy project developers and investors.

This session gathered a broad range of stakeholders active in Renewable Energy investment in the UNECE region, including public administrations, private sector, financial institutions and donors to discuss the opportunities and the barriers faced to boost renewable energy investments.

Gianluca Sambucini, Secretary of the Group of Experts on Renewable Energy, UNECE, was the moderator and delivered an opening presentation. He provided an overview of the work plan and the key activities of the Group of Experts on Renewable Energy and an update of key statistics on renewable energy share of total primary energy supply in seven selected countries (Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan).

Anca-Maria Simion, Sustainable Energy and Climate Change Unit, Directorate-General for International Cooperation and Development, European Commission, provided an overview of the European Union (EU) initiatives on financing facilities for renewable energy investment. She pointed out that EU aims to allocate more than EUR 3.5 billion from 2014 to 2020 to support Member States in achieving sustainable energy objectives, and a minimum of 20 percent of EU budget to Climate Action: Energy, given it is a core contributor to mitigating climate change. She also talked about the mission and work of EU-TAF.

Sergiy Savchuk, Head of the State Agency on Energy Efficiency and Energy Saving of Ukraine and Margalita Arabidze, Head of Energy Efficiency and Alternative Energy Division, Ministry of Energy, Georgia, delivered presentations on the status of renewable energy deployment and investment in the respective countries.

Deltcho Vitchev, Assignment Leader and Senior International Expert on Renewable Energy Investment Projects, EU-TAF, presented the EU-TAF for the Sustainable Energy for All. He gave an overview of the global renewable energy trends and renewable energy investment opportunities in the UNECE region by briefly introducing selected projects. Then he introduced the bilateral meetings.

In a discussion moderated by Deltcho Vitchev, participants exchanged their views on renewable energy investment opportunities in the region. Private developers and investors expressed the need to set a clear and stable regulatory framework and improve the contractual investment terms to effectively develop and implement the existing RE project proposals.

They stressed also the need for an instrument to alleviate the currency depreciation risks. On the financial side, further to the IFIs support (in particular EBRD), local banks need to be involved and a guarantee system set.

The EU has put in place integrated tools organized on three pillars: a) Support to policy and regulatory reforms; b) Capacity building and technical assistance; and c) Financing instruments for enabling RE and EE investments, such as blending (Investment Facility for Central Asia, IFCA), and a specific instrument targeting the private sector, ElectriFi and the External Investment Plan.

The event successfully provided a unique opportunity for networking, in particular between private sector representatives/project developers and investors/financiers on specific project opportunities in selected regions. For more information and video on matchmaking events and country presentations, please refer to: <http://www.unece.org/energywelcome/areas-of-work/renewable-energy/matchmaking-on-renewable-energy-investments.html>.

Track II *Energy Efficiency*

Workshop Creating the Business Case for Energy Efficiency: Engaging Governments with Industry

The workshop was jointly organized by UNECE, UNIDO, Copenhagen Centre on Energy Efficiency, UN ESCWA, and BG Consulting Engineers. It was attended by over 90 participants. The speakers, panellists and participants looked at the ways to engage governments with industry in order to consider how to improve awareness of the business case for energy efficiency. Today industry is responsible for one-third of the global primary energy consumption and CO₂ emissions. This is a sector that will continue to grow rapidly in order to contribute to the expected 88% global economy growth by 2050. As such, the challenge will be to not only avoid an increase of CO₂ emissions during this growth but to manage an overall reduction of emissions. While changing the energy mix will remain an important approach to address the emission reduction challenge, a key role will be played through the reduction of energy consumption. Economically viable energy efficiency actions, based on existing technology solutions, have the potential to already deliver up to 30% of energy consumption reductions within industry. However, to date even specifically designed policies have not managed to overcome all the everyday barriers that continue to restrict widespread uptake of this more often than not financially feasible solution.

One of the main reasons is that energy efficiency, and sustainable energy solutions in general, are in most cases treated separately from a company's day-to-day core operations. However, energy specific solutions can be shown to also have a positive impact on many types of operation-related activities, such as quality, safety, reliability and maintenance. The workshop looked at energy solutions as a potential driver of many different types of efficiency and productivity improvements within a company. The objective of the workshop was to promote and demonstrate how the joint efforts of policy makers and industry stakeholders are key to developing an improved and acceptable business case for energy driven operation efficiency improvements.

The four sessions of the workshop were a combination of presentations and panel discussions. *Session 1 Putting the business case for energy efficiency into context*, moderated by Hannes Mac Nulty, Sustainable Energy Solutions, BG Consulting Engineers, presented perspectives on why the business case matters and why it still remains a challenge. Presentations made by Ken Somers, Master Expert, Sustainability & Resource Productivity, McKinsey&Company; Vivien Foster, Global Lead for Energy Economics, Markets & Institutions, World Bank; Marco Matteini, Industrial Development Officer, UNIDO; and Oleg Dzioubinski, Energy Efficiency Programme Manager, UNECE led to a discussion on how to address the existing barriers to first understanding and then applying the business case for energy efficiency.

Session 2 Creating the business case begins with industry driven solutions, moderated by Scott Foster, Director, UNECE Sustainable Energy Division, was a panel discussion on the business case successes and challenges encountered by the different types of industry stakeholders. Panellists included Robert Hinrichs, Project Manager Sustainability - Global Engineering, Mondelez; Mikhail Akim, Director of Strategic Development, ABB Russia; Roberta Boscolo, Energy and Climate Focal Point, World Meteorological Organization; Natalia Jamburia, Chief Expert, Ministry of Energy, Georgia; Maxim Titov, Executive Director, ENERPO Research Center, European University at St. Petersburg, Russian Federation; and Robert Tromop, Independent Expert, New Zealand.

Session 3 Best practice policies and making them business friendly, moderated by Aleksandar Dukovski, Director, Energy Agency of the Republic of Macedonia, was a panel discussion on how governments typically apply best practice policy and in what ways such policy can be improved further to align with every day business reality. Panellists included Sergey Morozov, Specialist of operational improvement department, ArcelorMittal; Matija Vajdić, Senior Researcher, Energy Institute Hrvoje Pozar, Croatia; Kostiantyn Gura, Acting Director, State Company Subdivision "Green Investment Development Center", State Agency on Energy Efficiency and Energy Saving of Ukraine; Almat Kabykenov, Director, Center of expertise, management and monitoring of projects, JSC "Electric power and energy saving development institute (Kazakhenergoexpertise)", Kazakhstan; and Zlatko Pavicic, Independent Expert, Croatia.

At Session 4 Making better use of the business case supports that already exist, moderated by Tim Farrell, Senior Advisor, Copenhagen Centre on Energy Efficiency, speakers presented existing and proven solutions that support the effective and viable implementation of energy efficiency measures and assist with the development of comprehensive and clear business case, but which need combined support from all stakeholders to have widespread sectoral impact. Speakers included William McLaughlin, International Lead EnMS Expert, UNIDO; Kankana Dubey, Senior Research Associate, KAPSARC; Stefan Büttner, Head of International Affairs & Strategy, Institute for Energy Efficiency in Production; Aleksandar Dukovski, Director, Energy Agency of the Republic of Macedonia; and Mikhail Akim, Director of Strategic Development, ABB Russia.

The following main outcomes were outlined at the workshop. Industrial energy efficiency has become a much spoken about topic, yet it remains unclear to many different types of stakeholders how to actually achieve the identified potential. While energy efficiency has been shown to be largely cost effective and in line with typical industry investment criteria, it is still over-reliant on the climate change topic rather than on the business case as an

implementation driver. A new and innovative policy approach that moves beyond the more classic mix of incentives and obligations is required to bring about a more acceptable common understanding of the energy efficiency topic, which would improve considerably the ability to achieve tangible results on the ground. Rather than just compel or entice industry to implement energy efficiency, there is a need to actually convince them of the beneficial role energy efficiency can play within their overall business model. Industry is first and foremost about business. Energy efficiency makes financial sense and leads to increased industrial productivity, regardless of its importance to climate change. Convincing industry of this fact is crucial, as is convincing policy makers and supporting organizations to take this fact into account when designing and enforcing energy efficiency policies.

