



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

Geneva, 13-15 September 2023

Item 2 of the provisional agenda

High-level segment: Building resilient energy systems in the United Nations Economic Commission for Europe region-Launch of the United Nations Economic Commission for Europe Platform on Resilient Energy Systems**Advanced concept for the Platform on Resilient Energy Systems****Note from Secretariat**

1. The United Nations Economic Commission for Europe (ECE) region is undergoing major crises which increase uncertainty and urge countries to focus on building resilient energy systems. Countries across the ECE region that want to design and build resilient energy systems need dedicated tools to make informed decisions and prepare to adapt to future challenges.
2. Reiterating the **definition of “resilient energy system”**, adopted at the thirty-first session of the Committee, a resilient energy system is one where energy makes an optimal contribution to a country’s **social, economic, and environmental development** and is able to withstand and recover quickly from any shock.
3. A resilient energy system is thus based on **three pillars**:
 - **Energy security** that strengthens energy independence through decentralization, interconnectivity and trade
 - **Affordability** that reduces the costs and accessibility of electricity, heating, cooling, and transport services
 - **Environmental sustainability** that lowers pollutant emissions and the overall environmental footprint and enhances efficiency across the energy supply chain.
4. For ECE and its stakeholders, it is crucial to define energy systems broadly including not only physical, but also institutional, organizational, and governance related elements from both the energy supply and the energy demand sides.
5. At its thirty-first session, the Committee on Sustainable Energy concluded in ECE/Energy/143 Annual Report to set up a new priority area of activities - the **Platform on Resilient Energy Systems** (the Platform). The report also recognized the importance of **embedding resilience thinking** into the Working Plans for 2024-2025 of every Committee subsidiary body: Group of Experts on Coal Mine Methane and Just Transition (ECE/ENERGY/2023/5), Group of Experts on Gas (ECE/ENERGY/2023/6), Group of Experts on Energy Efficiency (ECE/ENERGY/2023/10), Expert Group on Resource Management (ECE/ENERGY/2023/7), Group of Experts on Renewable Energy

(ECE/ENERGY/2023/8), Group of Experts on Cleaner Electricity Systems (ECE/ENERGY/2023/9).

6. Given the complexity associated with dealing with uncertainties related to the future of the energy system, member States require tailored tools that would enable them to interpret information effectively and make informed decisions for reaching more resilient energy systems.

7. This unique Platform for Resilient Energy Systems will provide member States with two services:

(a) **An AI-powered (or based on AI (Artificial Intelligence)) tool to support tailored and targeted policy- and decision-making.** This AI-powered real-time interactive compendium of resources will assemble, in an aggregated and integrated manner, every relevant and accurate element of information on resilience of energy systems from vetted sources, and will provide access to official documents and data worldwide upon conversational queries. This will include the existing ECE and partnering organizations' documents properly structured, tagged, easily visible and accessible to stakeholders. It will also be subsequently complemented by similar knowledge base produced by other reputable sources;

(b) **A unique forum for information exchange and inclusive multi-stakeholder dialogue.** This Platform will host demand-driven policy dialogues on topical issues, supported by data collection, classification, and policy analysis (the interaction with stakeholders will embrace the CAC approach: *create* – where gaps are identified for member States, *adapt* – what has already been created for other countries/regions, *communicate* – to both experts and policy makers on what has been created and adapted so far).

I. AI-powered tool for tailored and targeted policy and decision-making

8. Thanks to the recent breakthroughs in AI, this tool will be based on the application of Large Language Models (LLMs) and natural language processing (NLP) to answer questions on policy and technology options for resilient energy systems. The interactive tool is planned to be a scalable solution with the following development plan, conditional on the availability of adequate extra-budgetary (XB) resources for each step:

- STEP 1 – a knowledge repository with a smart search engine, robust data and a documents library of vetted sources to uncover hidden insights and summarize the information upon request, citing the original sources. It will interpret and communicate insights through a conversational AI interface, empowering informed decision-making;
- STEP 2 – a scenario building tool, allowing different options for decision-makers and making data understandable and actionable. The AI model will be specifically crafted with vetted data and tailored for the unique requests regarding energy systems resilience;
- STEP 3 – an early warning/response system for advanced predictive data analytics on the functioning of energy systems (as soon as comprehensive data models are integrated).

