



**Terminal Evaluation of the UNECE Project “Enhancing understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050”
(the Carbon Neutrality Project or CNP)**

Final Report

July 2023



This report has been prepared by independent consultant evaluator. The findings and conclusions expressed herein do not necessarily reflect the views of UNECE.

(Enhancing understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050 (the Carbon Neutrality Project or CNP))
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List of acronyms and abbreviations

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
BAU	Business-as-usual
CCS	Carbon capture and storage
CCUS	Carbon capture, use and storage
CDR	Carbon dioxide removal
CEM	Clean Energy Ministerial
CNP	The UNECE Project “Enhancing understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050” (the Carbon Neutrality Project)
COP	Conference of Parties
EA	Expected Accomplishments
EBRD	European Bank for Reconstruction and Development
ECE	Economic Commission of Europe
ESCAP	Economic and Social Commission for Asia and the Pacific
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
ESCWA	United Nations Economic and Social Commission for Western Asia
EV	Electric vehicle
GCF	Green Climate Fund
GDP	Gross domestic product
GEA	Global Energy Assessment
GEEE	Green Energy & Environmental Engineering
GHG	Greenhouse gas
Gt	Gigatonne
GW	Gigawatt
HELE	High energy low emission technologies
hr	Hour
IAEA	International Atomic Energy Agency
IIASA	Institute of International Institute for Applied Systems Analysis
IFC	International Finance Corporation (World Bank)
IFESD	International Forum on Energy for Sustainable Development
IFI	International Finance Institution
IPCC	Intergovernmental Panel of Climate Change
IRENA	International Renewable Energy Agency
ktCO ₂	kiloton of carbon dioxide
LIST	Luxemburg Institute of Science and Technology
MESSAGE	Model of Energy Supply Systems And their General Environmental Impact
MW	Megawatt
NAMA	Nationally Appropriate Mitigation Action
NASA	National Aeronautics and Space Administration
OECD	Organization for Economic Co-operation and Development
PM	Project Manager
PMU	Project Management Unit
SDG	Sustainable Development Goal
SMR	Small modular reactor
S&P	Standard and Poor
tCO ₂	ton of Carbon Dioxide (-equivalent)
TCF	UNECE Technical Cooperation Project Form
ToC	Theory of Change
ToRs	Terms of Reference
TWG	Technical Working Group
TWh	Terawatt-hour
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission of Europe

UNEG	United Nations Evaluation Group
UNEP	United Nation Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
WMO	World Meteorological Organization
yr	year

Executive Summary

Overview of Evaluation Object

- E-1. UNECE member States have been seeking solutions to attain carbon neutrality goals with the ECE region being roughly 80% dependent on fossil fuels. Results from an earlier UNECE project called “Strengthening the Capacity of the UNECE Member States to Achieve the Energy-related Sustainable Development Goals – Pathways to Sustainable Energy” (Pathways Project) showed that UNECE countries needed to cut or capture 90 Gt of CO₂ emissions by 2050 to stay on the pathway to meet Paris Agreement targets. Immediate actions and investments are needed to support deployment of all carbon abatement technologies including renewable energy, nuclear energy, high energy low emission technologies (HELE) for coal fired plants, carbon capture, utilization and storage (CCUS), green and grey hydrogen, energy storage, biomass, and direct air capture.
- E-2. The UNECE Project entitled “Enhancing understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050” (otherwise known as the Carbon Neutrality Project or CNP) was an initiative to improve the understanding of these issues with policymakers, including achieving carbon neutrality without significant trade-offs involving security of energy supply, carbon emission reductions and energy system cost, and identifying where and how UNECE can help member States to accelerate the transition. The CNP was tasked with enhancing the understanding of senior policymakers of UNECE member States of the implications of and opportunities for moving to carbon neutrality (or to net-zero societies) in the UNECE region across the power and energy intensive industries by 2050. The Project was to enhance collaboration across sectors and technologies towards carbon neutrality through:
- recalibrating a model to a “Carbon Neutrality Framework” from modelling infrastructure from “Pathways to Sustainable Energy” project (completed on 31 October 2019) towards net-zero carbon neutral societies;
 - understanding the interplay of various carbon neutrality technologies through technology briefs;
 - fostering collaboration to attain carbon neutrality through formulating policy guidelines for low-carbon technologies and with the financial sector for a more meaningful and directed impact so that policy makers can develop a clear vision of how to achieve climate neutrality by 2050; and
 - awareness raising and policy dialogue on attaining carbon neutrality within the UNECE Region.

Evaluation Objectives, Methodology and Intended Audience

- E-3. The objectives of this Evaluation were to:
- promote organizational learning, by identifying lessons learned and best practices;
 - contribute to improvement of project performance, as progress towards and achievement of results, including by contributing to senior leadership decision-making;
 - ensure accountability of the Secretariat to member States, senior leadership, donors, and beneficiaries.
- E-4. The primary audience of the evaluation is the UNECE’s senior management and staff as well as the member States of the UNECE. The secondary audience of this Evaluation is expected to be the partner organizations of UNECE, operating in the domain of carbon neutrality. This Evaluation is to be made available online for all interested parties across the 56 member States of the UNECE.

Evaluation Methodology

- E-5. The Evaluation was guided by the objectives and activities established in the UNECE Technical Cooperation Project Form (TCF) covering the full period of implementation from June 2020 to December 2022. This Evaluation adopted a theory-driven, utilization-focused and gender and human rights responsive approach, using a mixed-method approach, including qualitative as well as quantitative data gathering and analysis as the basis for a triangulation exercise of all available data to draw conclusions and findings.

Most Important Findings and Conclusions

- E-6. The extent to which the CNP objective and expected accomplishments were achieved was that communications materials from the Project were produced without the technical jargon and hype, bringing the presentation of technology briefs to policymakers to a practical level where they can make rational technology decisions to inform and influence all stakeholders involved with climate issues (Para 38), and stronger marketing of the technologies rather than management of the technologies. This included technical briefs on nuclear power, hydrogen and CCUS and “Building Resilient Energy Systems” (Paras 45-49) formulated by experts who worked on a *pro bono* basis with Project funds used to convene meetings, workshops and conferences, and to publish information documents and brochures (Para 57).
- E-7. The CNP was set up so that policymakers and the financial community, not politicians, can address carbon neutral technology issues. The challenge for broader work of UNECE is how to reach politicians and financial institutions, unlocking private and public sector financing to make the investments happen (Para 40). The Project then had “high-level” policy dialogue on attaining carbon neutrality in the region through developing and implementing outreach strategies to disseminate Project results to policymakers and the financial community (Para 32). This made CNP unique as it sought to raise awareness on all carbon neutral technology options and interplay between the technologies, and improve communications of Project findings specifically to policymakers of UNECE member States, not technology experts (Paras 26-28).
- E-8. To a large extent, CNP outputs were consistent with and relevant to the overall CNP objective and expected accomplishments. Importantly, the report on “Technology Interplay under the Carbon Neutrality Concept” provides a conclusion that there is no “silver bullet” solution that can address carbon neutrality problems, but that all technologies are required in various proportions to contribute towards the attainment of a carbon neutral energy system (Para 27) and each country has its own pathway to carbon neutrality with all low- and zero-carbon technologies playing a role (Para 50). Expertise, however, is required to drill down to be more specific in articulating further action (Para 55).
- E-9. There was no specific evidence found of women’s and vulnerable groups being afforded particular attention during CNP activities as most CNP activities were highly technical and not specifically addressing women and marginalized groups. However, there is a need to accelerate access to clean energy for all by creating energy transition policies that enable all vulnerable groups to benefit, a need to increase women’s share in energy sector employment and support more education for women in the energy sector (Para 42).
- E-10. There are at least two encouraging developments in reaching for carbon neutrality for UNECE: i) 25 of the highest-revenue oil and gas companies are planning to use at least one option of carbon removal to meet their net-zero emission targets (Para 81); and ii) Ukraine is launching a green recovery plan to decarbonize the country as well as the rest of Europe with solar, wind and biomass, in light of the fuel import embargo against Russia (Paras 79-**Error! Reference source not found.**). There must be an effort by UNECE to link its decarbonization efforts with these developments (Para 87).

Main Recommendations

E-11. Recommendation 1: Work on a subsequent phase of CNP to encourage member States to take the actions required to reduce GHG emissions in line with the Paris Climate Agreement. This could be done by:

- strengthening outreach to policymakers, the financial community, and end-users in addressing carbon neutral technology issues to unlock investments in the public and private sector (Para 40), which is the challenge for broader work of UNECE. There should be a focus on getting policymakers involved in the technology issues at a really early stage with CNP-produced materials, and to ensure policymakers, the financial community and politicians get the legal framework in place before the private sector invests capital;
- focusing efforts on increased exposure to a very informative UNECE Carbon Neutrality Toolkit website to policymakers and technical experts to assist policymakers to be involved in the technology issues at a really early stage. This increased exposure to the Toolkit will provide policymakers and technical experts with sufficient knowledge and information to disseminate and reach end-users and politicians covering industrial, building and transport issues in the 56 UNECE countries;
- assist policymakers and technical experts to empower industrial end-users (and eventually politicians) by getting them to use the UNECE Toolkit to adopt carbon neutral technologies as a means of business survival¹. This will ensure all technologies are well understood to improve stakeholder capacities to make a selection on what technologies are needed;
- continue Task Force work on the Central Asian region to attain carbon neutrality in Central Asia with efforts to raise funds for additional zoom-ins for other UNECE member States;
- continue Task Force work on rebuilding a carbon neutral energy system in Ukraine;
- seeking more funding for the expert community to do more in-depth analyses at the 3rd Almaty Energy Forum in 2023 and subsequent forums, as a follow-up to initial work presented at the 2nd Almaty Energy Forum in November 2022 (Para 26).

E-12. Recommendation 2: Use expertise under the leadership of the Committee on Sustainable Energy to drill down to be more specific in the context of further action and adjust energy models to include increases in energy demand (which is not included in the current energy models predicting energy demand). Despite CNP preparing and adopting technology briefs and conducting discussions amongst experts on next steps, these discussions were deemed to be too general to advance the next steps in carbon neutrality development (Para 55). Current models only historically correlate energy use and GDP (which is going to change as in an example of 4 years of carbon emissions in EVs are brought forward before the EV is carbon neutral with 4 years of carbon emissions making the battery). The models produced by the CNP likely do not account for the energy demand increases (Para 47). With regards to the demand side:

- a deeper dive into more research and studies on building on recommendations from CNP findings on resilient energy systems can produce better assessments, making it more focused how the energy system processes works if extrabudgetary resources can be made available;
- if extrabudgetary resources are made available, western business models can be used for decarbonization of hard-to-abate sectors using an industrial cluster approach that can be replicated in the eastern part of the UNECE region
- extrabudgetary resources can also involve an assessment of decarbonization on the demand side and its integration with the electricity grid (especially with EVs potentially impacting the grid) to

¹ There are 3 types of companies: i) companies that know how to adopt new technologies and are willing to do it (western energy-intensive or large multi-national corporations); ii) companies that are willing to adopt new processes and technologies but lack the knowledge or resources to do so; and iii) companies that do not have the willingness, knowledge or resources to do so.

allow electrification of buildings and transport. This should cover decarbonization of 3 main sectors: industry, buildings and transport.

