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**Economic Commission for Europe****Committee on Sustainable Energy****Thirty-second session**

Geneva, 13-15 September 2023

Item 9 (b) of the provisional agenda

**Looking ahead: Future work of the Committee on Sustainable Energy:****Approval of documents****Work Plan of the Group of Experts on Cleaner Electricity Systems for 2024-2025****Prepared by the Group of Experts on Cleaner Electricity Systems****I. Introduction**

1. The Group of Experts on Cleaner Electricity Systems (the Group of Experts) carries out concrete, result-oriented activities underlining the critical role that electricity is playing in transforming the energy system, and seeking to significantly reduce greenhouse gas emissions.
2. Activities are developed and implemented with the active participation of member States of the United Nations Economic Commission for Europe (ECE), representatives from the energy and financial sectors and civil society, independent experts, and academia.<sup>1</sup>
3. While striving to achieve as broad of a geographical representation as possible by engaging major groups and relevant stakeholders active in areas related to sustainable development, the Group of Experts also maintains a focus on ensuring gender equality in the energy sector and on enabling intergenerational dialogue.
4. Areas of work of the Group of Experts are regulatory and policy dialogue on the following topics, considering technical, social, economic, and ecological aspects:<sup>2</sup>
  - (a) Electricity as a primary vehicle for achieving deep transformation of the energy systems, including transmission and distribution;
  - (b) Synergies between natural gas and renewable energy through properly structured balancing markets;
  - (c) Power market design for the 2030 Agenda for Sustainable Development (including enabling distributed generation);

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<sup>1</sup> See: [https://unece.org/DAM/commission/EXCOM/Key\\_documents/Decision\\_A65.pdf](https://unece.org/DAM/commission/EXCOM/Key_documents/Decision_A65.pdf)

<sup>2</sup> See: [https://unece.org/fileadmin/DAM/energy/se/pdfs/Comm27/ECE\\_ENERGY\\_119\\_\\_report\\_Final\\_submission.pdf](https://unece.org/fileadmin/DAM/energy/se/pdfs/Comm27/ECE_ENERGY_119__report_Final_submission.pdf)



- (d) High-efficiency, low-emissions technologies; in particular, more ambitious standards for fossil fuel-fired power plants;
- (e) Carbon capture, use and storage;
- (f) Digitalization;
- (g) E-mobility;
- (h) Information, communication and technology in support of high-performance buildings and smart, sustainable cities;
- (i) Decarbonisation of electricity production, including reduction of carbon dioxide and methane and the order of merit as defined by economic, environmental, and societal needs.

5. In view of the challenges facing the ECE region, the Group of Experts will also contribute, within its area of expertise and under the leadership of the Committee on Sustainable Energy and in cooperation with its other subsidiary bodies, to the work on increasing resilience of the energy systems.

6. Based on the outcomes of implementation of the Work Plan of the Group of Experts for 2022-2023 (ECE/ENERGY/2021/8) and the recommendations by the Group of Experts and its Bureau, in 2024-2025 the Group of Experts will undertake a number of activities, several of which represent a continuation (with adjustments as needed) of the Work Plan for 2022-2023. The activities of the Group of Experts proposed in this Work Plan shall contribute to efforts by ECE member States to deliver on the objectives of the 2030 Agenda for Sustainable Development in line with their national targets, development aspirations, and resource endowments.

7. The Group of Experts further emphasizes that cross-cutting activities necessitate expanding the scope of expertise by further engaging major groups and relevant stakeholders active in areas related to sustainable development, as well as cooperating with other subsidiary bodies of the Committee on Sustainable Energy and those of other ECE sectoral Committees, while ensuring gender equality in the energy sector and enabling intergenerational dialogue.

8. The Group of Experts requests the Committee on Sustainable Energy to renew its mandate until 31 December 2025, with the possibility of further extension.