A. Why are we looking at AI-powered tool?

9. **First**, it supports current work and activities of the Sustainable Energy Division, making its deliverables more visible, accessible and digestible, as well as helping to deliver on our strategic objectives. AI is set to be a major driver of the world's economic activity over the next 10 years. In fact, PricewaterhouseCoopers (PwC) forecasts that the accelerating development and adoption of AI will account for a 14% boost to global GDP by 2030.

10. **Second**, it disrupts the status quo in order to open up new opportunities for our stakeholders: by tracking and analyzing the requests, we will be able to define gaps in available research material to spur further innovative work. By highlighting to member States the importance of digitalization and increased systemic efficiencies, the AI-powered tool could be an example of capitalizing on opportunities from disruptive digital technologies.

11. **Third**, given the pace of digital transformation and how radically it has changed whole industries and societies, it could be an existential risk to the organization if no bold steps are pursued in adopting powerfully transformative technologies.

12. **Fourth**, only AI technologies today are able to manage complex and vast amounts of information in a structured way. The resilience of energy systems is a complex and multi-dimensional concept that eludes simple approaches. However, and in order to take policy and operational decisions, such complexity needs to be managed and organized in a discernible way for the policymaker to understand the trade-offs and the consequences of any decision. An AI-powered tool can provide such a framework and thus support informed policymaking.

13. **Fifth**, AI can be instrumental in enhancing capacity building among member States and removing barriers to accessing data and information on resilient energy systems. With the tool advancement to step 3, it can help disseminate proved and trained data analytic models from data-rich countries to member States with less available information thus allowing peer-to-peer learning across the ECE region.

14. ECE is also aware and stands ready to address all the challenges of such a solution:

(a) Hallucination, incorrect, biased or/and outdated information produced by AI-tool: this will be addressed by providing accurate input information from pre-vetted sources to generate reliable output with authoritative references and citations. For this reason, an Editorial Board will be created comprising partnering organizations (Organization for Security and Cooperation in Europe (OSCE), International Energy Agency (IEA), International Atomic Energy Agency (IAEA), World Meteorological Organization (WMO), European Investment Bank (EIB), etc.), which will conduct regular careful fact-checking and background checking to ensure the relevancy and accuracy of the sources, as well as participate in fine-tuning the AI data model and output production algorithms. Human-in-the-loop will bring higher value for the data and tool's algorithms. Also, the tool will be completely transparent by showing and linking the sources of information, and not allowing anonymized outputs. The information gaps will not be replaced by AI but clearly highlighted, so that they can be more easily identified and addressed in expert groups' working plans;

(b) Training Large Language Models is computationally expensive and has a high carbon footprint. ECE and its research partners will participate in the works enhancing the performance of natural language processing to keep up to the speed of developments in this sphere. Planned input of the vetted sources is comparatively low, so it would not have major environmental repercussions;

(c) Availability of skills, resources or processes to manage the adoption of AI in the organization and to further maintain the solution. ECE plans to actively engage in the UN Interagency Working Group on AI established in 2020 and co-led by International Telecommunication Union (ITU) and United Nations Educational, Scientific and Cultural Organization (UNESCO) to bring together UN system expertise on AI for SDGs attainment and support capacity development and multi-stakeholder collaboration. The projected scalability of the platform (from step 1 to step 3) would secure the ongoing maintenance activities.

B. The Platform will be guided by two main principles:

(a) **A holistic approach to energy systems resilience**, that assesses complex energy systems across different technology value chains, including interconnections with socioeconomic and environmental aspects. The Platform will not only deal with the resilience of energy assets but will also have an integrated and systems-based look at how energy is sourced, transmitted and utilized across all available technological solutions, and what socioeconomic and environmental implications energy policy decisions could have;

(b) **Use of the latest advances in artificial intelligence, machine learning and natural language processing technologies** to supply information, data and expertise for innovative, swift, bold, and data-based decision making.

15. The launch of the Platform at the 32nd Session of the Committee is meant to introduce new momentum to all the activities of ECE on sustainable energy and to harness the potential of **political and technical dialogue** for member States.