The key step in achieving the current and future potential of energy efficiency is therefore primarily related to awareness building. A two-prong approach includes helping policy makers understand how industry operates from a business perspective and helping industry appreciate the financial and productivity benefits of energy efficiency. At the same time, these levels of awareness need to be applied also to both financing and supporting organizations.

The following actions were proposed in presentations and discussions at the workshop:

- Developing a cohesive industry engagement strategy that focuses on helping companies develop a proper understanding of energy efficiency internally within their own organization (from “shop floor to boardroom”) and an exchange of experience and best practices between companies
- Working with policy makers to orientate the driver of energy efficiency more towards business improvements rather than just focusing primarily on climate change mitigation
- Developing a clear policy development approach that places the policy end user (the energy using company and the engineers on the ground) within the policy design cycle as a key input of information. The policy design cycle should consider also how government, industry, financial institutions and supporting organizations can share a common language on energy efficiency so that each can contribute in the most effective manner.

Track III *Modernizing Energy Industry*

Session Best Practices in High Efficiency Low Emissions Coal Power Generation

The workshop, organized by UNECE, World Coal Association, and IEA Clean Coal Centre, focused on the role of coal in meeting climate commitments. The event introduced some of the technological innovations that are the backbone of High Efficiency-Low Emissions (HELE) coal-fired power plants. Two case studies on the state-of-the art HELE power plants in Europe and Asia were presented.

Participants discussed how HELE technologies could enhance efficiency, environmental performance and reliability in coal-fired power plants. Increasing upstream efficiencies enables operators to reap significant economic and environmental dividends down the value chain of electricity generation, transmission, distribution and use. Each percent of increase in efficiency may result in 2-3 percent reduction in emissions of carbon dioxide and other air pollutants. The deployment of HELE technologies might therefore offer the member States

the opportunity to adjust policies and regulations as they prepare their energy system for the future.

The workshop was opened by Bakhytzhan Jaxaliev, Vice-Minister, Ministry of Energy, Kazakhstan, who stressed the role of clean coal in achieving Kazakhstan's developmental objectives and climate commitments. Barry Worthington, Chair of the UNECE Group of Experts on Cleaner Electricity Production from Fossil Fuels, presented activities of the Group of Experts in this field.

Judd Swift, Chief Executive Officer, Synfuels Americas pointed to the lack of policy parity with other clean technologies as a significant obstacle to wider deployment of HELE. Benjamin Sporton, Chief Executive, World Coal Association, presented the new global dynamics for coal that drives economic and social development. Andrew Minchener, General Manager, IEA Clean Coal Centre, presented latest technological developments that represent a key step towards zero emissions from coal. Akira Shindo, Japan Coal Energy Center, and Evgeniy Butov, General Electric, presented two case studies.

The key messages that emerged from the workshop are:

- Because of its role in supporting energy access and economic development, coal must remain part of the sustainable energy mix.
- Deployment of HELE could be accelerated through finance and technology transfer provided by the international organizations and other mechanisms.
- HELE is only the first step on the pathway toward zero emission that could be achieved only with carbon capture and storage. To stay on this pathway coal needs policy parity with other low emission technologies.

Panel Discussion Coal Mine Methane and Its Strategic Role in Climate Change Mitigation

Felicia Ruiz, U.S. Environmental Protection Agency, chaired this panel discussion.

Meredydd Evans, Senior Staff Scientist, Joint Global Change Research Institute, Pacific Northwest National Laboratory, delivered a presentation on Coal Mine Methane (CMM) in NDCs and NDC Implementation Plans. She argued that reduction of CMM could help States achieve their NDC goals. According to the presented data, 175 out of 189 countries included methane in the scope of their NDCs submitted to UNFCCC by March 2016. She underlined that at the same time, only a few of them specifically mentioned CMM, none of whom were major coal producers. She advocated for development of clear NDC implementation policies and plans, including on CMM, and for linking them with climate finance. In the context of the latter, she stressed that international financial institutions seeking to support CMM projects should focus on methane rather than coal, as the latter might not be eligible for climate financing. She observed that in situations in which methane concentrations are low, projects might need additional financial support from governments. She underlined that CMM and abandoned mine methane (AMM) offer important opportunities, particularly as emissions are likely to rise.

Xu Xiu, Senior Engineer, China Coal Information Institute, delivered a presentation on China's CMM Policy and Action in Tackling Climate Change. She explained that in 2012 total methane emission volume in China was 55.92 Mt, accounting for 9.9% of the total country's GHG emission. Regarding CMM capture and utilization, she presented data indicating that in 2016, 13.57 billion m³ of methane were captured, which signified an

increase by 317.4% compared to the 2006 level. Out of this amount, 4.99 billion m³ (37.3%) was utilized (increase by 333.6% compared to the 2006 level). According to the presented estimates, in 2020 combined CMM and coal bed methane (CBM) production will reach the level of 24 billion m³, of which 16 billion m³ (66.7%) is to be utilized. In the same year, CMM drainage volume will reach 14 billion m³, and its utilization rate will surpass 50%. She concluded her presentation with a statement that the volume of China's CMM emissions is huge, and therefore the matter of efficient management of this resource is of utmost importance.

Raymond Pilcher, Chair, UNECE Group of Experts on Coal Mine Methane, delivered a presentation on Coal Mine Methane and its strategic role in climate change mitigation – CMM policies in Colombia. He observed that the Colombian economy is highly sensitive to adverse impacts of climate change. He explained that electricity in the country is generated predominantly by hydropower, which due to the effects of El Niño, operates only at 60% of its capacity. He underlined that due to hydropower's fluctuating performance fossil fuels would continue to play an important role in the country's energy mix. Speaking about CMM, he indicated that in 2010, CMM emissions constituted 12.2% of the total energy GHG emissions, and he described several CMM projects that are being developed in the country. He also highlighted several methane-related accidents that have resulted in multiple casualties over the last decade. After presenting benefits of CMM projects, he described the next steps that the country should take. The latter included: greater focus on emission reductions from surface mines; dissemination of information about existing technology and policies that encourage development of CMM resources; and promotion of the development of the co-located methane and coal resources in coal licenses.

Clark Talkington, Vice-Chair, UNECE Group of Experts on Coal Mine Methane, delivered a presentation on CMM Project Scale and its Benefits for Climate Action. He observed that while the number of operating underground mines in the United States dropped by 48% between 2008 and 2014, methane emissions from underground mines declined over the same period by only 8%. Such situation is due to a move to large high production long-wall mining in deeper and gassier seams. He argued that CMM projects could constitute attractive investment opportunities, and discussed challenges that they face. Among the latter, he mentioned the fact that industries are under economic pressure necessitating focus on core business; the need for further R&D and wider deployment required to reduce capex and opex for certain technologies; small economic benefits as compared to a facility's total revenue stream; limited economic incentives; and – in certain cases – lack of available technical expertise.

Workshop Assessment of Coal Mine Methane Resources Using the United Nations Framework Classification for Resources (UNFC)

The workshop was organized jointly with the participation of members of the Expert Group on Resource Classification and the Group of Experts on CMM.

Coal mines are a significant emission source of methane, a potent greenhouse gas (GHG) with a global warming potential 28-34 times that of CO₂. Safe extraction, transport, and use of methane throughout the coal mine life cycle are essential to reduce environmental impacts.

Coal mine methane (CMM) provides an affordable and cleaner burning fuel for the communities that surround mining complexes.

The workshop discussed the socio-economics, technological maturity and resource estimate aspects of coal mine methane projects that can be evaluated using the United Nations Framework Classification for Resources (UNFC). UNFC provides a standard tool for managing energy and mineral resources. Applicable to all extractive activities, including solid minerals, oil, gas and uranium, as well as injection projects for the geological storage of CO₂ and renewable energy projects, including geothermal energy, UNFC ensures that resources are developed transparently, efficiently and sustainably in a socially acceptable manner.

An increasing number of multi-resource companies are today operating in many different countries and jurisdictions. In addition, the development of new types of resources, such as CMM, the mining of bitumen to produce synthetic crude oil, and development of unconventional gas reservoirs demonstrates that the historical boundaries between the minerals and petroleum sectors, which are reflected in different resource classification systems, are no longer sustainable.