9. The Group of Experts notes that under the existing resource constraints, activities requiring additional resources will be delivered if such additional resources, be they supplementary regular budget means, in-kind contributions, or extrabudgetary funds, are available.

## **II. Concrete activities**

10. The Group of Experts will emphasise outreach, communication, and dissemination of the content already created by the Group of Experts, and, building on this body of work and its findings, will collaborate with the other subsidiary bodies of the Committee on Sustainable Energy and other ECE sectoral Committees on the matters of common concern.

11. To increase the relevance and strengthen the impact of the work undertaken by the Group of Experts, its activities will be guided by the following three pillars:

- (a) Content creation: where there are critical gaps that need to be addressed that do not duplicate existing work by other bodies;
- (b) Content adaptation to regional and national circumstances: existing and new content with an emphasis on ensuring as wide a geographical coverage within the ECE region as reasonably justified, to make research outcomes tangible and relevant and thus ease the adoption of findings;
- (c) Communication of activities and collaboration: knowledge sharing and raising awareness of the activities and outcomes among policymakers and other stakeholders that

are likely to benefit from it, and thus to increase the impact of the activities undertaken; working in collaboration with the Committee on Sustainable Energy and other relevant ECE sectoral Committees and their respective subsidiary bodies, as well as ECE member States, other relevant organizations, and the expert community.

## **A. Improving electricity system resilience as an enabler for transformation of the energy system**

### **Description:**

12. Economics and policy are driving sustainable energy transition, and the energy system is fundamentally changing: from centralized to decentralized, and from fossil-based to renewable, thus challenging the existing balance of the energy policy triangle, i.e. the linkages between energy security, affordability, and its environmental impact.

13. Power plants become more flexible, with the effect that their ability to change output enables incorporation of intermittent renewable energy sources to grids, although in many cases the latter were not originally designed to adapt to rapidly changing supply side schemes. The electricity system will need to be ready for, and responsive to greater demand flexibility to enable broader integration of intermittent renewables-based generation, which will add to complexity of power systems, and thus also require appropriate changes in the relevant regulatory environment.

14. Electricity continues to be a pacing factor for transformation of the energy systems. Relying on new technologies allowing to simultaneously mitigate energy security risks, safeguard the environment, and ensure affordability of energy, the traditional electricity supply and demand will need to evolve to reflect the ever-growing distribution of energy assets.

### **Work to be undertaken:**

15. In 2024-2025, the Group of Experts will undertake the following activities:

(a) Review the existing documentation, assess the technology and infrastructure readiness, and study – on a system-wide basis – the lifecycle costs of integration of new technologies with the existing electric grid, with a focus on ensuring power system reliability;

(b) Assess, from an electric grid operations perspective, and document how the various sources of electricity can be dispatched and work together to contribute to the grid stability, reliability, and resiliency, while ensuring affordability;

(c) Explore the opportunities and barriers to reforming energy market design towards greater sustainability, including by conducting research on the full cycle of electricity systems in transportation, industry, and building management;

(d) Elaborate on the concept of technical decentralization of the energy system and the principle of “decentralization for resilience”;

(e) Engage, within the scope of the Group’s mandate and expertise, in cooperation with the Group of Experts on Coal Mine Methane and Just Transition and under the leadership of the Committee on Sustainable Energy, in work facilitating transformation and greening of ECE member States’ industries along the coal value chain and of coal-dependent regions in accordance with the principles of just transition.