II. The Platform as forum for information exchange and inclusive multi-stakeholder dialogue

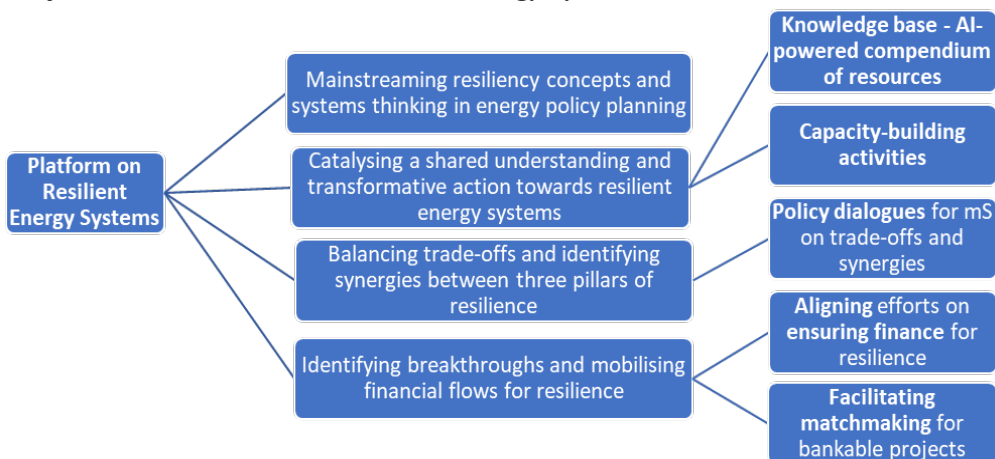
16. **It will aim to:**

- Embed and mainstream resiliency concepts and systems thinking in policy planning and development
- Catalyze shared understanding and transformative action towards resilient energy systems
- Explore the challenges, balance the trade-offs and find synergies between the three pillars of resilient energy systems (energy security, affordability and environmental sustainability)
- Identify technology and policy breakthroughs and mobilize financial flows for resilience.

17. **Finding a balance between the three pillars** (energy security, affordability and environmental sustainability) is a complex social, political, economic, and technological challenge for both developed and emerging economies, therefore ECE's ambition **is to have an AI-powered tool** to help countries address these issues together with our unique expert community.

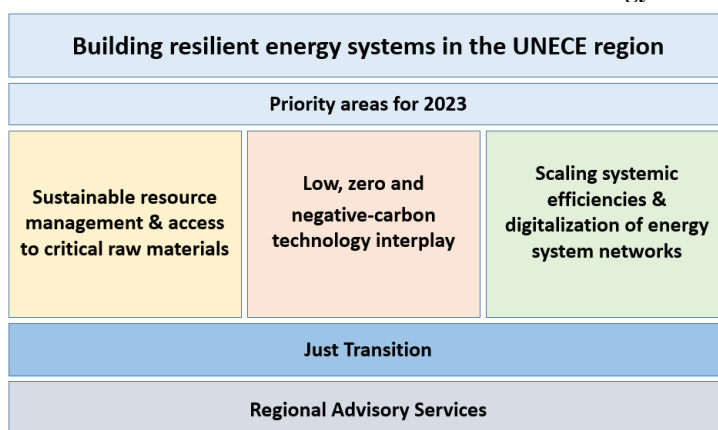
Figure I.

Objectives of the Platform on Resilient Energy Systems



18. **Activities** of the Platform will be based on all areas of work of the Committee on Sustainable Energy and its subsidiary bodies and aim to level up expert community interaction and **engagement with political stakeholders in 56 member States**. Using the Platform, member States would transition towards resilient energy systems not only by being informed or getting increased understanding of the main concepts, but also, and primarily, by **undertaking relevant actions and owning the whole transformative process**. Here, the **tight cooperation between the ECE and partnering organizations expert community and member States** is key to translate knowledge into strong political commitments and actionable contributions to build resilient energy systems in the region and beyond.