Four key presentations were delivered at the workshop, followed by interactive discussions. The key take away messages from this workshop were:

- Coal mines are a significant source of methane emissions. One of the more productive and rewarding near-term options is the capture and use of methane from coal mines.
- Recovery and utilization of CMM have multiple benefits such as providing clean and affordable energy, improved safety and productivity of coal mining operations, and reduction of a potent GHG. The carbon footprint of coal mining can to a certain extent be reduced by methane abatement.
- CMM projects are innovative and require decision-making related to the application of appropriate technologies and allocation of capital investments. Methane can be captured before, during and after mining by pre- and post-mining drainage techniques.
- Captured CMM is a clean energy resource for which there is a variety of uses. The most prevalent use for CMM is for power generation. Other uses include boiler fuel, injection to natural gas pipelines, town gas, industrial gas, the feedstock for conversion to vehicle fuels such as liquefied natural gas (LNG) or compressed natural gas (CNG), and coal drying.
- Currently, no accepted classification system for CMM exists. Even though volumes can be estimated with reasonable accuracy, using some of the techniques mentioned above, the assessment of recoverable quantities needs careful consideration of many factors. Since CMM, especially coal bed methane (CBM), can occur in varying geological circumstances with different content, careful consideration is needed regarding the geology, technologies for recovery, and socio-economic aspects to classify volumes. The future production of methane from coal mines will depend therefore on various factors, which can be all assessed within the single framework of UNFC.
- UNFC is a decision-making and management tool that can help governments and industry to understand the sustainable development benefits of CMM recovery and use, and increase its adoption and practice around the world.

Track IV *Regional Cooperation*

Session Regional Cooperation on Renewable Energy in Central Asia

The session on Regional Cooperation in Central Asia provided the opportunity to discuss the priorities for more accelerated development of renewables in the region and to exchange views on implementation of the IRENA Action Plan Unlocking Renewable Energy Potential in Central Asia. Representatives from Central Asia countries, as well as development partners identified specific areas of the Action Plan to collaborate with IRENA and other stakeholders to support the countries to advance renewable energy development in Central Asia.

Nazir Ramazanov, Advisor to Chairman, State Agency on Alternative and Renewable Energy Sources (AREA), Azerbaijan, invited IRENA to organize the Regional Conference on Renewable Energy in Baku, Azerbaijan in 2018.

Mohamed El-Farnawany, Director, Strategic Management and Executive Direction, IRENA and IRENA Commissioner for Astana EXPO-2017 provided welcoming remarks to the participants.

Gurbuz Gonul, Senior Programme Officer, IRENA, presented an overview of a Regional Action Plan for unlocking renewable energy potential in Central Asia. He presented the efforts by IRENA to help increase the uptake of renewable energy sources in Central Asia. Topics included resource assessment, grid integration, policies and regulations for renewable energy deployment, statistics and data collection, project development support, and awareness raising. He introduced the ongoing renewable energy engagement. He pointed out that more than USD 2.5 billion has been invested in renewable energy from 2005 to 2016, with more than 46.65 million dollars in technical assistance. He summarized the challenges hindering the renewable energy deployment in Central Asia.

Michael Curtis, Officer, USAID/Central Asia Regional (USAID/CAR), made a presentation where he reflected on IRENA's proposed Regional Action Plan. He showcased relevant programs in USAID/CAR for renewable energy, including C5+1 programme providing training to support scaling up renewable energy deployment in the five Central Asia countries (Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan and Turkmenistan), and a four-year USD 24 million Power the Future programme.

Nazir Ramazanov and Ainur Sospanova, Director, Renewable Energy Department, Ministry of Energy, Kazakhstan, led a panel discussion on the implementation of the Action Plan for Central Asia. It was recognized that there is a need for IRENA to support the region in their energy transformation as well as the pivotal role that IRENA can play in coordinating the work of stakeholders in the region.

Session System Integration of Renewable Energy from a Regional Perspective

This session discussed issues around the integration of variable renewable energy technologies into energy systems. The session was chaired by Martin Hullin of REN21 and started with a presentation by Paolo Frankl, Head, Renewable Energy Division, International Energy Agency, who showed that very high shares of variable renewables are technically possible. While at low shares, little adjustment is needed (provided some basic rules are followed), at high shares system flexibility is key. He then dispelled a number of myths around variable renewables, arguing for example that thanks to much better forecasting,

weather driven variability is manageable. Also, conventional power plants (even old coal plants) can, with some adjustment, be operated more flexibly. This is currently a more cost-effective option for system integration than battery storage. It is however important that governments provide incentives that optimize when and where renewable electricity is produced.

Ilka Lewington, Regional Expert and Consultant, DNV-GL, outlined some of the challenges facing system integration in the region. She highlighted that renewables were making relatively slow progress in the region and that renewables targets for 2020 are now looking unachievable in a number of countries. While there have been power sector reforms, these have not necessarily been renewables-friendly. She argued that in many countries, renewables integration is not a technical problem but one of market design and regulation. She then provided examples from Kazakhstan and Ukraine. She concluded that system operators and conventional generators needed to be brought on board, as they hold the key to successful system integration.

The presentations were followed by a discussion panel made up of the two speakers and 3 panellists: Nurzhan Isenov, Kazakhstan grid operator KEGOC, Nazir Ramazanov, State Agency on Alternative and Renewable Energy Sources of Azerbaijan, and Vincent Duijnhouwer, European Bank for Reconstruction and Development (EBRD). Issues discussed included the difficulty of operating old coal plants flexibly, the problem of financing in the region (with currency depreciation of for example 48% in Kazakhstan having hit the market hard), as well as feed-in-tariffs with high rates that make renewables very expensive.

The panel concluded that system integration of renewables is closely related to the political and economic situation in the countries. While the legacy of the power sector in individual countries has to be recognised, political will is needed to change it.

Key messages from the session were that the integration of variable renewables into electricity systems is not a problem but a task. It is very easy to do at low levels of renewables penetration, while at higher levels it depends primarily on the flexibility of the system into which they are integrated.

Session UN Day Dialogue 1: Energy for Sustainable Development

The session was organized by UNDP, UNIDO and UN-OHRLLS

Globally, climate financing mostly goes to the urban agglomerations, 95% of which goes into the medium developed countries. This leaves the poorest and the most vulnerable countries susceptible for negative impacts of climate change. The situation with the green financing in the developing countries is exacerbated with the nature of the green projects: high upfront costs and less enabling environment enhance the risks and prevent the potential private direct investments into the green business.

The key challenge is to unlock the financial capital by more even re-distribution of financial flows towards the least developed countries. This goal could be achieved through de-risking the private investments and removing the barriers on policy restrictions, access to market and investments.

To build the stable and reliable green financing system, the UN agencies should provide support to the governments in setting realistic targets, identifying the baseline, and enhancing the capacity to monitor progress.

Session UN Day Dialogue 2: A Nexus Approach to SDG7 implementation

The session was organized by UNDP, UNESCO, IAEA, ESCAP, UNICEF, UNEP and UN Women.

SDG7 is a key condition to achieve progress on all other SDGs. The key drivers to SDG7 are science and technology. Participants noted the need to increase the voluntary national commitments to the reduction of greenhouse gas emissions. Even if all the countries achieve their NDCs, the ultimate goal of keeping the rate of global warming under 2 degrees Celcius will hardly be achievable.

The UN agencies need to provide support to scale up the transfer of affordable technologies to the developing world that can be easily replicated and adopted in various countries. To build the nexus between the current energy needs and the available technological capacities, the detailed road map approach could be developed jointly with the national governments.

Track V Project Events

Training of the National Officials and Experts Responsible for Sustainable Energy Data Collection

The training focused on methods for collection, verification, aggregation and reporting of data, as well as statistical indicators relevant for monitoring of sustainable energy development. The goal of the training was to increase knowledge of national experts on relevant best practices on collection and monitoring of national data on sustainable energy in compliance with international standards. Based on the knowledge acquired during training, national experts strengthened their capacities to organize data collection in their countries in accordance with the United Nations Fundamental Principles of Official Statistics.