### **Deliverables and Timeline:**

16. In 2024-2025, the Group of Experts will deliver the following results:

(a) Informal document on the cost of ensuring energy system resilience and its impact of affordability of energy; by the twentieth session of the Group of Experts;

(b) Background document containing analysis of the system lifecycle costs of integration of new technologies on the electric grid; general overview by the twentieth session of the Group of Experts; in-depth regional case studies by the twenty-first session of the Group of Experts;

(c) Background document on the impacts of the various sources of generation on electric grid operations, analysing how they can be dispatched and contribute to system reliability; first draft by the twentieth session of the Group of Experts; final document by the twenty-first session of the Group of Experts;

(d) Contribution, within the scope of the Group's expertise and upon the Committee on Sustainable Energy's request indicating the expected input, to the work on building resilient energy systems in the ECE region undertaken under the umbrella and leadership of the Committee, by December 2025 in accordance with the Committee's request;

(e) Established working engagement with the other Groups of Experts operating under the umbrella of the Committee on Sustainable Energy ensuring that the just transition angle is properly reflected in their respective work on building resilient energy systems in the ECE region, by December 2025;

(f) Contribution, within the scope of the Group's mandate and expertise, to a study on how the regions currently dependent on legacy industries based on coal can transform towards the green economy in accordance with principles of carbon neutrality and just transition, by December 2025 (under the lead of the Group of Experts on Coal Mine Methane and Just Transition).

## **B. Supporting the creation of favourable power market design and financing conditions for the transformation of the electricity systems**

### **Description:**

17. Ambitious climate mitigation and adaptation policies advocate for development and implementation of low-carbon energy production options, the environmental implications of which pose a challenge to the power generation sector.

18. The transformative vision of the 2030 Agenda for Sustainable Development, and in particular its Goal 7 to ensure access to affordable, reliable, sustainable and modern energy for all, requires unprecedented investment that so far has not been forthcoming as needed. Unlocking both private and public funding to finance and manage the transition towards more resilient energy systems with a diverse energy mix (with due account for national circumstances), necessitates further progress in the creation of favourable framework conditions and financing mechanisms.

### **Work to be undertaken:**

19. Subject to availability of additional resources, be they supplementary regular budget means, in-kind contributions, or extrabudgetary funds, the Group of Experts will explore and assess how, apart from providing the necessary funds, market mechanisms could contribute to the transformation of the electricity system toward the net-zero aspirations. The work will be undertaken with the view to increase reliability and resiliency of the electricity system, focusing notably on:

- (a) Integration of renewables, distributed energy resources, energy storage, etc.;
- (b) Energy efficiency and conservation;
- (c) Active role of energy end-users;
- (d) Optimization of grid operations.

### **Deliverables and Timeline:**

20. Taking account of the evolving scope, priorities, opportunities, and challenges, and subject to availability of in-kind contributions and/or extrabudgetary resources, in 2024-2025, the Group of Experts will deliver the following:

(a) Background document on the role of market mechanisms, policies, and regulation on integration of new technologies to the grid; by the twentieth session of the Group of Experts;

- (b) Regional roundtable; by the twenty-first session of the Group of Experts.

## C. Assessing the contribution of digitalization to designing cleaner electricity systems

### Description:

21. The Committee on Sustainable Energy, in the report from its thirty-first session (ECE/ENERGY/143), noted that digital and green transformations related to energy are critically necessary steps for achieving sustainable development and circular economy. The Committee on Sustainable Energy also acknowledged the role of the Task Force on Digitalization in Energy, which:

(a) Enables constructive technical and policy dialogue on digitalization to help bridge the gap between academic research, industrial innovations, and policy needs and achieve higher levels of efficiency in the energy system, and;

(b) Coordinates research and activities related to digitalization in energy across the subsidiary bodies of the Committee.

22. Digitalization is acknowledged as a solution for designing more resilient energy systems, as it is making energy systems more connected, efficient, reliable and sustainable, and acts as an enabler of a cleaner power generation by allowing integration of intermittent renewables, baseload and dispatchable power, and distributed energy resources, as well as facilitating grid optimization, demand-side management, customers' participation, etc.

23. As policymakers face increasingly complex challenges, incomplete or imperfect information might lead to sub-optimal decisions. By enhancing accessibility, improving accountability, and increasing transparency across the value chain, digital innovations can significantly improve the way in which policies are developed, coordinated, and implemented.