E-13. Recommendation 3: For subsequent phases of CNP, identify more women for the entire UNECE region for increased education and engagement in the energy sector that will lead to increased contributions by women to discussions on carbon neutrality. While the energy sector is dominated by males especially in the whole UNECE region, actions placing focus on women and other vulnerable groups should be taken to:

- support more education for women in the energy sector. This is absolutely necessary given the anticipated personnel shortages and increasing employment on green energy; and
- encourage all policymakers to create carbon neutral energy transition policies that enable all vulnerable groups (i.e. women, children, elderly and disabled people) to benefit from energy systems that are carbon neutral to accelerate “affordable and clean energy for all” (SDG 7).

1. Background

1. Being roughly 80% dependent on fossil fuels, UNECE member States have been seeking solutions to attain carbon neutrality goals. Results from an earlier UNECE project “Strengthening the Capacity of the UNECE Member States to Achieve the Energy-related Sustainable Development Goals – Pathways to Sustainable Energy” (Pathways Project) show that the countries in the UNECE region need to cut or capture at least 90 gigatonnes (Gt) of CO₂ emissions by 2050 to stay on a pathway that meets the 2°C target. This translates into UNECE member States needing to take immediate action and investments to support deployment of all carbon abatement technologies including renewable energy, nuclear energy, high energy low emission technologies (HELE) for coal fired plants, carbon capture, utilization and storage (CCUS), green and grey hydrogen, energy storage (batteries, power-to-X, hydro), biomass (with CCUS), and direct air capture.
2. Carbon neutrality cannot be achieved without significant trade-offs involving security of energy supply, carbon emission reductions and energy system cost. Carbon neutrality can only be achieved through understanding technical, economic, and public relations challenges that would result in meaningful decarbonization, and identifying where and how UNECE can help member States to accelerate the transition. All available low-carbon technologies will need to be deployed to fill the gap between what has been committed and what is needed. The Pathways Project informed all policymakers that they cannot afford to leave “off the table” any low-carbon technologies.
3. The UNECE Project entitled “Enhancing understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050” (otherwise known as the Carbon Neutrality Project or CNP) was an initiative to improve the understanding of these issues with policymakers. Financed by the United States Energy Association and World Nuclear Association, the CNP was tasked with enhancing the understanding of senior policymakers of UNECE member States of the implications of and opportunities for moving to carbon neutrality (or to net-zero societies) in the UNECE region across the power and energy intensive industries by 2050. With an estimated 2.5 million industrial companies in UNECE member States (out of which 16,000 are large industries), the Project was designed to ensure collaboration across sectors and technologies towards carbon neutrality through:
 - a) recalibrating a model to a “Carbon Neutrality Framework” from modelling infrastructure from the Pathways project (completed on 31 October 2019) towards net-zero carbon neutral societies with refined data and assumptions of technology inputs. This approach allowed for a better understanding of technology deployment curves and for a risk-adjustment of the models accordingly and per subregion;
 - b) understanding interplay of various carbon neutrality technologies through technology briefs. This translated into understanding and analyzing the role of selected technologies and innovation towards carbon neutrality, and supporting lowest cost opportunities across the power and energy intensive sectors for potential low-, zero- and negative carbon technologies across the region;
 - c) fostering collaboration to attain carbon neutrality through formulating policy guidelines for low-carbon technologies and with the financial sector for a more meaningful and directed impact. This would allow policy makers to develop a clear vision of how to achieve climate neutrality by 2050; and
 - d) awareness raising and policy dialogue on attaining carbon neutrality within the UNECE Region. This should include the Project team cooperating and coordinating Project activities with other United Nations agencies, international governmental and non-governmental organizations active in the fields of public participation, human rights and the environment, all done to promote synergies and avoid duplication.
4. This evaluation was deemed necessary to assess the extent to which the CNP succeeded in enhancing the understanding of policymakers of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050.

2. Purpose, Scope and Methodology

2.1 Purpose

5. The purpose of this Evaluation was to assess the extent to which the Project is enhancing the understanding of policymakers of carbon neutrality in UNECE region and opportunities to enhance and accelerate carbon neutrality in the power sector and energy intensive industries by 2050. The Evaluation was also to assess:
 - the relevance of the Project;
 - the effectiveness in enhancing the capacity of UNECE member States in addressing carbon neutrality and achieving energy-related SDGs as well as other internationally agreed goals and targets;
 - the efficiency and sustainability of the Project to learn how to maintain and possibly replicate lessons-learned in the activities of the subprogramme;
 - how Project activities contribute to gender equality and women's empowerment, the realization of human rights, with an emphasis on 'leaving no one behind', and whether it applied disability inclusion approaches with recommendations on how these considerations can be better addressed in future subprogramme activities;
 - the impact of the COVID-19 pandemic on Project activities; and
 - to the extent possible, UNECE's response to the Project's contribution to solving the energy security crisis and proposed responses to design and implement carbon neutral energy systems.
6. The purpose of the Evaluation was also to identify areas that need further attention and provide practical recommendations on how to improve the efficiency, effectiveness and sustainability of future work on similar topics. The results of the evaluation were to support the improvement of the quality of the services provided by the subprogramme in future projects and activities on similar topics.

2.2 Scope and objectives

7. The scope of this Evaluation was to evaluate all activities funded by UNECE. The Terms of Reference (ToRs) for this Evaluation are contained in Annex I. Key issues addressed on this Evaluation include:
 - that the Evaluation is independent of UNECE Project management to ensure independent quality assurance;
 - the application of norms and standards for evaluations under UNECE's Evaluation Policy and the revised Norms and Standards for Evaluation (2016) of the United Nations Evaluation Group (UNEG) using a range of data-collection techniques such as key stakeholder interviews, surveys, and structured documentary analyses. This includes a participatory approach by including all relevant stakeholders who achieved a certain level of ownership with regard to the Project's output;
 - assessment of the delivery of 4 Expected Accomplishments (EA), likelihood of the sustainability of the EAs, and if the Project met the minimum M&E requirements; and
 - an outlook and guidance in charting future directions of UNECE and their future support for a possible subsequent phase to the CNP Project.
8. While conducting this Evaluation, the following strategic issues were identified for further discussion:
 - to what extent has there been a better understanding of technology deployment and the models that provide adjustments for subregion;

- to what extent has there been identification of lowest cost opportunities across the power and energy intensive industrial sectors that can be further developed as primary carbon neutrality opportunities that will stimulate a catalytic or replication effect within a country and region;
 - how does the position paper (on financing clean energy technologies across the UNECE region) reflect policymaker's capacity to present a clear vision of, and to implement investments on climate neutrality by 2050.
9. The objectives of the Evaluation of the Carbon Neutrality Project are to:
- promote organizational learning by identifying lessons learned and best practices;
 - contribute to improvement of project performance, as progress towards and achievement of results, including contributing to senior leadership decision-making;
 - ensure accountability of the Secretariat to member States, senior leadership, donors, and beneficiaries.

2.3 Methodology

10. The Evaluation was guided by the objectives and activities established in the UNECE Technical Cooperation Project Form (TCF) and covered the full period of Project implementation from June 2020 to December 2022. To be sure the evaluation is focused on specific impacts of the Project, the Evaluator undertook interviews from 1 March to 30 April 2023, collecting feedback from key Project stakeholders, such as members of the Carbon Neutrality Task Force, the Project Advisory Board and the Bureau of the Group of Experts on Cleaner Electricity Systems under whose auspices this Project was implemented. A listing of stakeholders interviewed is provided in Annex II.
11. This Evaluation adopted a theory-driven, utilization-focused and gender and human rights responsive approach. The universally recognized values and principles of human rights and gender equality were to be integrated into all stages of the Evaluation as well as disability inclusion in compliance among others with UNEG norms and standards and the UN Disability Inclusion Strategy. The Evaluation made attempts to assess how the Project activities contributed to gender equality and women's empowerment, the realization of human rights, with an emphasis on 'leaving no one behind', and whether it applied disability inclusion approaches.
12. The Evaluator used a mixed-method approach, including qualitative as well as quantitative data gathering and analysis as the basis for a triangulation exercise of all available data to draw findings and conclusions. This included 12 responses from a survey questionnaire that was shared with aforementioned key Project stakeholders (Para 10). Steps were also undertaken to enhance stakeholder engagement and the quality of consultation:
- interviewees were informed about the Evaluation's aims and informed of the expectations of the evaluation;
 - open-ended questions were used to promote balanced reflection, generate new insights, and yield higher quality information (as opposed to yes/no questions or an 'audit' approach); and
 - interviewees were assured of the anonymity and confidentiality of their input whenever deemed appropriate.

These methodologies are all based on the norms and standards for evaluations under UNECE's Evaluation Policy and the revised Norms and Standards for Evaluation (2016) of UNEG.

Sampling Strategy for Data Collection

13. Data for the Evaluation was collected on the basis of a desk review of all relevant documents over the period including:
- all relevant documents including materials developed in support of the activities (agendas, plans, participant lists, background documents, final reports and publications);

- reports and briefs prepared under Project implementation; and
 - proposed programme budgets covering the evaluation period.
14. The sampling strategy included interviews with the Project team and executing partners and administering a questionnaire survey to Project stakeholders. Different key groups involved in the Project who were interviewed included:
- Project team. This involved the UNECE Project team who disclosed issues of implementation and execution;
 - Executing partners. This involved UNECE Task Force on Carbon Neutrality;
 - Project partners. This involved entities who worked in close collaboration with the Project team, including senior officials from ministries of energy and industry, private sector experts, civil society, international organisations, academia, and financial institutions;
 - Beneficiaries. This involved UNECE member States.

Data collection methods

15. Data and information were collected from interviews with several stakeholders as well as data collection through the aforementioned questionnaire. The tailored questionnaire, as provided in Annex III, was developed for interviews by the Evaluator in consultation with the Project manager to assess the views of stakeholders: parties, experts, staff from UNECE, other regional commissions and relevant counterparts in the United Nations System and other international organizations. The questionnaire was applied to interviews with selected stakeholders mainly carried out via Zoom calls. There were also on-line questionnaires sent to 50 persons that resulted in only 12 responses. Results of the interviews and surveys were disaggregated by gender wherever possible. The Evaluation was conducted in accordance with the [ECE Evaluation Policy](#) that included a gender-responsive methodology with Evaluation findings, conclusions and recommendations reflecting gender analysis wherever possible.

2.4 Key Evaluation Questions

16. Key evaluation questions were related to the effectiveness of technical assistance being provided by CNP to:
- reorientate a model towards net-zero carbon neutral societies to allow for an improved understanding of technology deployment curves;
 - improve understanding of the role of carbon neutral technologies and innovation to identify and support lowest cost opportunities in power and energy intensive industrial sectors; and
 - facilitate collaboration across technologies and with the financial sector for a more meaningful impact that would allow policymakers to develop a clear vision of how to achieve climate neutrality by 2050.
17. The Evaluation applied the criteria of relevance, efficiency, effectiveness, and sustainability introduced by the Organization for Economic Co-operation and Development (OECD) and was designed to provide answers to key questions as listed in Annex III, thereby identifying key lessons learned with regard to partnership and cooperation between the UNECE and other internal or external stakeholders. Gender and human rights aspects were addressed throughout the evaluation with an appropriate methodology and evaluation questions prepared.

2.5 Evaluation Limitations, Challenges and Risks

18. Limitations to this Evaluation include:

- only interviewing 12 key stakeholders selected on the basis of their familiarity with the Project and their availability, which did not allow for the random selection of stakeholders. As such, challenges to the data collection included interviewing some of the selected stakeholders more than once to triangulate the quality of information received, and to provide assurance that the conclusions of the evaluation are robust;
- the pool of survey respondents was very limited to those who had already participated in activities carried out by the UNECE and whose contact details were available, causing a sampling bias;
- the EA-level achievements covered under the Evaluation criteria of effectiveness were limited to a few selected cases reported by the PMU which possibly may not fully reflect the wide range of outcomes;
- the impact of collaboration between the CNP and other organizations was likely limited by the knowledge of the interviewed stakeholders.

