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**Economic Commission for Europe****Committee on Sustainable Energy****Twenty-eighth session**

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Item 5(c) of the provisional agenda

**Sustainable resource management:****Groups of Experts on Cleaner Electricity Systems and Gas and Expert Group on Resource Management:  
Mandates and work plans.****Work Plan of the Group of Experts on Cleaner Electricity  
Systems for 2020-2021****Prepared by the Group of Experts on Cleaner Electricity Systems****I. Introduction**

1. The Group of Experts on Cleaner Electricity Systems (Group of Experts) carries out concrete, result-oriented activities that contribute to transformation of energy systems and promote reduction of greenhouse gas (GHG) emissions from fossil fuel-fired electricity generation. These activities are developed and implemented with the active participation of the member States of the United Nations Economic Commission for Europe (ECE), energy companies, financial sector, civil society, academia and independent experts.

2. The areas of work of the Group of Experts are regulatory and policy dialogue on modernization and decarbonisation of electric power systems: sharing best practices in the field of cleaner electricity systems in the ECE region; carbon capture, use and storage (CCUS); advanced fossil fuels technologies for power generation, including high-efficiency, low-emissions (HELE) technologies; interplay of technologies, including between flexible clean coal, natural gas and renewables; financing clean energy projects; digitalization of energy systems; impact of information and communications technologies (ICT) on high-performance buildings and smart, sustainable cities; impact of E-Mobility on power system design and operation.

3. On the basis of the outcomes of the implementation of the Work Plan for 2018-2019 and the recommendations from the Group of Experts and its Bureau, the Group of Experts will undertake a number of activities. Among these activities, several represent a continuation, adjusted as needed, of the 2018-2019 Work Plan. A number of new activities, projected to ensure relevance of the Group of Experts' work to, and suitability for, delivering on the objectives of the 2030 Agenda for Sustainable Development, in line with the mandate of the Group of Experts, are also indicated. Following the request of the Committee on Sustainable Energy (the Committee) at its twenty-seventh session (26-27 September 2018) to explore opportunities for closer cooperation among its subsidiary bodies, three of the new activities are cross-cutting in nature. In this regard, the Group of Experts invites other subsidiary bodies of the Committee, and other sectoral Committees of ECE, to collaborate on electricity-related activities. The Group of Experts will also engage, within the scope of

its expertise, in joint work in the context of sustainable electricity: while not limited thereto, it will aim to inform the dialogue on sustainable energy development in ECE region from the electricity sector perspective in support of the Committee's activities under the project "Strengthening capacity of the ECE member States to achieve the energy-related Sustainable Development Goals" ("Pathways to Sustainable Energy").

4. The Group of Experts notes that under the current resource constraints successful implementation of the 2020-2021 Work Plan requires institution of dedicated Task Forces. When deciding on which activities to pursue, the Group of Experts therefore has considered the willingness of experts to take a leading, or at least an active, role in these Task Forces' and other Group of Experts' work between sessions as one of the key selection criteria success.

5. The Group of Experts further particularly emphasises that its new activities necessitate expanding the expert base of the current Group of Experts, both geographically and substantively.

## II. 2020-2021 Activities

### A. Electricity as a driver for achieving deep transformation of the energy system

#### Description:

6. Electricity continues to be a pacing factor for energy systems' transformation. Power plants have become more flexible, with the effect that their ability to vary output rapidly enables incorporation of intermittent generation sources (primarily, wind and solar energy) to the grid – which is at variance with the belief that the existing energy system cannot cope with such. Although traditional power grids were not designed to adapt to rapidly changing supply side schemes, system operators have learned how to use various flexible resources that complement growing shares of variable renewable energy. Modern optimised coal-fired power plants can operate at less than 20% of full load capacity; lignite power plants can achieve 25-30% of nominal load. In contrast, power plants built ten to twenty years ago in industrialized countries had minimum load levels ranging from 40% (hard coal) to 60% (brown coal).<sup>1</sup>

7. Modernization can reduce the minimum load even more. Countries with large and aging coal-fired power plants that were designed to handle base load, have great potential for efficiency and flexibility improvements. Modernization of the existing thermal power plants fleet would allow larger renewable energy integration using fossil fuels as flexible balancing sources where these are abundant.