### Work to be undertaken:

24. The Group of Experts will continue its collaboration with the Task Force on Digitalization that operates under the auspices of the Group of Experts on Energy Efficiency, to advance its work on promoting how digitalization contributes to a cleaner electricity system, to capture the related benefits and address challenges, and to help unlock the potential of systemic efficiency improvement through digitalization, by the means of supporting a dialogue between academia, industry and businesses, energy suppliers, and policymakers.

25. This activity is based on the decisions adopted by the Economic Commission for Europe at its seventieth session of under the designated theme "Digital and green transformations in the region of the Economic Commission for Europe". It will support activities outlined in the Work Plan of the Group of Experts on Energy Efficiency for 2024-2025 (ECE/ENERGY/2023/10), Section C, and will in particular:

(a) Complement the existing content especially in cybersecurity, Artificial Intelligence (AI) use in the electricity system, technology compatibility, grid resiliency and electrification areas;

(b) Map the existing content to facilitate access to non-initiated parties;

(c) Seek opportunities for broader outreach through organization of, and active participation in seminars, technical conferences, and other events organized by ECE and/or other parties.

### Deliverables and Timeline:

26. In 2024-2025, the Group of Experts will deliver the following results in the framework of cooperation with the Task Force on Digitalization in Energy:

(a) Background document on AI and the related challenges and opportunities in the power sector; first draft by the twentieth session of the Group of Experts, final document by the twenty-first session of the Group of Experts;

(b) Background document on the role of electrification of the transportation sector and its impact on the electricity system; by November 2024;

(c) Roundtable on technology compatibility issues; by the twenty-first session of the Group of Experts.

## **D. Exploring the impact of E-mobility integration on electric system design and operation**

### **Description:**

27. The Group of Experts observes that e-mobility will have as much impact on the design and operation of the electric grid as it will on transportation systems themselves. Electric loads will grow significantly, and therefore location and operation of Electrical Vehicles (EV) chargers (private or public) need to be integrated with grid and resource planning, and a greater emphasis should be placed on cybersecurity. As a result, ensuring a balanced integration of electric mobility, calls for collaboration and information sharing between governments, electricity and transport sector experts, and other stakeholders active in the related areas.

28. The Group of Experts will further strengthen its cooperation with the Group of Experts on Energy Efficiency on the matters related to integration of e-mobility, and will cooperate closely with the Working Party on Transport Trends and Economics (WP.5) and the World Forum for Harmonization of Vehicle Regulations (WP.29) of the Inland Transport Committee, to ensure synergies and support cross-sectoral cooperation and closer engagement envisaged in ECE/TRANS/328 (paras.76-77).

29. All activities and outputs are subject to regular consultations among the Group of Experts and the Group of Experts on Energy Efficiency, and subsidiary bodies of the Committee on Sustainable Energy, the Informal Working Group on Electric Vehicles and the Environment and its parent bodies, partner organizations, and donors, and might be subject to adaptations.

### **Work to be undertaken:**

30. This activity will mutually support activities outlined in the Work Plan of the Group of Experts on Energy Efficiency for 2024-2025 (ECE/ENERGY/2023/10), Section D, and will contribute in particular to the analysis and the assessment (based on the evidence, lessons learned, practical case studies across the ECE region and beyond, and extensive consultations) of the degree of integration of e-mobility into electricity system, and on the impact that it has on the latter's design and operations. Notably, technical aspects of grid-friendly EVs charging behaviours, steady-state consumption control, power factor, frequency response, etc., will be considered.

### **Deliverables and Timeline:**

31. The following deliverables for 2024-2025 will orientate the work of the Group of Experts on matters related to e-mobility:

(a) A set of workshops and seminars on the relevant selected topics of interest; ongoing, 2024-2025;

(b) A background document containing considerations on the degree of integration of e-mobility into electricity system, and on the impact that it has on the latter's design and operations; first draft by the twentieth session of the Group of Experts, final draft by the twenty-first session of the Group of Experts.

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