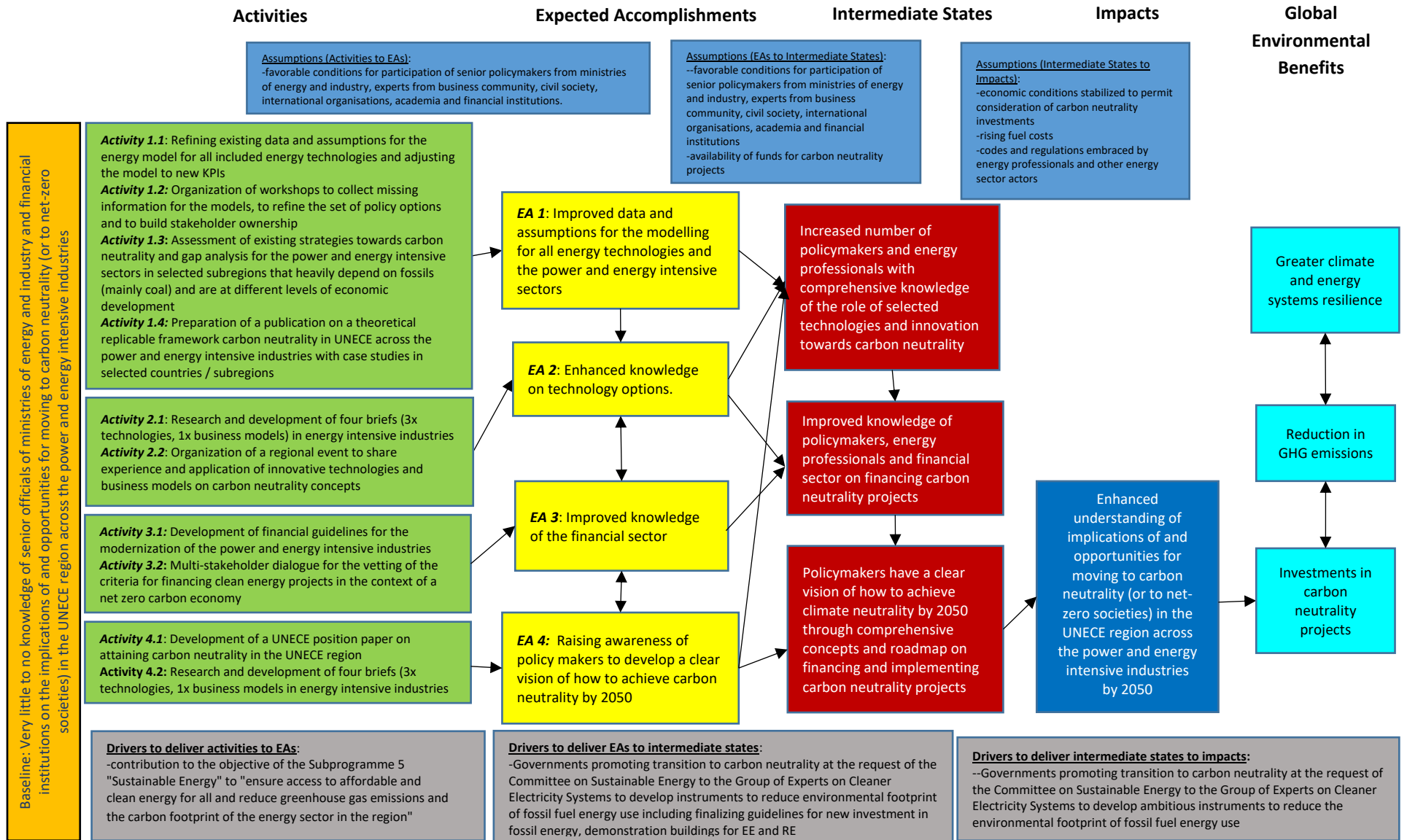
2.6 Evaluation Audience and Key Stakeholders Surveyed

19. The primary audience of the evaluation is the UNECE's senior management and staff as well as the member States of the UNECE. The secondary audience of this Evaluation is expected to be the partner organizations of UNECE, operating in the domain of carbon neutrality. This Evaluation is to be made available online for all interested parties across the 56 member States of the UNECE.
20. In total, the Evaluator only interviewed 12 stakeholders and received 12 respondent stakeholders to the on-line survey from representatives of other UNECE Member States, academia, research centers, and intergovernmental organizations, as well as independent experts. Of the survey respondents, 16.67% (2 out of 12) were female. Of the interviewees, 25% (3 out of 12) were female. Most of the respondents briefly answered gender questions.

2.7 Theory of Change of the Project

21. A Theory of Change (ToC) for a project essentially describes the roadmap of developmental pathways driven by regulatory or market drivers in combination with project activities to reach intended Expected Accomplishments as well as impacts and global environmental benefits to reflect the sustainability of the project activities. No ToC was prepared for the CNP Project. However, CNP did have activities listed on the UNECE TCF that indicates the need for a link between baseline, activities, delivery of intended Expected Accomplishments, intermediate states, impacts (or objectives) and global environmental benefits. A ToC is provided on Figure 1.

Figure 1: ToC Diagram for the CNP Project



3. Evaluation Findings

3.1 CNP Project activities

22. All CNP Project activities were meant to achieve the projected impact of the Project or the objective of CNP of “enhanced understanding of implications of and opportunities for moving to carbon neutrality (or to net-zero societies) in the UNECE region across the power and energy intensive industries by 2050”, as indicated under “Impacts” in the blue box of Figure 1.
23. Under EA 1, Activity 1.1 (Refining existing data and assumptions for the energy model for all included energy technologies and adjusting the model to new KPIs), the following was completed:
- outreach started in August 2020 and continued until June 2021 with expert groups from Member States to strengthen data and assumptions for CCUS, nuclear energy, hydrogen, and energy efficiency. The modelling institution, Institute of International Institute for Applied Systems Analysis (IIASA) was recruited in October 2020 to support this activity;
 - modelling activity was launched during the May to July 2021 period with IIASA and Luxemburg Institute of Science and Technology (LIST) to support the report on technology interplay under a carbon neutrality concept with the Task Force on Carbon Neutrality and the wider Project stakeholder community. After refining data and compiling preliminary Project results, a publication on Life Cycle Assessment of Power Generation Technologies was finalized in March 2022 and a publication on Carbon Neutrality in the UNECE Region;
 - Technology interplay under the Carbon Neutrality Concept in September 2022.
24. Under EA 1, Activity 1.2 (Organization of workshops to collect missing information for the models, to refine the set of policy options and to build stakeholder ownership), the following was achieved:
- two workshops were conducted in September 2020, the Project kick-off workshop and a workshop “Attaining carbon neutrality in the UNECE region”;
 - organised a workshop session at the 16th annual meeting of the Group of Experts on Cleaner Electricity Systems in November 2020 that included a high-level roundtable on CCUS with the objective to raise awareness of the potential of CCUS in the region, and discussions on the role of nuclear energy to attain carbon neutrality in the Eastern Europe, the Caucasus and Central Asia;
 - 5 additional workshops delivered on:
 - 24 March 2021 on “Role of hydrogen in attaining carbon neutrality in the UNECE region”;
 - 14 April 2021 on “Carbon neutral energy intensive industries in the UNECE region”; and
 - 2 June 2021, 14 July 2021 and 7 October 2021 on “Project Stakeholder Consultations on Technology Interplay under Carbon Neutrality Concept”.
- Activity 1.2 was completed with these 8 multi-stakeholder workshops strengthening the assumptions and robustness of the modelling outputs with local input, enabling the modellers to refine the data and assumptions on a subregional level within 3 distinctive scenarios: reference scenario, carbon neutrality scenario, and innovation carbon neutrality scenario.
25. Under EA 1, Activity 1.3 (Assessment of existing strategies towards carbon neutrality and gap analysis for the power and energy intensive sectors in selected subregions that heavily depend on fossils (mainly coal) and are at different levels of economic development), the following was completed:
- a draft carbon neutrality framework was developed together with a Task Force in September 2020; and

- the final document of the draft carbon neutrality framework was presented and endorsed at the 16th annual meeting of the Group of Experts on Cleaner Electricity Systems on 23 November 2020. This served as a basis for further Project implementation.
26. Under EA 1, Activity 1.4 (Preparation of a publication on a theoretical replicable framework carbon neutrality in UNECE across the power and energy intensive industries with case studies in selected countries/subregions), the following was completed:
- work that built off the knowledge products with language specific for policymakers on technology interplay under carbon neutrality concept (Activity 1.2) was initiated in Q1 2022 and continued until Q4 2022. The result was a publication on a theoretical replicable framework carbon neutrality in UNECE, focusing on 2-3 UNECE subregions to improve the impact of the work;
 - the Task Force agreed to focus on the Central Asian region in September 2022 with the following subregional activities launched: i) attaining carbon neutrality in Central Asia; and ii) rebuilding energy system in Ukraine under the carbon neutral system. These activities were a focus in Q4 2022 with initial work presented at the 2nd Almaty Energy Forum in November 2022. The expert community decided to seek additional funds to do more in-dept analysis in 2023.
27. Under EA 2, Activity 2.1 (Research and development of four briefs (3x technologies, 1x business models) in energy intensive industries), the following was completed:
- technology briefs were prepared with language tailored for policymakers for:
 - CCUS (that were started in August 2020 and completed in April 2021) with several dissemination events including UN Climate Change Conferences COP26 and COP27 and a request to deliver a targeted workshop on role of CCUS in Kazakhstan;
 - nuclear energy (completed in August 2021) with dissemination events at COP26 and the 1st Almaty Energy Forum in 2021;
 - hydrogen (completed and published at COP26 beginning of November 2021) with key findings disseminated at the 30th session of the Committee on Sustainable Energy, COP26, the 1st Almaty International Forum, and 9th session of the Group of Experts on Gas and the Training on Hydrogen in Croatia;
 - decarbonization of energy intensive industries that started with “Pathways to Effectively Decarbonizing Industry” at the GEEE 8 and 11th IFESD, further disseminated at COP26 and the 2nd Almaty Energy Forum in November 2022, and completed in Q4 2022 and jointly launched with ESCWA at COP27;
 - a study was commenced in October 2020 and completed in April 2021 on “Geologic CO₂ storage in Eastern Europe, Caucasus and Central Asia”. Dissemination events were delivered in April 2021 at the CIS Electric Power Council Executive Committee Meeting on 6 April 2021, the 69th session of the Commission on 20-21 April 2021, the 30th session of the Committee on Sustainable Energy on 23 September 2021, the UN High Level on Energy on 24 September 2021, COP26 and the 1st Almaty International Forum in November 2021;
 - work on a report on “Technology Interplay under the Carbon Neutrality Concept” commenced in Q2 2021 and completed in September 2022 as an addition to the UNECE Carbon Neutrality Toolkit. The report provides clear, achievable pathways for policymakers to implement a carbon-neutral energy system through technology interplay by combining existing and new technologies within an integrated framework. The report urges: 1) accelerated phase-out of unabated fossil fuels, 2) electrification of all sectors through renewable energy and nuclear power, and 3) widespread deployment of low- and zero-carbon technologies (including CCUS for the continued use of fossil fuel and hard-to-abate sectors, hydrogen, and next generation of nuclear power). *Importantly, the report provides results from modeling that there is not a single technological solution that can address carbon neutrality problems, but that all technologies are required in various proportions to contribute towards the attainment of a carbon neutral energy system.* Notwithstanding that a carbon-neutral compliant energy transition is affordable under the existing global finance capacity, 75% of the current global energy expenditure (US\$ 4.5 trillion) is

persistently allocated to unabated fossil fuels. In light of this, significant mobilization of capital needs to be redirected into clean-energy projects with the most potential to reduce emissions whilst maintaining the quality of life of the people.