The training was jointly organized by UNECE and ESCAP in the framework of implementation of the joint United Nations Development Account project “Sustainable Energy for All (SE4All) in Eastern Europe, the Caucasus and Central Asia”.

UNECE and ESCAP representatives introduced the objectives and activities of the project and outlined the work already accomplished by the two United Nations Regional Commissions in the beneficiary countries.

Overview of sustainable energy statistics in Azerbaijan, Belarus, Georgia, Kazakhstan, and Kyrgyzstan was provided by the countries’ representatives and national consultants: Mr. Igbal Guliyev, Azerbaijan, consultant, Deputy Director, IIEP MGIMO-University; Mr. Andrei Malochka, Belarus, consultant, ALC ENECA – Energy Engineering and Consulting Company; Mr. Gogita Todradze, Georgia, consultant, Deputy Executive Director, National Statistics Office of Georgia; Mr. Bahytzhan Jaxaliev, Vice Minister of Energy, Kazakhstan; Ms. Ainura Nurbaeva, consultant, Head of Department for Industry and Energy Statistics, National Statistical Committee, Kyrgyzstan.

The role of energy statistics in achieving sustainability was presented by speakers from international organizations and private sector: Ms. Céline Rouquette, Head of Non Member Countries Section, IEA Energy Data Centre; Mr. David Macdonald, Vice President, Segment Reserves, British Petroleum; Mr. Leonardo Rocha Souza, Statistician, Industrial and Energy Statistics Section, United Nations Statistics Division, UN DESA.

The UNECE international consultant Mr. Robert Smith provided training to participants with the focus on the United Nations Official Principles of Statistics and their relation to sustainable energy statistics as well as on Sustainable Energy Statistics in general.

14 June 2017

Sessions and Workshops

Track I *Renewable Energy*

Session Matchmaking for Renewable Energy Investments

This session was a continuation of the matchmaking event, jointly organized by UNECE, EU-TAF, and ESCWA, which allowed country representatives to continue to showcase their projects.

Country representatives from Kazakhstan, Azerbaijan and Ukraine provided an overview of the current situation the countries are facing in increasing the uptake of renewable energy in the future energy mix and showcased a great potential of deploying renewable energy and attracting investment in their countries. Presentations were made by Ms. Ainur Sospanova, Ministry of Energy, Kazakhstan, Mr. Anar Suleymanov and Mr. Jamil Malikov, Deputy Chairman of the State Agency on Alternative and Renewable Energy Sources of the Republic of Azerbaijan, and Mr. Valerii Kotsiuba, Acting Director of the Department on Investment Activity in Renewable Energy, State Agency on Energy Efficiency and Energy Saving of Ukraine.

Participants, including regional and international stakeholders, discussed the key issues in renewable energy investment. Topics included key barriers and priorities from the investor perspective to facilitate renewable energy investment, especially the most critical requirements to jumpstart investments; requirements for the creation of suitable market conditions for renewable energy investments; and the missing instruments and financing mechanisms for different renewable energy projects. The discussion also addressed the importance of support from EU, UNECE and other international actors.

The roundtable discussions concluded that there is a clear progress in RE investments but it has been uneven, given the diversity of situations. There is a need to accelerate the rate of RE deployment to meet the policy goals. For instance, investment financing is available but has to be coherent with the countries' economic (e.g. affordability) and energy circumstances. However, many project proposals are not sufficiently developed to reach bankability. Thus, new innovative investment instruments (e.g. currency hedging) and specific technical assistance can play a crucial role in supporting project developers, investors and financial institutions. Such necessary changes may be slow but should be inclusive in order to be sustainable.

The two-day event proved to be a valuable platform and an opportunity for national authorities, project developers, investors and financial institutions to meet and match their interests in developing and financing renewable projects in the region of Eastern Europe, the Caucasus, and Central Asia.

The public authorities are addressing those obstacles through policy, regulatory and investment measures. For instance, most countries have adopted RE strategies and action plans with ambitious goals, improved RE regulation (permitting and tariff, in particular feed-in tariff and net metering) and enhanced the bankability of contracting conditions.

Private developers and investors expressed the need to set a clear and stable regulatory framework and improve the contractual investment terms to effectively develop and implement existing RE project proposals. They stressed also the need for an instrument to alleviate the currency depreciation risks. On the financial side, further to the IFIs support (in particular EBRD), local banks need to be involved and a guarantee system set.

The participating developers and investors identified a number of issues and areas where there is a need for assistance and cooperation. The most promising and important concerns are summarized as following: a) assistance in establishing a legal framework and financial instruments for resolving the financial and legal matters pertaining the financing and construction associated with RE project infrastructure; b) establishment of financial instrument to cover the currency risk in RE investments in the region; c) assistance in establishment and capitalization of a green investment fund for Ukraine; d) assistance to project developers in preparation of RE investment proposals; and e) assistance in facilitation of contacts between investors and developers.

Workshop Renewable Energy Finance

This workshop was jointly organized by IRENA and the European Bank for Reconstruction and Development (EBRD). Based on the shared interests of IRENA and EBRD, this session explored the renewable energy financing landscape and discussed various financial instruments and support schemes that could help improve access to finance at local level and mitigate risks.

Adia Sitdikova, Director for Energy and Natural Resources for Russia, Caucasus and Central Asia, EBRD gave an opening address.

Henning Wuester, Director of Knowledge, Policy and Finance Centre, IRENA, made a presentation on the role of public finance institutions in scaling up renewable energy investment. Global investment in renewable energy has seen significant growth in recent years, driven by the adoption of enabling policies, emergence of new markets and growing cost competitiveness of renewable energy technologies. However, with majority of investments taking place in developed economies, renewable energy investment in developing economies need to be scaled up significantly and rapidly for an accelerated energy transition. Although renewable energy investment in Central Asia has been growing relatively slowly during the last decade, tremendous opportunities remain yet untapped in the region. In order to address key investment risks and barriers, public finance institutions have an important role in facilitating access to finance at a local level and mobilizing private finance through provision of risk mitigation instruments. He gave an overview of the trends and status quo of investment flows in renewable energy in Central Asia. He pointed out that

there is an urgent need of scaling up the investment in renewable energy globally before 2030, and especially for developing economies (excluding China, India and Brazil). The rate of growth needs to accelerate 15 to 20 times. To achieve that, IRENA proposes a scheme, which includes improvement of access to finance at the local level, mitigation of risks through mobilization of private finance, and mobilization of capital markets. He concluded the presentation by restating the role of public finance institutions.

The session continued with a panel discussion on typical ways of financing renewable energy projects in emerging markets and in the region. It was moderated by Jan-Willem van de Ven, Head of Carbon Market Development, EBRD. Other discussion topics included key risks and barriers limiting the development of project pipeline and access to local capital for renewable energy projects, a regulatory framework and policy measures that can help improve access to local finance and promote local currency lending, and the role of public financial institutions in mobilizing private sector investors and banks.

The panellists highlighted the need for a well-developed policy and regulatory framework, importance of involving all stakeholders in the process of foreseeing the development of the sector, and the key importance of policy, off-taker and currency risks. The experts also highlighted the possibility of national and subnational actors to mobilize funds through the issuance of green bonds and the need for a level playing field, so that cost-competitive renewables can compete in the market, obtain long-term and stable revenue and secure financing.

Workshop From Diesel Generators to Renewable Energy in the Context of Crisis

Gianluca Sambucini, Secretary of the Group of Experts on Renewable Energy, UNECE, moderated the session.

Off-grid, rural, refugee and crisis settings are among the situations where diesel generators produce most of the electricity. Large amounts of money are spent on purchasing, maintaining, and securing diesel generators. Coupled with innovative business models that allow for the purchase of electricity, readily deployable and cost-competitive renewable energy technology options can provide a potential solution to the situation.

This session, jointly organized by United Nations Institute for Training and Research (UNITAR), United Nations High Commission for Refugees (UNHCR), Program on Conflict, Climate Change and Green Development at the University of California-Berkeley, and BG Consulting Engineers, provided an overview of such situation and presented cases from Tanzania, Djibouti and South Sudan.