Figure II.
Workstreams Architecture of the Committee on Sustainable Energy Subsidiary Bodies



19. **The Activities** of the Platform will build upon the current and future deliverables of the groups of experts and will focus on these priority areas:

- **Sustainable resource management and access to critical raw materials**
 - ECE aspires to stimulate countries to implement a whole-of-government approach to energy systems resilience, starting with the United Nations Framework Classification for Resources (UNFC) and United Nations Resource Management System (UNRMS) frameworks application to all the resources and raw materials needed for the energy transition along the respective supply chains.
- **Low, zero and negative-carbon technology interplay**
 - The development of different technologies for power production, transmission, distribution and storage for particular countries or regions should take a technology-agnostic full lifecycle assessment approach and ideally should always be analysed in the wider context of energy security, affordability and environmental sustainability.
- **Systemic efficiencies and digitalization of energy system networks**
 - Since energy efficiency is called “the first fuel” in clean energy transitions, ECE will underpin its role across all the components of the energy system in the framework of the Platform on Resilient Energy Systems. The Platform will incorporate ECE’s work on advancing energy efficiency in industry and buildings. Mainstreaming resilient energy systems will be impossible without monitoring new and emerging trends in the digitalization in the energy domain, enabling advances in connectivity, data, analytics, optimization of the overall energy infrastructure, and greatly increasing overall efficiency of the energy system.
- **Just transition**
 - Ensuring that quality of people’s life in moving towards climate neutral energy systems will continue to be addressed by the Group of Experts on Coal Mine Methane and Just Transition and its dedicated Task Force on Just Transition. Hence, to ensure that the affected people’s concerns and aspirations are adequately reflected in any transition strategies that ECE is involved in, whether at the development or implementation stage, we will incorporate these activities and deliverables into the operation of the Platform, as an important tool to address the economic and social challenges of greening the energy sector.
- **Regional advisory services**
 - ECE’s aspiration is to make its work even more demand-driven than before, that is why ECE will continue its efforts to collect needs and priorities as well

as recommendations from member States for the resiliency concept development. Moreover, our ambition is to help countries define institutional mandates and strategies for energy resilience, introduce resilience concepts in regulations, legal frameworks and incentive systems of different sectors, and supply chains. Hopefully our work will improve decision making through data, tools, and skills. Thanks to coordinating efforts related to energy resilience across the region, we would like to form strategic partnerships among developed and emerging economies.

20. **Stakeholder management** is the key for the Platform operation. Mapping them, reinforcing cooperation with them, serving as matchmaking facilitator and providing impulse for strong regional or/and topical coalitions, is ECE's goal. The main stakeholders of the Platform would be:

- (a) Government agencies and administrations responsible for energy policy and regulations;
- (b) Energy utilities and other energy assets "owners": the platform can provide an opportunity for them to incorporate resiliency concept into their existing or planned infrastructure;
- (c) Regional associations of energy utilities;
- (d) Financing institutions: partnerships with national financial institutions and international development banks will be vital to provide the necessary capital for resiliency projects;
- (e) Private sector: private sector partners can bring valuable technical expertise, like operations and maintenance, and project management capabilities. In addition, partnerships with large corporations looking to reduce GHG emissions or increase energy resiliency can be especially beneficial;
- (f) Communities: can be an essential stakeholder for ensuring buy-in, promoting awareness, and ensuring the mainstreaming of the resiliency concept;
- (g) Research institutions: partnerships with research institutions can ensure that the development and implementation of the Platform deliverables is grounded in scientific research and can foster innovation and drive the advancement of new technologies;
- (h) Other relevant international organizations.

A. Timeline of the Resilient Energy Systems Platform Activities

21. The building of the Platform is a complex endeavor that will stretch over a relatively long period of time. This is the reason why the development process is built around three steps, that progressively build upon each other, each preceding step being the basis for the next one. Each step necessitates a dedicated independent project that will require XB resources, for its establishment (capital expenditures) but also for its maintenance over time (operational expenditures).