28. Under EA 2, Activity 2.2 (Organization of a regional event to share experience and application of innovative technologies and business models on carbon neutrality concepts), the following was completed:
- an event with subregional focus was delivered at the 1st Almaty Energy Forum from 1-4 November 2021 as part of the International Forum on Innovating and Modernizing Energy and Water in Central Asia. Project findings were disseminated and a session on carbon neutral energy intensive industry was delivered, serving as a core for further project implementation. Subregional data and findings on building carbon neutral energy systems in Central Asia were presented to expert groups at the 2nd Almaty Energy Forum from 14-16 November 2022 in Almaty;
 - more events were expected in 2022 for an in-depth subregional approach with technology workshops and policy dialogues at the subregional level in Dushanbe, Tajikistan. However, due to geopolitical circumstances and the war in Ukraine, these events were postponed. The Project team delivered a subregional event on carbon neutrality at the 2nd Almaty Energy Forum with UNDP, ESCAP, UNESCO and the Kazakh-British Technical University on CNP regional results. The Expert Community expressed interest to do more work on Carbon Neutrality in Central Asia, in light of the updated UNECE Carbon Neutrality Toolkit.
29. Under EA 3, Activity 3.1 (Development of financial guidelines for the modernization of the power and energy intensive industries), the following was completed:
- initial discussions started at the high-level CCUS Roundtable on 23 November 2020, with dialogue focusing on building partnerships with existing initiatives (such as Clean Energy Ministerial or CEM), multilateral and private financing institutions, such as EBRD, World Bank and EIB and involving member States from the eastern part of UNECE region. Dialogue was conducted in September 2022;
 - the Secretariat of UNECE started doing gap analysis to understand from which donors the financing is flowing into clean energy projects across the UNECE region with a focus on countries in Central Asia, particularly Kazakhstan. Knowledge products were presented during the UNECE Sustainable Energy Week on 20 September 2022 with discussions held with EBRD, AIIB, ADB, GCF. A position paper on financing clean energy projects across the UNECE region was presented at the 18th session of the Group of Experts on Cleaner Electricity Systems (Para 71).
30. Under EA 3, Activity 3.2 (Multi-stakeholder dialogue for the vetting of the criteria for financing clean energy projects in the context of a net zero carbon economy), the following was completed:
- dialogue was conducted on 7 September 2021 in partnership with CEM, gathering 30 technology and finance experts to understand the contributions CCUS can make to global climate efforts; evaluate what works and what does not and why with respect to technical, economic, and public barriers for CCUS project implementation; and to identify criteria for financing CCUS projects in collaboration with financial institutions and partners who want to take the next step towards driving CCUS projects forward. Findings from this dialogue informed the discussion on CCUS at the 30th session of the Committee on Sustainable Energy on 23 September 2021²;
 - dialogue continued in October 2021 during the Annual Meeting of the Group of Experts on Renewable Energy and the Group of Experts on Cleaner Electricity Systems on financing modernization of energy infrastructure, and at the International Forum on Innovating and Modernizing Energy and Water in Central Asia in November 2021 where the experts tried to understand what it takes to unlock investments in clean energy projects in Central Asia;

² CCUS examples were shared: The Boundary Dam project in the Canadian power sector, Heidelberg Cement/Norcem in the Norwegian cement sector, and Al Reyadah in the UAE steel sector.

- dialogue on financing clean energy project was delivered during Q3 2022 at the Sustainable Energy Week, in close collaboration with ADB, AIIB, GCF, and EBRD (Paras 71-72).
31. Under EA 4, Activity 4.1 (Development of a UNECE position paper on attaining carbon neutrality in the UNECE region), this activity has been completed with a draft position paper submitted to the Committee on Sustainable Energy for consideration in preparation for the annual meeting of the Group of Experts on Cleaner Electricity Systems in October 2021.
 32. Under EA 4, Activity 4.2 (Organization of a high-level policy dialogue on carbon neutrality), the following was completed:
 - First high-level dialogue with a subregional focus took place in November 2021;
 - A final high-level event took place at the 31st session of the Committee on Sustainable Energy on 21 September 2022 and the Annual Meeting of the Group of Experts on Cleaner Electricity Systems on 19 September 2022.
 33. These activities culminated with a reported series of impacts that included:
 - a better understanding of the role of CCUS in Kazakhstan from a regional workshop;
 - a better understanding of carbon neutrality scenarios for the aggregate UNECE region and a number of UNECE subregions (Central Asia, the Caucasus and Western Balkans) through a completed modelling exercise and modelling outputs with IIASA, and “Technology Interplay under the Carbon Neutrality Concept”;
 - a better understanding of financing clean energy infrastructure;
 - a renewed use of the relaunched and highly informative UNECE Carbon Neutrality Toolkit³; and
 - a renewed outlook by policymakers of attaining carbon neutrality in Central Asia and Ukraine through regional activities.
 34. This renewed outlook has policymakers equipped with increased knowledge on the decarbonization of energy intensive industries, knowing:
 - the status of selected energy intensive industries in UNECE region;
 - the merits of various technology options and innovative business models that can reduce carbon intensity of selected industries;
 - the successful business models and collaborative activities across UNECE region;
 - the means of scaling-up of successful business models and designing industrial clusters for UNECE region; and
 - policies needed for energy intensive industries in UNECE region.

3.2 Relevance

Was the Project design and implementation appropriate for meeting the Project’s objective?

35. The stakeholders interviewed and 10 on-line respondents (out of 12 respondents) agreed that the collaboration between the UNECE and internal or external stakeholders (organizations and subject-matter experts), other organizations and individual experts on CNP was highly relevant when it came to delivering on the expected accomplishments and attaining the goals of the UN’s 2030 Agenda for Sustainable Development and the targets of the Paris Climate Agreement⁴. The creation of knowledge and development of collaborative efforts were applied to the principles of the 2030 Agenda and in the guidance towards the targets of the Paris Agreement.

³ <https://carbonneutrality.unece.org/>

⁴ 2 respondents replied that the collaboration was only partially relevant.

36. From the Evaluator's perspective, the Project was designed to prepare and disseminate the possibilities and constraints of carbon neutral technologies by refining data and technology assumptions from the project "Pathways to Sustainable Energy". This contributes to the selection of appropriate carbon neutral technologies, specifically addressed to inform policymakers and the financial community. The CNP Project was unique in using experts who have practical experience in complex tradeoffs required to address the fossil-fuel problem without seriously damaging societies. The Project was then to have "high-level" policy dialogue with regional policymakers on attaining carbon neutrality through developing and implementing outreach strategies to further disseminate Project results to other relevant policymakers and the financial community (Para 32). Given the resources allocated, the Project design and implementation appear to be appropriate to meet the Project's overall objectives.

To what extent did the project respond to the priorities and needs of UNECE member States? How relevant were they to the target groups' needs and priorities?

37. CNP is a follow-up from a previous UNECE project "Pathways to Sustainable Energy", and to update that project including technologies which had previous constraints, to demonstrate to policymakers that the mix of policies that are chosen is very important and interrelated, and to inform policymakers of the seriousness of carbon neutrality issues. The CNP Project was unique in that it sought to improve communications of Project findings specifically to policymakers of UNECE member States, not technology experts (Paras 26-28).
38. Policymakers from all countries are subject to the hyping of technologies, not knowing how most technologies work or how to apply them. CNP applied technology neutrality with no politically preferred technologies. CNP technology selections were based on carbon mitigation effectiveness, economic performance (life cycle costs) and market penetration constraints. As such, the communications materials produced from the Project were produced without the technical jargon and hype that is present in many technology briefs, bringing the presentation of technology briefs to policymakers to a practical level where they can make rational technology decisions and inform and influence politicians who have taken over climate issues. In conclusion, the information briefs provided by CNP were highly relevant in responding to priorities and needs of policymakers from most UNECE member States.
39. However, the Project did not respond to any issues on gender equality. Only 2 out of the 12 respondents to the on-line survey said the ongoing collaboration with the UNECE is relevant to gender equality and empowerment of women. Five of the respondents said this was partially relevant while another 5 said it was not relevant or that they had no knowledge of the issue. Most stakeholders interviewed said that most activities of the CNP were highly technical and did not specifically address gender equality, women's empowerment, and human rights initiatives. With CNP activities being relevant to improving the living standards of the population including marginalized groups, there was no specific evidence found during CNP working sessions of women's and vulnerable groups being afforded particular attention.

What is the relevance of the project for the broader work of UNECE?

40. UNECE promotes economic collaboration between its member States. In particular, member States are interested in energy collaboration in Europe (with most of Europe being a net energy importer). The CNP was set up so that policymakers, not politicians, can address carbon neutral technology issues. The setup of CNP does not allow scientific issues to be addressed to politicians. While the UNECE Executive Committee approves project budgets through consensus, there is a question as to how effectively UNECE can collaborate with other regional commissions and other multilateral organizations to reach policymakers and financial institutions and eventually politicians on the issues of carbon neutrality⁵. The challenge for broader work of UNECE is how to unlock public and private investments through policymakers and financial institutions.

⁵ This would include collaborations with UNDP, UNIDO, ADB, World Bank, EBRD, IRENA, IAEA, IIASA, the European Energy Research Alliance, the EuroGeoSurveys, the International Energy Agency, Infrastructure Bank of Canada.

41. Most governments have considered technology readiness levels (invented by NASA) from concept to work in the lab, pilot scale, full scale, and widespread implementation, and commercial readiness levels ranging from initial evaluation, profitability and feasibility analysis to proving the business model and ongoing business. Social readiness levels involve half the UNECE Member governments to consider:
- the implications across all the other policies they are responsible for;
 - whether or not they have piloted the technologies in any way; and
 - whether there was an initiative to pass the laws necessary to implement the technology, and laws are ready for companies to deploy.

Social readiness was well behind technology and commercial readiness for more than half the governments of UNECE member States. Materials produced by this Project attempted to address policymakers involved in these technology issues at a really early stage to get politicians to ensure that the legal framework is in place before the private sector wants to invest capital. This is clearly not the case at this time. In conclusion, CNP is relevant to broader work of UNECE to work with policymakers and politicians.

Did UNECE advocate for gender equality in this area of work, as well as the realization of human rights, with an emphasis on “leaving no one behind”?

42. Given that CNP addressed the capacity of policymakers, no specific evidence was found of women's and vulnerable groups being afforded particular attention during CNP working sessions. However, the majority of stakeholders (10 out of 12 on-line respondents) confirmed that the UNECE advocates for, or contributes to, or enhances gender equality and empowerment of women in the energy sector. All 10 stakeholders interviewed also said that the Project was relevant to improving the living standards of the population including marginalized groups; this included 9 out of 12 respondents to the on-line survey. However, 10 stakeholders interviewed said that most activities of the CNP were highly technical and did not specifically address women and marginalized groups.

Was UNECE's collaboration with the UN system relevant in terms of delivering on the Carbon Neutrality agenda? If so, why?