Thomas Fohgrub, UNITAR, presented the current energy situation at refugee camps. He pointed out the crucial fact that 90% of refugees lack access to clean, safe and secure energy services. In the meanwhile, electricity in camps for refugees and migrants is very often produced using inefficient diesel generator solutions. It is estimated that humanitarian agencies spend more than USD 100 million per year on this. Renewable energy solutions are a sustainable alternative to the current way of producing energy. He illustrated how renewable energy solutions can help mitigate the critical situation using examples from Tanzania and Djibouti.

David Mozersky, Energy Program on Conflict, Climate Change and Green Development, UC Berkley, Renewable and Appropriate Energy Lab (RAEL), made a video presentation on

how renewable energy can serve as a building block for peace. Renewable energy can help reduce tensions between refugees and host communities. Very often host communities and refugee settlements are facing similar challenges when it comes to energy services and it is essential that both benefit from RE solutions. Lighting, communications and energy services in general can improve nighttime security in camp settings. RE can offer a “shared” service between camps and host communities, thus reducing a potential source of friction. RE installations are long lasting and can outlive the crisis and/or the camps, offering tools to support clean local energy capacity, reconstruction and stabilization, and peace building.

Hannes Mac Nulty, Sustainable Energy Solutions, BG Consulting Engineers, delivered a presentation focusing on the potential business case for private investors. Renewable energy solutions can be economically viable even in harsh conditions and crisis situations. However, the humanitarian sector’s “procure and provide” model precludes opportunities for better energy services. He stressed that there is an urgent need to explore new delivery models that can bring down costs through scaling up demand, develop appropriate payment models, support technology innovation policies, and pilot demonstration projects with a potential for replicability.

To implement these and other solutions, comprehensive feasibility studies are necessary, which should include social, developmental and environmental aspects in addition to the technical ones. Currently there is a lack of quality data about the energy situation in camp settings, especially when it comes to the electricity that is needed to power the operations. To plan adequate renewable energy solutions and to gain evidence-based policy options, it is critical to assess the energy situation in detail in the camps. The priority will be to specify and define the necessary data requirements and to develop practical processes for effectively capturing and analyzing the data. In addition, simply deploying RE systems is not sufficient. It should be accompanied by training and capacity building to harness the full potential and ensure sustainability. Specialized technical capacity is essential to develop and deliver alternatives to existing fossil fuels solutions. With severe shortages of energy expertise in the humanitarian system, it is important to equip governments, companies and organizations with relevant skills and knowledge to efficiently plan, manage and monitor energy interventions, to build strong local institutions, and to promote local technical expertise. Capacity building programmes and training need to be based on prior needs assessments and on local traditional knowledge.

Session Realising Renewable Energy Targets and Commitments through Policies

Signalling a global recognition of the benefits that renewables offer, the number of countries establishing renewable energy targets has continued to grow. At a regional and national level, renewable energy targets have emerged as a popular mechanism to provide a clear vision for the development of the sector and the envisioned market growth trajectory. At a global level, commitment towards renewables has also grown with the adoption of the Sustainable Development Goals and the Paris Agreement. Translating targets into investments and deployment, however, requires specific policies and measures. To inform policymaking, IRENA provides state-of-the-art analysis of enabling policy frameworks, spanning the entire renewable energy development cycle. This includes best practice and

trends in policy design (e.g., growing adoption of renewable energy auctions), evaluation of support mechanisms, and their adaptation to changing market conditions.

This session provided an opportunity for IRENA to showcase its growing body of work on renewable energy policy design and provide the basis for sharing best practices and lessons learnt among different sector stakeholders.

Henning Wuester, Director of Knowledge, Policy and Finance Centre from IRENA, was the moderator of the session and gave a welcoming address.

Alvaro Lopez-Pena, Program Officer of Policy Advisory, IRENA, presented latest information on renewable energy target settings and support schemes. He showed the increasing global trends in setting renewable energy targets, where 173 countries have at least one type of renewable energy target as of 2015 compared to 43 countries in 2005. He presented trends in renewable energy support policies, by pointing out strengths and weaknesses in each of the supporting policies, including feed-in tariffs, feed-in premiums and auctions.

Sarah Lawson, Presidential Management Fellow, Energy and Infrastructure Team, USAID, delivered a presentation on reverse auctions for scaling up renewable energy and driving development assistance.

Henning Wuester moderated a panel discussion, where panellists shared best practices and lessons learned in setting effective renewable energy targets, developing appropriate policies for ensuring investments and rapid growth of renewable energy sector, and adapting support schemes to the market conditions.

Track II Energy Efficiency

Session Towards Smart Sustainable Cities – Integrated Approaches

The UNECE, swissuniversities, the ZHAW Zurich University of Applied Sciences, and the Copenhagen Centre on Energy Efficiency jointly organized this event.

The event aimed to discuss the benefits of integrated approaches and the role and use of technologies to realize smarter and more sustainable cities worldwide; to highlight existing networks and opportunities for cities that want to accelerate action; to identify innovative solutions, including implementation models and finance opportunities, to energy challenges for cities; to discuss the transformation of sociotechnical energy and transport systems at the city level; and to examine the role of energy infrastructures. It showcased city-level solutions and innovations relating to energy efficiency that provide inspiration and replication models for other aspirational cities.

The global urban population is currently estimated to be approximately 3.5 billion and is projected to reach 8.5 billion by 2030. Cities is one of the biggest consumers of energy in the world, representing almost two-thirds of global primary energy demand and accounting for 70 per cent of greenhouse gas emissions in the energy sector. Many cities are choosing to reduce energy use and emissions beyond what has been pledged by national governments to deliver the array of multiple benefits to its citizens. A growing number of cities are joining partnerships and networks, in an effort to become more efficient, sustainable and low emitting. A growing number of cities are leading by example and setting the pace and scale of action that is required to put the climate on a safe pathway.

The concept of Smart Sustainable Cities is a combination of solution-oriented and integrated approaches based on technological innovations to address the current and future challenges of cities to improve the way cities function. In line with the Sustainable Development Goal 11 on cities and human settlements, UNECE and International Telecommunications Union (ITU), together with other partner organizations, developed a definition: “A smart sustainable city (SSC) is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects.”

The event was the first day of the international seminar “Towards Smart Sustainable Cities – Integrated Approaches” which continued at the Nazarbayev University in Astana on 15 and 16 June 2017.

The event was opened by Urs Schmid, Ambassador of Switzerland to Kazakhstan, and Ivonne Higuero, Director of Forests, Land and Housing Division, UNECE, who stated the importance of the concept of smart sustainable cities for the future human settlements. The four sessions of the workshop were a combination of presentations and panel discussions.

Session 1 *The Role and Use of Technologies and Indicators to Achieve Smarter and More Sustainable Cities* was moderated by Domenica Carriero, Associate Economic Affairs Officer, Housing and Land Management Unit, UNECE. It addressed the role of technologies and innovation for urban development and the role of standards and indicators to monitor the transition into smarter and more sustainable cities. Domenica Carriero set the frame of the event by describing the world urban trends and its related challenges and explained what a smart sustainable city is. She described the UNECE global initiative “United for Smart Sustainable Cities” jointly launched with ITU and the project “United Smart Cities” and the related work on the Key Performance Indicators for Smart Sustainable Cities, which support the achievement of SDGs at the local level.

Presentations were made by George Abulashvili, Director, Energy Efficiency Center, Georgia; Aleksandar Dukovski, Director, Energy Agency of the Republic of Macedonia, the former Yugoslav Republic of Macedonia; Eva Knöbl, Managing Director, Stadtakademie, Vienna; Vahram Jalalyan, UNDP Armenia; Astrid Schneider, Research Engineer, Business Unit Photovoltaic Systems, Center for Energy, Austrian Institute of Technology.

Session 2 *Integrated Approaches of Energy and Transportation Infrastructures for Cities* was moderated by Vicente Carabias-Hütter, Deputy Head, ZHAW Institute of Sustainable Development, Coordinator Platform Smart Cities & Regions, ZHAW Zurich University of Applied Sciences. It dealt with good practices for integrated energy and transportation systems for a smarter and more sustainable urban development.