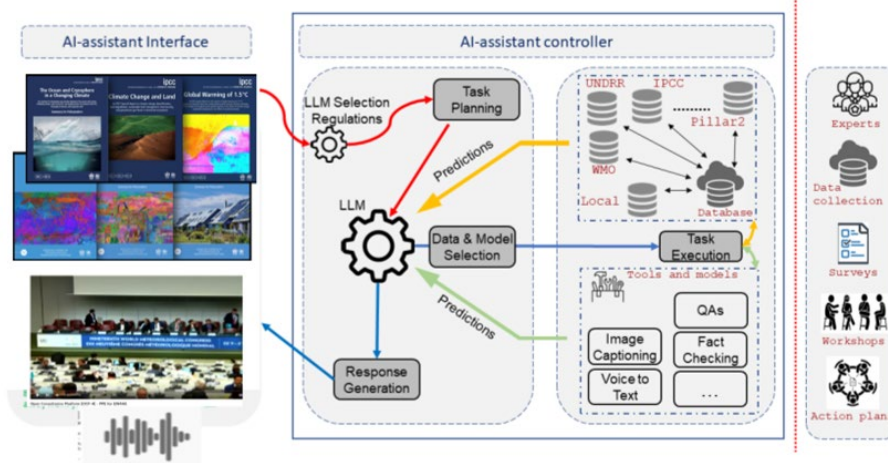
22. Given the complexity of the challenge, ECE has not only partnered with other relevant organizations (WMO, OCSE, IEA, IAEA, EIB) to garner their support and contribution and, more importantly, their production of knowledge (existing and to come), but also with other UN organizations (ITU, UNESCO) to leverage their work in the AI space. ECE is collaborating as well with a team of AI experts of the University of Zürich that developed similar interfaces (see www.ChatClimate.ai and www.climatereport.ai – the latter still in beta mode) and has ongoing discussions with relevant companies in the sector, such as Google and Microsoft.

23. These organizations are contributing in kind to the project (for example, the partnering organizations are members of the Editorial Board) or will bring dedicated and highly technical expertise (such as the academic team and private sector companies). ECE will need to raise XB funding resources to adequately contribute to this endeavor. For this purpose, and

as the immediate next step, ECE with its partners will prepare an XB project proposal aimed at delivering Step 1 and will solicit member States contributions.

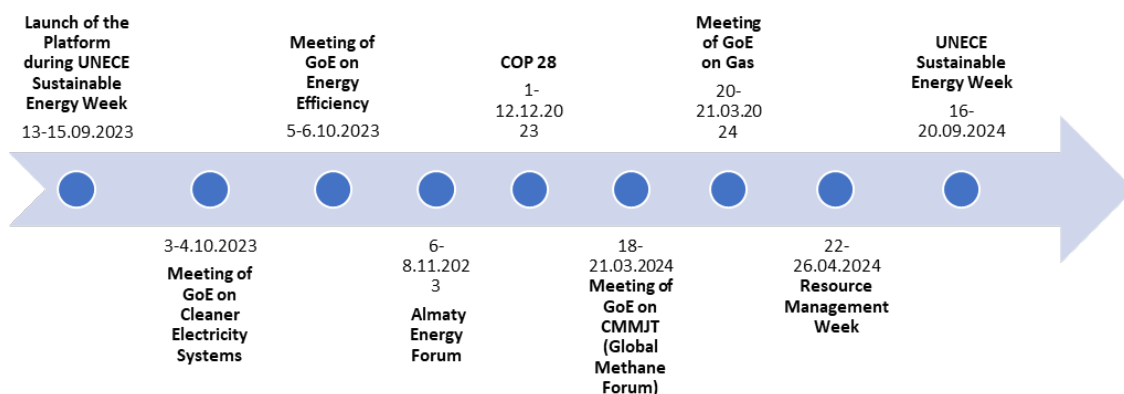
24. More in particular, Step 1 will concern the development of a multi-modal AI assistant, a transformative tool, to elevate the decision-making processes of end users. This tool will integrate relevant modes of communication and data representation to deliver comprehensive insights and responses.

Figure III
Multi-modal AI-Assistant Framework – Taking the ideas from conception to completion



Source: ETH Zurich University 2023

25. Moreover, and throughout the year and in the future, ECE will continue contributing to the work on resilient energy systems through the subsidiary bodies of the Committee on Sustainable Energy. Below are the planned principal milestones for this work, that will add to the knowledge base of the Resilient Energy Systems Platform.



B. Conclusions and Recommendations

26. The Committee on Sustainable Energy endorses the establishment of a Resilient Energy Systems Platform as described above and recommends potential donor member States to support the launch of Step 1 with the necessary resources. ECE endeavors to keep the Committee and the member States abreast of developments through regular reporting at the ECE Executive Committee.