43. UNECE's Carbon Neutrality Project has a vital linkage with the UNFCCC to provide technical assistance to developed and developing countries to reach carbon neutrality. With the UNFCCC being the lead agency to enforce the Paris Agreement, an international environmental treaty to “combat dangerous human interference with the climate system” (in part by stabilizing greenhouse gas concentrations in the atmosphere), CNP through UNECE has a major aim to assist UNFCCC in promoting carbon neutrality through pan-European economic integration through policy dialogue, negotiation of international legal instruments, development of regulations and norms, exchange and application of best practices as well as economic and technical expertise, and technical cooperation for countries with economies in transition. Preparation of information briefs, policy dialogue, and the exchange and application of best practices as well as economic and technical expertise are the signature activities of CNP. Hence, UNECE's collaboration with the UN system was relevant in identifying policy and technology options to attain carbon neutrality and to deliver Agenda 2030 for sustainable development and Paris Agreement targets. The CNP, however, is only a first step towards negotiation of international legal instruments, and technical cooperation for countries with economies in transition.

Has the collaboration among the UNECE, the UN system and other partners assisted UNECE member states in delivering on building capacities and financing opportunities in Carbon Neutrality?

44. The collaboration between the policymakers, Expert Groups, UNECE and UNECE assisted Member States has built capacities amongst most policymakers through information briefs on low and zero carbon technology interplay as well as nuclear, hydrogen and CCUS technologies. Eight out of 12 respondents to the on-line survey agreed that the collaboration with the UNECE assisted Member States in delivering carbon neutrality and energy for sustainable development. The information briefs

and the UNECE Toolkit provided excellent information that was tailored to policymakers, making them aware of available technologies and constraints. However, until the issue of preferred technologies is resolved amongst policymakers, governments cannot set up regulatory frameworks to mandate the use of those technologies, and capital markets cannot identify what technologies to finance. In conclusion, collaboration among the UNECE, the UN system and policymakers from other countries has assisted UNECE member states in delivering on building capacities and financing opportunities for policymakers in Carbon Neutrality.

3.3 Effectiveness

To what extent were the project objectives and expected accomplishments achieved?

45. There are 2 steps in the book called “Fixing the Climate”⁶ where firstly, a demonstration of a new environment needs to be conducted (as in the Montreal process with the removal of acid rain), and secondly, regulation. At the time of CNP, demonstrations were happening throughout the environment of CCUS, hydrogen, nuclear and interplays with low and zero carbon technologies. The time has arrived to start regulating these technologies (as an example, Norway got regulations to stop flaring, not as a result of CNP). CNP is just a beginning to provide thorough overviews of carbon neutral energy sources for policymakers that set the stage for regulation after successful demonstrations. Considering the Project was designed only to disseminate refined data on appropriate carbon neutral technologies from the project “Pathways to Sustainable Energy” (specifically addressed to policymakers and the financial community), the extent to which the CNP objective and expected accomplishments were achieved was stronger marketing of the technologies rather than management of the technologies.

To what extent were the outputs consistent and effective with the overall project objectives and expected accomplishments?

46. Most activities were consistent and effective with the Project objective. In particular, EA 1 (Activity 1.1) was launched in 2021 with IIASA and LIST to support the report on Life Cycle Assessment of Power Generation Technologies, a report that expands on technology interplay under a carbon neutrality concept (Para 22). While several models were used to forecast energy demand, economic development, supply, resources, impacts, the MESSAGE model⁷ was used as the systems engineering model encompassing energy sectors and their GHG emissions. MESSAGE provides a flexible framework for the comprehensive assessment of major energy challenges and has been applied extensively for the development of energy scenarios and the identification of socioeconomic and technological response strategies to these challenges. It has been used to account for future uncertainties and develop robust technology strategies and related investment portfolios to meet a range of user-specified policy objectives. It has been used by the Intergovernmental Panel of Climate Change (IPCC), the World Energy Council, the German Advisory Council on Global Change, the European Commission, and the Global Energy Assessment (GEA).
47. One issue does not align well with overall objectives. The MESSAGE model is also increasingly used for detailed analysis of energy demand issues, such as for policy analysis of energy access in the residential sector. Energy models have a feature with energy demand that is related to historical energy uses with GDP, with models predicting how much energy is needed. For example, 4 years of carbon emissions in EVs are brought forward before the EV is carbon neutral (4 yrs of carbon emissions making the battery). The historical correlation of energy use and GDP is going to change, increase energy demand, the demand of which is not included in the modeling. Some of the model outputs produced by the CNP likely do not account for the energy demand increases.
48. However, most activities were consistent and effective in achieving the overall CNP objective. For example:

⁶ <https://press.princeton.edu/books/hardcover/9780691224558/fixing-the-climate>

⁷ MESSAGE stands for Model of Energy Supply Systems And their General Environmental Impact

- nuclear power was promoted as a necessity for carbon neutrality with small modular reactors (SMRs) with plutonium and advanced high temperature reactors being necessary as the sole alternative to fossil fuels (especially considering the 700°C+ needs of industry for products such as solar panels, windmills), none of which can be generated using electricity. Policymakers were certainly not aware of this issue;
 - hydrogen was promoted as a fuel that can provide progress towards decarbonization of hard-to-abate sectors, namely energy intensive industries (such as production of steel or chemicals that use high temperatures in their processes) or long-haul transport. These are examples of important economic activity where electrification of end-use is only partially possible, or the technology does not yet exist. As such, a deliberate, swift and extensive expansion of renewable and low-carbon hydrogen production is consistent with the aims for Carbon Neutrality by 2050 and Agenda 2030 for Sustainable Development;
 - CCUS technology was promoted as an essential step towards mitigating climate change, allowing UNECE member States to establish a pathway to carbon neutrality and stay within their emission targets. CCUS technologies and solutions were proposed with comparative analysis of the CCUS technologies based on carbon capture potential, cost, technology readiness level, commercial readiness level, and social readiness level as well as environmental impact. There were also policy actions proposed to accelerate commercialization and wider deployment across the region. Political agreements are required for long-term engagement and societal commitment, recognizing the scale and cost to industry that needs to be developed in a very short time;
49. There was also a technical brief on “Building Resilient Energy Systems: Actions for Achieving Greater Energy Security, Affordability and Net-zero in the UNECE Region” issued in December 2022 from UNECE Expert Groups to the Committee level and the Member States, to re-examine energy with a goal to identify, enhance and implement strategies that meet their immediate energy and economic needs (without jeopardizing achievement of their longer-term 2030 Agenda for Sustainable Development and the Paris agreement goals). This serves as the basis for the 3 pillars of sustainable energy:
- affordability (improving the living conditions of all citizens by providing affordable, safe, reliable modern energy);
 - energy security (securing the energy needed for economic development); and
 - environmental sustainability (limiting the impact of energy system on climate, ecosystem and health).

At the 31st session of the Committee on Sustainable Energy in September 2022, member States agreed to prioritize and implement special activities related to energy resilience across the UNECE region, providing an UNECE Platform on Resilient Energy Systems. This promoted inclusive dialogue to coordinate, compile, promote and provide information, guidance, training and technical assistance that supports member States as they build resilient energy systems.

50. A key message for these technologies and technology interplay is that there is no “silver bullet” technology to achieve Paris Agreement targets and Carbon Neutrality by 2050. Each country has its own pathway to carbon neutrality and all low- and zero-carbon technologies will play a role. Future energy systems will be interconnected.

How did the project strengthen the national capacity of Member Countries to develop, implement and track national sustainable energy policies aligned with international agreements?

51. Information on pros and cons of different utilization of technologies, as well as the issues and cost profiles on CCUS was fed into the Clean Electricity Group who put together brochures and briefs on these issues where there was previously nothing. This has been used by experts to disseminate messages on carbon neutrality.
52. During Sustainable Energy Week, the 18th session of the Group of Experts on Cleaner Electricity Systems was conducted on 20 September 2022 and included:

- an evaluation of existing sustainable investment flow strategies of key IFIs influential in the UNECE region and to enhance understanding of the current sustainable investment climate and its implementation;
 - presentation of a case study gap analysis for Kazakhstan to demonstrate discrepancies between presently implemented sustainable financing instruments with the modelled pathways to reach carbon-neutral in the “Technology Interplay under the Carbon Neutrality Concept” report;
 - provision of foundations (brochure materials) to kick start discussions for sustainable financing within the UNECE region;
 - holding discussions of the financing of cleaner energy technologies with key members of the IFIs in line with the objectives the objectives of the Paris Agreement, Agenda 2030, and the UNECE Regional Forum on Climate Initiatives to Finance Climate Action and the SDGs, all within a carbon-neutral framework;
 - informing stakeholders on diversification in the future energy portfolio needed for carbon neutrality and to highlight the benefits of a diversified energy portfolio for building resilient energy systems.
53. National energy experts, however, are constrained by a number of factors that limit the expected achievements to reaching politicians. For example, CCUS experts have been responsible for identifying lowest costs in deploying technology such as cheap energy, and industrial clusters to support carbon neutral activities. While CCUS technology works, implementers will not do CCUS if there are only tax breaks or carbon pricing. These are clearly decisions to be made by politicians alongside policymakers. Hence, there were policymakers, national energy experts and representatives from member State governments who were in expert groups, responsible for developing carbon neutral technology briefs that were to be used for implementing and tracking technology use, not national sustainable energy policies to be aligned with international agreements.

Are the outputs of the UNECE's CNP supported by partnerships with the UN system and other partners?

54. Outputs of CNP are supported by experts from different countries, as well as partnerships within the UN system. All these experts worked on a *pro bono* basis to produce knowledge products on various carbon neutral technologies. There were also workshops with a diverse group of experts that amongst other issues, focused on:
- supply and demand issues, especially demand issues where financing transformation involves sunk cost and premature retirement of assets and infrastructure;
 - the private sector as an important actor to carbon neutrality where financial calculations, laws and regulation, and tax implications are keys to changing their behavior;
 - how the coal industry could be compensated to close down more quickly through investing in the regions to create employment to replace jobs which will be lost with coal mine closures;
 - decarbonizing of heavy industry with clean coal with CCUS, gas with CCUS, HELE coal power plants, and hydrogen;
 - relieving higher electricity costs to consumers and industry with CCUS projects which have the potential to generate negative economic values for CCUS;
 - needing to make CCUS projects commercially segregated, and reducing capital risk in transport and storage;
 - analysis in depth of the role of small modular reactors for nuclear power;
 - how energy storage (chemical, mechanical or thermal) can compensate for the intermittency of renewable energy;
 - working community-scale or small-scale use of hydrogen projects alongside large-scale projects; and
 - the legislative and policy challenges to access public and international financing.

This diverse group of experts led workshop meetings of these issues, from energy agencies and ministries of environment (various UNECE countries), energy and climate change special groups. They were comprised of UNECE member States to academia (Imperial College, University of Glasgow, Dalhousie University) and multilateral organizations (such as IFC, World Economic Forum, World Nuclear Association, UNDP, ESCAP, ESCWA, ECLAC, UNEP, UNESCO, UNIDO, IAEA, WMO) and UNECE. In conclusion, the outputs of CNP were supported by partnerships inside and outside the UN system.

What were the challenges/obstacles (if any) to achieving the expected results? What (if anything) has been preventative in achieving the desired results?