Vicente Carabias-Hütter opened the session highlighting the main aim of smart sustainable cities to increase quality of life in a city while at the same time reducing energy and resource consumption. Other panellists included Uwe W. Schulz, Lucerne School of Engineering and Architecture, Switzerland; Merla Kubli, SCCER CREST Swiss Competence Center for Research in Energy, Society and Transition; Roman Rudel, Head of Institute for Applied Sustainability to the Built Environment, SUPSI, Switzerland; Alejandro Santis, BFH-CSEM Energy Storage Research Centre, Switzerland; Hansjörg Dennig, ZHAW Centre for Product and Process Development, Switzerland; Yelena Yerkovich, UNDP-GEF Project,

Kazakhstan; René Itten, ZHAW Institute of Natural Resource Sciences, Switzerland; Reiner Keller, University of Augsburg, Germany; and Peter Stücheli-Herlach, ZHAW Applied Linguistics, Switzerland.

Session 3 *Unlocking Implementation Models and Finance for City Energy Efficiency* focused on the models to implement energy efficiency policies and projects at the city level, as well as the ways to mobilize energy efficiency finance.

The first part of the session was structured around experiences from two inspirational cities (those already on the way towards higher energy efficiency and have success stories to share) and two aspirational cities (those at the early stages of their journey and keen on learning from existing best practices). Tim Farrell, Senior Advisor, Copenhagen Centre on Energy Efficiency, presented the model, which the Copenhagen Centre on Energy Efficiency is using in order to link aspirational and inspirational cities under a broad global network of partners and experts to enable implementation of energy efficiency actions.

The two inspirational cities presented at the session were Masdar, United Arab Emirates and Copenhagen, Denmark.

Yousef Baselaib, Executive Director for Sustainable Real Estate, Masdar, gave a presentation on the City of Masdar, a commercial and integrated community, which currently hosts 450 residents and aims at increasing its population to 7,000 people by 2020. The city follows a holistic approach in its efforts combining sustainable urban development, renewable energy utilization, advanced clean tech innovations and industry and knowledge platforms.

Ksenia Petrichenko, Researcher, Copenhagen Centre on Energy Efficiency, gave an overview of the key energy efficiency developments in Copenhagen that has the ambition to become the first carbon neutral capital in the world by 2025. She outlined the following success areas, in which the city has set strong targets and has already made notable progress: highly efficient district energy systems (including shift from steam to water); transition towards sustainable biomass; high share of wind in electricity production; focus on green mobility; efficient street lighting; accelerating energy efficiency in buildings; and smart city solutions tested and implemented in several city districts.

Astrakhan, Russian Federation and Tbilisi, Georgia were the examples of aspirational cities presented at the session.

Oleg Polumordvinov, Head of City Administration, Astrakhan presented the programme *Astrakhan – the sustainable city*, which includes six components for improving the quality of life in the city, with energy savings and energy efficiency being one of them. Astrakhan identified three priority areas for energy efficiency improvement: modernization of street lighting, modernization of the water supply system, and renovation of municipal buildings. The City Administration has gathered different partners under each component to develop specific flagship projects.

Natalia Jamburia, Chief Expert, Ministry of Energy, Georgia, shared experiences on energy efficiency improvement in Tbilisi. Tbilisi is a member of the Covenant of Mayors and has a goal to become a low carbon city by 2020 through the support of social and economic development. Actions in the city supporting this initiative include energy efficient rehabilitation of municipal buildings, improvement and modernization of bus operations and extension of subway lines, as well as development of the Green City Action Plan.

The second part of the session focused on financing models for energy efficiency projects, as well as support offered by city networks, such as the Covenant of Mayors.

Svetlana Radchenko, Associate Director - Senior Banker, ERBD, presented several models used by ERBD to support energy efficiency investments. For example, in Lithuania, long-term grants and credits were provided by the state agency for residential efficiency investments with additional debt financing from EBRD in the form of structural loans. In Croatia, EBRD supported the tender preparation from the ESCO street lighting project in the city of Novigrad. EBRD financed ESCO forfeiting facility in Latvia to conduct performance-based deep retrofits and provided a loan to finance the installation of heat meters in residential buildings of Kazakhstan.

Amitabh Mehta, Director, Innovative Financing, Strategy, Corporate Partnerships & CSR, Indus Blue Consulting, provided an overview of the innovative mechanisms for energy efficiency financing, advocating that they should provide for the following: sustainability, predictability, transparency, leverage and partnerships. He focused on two such models: Catalytic Sustainable City Energy Fund and securitised regional bond programme. He also noted the importance of knowledge development and training, especially for financiers and private sector.

George Abulashvili, Director, Energy Efficiency Center, Georgia, delivered a presentation on the Covenant of Mayors initiative, which brings together local and regional authorities voluntarily committing to implement the EU's climate and energy objectives on their territories. Signatories of the initiative commit to reduce CO₂ emissions by at least 40% by 2030, enhance resilience to the impacts of climate change, increase cooperation to improve access to sustainable energy, and offer citizens high quality of life in sustainable and climate-resilient cities.

Session 4 *Designing Smart and Sustainable Urban Isles*, moderated by Heinz J. Bernegger, CEO of the Swiss Sustainable Building Council and Lecturer for Life Cycle Management of Buildings at ZHAW Institute of Facility Management, ZHAW Zurich University of Applied Sciences, promoted smart and sustainable urban isles as basic units of energy efficiency measures for cities. This can lead to a new way of urban planning, which will allow cities to grow in a smarter and sustainable way. Guidelines on sustainable management of smart areas, buildings, infrastructures and smart services were also presented.

Speakers included Vicente Carabias, ZHAW Institute of Sustainable Development, Switzerland; Andrey Dodonov, Project consultant at UNDP-GEF, Russian Federation; Hanna Sotnikova, ZHAW Institute of Computational Physics, Switzerland; Mehdi Bagheri, School of Engineering, Nazarbaev University, Kazakhstan; Andreas Dreisiebner, Solarspar Association for Innovative PV Solutions, Switzerland; and Vladimir A. Sidorovich, Institute of Energy Efficient Building Technologies, Russian Federation.

The following key messages were outlined at the event. Sustainability of the energy supply is a strong component for smart, sustainable and livable cities, given their high and growing level of energy consumption. A growing number of cities are leading by example and setting the pace and scale of action to put the climate on a safe pathway also with the support of Information and Communication Technologies (ICTs), inspiring many other cities to follow suit. The concept of Smart Sustainable Cities is a combination of solution-oriented and integrated approaches based on technological innovations, enabling conditions from governments, stakeholders' collaboration, innovative financing models and mechanisms and

citizens' participation to address the current and future challenges of cities and make them better places to live in. In order to support the transition into smart sustainable cities, the use of key performance indicators and standards to evaluate smart and sustainable cities are critical to analyze the cities' performances, set priorities for change, and increase access to sustainable energy and achieve a better quality of life.

Track III Modernizing Energy Industry

Workshop Energy and Materials from Wastes: Application of UNFC for Sustainable Management of Anthropogenic Resources

Waste hierarchy principles adopted by many countries consider disposal of wastes as the last and least preferred option. SDG12 calls for a substantial reduction of waste generation through prevention, reduction, recycling and reuse. Studies worldwide have demonstrated that a number of valuable materials and energy can be recovered from wastes.

Waste from industrial and domestic activities is a major concern for many countries around the world. As the global population grows and consumption increases, managing waste has become a seemingly insurmountable challenge. For example, solid municipal waste, which is generated at an annual rate of 1.2 billion tonnes per year, is projected to almost double to 2.2 billion tonnes by 2025.

Waste-to-energy (WTE) technologies have been employed worldwide over the past few decades to process and reduce wastes with significant success. Anthropogenic resources are major contributors to the circular economy. The United Nations Framework Classification for Resources (UNFC) can be a useful tool for assessment and management of anthropogenic resources (secondary resources) and projects that create value from wastes.

Clear and consistent classification of all resources is the foundation for sound management and development of resources. UNFC uses a unique project maturity model for classification, which in the hands of experienced professionals can become a powerful tool for progressive development of resources in a sustainable manner. Therefore, it is not just the class in which a resource falls that is important, but how the resources can be moved to a higher class that determines how, when and at what cost the resources can contribute to socio-economic development.