8. Whereas fossil fuels are expected to account for 40% of the regional energy mix in 2050,<sup>2</sup> and fossil fuel-fired generation is to remain a viable part of future sustainable electricity systems, there are two indispensable aspects to consider: Interplay of technologies, including between flexible clean coal, natural gas and renewables, and; Power market design (including enabling distributed generation).

#### Work to be undertaken:

(a) The Group of Experts supported by the secretariat will elaborate on the lessons learnt on enabling role of fossil fuels in increasing the uptake of renewable energy in the ECE region;

(b) The Group of Experts supported by the secretariat and on the back of previous work, will further consider opportunities for combined heat and power, gasification (for

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<sup>1</sup> <https://www.worldcoal.org/flexibility-german-coal-fired-power-plants-amid-increased-renewables>

<sup>2</sup> [http://www.unece.org/fileadmin/DAM/energy/se/pdfs/comm\\_gen/Publications/2017/UNECESustainableEnergyPub.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pdfs/comm_gen/Publications/2017/UNECESustainableEnergyPub.pdf)

direct power, indirect power via fuel cells and as a means to produce chemicals, including future fuels) and chemical (non-energy) use of coal;

(c) The Group of Experts supported by the secretariat will prepare a background document on interplay of technologies, including between flexible clean coal, natural gas and renewables;

(d) The Group of Experts supported by the secretariat will prepare a background document on alternative electricity market models;

(e) Based on the above, the Group of Experts will organize a round table on the topic of Electricity as driver for achieving deep transformation of the energy system;

(f) In the context of Activity A, the Group of Experts within its area of expertise, supported by the secretariat will seek to further inform the project “Strengthening capacity of the ECE member States to achieve the energy-related Sustainable Development Goals” (“Pathways to Sustainable Energy”) by providing key messages, policy recommendations and other materials derived from the respective modelling results.

**Deliverables:**

(a) Round table on Electricity as driver for achieving deep transformation of the energy system;

(b) Background document on interplay of technologies, including between flexible clean coal, natural gas and renewables;

(c) Background document on the alternative electricity market models;

(d) Background document on lessons learnt on opportunities for development of combined heat and power, gasification and chemical use of coal.

**Timeline:**

(a) Round table on Electricity as driver for achieving deep transformation of the energy system by December 2020;

(b) First draft background documents by April 2021;

(c) Final draft background documents by October 2021.

## **B. Modernization and decarbonisation of the electric power system**

**Description:**

9. Ambitious climate mitigation policies advocate for development and implementation of low-carbon energy options, and environmental implications thus mount a pivotal challenge to power production sector. However, ensuring secure, affordable and sustainable energy requires a diverse energy mix, to which – with due account for national peculiarities – each source of energy would be valuable, provided its carbon neutrality or at least acceptable emissions level to achieve national carbon reduction commitments. Naturally, in addition to the roles that renewable energy sources and natural gas (considered by the ECE Group of Experts on Renewable Energy and the ECE Group of Experts on Gas, respectively) would play in future electric power systems, coal is argued to maintain a significant (yet lower than the current 38%) share in energy mix.<sup>3</sup>

10. Coal-fired power plants have undergone modernisation over the past decade experiencing improvements in operational efficiencies and emission control system performances. Steps can be taken to further decrease power generation emissions in the ECE region from the existing coal-fired generation while increasing efficiency of power plants through coupling technological developments with more effective regulations in ways that incentivise or compel faster adoption of more efficient boilers and state-of-the-art air quality

<sup>3</sup> <https://www.iea.org/statistics/?country=WORLD&year=2016&category=Heat&indicator=HeatGenByFuel&mode=table&dataTable=ELECTRICITYANDHEAT>

control systems. Deploying HELE coal-fired power plants is a key first step along a pathway to near-zero emissions from coal with CCUS.