55. There were not any challenges or concerns in achieving the expected results of CNP which was to inform policymakers of the possibilities and constraints of carbon neutral technologies. The Project has done this through technology briefs and discussions amongst experts held on 7 October 2021 as to the next steps. The discussions were expected to be general to advance the next steps in carbon neutrality development. In this regard, expertise is required to drill down to be more specific in articulating further action with the following issues needing consideration:

- many experts pointed out the urgency of achieving carbon neutrality;
- all technologies are needed but countries need to make a selection on what technologies are needed;
- some countries felt the need for more information to improve the use of leading technologies;
- policies at the moment are inadequate causing decision-making to be difficult;
- all member States needed to agree on the deadlines for moving towards carbon neutrality notwithstanding that carbon neutrality will be an economic burden with some member States experiencing short-term competitive advantages;
- there has been too much focus on the supply side of energy systems and investments and opportunities, thinking that technology will be an elixir. There needs to be more research and studies on how the energy system process works, not technology studies, to seek solutions to the demand side. At that point, investments can be made into infrastructure, and technology and construction companies;
- energy for heating and cooling is the largest part of demand side;
- international collaboration is not yet a reality. For example, Central Asia's infrastructure is not used optimally. The issue is how can UNECE facilitate this implementation and through a UNECE-wide market;
- to implement carbon neutral technology and policy options, all countries have different economic positions, endowments and economic development levels which need to be taken into consideration.

How effective was the support of the secretariat in servicing the activities under project implementation?

56. The UNECE Secretariat was central to the servicing the activities of the Project as well as next steps after CNP:

- The reports on “Technology Interplay under the Carbon Neutrality concept” and “Life Cycle Assessment of Electricity Generation Options” were referenced with the Group of Experts concluding that extrabudgetary funds or in-kind contributions be identified;
- The Group of Experts of Cleaner Electricity Systems in cooperation with the Group of Experts on Gas and the Expert Group on Resource Management in late 2022 conducted an analysis of the potential of hydrogen hubs and carbon storage hubs across the ECE region and their role to decarbonize sectors such as energy intensive industries and long-haul transport, bearing in mind the urgency of measures and the complexity of the global energy system;

- The Group of Experts further emphasized the importance of focusing on the demand side to enhance work on international collaboration, further drilling down on findings and recommendations. This led to a request that the Task Force on Carbon Neutrality continue engaging in the dialogue on technology interplay under the auspices of CNP, on future work considering impacts and practicality of the roles of additional technology options and demand side opportunities.

3.4 Efficiency

Were the resources sufficient for achieving the results?

57. Several technical reports on carbon neutrality including “Technology Interplay under the Carbon Neutrality concept” and “Life Cycle Assessment of Electricity Generation Options” were produced with CNP funds with dissemination activities conducted by the end of 2022. Most experts worked on a *pro bono* basis with funds used to convene meetings, workshops and conferences, and to publish information documents and brochures. For the funds spent on CNP, there was definitely an excellent return on investment. Resources were sufficient in achieving results.

Were the results achieved on time and were all activities organized efficiently?

58. All activities including meeting sessions, workshops and conferences were efficiently organized. COVID-19 did not affect operations with most activities performed online. Results were achieved in a timely manner.

To what extent were the resources used economically?

59. With technical reports and dissemination activities referenced in Para 57, CNP resources were used economically. Many of the experts worked on *pro-bono* basis on technology briefs. Considering the funds spent on CNP, the resources used were exponentially economical in comparison to other multi-million-dollar investments into climate change mitigation activities with other multi-lateral and bilateral agencies.

How could the use of resources be improved? Would you propose any alternatives to achieve the same results? If yes, which ones?

60. There is little room for improvement in the use of resources. However, one possible alternative to improve the CNP process would have been finding optimal pathways to build consensus with governments and business, and to facilitate the exchange of strategic communication and multi-stakeholder dialogue on what alternatives and pathways are possible. As referenced in Para 47, improved energy demand modelling may improve planning for informed decision-making. Informed decision making includes possible future solutions, analyses all possible resources, conducting gap analysis, supporting research and development, and exploring technology interplay that supports decarbonization of the energy system.

Were the activities implemented in the most efficient way compared to alternatives? In particular, how do the costs and use of resources compare with other similar projects (within UNECE, other regional commissions, other UN agencies, or other organizations and initiatives)?

61. Under CNP, the Group of Experts reported that the Task Force delivered 14 capacity-building workshops and multi-stakeholder dialogues to raise awareness about the potential of low- and zero-carbon technologies and their interplay to attain carbon neutral energy systems in the ECE region; 3 technology briefs on CCUS, hydrogen, and nuclear power; a brief on carbon neutral energy intensive industries; 3 publications on the Technology Interplay under the Carbon Neutral Concept, the Life Cycle Assessment of Electricity Generation Options, and the Geologic storage of CO₂ in Eastern Europe, the Caucasus and Central Asia. Again, the Group of Experts worked on a *pro bono* basis, proactively participating in developing and disseminating CNP’s findings at high level international events, such as the UN High Level Dialogue on Energy in New York, COP26 in Glasgow, and the Almaty International Energy Forums. Key themes of the UNECE Sustainable Energy Week in September 2022 included dialogues with a panel on building a resilient energy system in the UNECE region through:

- low- and zero-carbon technology interplay and how the interplay between flexible clean coal, natural gas and renewable energy, CCUS, advanced fossil fuels technologies for power generation, including HELE technologies, nuclear power and hydrogen;
 - deep electrification of the energy system;
 - a mechanism to finance clean energy technologies;
 - digitalizing the electricity system;
 - concluding that the region needs to design and implement a resilient energy system that ensures that energy makes an optimal contribution to a country's social, economic, and environmental development, and that is built on the following three pillars: energy security, affordability and environmental sustainability; and
 - publishing a technical brief on “Building Resilient Energy Systems” (Para 49).
62. Several other hybrid events were conducted including the 18th session of the Group of Experts on Cleaner Electricity Systems, the UNECE Regional Forum on Climate Initiatives to Finance Climate Action and the SDGs on 17 October 2022, and the 31st session of the Committee on Sustainable Energy. These meetings were attended by more than 150 experts from UNECE Member States as well as experts from Argentina, Bangladesh, Brazil, China, Egypt, India, Mongolia and Nigeria and several multi-lateral institutions. Building on the discussions and recommendations from the COP 27 in Sharm el-Sheikh in Egypt in November 2022, UN organizations including UNECE, ESCAP, UNDP and UNESCO built a regional partnership to provide a platform for a continuous inclusive multistakeholder dialogue to facilitate regional cooperation, provide technical capacity support and help countries in Central Asia innovate and modernize its regional infrastructure to build resilient energy systems that are secure, affordable and deliver on net-zero targets.
63. The 2nd Almaty Energy Forum (14-16 November 2022) gathered representatives from energy industry, policymakers, the finance sector, and science and academia sectors to:
- revisit proposed actions for Central Asia from the 1st Almaty Energy Forum and attract innovation, investment, and financing for regional energy projects. This included innovating and modernizing energy systems in Central Asia through low- and zero-carbon technology interplay through private and public financing;
 - strengthen the United Nations Special Programme for the Economies of Central Asia and its Working Group on Water, Energy, and Environment through targeted dialogues. This included examining the opportunities and threats in deploying energy-water-land nexus approach in Central Asia;
 - strengthen regional cooperation and building cross-regional technical and institutional capacity. This included building a network of regional and international universities to foster the next generation of energy experts and strengthen science-based policy making.
64. As previously mentioned in Paras 57 and 59, the resources spent on CNP were exponentially economical in comparison to other multi-million-dollar investments into climate change mitigation activities. The CNP Project is “one brick” in a huge wall required to stem the impacts of climate change. COPs are too slow with agreements in principle to reach consensus, with plans getting stranded in assessment and verification details. The concept of a national project assessment body has been proposed in various countries to assess criteria to align national requirements with the COP outcomes as further described in Para 67.

3.5 Sustainability

To what extent will the benefits of the project continue after its completion, without overburdening recipient countries and stakeholders?

65. Each country has its own pathway to carbon neutrality. The CNP has informed member State policymakers of what technologies are available to reduce carbon emissions. Sustainability benefits

of CNP are to be accrued on the next step in producing a deeper dive into more research and studies on how the energy system processes works. From this deeper dive, a roadmap can be developed for each member State. In resources management meetings, each member State needs to present a plan for resource management and a draft roadmap of what is required (such as the nuclear industry needing discounted financial rates to finance their projects).

66. Stakeholders interviewed said the benefits of the Project will continue with the engagement of the Cleaner Electricity Group in a deeper dive into how the energy system process works, not technology studies, to seek solutions to the demand side. This was also the consensus of 11 of 12 respondents to the on-line survey. This deeper dive includes cost curves and looking into public-private partnerships where the UN and governments set the framework conditions. At that point, investments can be made into infrastructure, technology and construction where companies provide their best technical capabilities, and the capital market provides finance, all strongly interlinked and all parties working together to bring out the best in each other's capabilities. After the capabilities of industry have been demonstrated, regulatory frameworks can be formulated, specifying technologies to be deployed, and others to be sidelined with their markets disappearing.

How is stakeholder engagement likely to continue, be scaled up, replicated or institutionalized?

67. There are two measures that will scale-up and institutionalize stakeholder engagement:
- a strong movement by the financial community in its international reporting standards for sustainable development with the objective to provide transparency for investors for environmental and regulatory risks;
 - the concept of a national project assessment body in various countries to assess criteria to align national requirements with the COP outcomes, whatever they may be, so that projects can be designed with less risk of rejection. Institutional capacities, however, are necessary to determine the characteristics of personnel in the assessment bodies and for developing assessment criteria that is important in establishing credibility for potential investors.
68. In conclusion, engagement of various ministries of governments and IFIs is likely to be scaled up, replicated and institutionalized to a certain extent. There is a strong likelihood that benefits (such as the use of the UNECE Carbon Neutrality Toolkit) arising from the UNECE's CNP activities (such as at COP 26, COP 27, and the Almaty Energy Forums) delivered through collaboration with other UN organizations and other partners, will be sustained over time with policymakers and energy experts. There was also strong evidence that CNP strengthened cross-regional collaboration, leading to the application of CNP Toolkit and best practices by other regions, enhancing stakeholder scaling-up and replication.

To what extent do the partners and beneficiaries 'own' the outcomes of the work?

69. Members of the Expert Groups own the knowledge products but need to follow-up with a deeper dive into the public-private partnerships where the UN and governments can set the framework conditions that would allow industry to provide their best technical capabilities with capital markets providing finance. There also needs to be an integration of the various expert groups on deeper dives into how the energy system processes works to enhance the means on how to move towards carbon neutrality (such as a "UNECE Task Force on Industrial Energy Efficiency", to carry on the work on energy demand-side optimization) that includes other sources of energy such as renewables without overlapping mandates of other groups. Again, the question remains as to what is the likelihood that the benefits arising from the UNECE's CNP activities delivered through collaboration with the UN and other partners will be sustained over time. As mentioned in Para 68, there is a strong likelihood of this occurring.
70. Demonstrating beneficiary and partner ownership of the work outcomes, position papers were drafted by the UNECE Secretariat with the assistance of CNP and submitted to the Committee on Sustainable Energy for consideration in preparation for the 30th session of the Committee on Sustainable Energy during 22-24 September 2021 and the annual meeting of the Group of Experts on Cleaner Electricity Systems in October 2021. As mentioned in Para 62, the 18th session of the Group of Experts on

Cleaner Electricity Systems was attended by 150 experts on 19-20 September 2022 to adopt position papers on attaining carbon neutrality in the UNECE region. Panelists of the Group concluded that the region needs to design and implement resilient energy systems that ensures energy makes an optimal contribution to a country's social, economic, and environmental development, and that is built on the following three pillars: (a) energy security; (b) affordability; and (c) environmental sustainability (Para 49). The Group of Experts also:

- requested the Task Force to adopt a subregional and a national approach in disseminating the findings and recommendations of CNP;
 - took note of the Committee on Sustainable Energy's recommendation to lead on the issue of energy system transformations, in cooperation with the other Groups of Experts reporting to the Committee and to conduct a deeper dive into technology interplay;
 - recommended to policymakers to invest in reliable low- and zero-carbon electricity capacity; promote deployment of distributed energy sources and smart grids; and develop and deploy energy storage solutions;
 - agreed to launch a cross-sector activity that cooperates with other groups such as the Group of Experts on Energy Efficiency, to help countries enhance their understanding of the implications of the electrification of the transport and buildings sectors on their electricity systems;
 - decided to support activities under the proposed UNECE Platform on Resilient Energy Systems and collaborate closely with the other Groups of Experts to advance this important topic.
71. At the same 18th session on Cleaner Electricity Systems, the Group of Experts also issued a position paper on a technical dialogue launched with the global financial community⁸ on developing an investment framework to facilitate the development and deployment of all low- and zero-carbon technologies (including fossil fuels with CCUS, capture and use or conversion of methane released during fossil fuel extraction, low-carbon and renewable hydrogen production, nuclear power, and renewable energy), discussing findings from an analysis on the current pattern in the distribution of climate finance with a focus on Kazakhstan.
72. Recommendations from that technical dialogue fed into the ECE Regional Forum "Towards COP27: Regional Forums on Climate Initiatives to Finance Climate Action and the SDGs" that took place on 17 October 2022. This event created momentum and advanced a set of partnerships on enhancing sustainable management and financing for the critical raw materials required for low-carbon transitions. The Group of Experts:
- highlighted that the energy transition in the UNECE region will require both policy support and private and public sector financing for low- and zero-carbon technologies, including CCUS, hydrogen, and advanced nuclear power;
 - concluded that strengthened international cooperation is necessary to facilitate access to clean energy research and technologies, and to promote investments in modernization of energy infrastructure and low and zero-carbon technologies;
 - encouraged continued cooperation with the Expert Group on Resource Management to facilitate a dialogue with IFIs and other relevant stakeholders on financing critical raw materials required for low-carbon energy transitions; and
 - encouraged multi-stakeholder dialogue on the potential role of UNECE in setting standards for financing guidelines for low- and zero-carbon technologies and critical raw materials aiming to help unlock climate financing for all low- and zero-carbon technologies and deliver on the climate targets of the Paris Agreement.
73. Furthermore, the Group of Experts on Energy Efficiency and the Group of Experts on Cleaner Electricity Systems on 19-20 September and 3-4 October 2022 joined forces under the Task Force on Digitalization in Energy to issue a position paper that explores opportunities and side effects of

⁸ This included representatives from the Asian Infrastructure Investment Bank, ADB, EBRD, and GCF.

digitalizing electricity systems, with a focus on increased system efficiency, innovative business models, and effective policymaking. The session discussed the opportunities and benefits of digitalizing electricity systems, mapped the stakeholders involved, and outlined challenges for consideration by the public authorities, private sector actors, and customers. It also offered recommendations on policies for accelerating transformation of the electricity system through digitalization, indicating that they should aim to achieve higher levels of efficiency while ensuring security and sustainability of the system. The Group of Experts:

- concluded that digitalization is making energy systems more connected, efficient, reliable, and sustainable. The electricity sector being an early adopter of digital technologies, has potential to contribute to energy system resiliency by applying a portfolio of available digital solutions;
 - encouraged continued cooperation with the Task Force on Digitalization in Energy and the Group of Experts on Energy Efficiency and proposed to join forces in conducting research on funding models for the areas in greatest need of attention; and
 - agreed to initiate in-depth work on electricity system resilience and the importance of transmission and distribution grid modernization and digitalization to mitigate the impacts of climate change and adapt to the changing climate.
74. In conclusion, position papers present a clear vision of what is needed for implementing investments on climate neutrality by 2050, reflecting strong ownership of policymakers and beneficiaries. All stakeholders interviewed and all respondents to the on-line survey agreed that collaboration with the UNECE on sustainable energy and carbon neutrality should be sustainable at a global level.

How has the project built-in resilience to future risks?

75. UNECE expert community met with the Group of Experts on Gas and the Group of Experts on Coal Mine Methane and Just Transition in March 2023 during the Annual Meetings to discuss how to join forces in designing and building resilient energy systems in the UNECE region. A previous meeting 2 years ago had the unfortunate outcome of misalignment of the best ways forward, and policies to be set. With the December 2022 publication of the “Building Resilient Energy Systems” technical brief, the March 2023 meeting had set a built-in resilience to future risks with an approach on what the best way forward for each of UNECE member State. The UNECE expert community agreed to launch a Platform on Building Resilient Energy Systems that builds on the findings from CNP. Good progress has been made in Central Asia on concrete actions taken by the Group after the 2nd Almaty Energy Forum, and in preparation for the 3rd Almaty Energy Forum in November 2023.
76. While UNECE member States in transition are increasingly interested in CCUS technologies, future risks involve high capital costs and unclear or missing regulatory frameworks making CCUS projects unattractive. For example, studies have shown that the price of electricity would double in Kazakhstan, should CCUS projects in electricity generation be deployed to decarbonize. Member States agreed that a clear legal and regulatory framework are necessary to create the necessary favourable conditions for CCUS projects to become bankable to attract investment. IFIs have a clear role here to help with frameworks, guidelines, advisory services, and project financing, and in the long run build in resilience to future risks to CCUS.
77. Future risks to sustainability can include the oil and gas industry going back to business-as-usual (BAU). Even without the spectre of climate change, the oil and gas industry is highly dynamic given the inexorable requirement to replace reserves, particularly as the most accessible reserves are exploited first and new opportunities typically involve greater technical challenges, institutional challenges, or both. With increased environmental scrutiny, these challenges become even more complex and dynamic, as resources are to be extracted with an eye to both economic efficiency and an environmental footprint that may include local contamination, local social and economic displacement, water use, and greenhouse gas emissions. The default position of many oil and gas companies is BAU.

78. Further to built-in resilience to future risks for other technologies and projects, many member States still need to take the following actions required to reduce GHG emissions in line with the Paris Climate Agreement:

- conduct a comprehensive study of technology development of large solar and wind energy projects;
- consider using market mechanisms to regulate greenhouse gas emissions;
- include measures to adapt electric power facilities to climate change in national plans;
- develop international cooperation to reduce GHG emissions;
- stabilize energy systems by regulating peak loads and power flows;
- promote cooperation within the framework of a “Transcaucasian Electric Ring”;
- promote synergies between renewable energy and other low or zero carbon technologies;
- develop long-term strategies for RE projects in rural areas;
- ensure a level playing field for market participants and compliance with national regulations;
- develop auction rules;
- provide detailed information on contracts for the purchase of electricity at auction prices;
- improve educational and operational programs on energy policy and management;
- create training centers and advanced training programs with the involvement of international training centers and experts on renewable energy;
- create information networks for the exchange of experience and knowledge about green energy for sustainable development.

What are the major factors which influence the achievement or non-achievement of sustainability of the project?

79. The sustainability of CNP is possibly positively affected by the Ukraine war. Ukraine has been launching a green recovery plan to decarbonize the country as well as the rest of Europe with solar, wind and biomass, in light of the fuel import embargo against Russia⁹. There is evidence that recommendations emerging from CNP such as the use of hydrogen for green steel production¹⁰, are relevant due to pilot projects which are being implemented in Sweden combined with interest in Ukraine and other countries as part of green development.

80. There is also an urgent need to close the resources and technology gap between countries in the East and West. With a “one-size-fits-all” approach to CCUS, there is need for an inclusive and transparent dialogue and exchange of lessons learned, best practices and technology transfer to accelerate the commercialization and deployment of CCUS projects across the UNECE region.

To what extent are the objectives of the project still valid? How can the project be replicated in the UNECE region? Or in other regions?

81. The CNP objectives are still valid but with caveats in terms of how the Project can be replicated in the UNECE region. At a Clean Energy Ministerial CCUS-UNECE meeting on 7 September 2021, a number of UNECE member countries gave views on CCUS that most countries do not have a strategy in place even with significant demand for continued, active knowledge-sharing on CCUS, and are only

⁹ <https://cleantechnica.com/2023/06/21/ukraines-green-recovery-to-kick-global-decarbonization-into-high-gear/>

¹⁰ There is a 2021 startup called “H2 Green Steel” who have ambitious plans for deploying renewable energy in a massive electrolyzer system to produce green hydrogen at scale, which can be used to convert iron ore into sponge iron without the need for fossil inputs. The firm is moving forward with plans to construct a green steel plant in Sweden with Cargill and Mercedes-Benz among those already signed up for the first products.

beginning to look into CCUS as an option to decarbonize the energy system and hard-to-abate sectors. An update to this is a 2023 report by S&P Global Ratings¹¹, where a sample of 25 of the highest-revenue oil and gas companies have disclosed plans to use at least one option (CCUS, carbon capture and storage (CCS), carbon dioxide removal (CDR)¹², or carbon credits) to meet their net-zero emission targets. In some countries, large oil and gas companies are exploring different business models for carbon capture, which may include sequestering emissions from other company activities, not necessarily capturing their own emissions. Further, the S&P report said that CCS investments are “prudent and affordable” for large companies but “not transformational”. Particular points that appear to merit further attention include:

- the role CCS and CCUS could play in a country’s energy and climate portfolio;
- general overviews of CCS and CCUS technologies for all relevant sectors;
- specific opportunities and cost for CO₂ storage;
- examples from current experience and options for UNECE country policy development;
- linkages to a price on carbon or a carbon tax;
- advocacy for CCS and CCUS as a transition measure rather than a defensive mechanism by the fossil fuel industry;
- partnering with NGOs.

4. Conclusions and Recommendations

4.1 Findings

82. CNP was designed to prepare and disseminate the possibilities and constraints of carbon neutral technologies by refining data and technology assumptions from the “Pathways to Sustainable Energy” that contributes to the selection of appropriate carbon neutral technologies, specifically addressed to inform policymakers and the financial community. The extent to which the CNP objective and expected accomplishments were achieved was the communications materials from the Project were produced without the technical jargon and hype, bringing the presentation of technology briefs to policymakers to a practical level where they can make rational technology decisions and inform and influence politicians who have taken over climate issues (Para 38). There was also stronger marketing of the technologies rather than management of the technologies. This included technical briefs on nuclear power, hydrogen and CCUS and “Building Resilient Energy Systems” (Paras 45-49) formulated by experts who worked on a *pro bono* basis with Project funds used to convene meetings, workshops and conferences, and to publish information documents and brochures (Para 57).
83. The Project was set up so that policymakers and the financial community can address carbon neutral technology issues. The challenge for broader work of UNECE is how to reach policymakers, financial institutions and end users to unlock private and public sector financing to make the investments happen (Para 40). The Project then had “high-level” policy dialogue on attaining carbon neutrality in the region through developing and implementing outreach strategies to disseminate Project results to policymakers and the financial community (Para 32). This made CNP unique as it sought to raise awareness on all carbon neutral technology options and interplay between the technologies, and improve communications of Project findings specifically to policymakers of UNECE member States, not technology experts (Paras 26-28).

¹¹ <https://www.spglobal.com/assets/documents/ratings/research/101578150.pdf>

¹² CDR includes both nature-based and technological solutions that remove carbon dioxide from the atmosphere and permanently store it in terrestrial, geological, or ocean reservoirs, as defined in the S&P report. Examples of CDR include planting trees in the process of afforestation and reforestation, as well as improving soil quality. However, CDR technologies often do not directly reduce emissions.