Since UNFC places a strong emphasis on how much is expected to be produced at a given cost with available technologies, the system is a powerful tool for planning, as well as for the appropriate allocation of capital resources. To further ensure that resources are developed and produced in an environmentally and socially acceptable manner, UNFC provides additional high-level guidelines. Similarly, Competent Persons are required to make proper assessments, consistent application and to guide the project forward, for which UNFC has specific guidelines.

Sustainable growth and development require minimizing the natural resources and toxic materials used, as well as minimizing the waste and pollutants generated throughout the entire production and consumption process. This approach is not only good for the planet but also generates additional resources and value for society - a key theme addressed during the workshop.

Seven presentations and case studies were delivered at the workshop followed by a facilitated discussion. The workshop arrived at the following conclusions:

- Waste of all kinds (solid municipal wastes, mining wastes, industrial wastes, waste water, etc.) is a growing concern worldwide and conversion of waste where possible to an energy resource could significantly alter this dynamic.
- Social issues and ‘licence to operate’ concerns can stop or significantly hinder the development of energy from waste projects.
- There was a recognition by participants of the importance of clear communication with and between all stakeholders of the benefits and challenges of potential projects addressing energy from waste projects.
- UNECE’s People-first PPP guidelines or guiding principles, developed to ensure that out of all interested parties, ‘people’ should be receiving the largest share of benefits, should be adopted by all WTE projects.
- Advances in technology are making WTE plants a financially attractive alternative to conventional landfill.
- The three key points mentioned above – social licence, technology development, and economic viability – are explicitly addressed within the anthropogenic resources specifications of UNFC.
- There was general acceptance of the need for adoption of UNFC by governments and private industry as a tool to aid communication and sustainable management of waste as a valuable resource.
- Financing development (feasibility studies, demonstration/pilot plants) and implementation require major investment of capital and human resources. UNFC is a tool for identifying potential projects, channelling investments and managing their successful execution.
- Guidelines and case studies for application of UNFC to waste-to-energy and materials from wastes projects, incorporating People-first PPP criteria, should be developed.

***Workshop Modernization of the Energy Sector:
a Pathway Towards Low-Carbon Energy and Green Economy***

Raymond Pilcher, Chair of the UNECE Group of Experts on CMM, moderated this session. He opened the session by stating that there is an urgent need to take positive actions in the energy sector to mitigate climate change. He noted that 80% of the energy sector worldwide is fossil fuel-based. He further underlined that the legacy-industries using inefficient technologies and processes offer an opportunity to employ readily available and modern solutions, as well as expertise to mitigate environmental impacts. He explained that the UNECE groups of experts joined forces to examine the opportunities to deploy their collective capabilities to this end.

Aleksandar Dukovski, Chair of the UNECE Group of Experts on Energy Efficiency, observed that people are creatures of comfort and do not want to change their way of life, nor the way in which they perceive the world. He argued that in the debate on modernizing the energy sector, the technology is actually of less importance than the organizational structure of the society. The real challenge, in his view, is with the latter, which is incomparably harder, though cheaper, to change.

David MacDonald, Chair of the UNECE Expert Group on Resource Classification, pointed out that the United Nations Framework Classification for Resources (UNFC)

constitutes a very useful tool for identifying barriers that either hinder projects' development or even prevent the latter from gaining traction.

Nazir Ramazanov, Chair of the UNECE Expert Group on Renewable Energy, observed that renewable energy is not as expensive as many people think, and emphasised that it should be a critical component in the future energy mix.

Torstein Indrebø, Vice-Chair, UNECE Group of Experts on Gas, remarked that thanks to the energy sector, the world has experienced great prosperity. He underscored the continued necessity of fossil fuels, and warned that closing fossil fuel-based facilities would lead to social unrest. He argued that the question the world should seek an answer to is not how to eliminate fossil fuels, but rather how to modernize the industry so it produces the fossil-based energy in a cleaner way. He also advocated for focusing more on the consumers who, in his view, could be a driving force for a change.

Richard Mattus, UNECE Expert, observed that the general public is currently not fully implicated in the climate change debate. He pointed out that it has no tools to act and called for empowering people by providing them with information and proper means necessary to engage in the debate. He agreed that there is a need to make fossils climate friendly. He argued that it is necessary to differentiate between long-, medium- and short-term perspectives, and to think about solutions accordingly. He stressed the necessity of finding quick solutions and advocated for improvements in energy efficiency and a greater use of gas co-located with coal. Being of the position that CMM can contribute to reducing the use of coal, he observed that being only a by-product it often rests unexploited by the companies that have no incentives to utilize it.

Sigurd Heiberg, former Chair, UNECE Committee on Sustainable Energy, agreed that if gas has no value at the source, then it is usually wasted. Referring to Aleksandar Dukovski's intervention, he underlined the importance of education in changing people's attitude.

Raymond Pilcher closed the session by observing that the time had come to act and to demonstrate the power of the discussed approach by finding a host country and a pilot project to inspire further development.

Session Energy Corporations, Sustainable Development and Corporate Social Responsibility

The session on social responsibility of oil and gas corporations was one of the final events at the Forum. The speakers included: Dmitri Fryshchin, Coordinator of the United Nations Volunteers Program for Central Asia; Saltanat Rakhimbekova, Chairman of the Board, Coalition for a Green Economy and the Development of G-Global; Marat Kalmenov Head, Office of the Transformation Program of Samruk-Energo JSC; Daulet Akhmetov, Director, Public Relations Division, AES Group in Kazakhstan; Zarina Bakenova, Director, Department for External Relations and Interaction with Governmental Organizations, Shell Kazakhstan; Yerlik Karazhan, Deputy Director General for Strategic Development of KazMedia Ortaly Management Company; Rzabek Artigaliyev, General Manager of the Government and Public Relations Department of Tengizchevroil; and Raushan Beknazarova,

Expert on Sustainable Development, KazMunayGas. Lima Diaz, Fund for the Development of Social Projects “Samruk-Kazyna Trust” was the moderator of the session.

Over 100 people attended the discussion about the experience of social responsibility of the largest companies of Kazakhstan. According to Dmitriy Frishchina, global trends show that involving the company’s employees in volunteer activity is becoming one of the central social approaches for strengthening the corporate spirit, reducing staff turnover and establishing new contacts. A lot of attention was paid by the speakers to risk management issues through the social activities of companies.

Zarina Bakenova emphasized that corporate social responsibility (CSR) is one of the basic business principles and that social-oriented activity in the company helps to manage risks. World practice shows that the cost of conflict with the public in the extractive industry is estimated at USD 10 thousand a day at the stage of initial exploration, and in later stages – up to USD 50 thousand a day.

Track IV Regional Cooperation

Workshop Pathways to Sustainable Energy

Two sessions were held in the context of the UNECE-led *Pathways to Sustainable Energy* project, which seeks to provide answers to the question on how countries can attain sustainable energy in the future. The project utilizes modelling of sustainable energy scenarios as a tool to inform a policy dialogue on policy and technology options available to countries to achieve a transformation towards a sustainable energy system while meeting internationally agreed goals, notably SDGs. The formulation of adaptive policy pathways will help countries to improve responsiveness to changing environments, challenges and objectives, while an early-warning system with “signposts” can alert those countries that are in risk of moving off-track.

During the first session *Project Kick-off and Scenario Scoping*, participants were briefed on the outcomes of the kick-off meeting with the modelling institutions in Germany in May 2017. The session served as the initiation of the implementation phase of the project with a larger stakeholder group. The UNECE presentation focused on the modelling work to be undertaken by the three modelling institutions, IIASA, PNNL and Fraunhofer Institute, to model a set of distinctive but equally plausible sustainable energy scenarios. Participants were then informed about the status of the narrative storylines underlying the project and were invited to share their views on the planned stakeholder engagement to create a feedback loop with the modeller team. Participants were presented with the research questions as well as proposed inputs (drivers) and outputs (indicators) and invited to make comments.