11. Introduction of HELE technologies is critical for decarbonisation of power systems through enhanced efficiency, higher environmental performance and reliability. Negative carbon technologies exist and can be considered. Particularly, coal gasification is a promising technology that offers a versatile and clean way to convert coal into electricity, hydrogen and other valuable energy products.

12. CCUS development and deployment is an important way to support progress in ECE member States. The focus on CCUS technology transfer and implementation for sustainable energy area is crucial, as many countries, which economies are based on fossil fuels, are still in the stage of development of the competitive sustainable energy system. The technology transfer has potential advantages for both sides; however, some issues related to the process might endanger the good functionality of the CCUS technologies. Further work has to be undertaken on the comprehensive and consistent policy approach to developing and implementing standards on financing CCUS.

13. Increasingly, the most advanced coal technologies are viable and economic choice, and moreover progress in this direction can have a resounding impact on technological advances in other industries, thus bringing tangible benefits in various nexus areas. Yet issues related to financing cleaner fossil fuel-based electric power generation infrastructure are crucial and must be resolved.

14. A combination of decarbonisation technologies – such as demand-side measures, energy efficiency improvements, electrification of heat, use of hydrogen and biomass as feedstock or fuel, etc. – could also bring the industries' emissions close to zero. An optimal mix of options, however, greatly depends on electricity prices and certain local factors, which include carbon storage capacity, regulatory regime, public acceptance, etc. Hence, long-term planning and timely action could drive technological maturation, lower the cost of industrial decarbonisation and ensure that it advances in parallel with required changes in energy supply. Related activities could be considered for inclusion in future Work Plan of the Group of Experts.

**Work to be undertaken:**

(a) The Group of Experts will revise the results of activities carried out in 2018-2019 and any lessons learned;

(b) Based on the findings and results achieved to date on best practices in HELE technologies in the ECE region, and in collaboration with partners such as the World Coal Association and the IEA Clean Coal Centre, the Group of Experts will organize a round table discussion to consider options for organising a transparent and inclusive process for development of ECE minimum efficiency and carbon dioxide reduction standards for electric power plants;

(c) The Group of Experts will draft generic guidelines on HELE power generation from coal, natural gas, fuel oil, and biomass in the ECE region laying the groundwork for, and leading, eventually, to, an ECE standard;

(d) Provided needed extra-budgetary funds or in-kind contributions are identified, the Group of Experts will draft generic guidelines for financing clean energy projects.

**Deliverables:**

(a) Round table discussion on HELE technologies deployment, development of ECE emissions and efficiency standards for electric power plants, and options for financing clean energy projects;

(b) Round table on options for financing CCUS;

(c) Subject to extra-budgetary funds or in-kind contributions, generic guidelines on minimum efficiency and carbon dioxide reduction standards in the ECE region;

(d) Subject to extra-budgetary funds or in-kind contributions, generic guidelines for financing clean energy projects.

**Timeline:**

- (a) Round table on options for financing CCUS by October 2020;
- (b) Round table on HELE technologies deployment by December 2020;
- (c) First draft of the reports on new developments in HELE technologies in the ECE region with a focus on minimum efficiency and carbon dioxide reduction standards and options for financing clean energy projects by October 2021.

**C. Energy management in smart urban ecosystem (cross-cutting activity)****Description:**

15. Global efforts have driven innovation of decarbonisation technologies for power generation and transportation, which, scaled up, have led to major reductions in costs. Examples are reductions in costs of solar photovoltaic modules and electric vehicles (EVs). These, combined with advancements in energy storage, are primary sources of the current changes in the energy systems: decentralization and emergence of the category of 'prosumers' in localities with enabling regulatory environment.

16. Further integration of E-Mobility will add a significant load to the system, leading to potential congestion in conventional power networks, as these are not designed for rapid increases of energy consumption by, e.g., relatively energy-intensive EVs. That could lead to either increased dependence on grid expansion, or could counteract network congestions by using smart solutions, including ICT and automation. A well-planned integration can avoid grid expansion, while allowing for deployment of community scale and household renewable energy units backed by flexible fossil fuel-based generation. Such a systemic approach to E-Mobility uptake would add value to all the parties in the power grid, while also helping to reduce carbon footprint of the energy sector in the region.

**Work to be undertaken:**

- (a) The Group of Experts will cooperate with other subsidiary bodies of the Committee to explore the role of ICT in support of high-performance buildings and smart, sustainable cities;
- (b) The Group of Experts will assess the impact of E-Mobility on power system design and operation;
- (c) Pending available resources, the Group of Experts will collect relevant case studies and lessons learnt from policies implemented by ECE member States over the past several years in the field of ICT and E-Mobility.

**Deliverables:**

- (a) Background document on current status and prospects for the development of ICT in support of high-performance buildings and smart, sustainable cities;
- (b) Background document on the impact of E-Mobility on power system design and operation;
- (c) Case studies from ECE member States on the results achieved through implementation of policies supporting development of E-Mobility and ICT for high-performance buildings and smart, sustainable cities (subject to identification of extra-budgetary funds, in-kind contributions, or willingness of experts to take a leading role).

**Timeline:**

- (a) First drafts of the background documents by November 2020;
- (b) Final drafts of the background documents by November 2021;
- (c) Case studies from ECE member States on the results achieved through implementation of policies supporting development of E-Mobility and ICT for high-performance buildings and smart, sustainable cities by November 2021 (pending available resources).

**D. Promote a gender perspective in the work of the Committee on Sustainable Energy and its Groups of Experts (cross-cutting activity)****Description:**

17. Achieving gender equality, empowering all women and girls will ensure women and girls equal access to education, health care, decent work, gender-balanced representation in political and economic decision-making processes, equal access to, and control over resources, including energy. Providing access to affordable, reliable, sustainable and modern energy for all the Sustainable Development Goals (SDGs) can only be achieved if the needs of women and men are the same. Women, as direct energy consumers – both in households and as entrepreneurs – can take advantage of advanced solutions for energy services in urban and rural areas.

18. Although issues of energy production and consumption are common to both women and men, in some countries, energy problems affect women and men differently and to varying degrees. The process of energy consumption / production for household needs has its own gender and regional differences due to the following reasons: (a) different energy supply and different access to energy services in rural and urban areas, by region; (b) various unpaid load on household members when using traditional types of energy resources (harvesting wood and coal, kindling and cleaning the furnace, maintaining fire and the required temperature, ensuring the safety of the furnace, heating devices, etc.) and using environmentally cleaner types energy; (c) gender distribution of roles in the household in the consumption / production of energy for the needs of the household: women-housewives often bear almost the entire burden of cooking, maintaining heat and light in the house; for washing and bathing children or elderly / infirm family members (respectively, by heating the room water).

**Work to be undertaken:**

19. The work of the Group of Experts should focus on how to promote clean and affordable energy to empower women through:

(a) Mapping gender gaps in women’s participation in energy related decision making and in the energy sector, including planning;

(b) Analysing the differences in access to energy resources and use of energy services by women and men in rural and urban settings;

(c) developing gender-responsive policy recommendations to ensure gender equality in access to sustainable energy, in participation in decision-making and management of the energy and related sectors, and in opportunities for jobs and career development.

**Deliverables:**

(a) Session on “Women and diversity in energy” by October 2020;

(b) Case study: “The success of women in ‘non-female’ profession”, by November 2021 (pending available resources).

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