Participants shared their thoughts on topics and research questions to be considered for this project. Mentioned were the future emissions from coal mines, the impact of innovative technology development on climate budget, which may lead to an increase in emissions, and the role and opportunities of carbon capture and storage (CCS). Participants stressed to keep the main goal in view, which is not the modelling itself, but the political dialogue on stakeholder engagement. An open-ended and creative dialogue between modellers and experts should be created in order to derive policy options and adaptive policy pathways that can guide through uncertainty. Assumptions and scenarios need to be analyzed carefully and

in cooperation with a larger stakeholder community, including policy makers, in order to draw conclusions that can be discussed in a political dialogue.

The aim of the second session *Policy and Technology Options to Achieve Sustainable Energy* was to start the discussion about the formulation of policy options as input to the modelling, with the ultimate goal to define adaptive policy pathways.

Stefanie Held and Lisa Tinschert, UNECE, made a brief overview on the proposed definition and conceptualizations of Sustainable Energy with the three pillars – Energy Security, Environmental Sustainability, and Quality of Life. Aleksandar Dukovski, Director of the Energy Agency of the Republic of Macedonia, Artan Leskoviku, Director of Energy of the National Agency of Natural Resources of Albania, and Mikhail Malashanka, Vice Chairman of the State Committee on Standardization of the Republic of Belarus and Director of the Department for Energy Efficiency made presentations. The focus of these presentations was on how countries define sustainable energy and how global objectives of the 2030 Agenda and the Paris Agreement are integrated in their national policymaking.

In the discussion following the national presentations, points were raised on the importance of adaptive policy options that could deal with uncertainties while mitigating risks and capturing opportunities. Further advice was to take into account social aspects such as jobs and health in policymaking, while also avoiding being too general, as all countries are different. For example, the shale gas revolution in the United States led to the phase-out of coal, which has its own social dimensions. It was highlighted that models and scenarios should be used to display alternatives on how to achieve sustainable energy under different circumstances, in particular having in mind the urgency to act now to limit global warming to 2 degrees Celsius.

Workshop Tracking Progress on Energy for Sustainable Development: Data and Indicators

This workshop was organized by the five UN Regional Commissions, with the objective to explore deeper a set of indicators to track progress on energy for sustainable development. The workshop concept was based on the experience gained in the process of preparations of the five regional reports for the SEforALL Global Tracking Framework (GTF).

The objective was to bring together stakeholders from national governments and international organizations in order to discuss the status quo of energy data measuring and tracking progress of sustainable energy. It explored extending the energy-related indicators towards a broader set of indicators focusing on energy for sustainable development in order to address a much broader spectrum of sustainable energy. The ultimate goal is to develop recommendations that can feed into the revision process of the energy-related SDGs in 2018.

Scott Foster, Director, Sustainable Energy Division, UNECE, who moderated the session, gave a brief overview of the purpose of the workshop, the current indicators and targets of SDG7 on energy, and feedback received from countries on the quality of data used for the GTF reports. Ralf Becker, Chief, Industrial and Energy Statistics Section, UN Statistics Division made presentation by audio from New York, in which he highlighted the role and work of the UN Statistics Programme, and provided more detailed information on the forthcoming SDG7 review process. At a series of symposia and workshops and a preparatory meeting in New York in December 2017, countries and organizations will be able to provide inputs on the revision of existing SDG7 indicators and make suggestions to add energy-

related indicators. Claire Morel, Statistics Programme, IEA, made a presentation on the EU4Energy Project of the IEA and briefed participants on the IEA work on refining energy efficiency indicators.

Following the presentations, participants were invited to discuss and define energy for sustainable development indicators for tracking 2030 Agenda within three breakout groups: (1) Improvement of existing SDG7 indicators, (2) Energy Resources Indicators: Energy Efficiency, Renewable Energy, and Fossil Fuels, and (3) Nexus & Cross-Cutting Indicators: Climate, Environment, Finance, and Access. Discussions in the groups were facilitated by Mongi Bida, Sustainable Development Policies Division, ESCWA, Claire Morel, and Scott Foster.

Discussion results included proposals for the revision of the existing SDG7 indicators:

- *Renewable energy.* Add *inter alia*: Share of RE in Total Primary Energy Supply (TPES); for fossil intensive economies, share of RE in Total Primary Energy Requirement (TPER); Share of RE in bus-bar energy; and Installed reliable RE capacity per capita, quality of RE supply;
- *Energy efficiency.* Add *inter alia*: Ratio of TPES to Total Final Energy Consumption (TFEC) net of imports and exports; in indicator 7.a.1, Replace “USD invested in energy efficiency” with “USD invested divided by energy saved over the life of the investment”; and Price elasticities of energy demand and supply;
- *Energy access.* Should not only focus on physical access but add *inter alia* Quality and reliability of supply and Affordability.

In addition, it was suggested to add additional indicators that can help strengthen the linkage between SDGs, in particular for energy-related SDGs such as SDG13 on climate. Suggestions include indicators on fossil fuels, carbon intensity, water and land use of the energy sector, competition with food, as well as socio-economic topics. The detailed recommendations are available at <https://www.unece.org/trackingprogressonesd.html>.

The recommendations coming out of the workshop have been submitted as an input to an SDG7 review symposium to be held in Bangkok in June 2017 and will be considered within the larger SDG7 review process.

Track V Project Events

21st Session of the Working Group on Water, Energy and Environment of the United Nations Special Programme for the Economies of Central Asia

Thirty participants attended the 21st Session of the Working Group (WG) on Water, Energy and Environment of the United Nations Special Programme for the Economies of Central Asia (SPECA) with delegations representing Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. Representatives of ESCAP, UNECE, the Regional Environmental Centre for Central Asia (CAREC), Interstate Commission for Sustainable Development (ICSD) of the International Fund for Saving the Aral Sea (IFAS), International Water Assessment Centre, United Nations Environment Programme (UNEP) and other organizations also participated in the meeting.

Participants of the session stressed the importance of SPECA both in strengthening regional cooperation and in deeper integration of the region into the global economy. Participants also emphasized an existing huge potential of the WG in facilitation of the achievement of SDGs in SPECA countries. The WG efforts to support attainment of the countries' sustainability in water, energy and environment should be intensified further.

The participants agreed on the future role of the WG and supported the proposed potential projects *Central Asian energy cooperation on transboundary issues to achieve Sustainable Development Goal 7* (jointly implemented by UNECE and ESCAP) and *Supporting sustainable management of energy and mineral resources of Central Asia* (UNECE). The WG endorsed the Secretariats' proposal to apply for funding for the implementation of the first project to the Government of the Russian Federation.

The WG further endorsed the work of ESCAP on capacity building and monitoring of progress made by SPECA countries towards sustainable energy development, along with tracking of the existing regulatory framework through Asia Pacific Energy Portal, and welcomed commissioning of its Russian language interface version (<http://asiapacificenergy.org>).

With regard to the future role of the WG, it was agreed that the WG would:

- a) Continue providing a platform for supporting progress towards achieving SDGs with a focus on the SDGs directly related to water, energy and environment.
- b) Raise awareness in SPECA countries on water-, energy- and environment-related SDGs through facilitating extensive exchange of information and sharing of best practice experiences, with regard to implementation of SDGs that are considered as the most relevant to the thematic area of the WG, but also taking into account strong interlinkages among SDGs.
- c) Retain the status of a platform for identification of emerging trends and coordination of technical issues within the scope of the WG competence. This might consequently support leveraging the degree of mutual trust and confidence at the political level.

Closing Session

Representatives of the Forum co-organizers – Ramazan Zhampiisov, KAZENERGY, Kazakhstan, Mongameli Mehlwana, ECA, Scott Foster, UNECE, Hongpeng Liu, ESCAP, and Radia Sedaoui, ESCWA – provided closing remarks of the Forum. Key messages resulting from the Eighth International Forum on Energy for Sustainable Development were presented to the participants by Scott Foster, Radia Sedaoui, and Hongpeng Liu. The Forum participants expressed appreciation to the Government of Kazakhstan for hosting the Energy Ministerial Conference and the Eighth International Forum on Energy for Sustainable Development. The outcome document of the Forum *Implementing the Astana Ministerial Declaration: Outcomes of the Eighth International Forum on Energy for Sustainable Development* was approved by the Forum participants by acclamation.

All Forum materials are available at: <http://www.unece.org/astana2017.html>.