84. The only blemish to CNP is the lack of historical correlation of energy use and GDP in the modeling (Para 48). COVID-19 did not affect CNP operations with most activities performed online, and all results were achieved in a timely manner (Para 58). CNP has informed policymakers through technology briefs and discussions conducted amongst experts on 7 October 2021 as to what are the next steps. Expertise, however, is required to drill down to be more specific in the context of further action (Para 55).
85. Policymaker capacities to present a clear vision of what is needed for implementing investments on climate neutrality by 2050 were demonstrated with the adoption of position papers drafted by CNP:
- the papers were adopted by the Committee on Sustainable Energy at the 18th session of the Group of Experts on Cleaner Electricity Systems on 19-20 September 2022. The Group concluded the region needs to design and implement a resilient energy system to ensure that energy makes an optimal contribution to a country's social, economic, and environmental development, and energy is built on energy security, affordability, and environmental sustainability (Paras 29 and 70);
 - technical dialogue on 17 October 2022 fed into the ECE Regional Forum "Towards COP27: Regional Forums on Climate Initiatives to Finance Climate Action and the SDGs" that created momentum and advanced a set of partnerships on enhancing sustainable management and financing for the critical raw materials required for low-carbon transitions (Paras 71-72); and
 - a position paper exploring opportunities and side effects of digitalizing electricity systems was prepared and issued by the Group of Experts on Energy Efficiency and the Group of Experts on Cleaner Electricity Systems after meetings on 19-20 September and 3-4 October 2022 with a focus on increased system efficiency, innovative business models, and effective policymaking (Para 73).

4.2 Conclusions

86. To a large extent, CNP outputs were consistent with and relevant to the overall CNP objective and expected accomplishments. Importantly, the report on "Technology Interplay under the Carbon Neutrality Concept" provides a conclusion that there is no "silver bullet" solution that can address carbon neutrality problems, but that all technologies are required in various proportions to contribute towards the attainment of a carbon neutral energy system (Para 27); the report also finds that there is no "silver bullet" technology to achieve Paris Agreement targets and Carbon Neutrality by 2050, that each country has its own pathway to carbon neutrality and all low- and zero-carbon technologies will play a role (Para 50). Expertise is required to drill down to be more specific in articulating further action (Para 55).
87. However, there was no specific evidence found of women's and vulnerable groups being afforded particular attention during CNP activities as most CNP activities were highly technical and not specifically addressing women and marginalized groups (Para 42). While the Project did not really address women in energy transition to carbon neutrality, some conclusions emerge from CNP including:
- a need to accelerate access to clean energy for all by creating energy transition policies that enable all vulnerable groups (i.e. women, children, elderly and disabled people) to benefit;
 - a need to be an increase in women's share in energy sector employment given that the energy sector in most countries is male-dominated;
 - support to more education for women is important in the energy sector. This is highly relevant for increasing the number of personnel employed in the energy sector.
88. There are at least two encouraging developments in reaching for carbon neutrality for UNECE. First, there is a sampling of 25 of the highest-revenue oil and gas companies planning to use at least one option of carbon removal to meet their net-zero emission targets (Para 81). Secondly, Ukraine is launching a green recovery plan to decarbonize the country as well as the rest of Europe with solar, wind and biomass, in light of the fuel import embargo against Russia (Paras 79-80). There must be an effort by UNECE to link its decarbonization efforts with these developments.

4.3 Recommendations

89. Recommendation 1: Work on a subsequent phase of CNP to encourage member States to take the actions required to reduce GHG emissions in line with the Paris Climate Agreement. This could be done by:

- strengthening outreach to policymakers, the financial community, and end-users in addressing carbon neutral technology issues to unlock investments in the public and private sector (Para 40), which is the challenge for broader work of UNECE. There should be a focus on getting policymakers involved in the technology issues at a really early stage with CNP-produced materials, and to ensure policymakers, the financial community and politicians get the legal framework in place before the private sector invests capital;
- focusing efforts on increased exposure to a very informative UNECE Carbon Neutrality Toolkit website to policymakers and technical experts to assist policymakers to be involved in the technology issues at a really early stage. This increased exposure to the Toolkit will provide policymakers and technical experts with sufficient knowledge and information to disseminate and reach end-users and politicians covering industrial, building and transport issues in the 56 UNECE countries;
- assist policymakers and technical experts to empower industrial end-users (and eventually politicians) by getting them to use the UNECE Toolkit to adopt carbon neutral technologies as a means of business survival¹³. This will ensure all technologies are well understood to improve stakeholder capacities to make a selection on what technologies are needed;
- continue Task Force work on the Central Asian region to attain carbon neutrality in Central Asia with efforts to raise funds for additional zoom-ins for other UNECE member States;
- continue Task Force work on rebuilding a carbon neutral energy system in Ukraine;
- seeking more funding for the expert community to do more in-depth analyses at the 3rd Almaty Energy Forum in 2023 and subsequent forums, as a follow-up to initial work presented at the 2nd Almaty Energy Forum in November 2022 (Para 26).

90. Recommendation 2: Use expertise under the leadership of the Committee on Sustainable Energy to drill down to be more specific in the context of further action and adjust energy models to include increases in energy demand (which is not included in the current energy models predicting energy demand). Despite CNP preparing and adopting technology briefs and conducting discussions amongst experts on next steps, these discussions were deemed to be too general to advance the next steps in carbon neutrality development (Para 55). Current models only historically correlate energy use and GDP (which is going to change as in an example of 4 years of carbon emissions in EVs are brought forward before the EV is carbon neutral with 4 years of carbon emissions making the battery). The models produced by the CNP likely do not account for the energy demand increases (Para 47). With regards to the demand side:

- a deeper dive into more research and studies on building on recommendations from CNP findings on resilient energy systems can produce better assessments, making it more focused how the energy system processes works if extrabudgetary resources can be made available;
- if extrabudgetary resources are made available, western business models can be used for decarbonization of hard-to-abate sectors using an industrial cluster approach that can be replicated in the eastern part of the UNECE region;
- extrabudgetary resources can also involve an assessment of decarbonization on the demand side and its integration with the electricity grid (especially with EVs potentially impacting the grid) to

¹³ There are 3 types of companies: i) companies that know how to adopt new technologies and are willing to do it (western energy-intensive or large multi-national corporations); ii) companies that are willing to adopt new processes and technologies but lack the knowledge or resources to do so; and iii) companies that do not have the willingness, knowledge or resources to do so.

allow electrification of buildings and transport. This should cover decarbonization of 3 main sectors: industry, buildings and transport.

91. Recommendation 3: For subsequent phases of CNP, identify more women for the entire UNECE region for increased education and engagement in the energy sector that will lead to increased contributions by women to discussions on carbon neutrality. While the energy sector is dominated by males especially in the whole UNECE region, actions placing focus on women and other vulnerable groups should be taken to:

- support more education for women in the energy sector. This is absolutely necessary given the anticipated personnel shortages and increasing employment on green energy; and
- encourage all policymakers to create carbon neutral energy transition policies that enable all vulnerable groups (i.e. women, children, elderly and disabled people) to benefit from energy systems that are carbon neutral to accelerate “affordable and clean energy for all” (SDG 7).

5. Annexes

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Annex I. Terms of Reference for the Evaluation



TERMS OF REFERENCE

Enhancing understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050

I. Purpose

The purpose of this evaluation is to assess the extent to which the Carbon Neutrality project (the project) succeeded in enhancing the understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050. The evaluation will assess the relevance of the project, as well as its effectiveness in enhancing the capacity of the ECE member States to attain carbon neutrality and achieve the energy related Sustainable Development Goals (SDGs) as well as other internationally agreed goals and targets, as appropriate. The evaluation will also address the efficiency and sustainability of the project, in order to learn how to maintain and possibly replicate lessons-learned in the activities of the subprogramme. The evaluation will finally look at the activities repurposed to address the impact of the COVID-19 crisis, and assess, to the extent possible, UNECE's response to COVID-19, as well as project's contributions to solving of the energy security crisis and proposed response to design and implement carbon neutral energy systems.

The evaluation should identify lessons learned from the implementation of the project and areas that need further attention and provide practical recommendations on how to improve the efficiency, effectiveness and sustainability of future work on similar topics. The results of the evaluation will support the improvement of the quality of the services provided by the subprogramme in future projects and activities on similar topics.

II. Scope of activities for evaluation

The evaluation will be guided by the objectives, indicators of achievement and means of verification established in the logical framework of the project documents. The evaluation will cover the full period of implementation from June 2020 to December 2022.

To make sure the evaluation is focused on specific impacts of the project, the evaluator will undertake interviews, collecting feedback from key project stakeholders, such as members of the Carbon Neutrality Task Force, the project Advisory Board and the Bureau of the Group of Experts on Cleaner Electricity Systems under whose auspices this project was implemented.

The universally recognized values and principles of human rights and gender equality need to be integrated into all stages of the evaluation and disability inclusion need to be mainstreamed throughout the evaluation process, in compliance among others with the United Nations Evaluation Group's norms and standards and the UN Disability Inclusion Strategy. Therefore, the evaluation will assess how the project activities contributed to gender equality and women's empowerment, the realization of human rights, with an emphasis on 'leaving no one behind',

and whether it applied disability inclusion approaches, and it will make recommendations on how these considerations can be better addressed in future subprogramme activities, if needed.

III. Background

The project built on the analytical capabilities developed in the “[Pathways to Sustainable Energy](#)” project (completed on 31 October 2019), including the analytical model [MESSAGE by IIASA](#) that was used for scenario planning to help policymakers identify technology and policy options to deliver on net-zero carbon societies by 2050.

In order to understand what technology and policy options are required to attain carbon neutrality in the UNECE region, the following activities were conducted:

- i) Refinement of data and assumptions of technology inputs: The objective was to reorientate the model towards net-zero carbon neutral societies and refine and solidify data and input assumptions. This approach allowed a better understanding of technology deployment curves and to risk-adjust the models accordingly and per subregion.
- ii) Understanding the role of selected technologies and innovation towards carbon neutrality: This part sought to analyse the potential of low-, zero- and negative carbon technologies across the region to identify and support lowest cost opportunities across the power and energy intensive sectors.
- iii) Collaboration across sectors towards carbon neutrality: The project proposed to collaborate across technologies and with the financial sector for a more meaningful and directed impact so that policy makers can develop a clear vision of how to achieve climate neutrality by 2050.

The project team cooperates and coordinates the project activities with other United Nations agencies, international governmental and non-governmental organizations active in the fields of public participation, human rights and the environment, as to promote synergy and avoid duplication.

IV. Issues

The evaluation will answer the following questions:

1. **Relevance**
 1. Was the project design and implementation appropriate for meeting the project’s objective?
 2. To what extent did the project respond to the priorities and needs of UNECE member States? How relevant were they to the target groups’ needs and priorities?
 3. What is the relevance of the project for the broader work of UNECE?
 4. Did UNECE advocate for gender equality in this area of work, as well as the realization of human rights, with an emphasis on “leaving no one behind”?
2. **Effectiveness**
 5. To what extent were the project objectives and expected accomplishments achieved?
 6. To what extent were the outputs consistent with and relevant to the overall project objectives and expected accomplishments?
 7. How did the project strengthen the national capacity of member States to develop, implement and track national sustainable energy policies aligned with international agreements?
 8. What were the challenges/obstacles (if any) to achieving the expected results?
 9. What (if anything) has prevented to achieve the desired results?

10. How effective was the support of the secretariat in servicing the activities under project implementation?
3. **Efficiency**
 11. Were the resources sufficient for achieving the results?
 12. Were the results achieved on time and were all activities organized efficiently?
 13. To what extent were the resources used economically?
 14. How could the use of resources be improved? Would you propose any alternatives to achieve the same results? If yes, which ones?
 15. Were the activities implemented in the most efficient way compared to alternatives? In particular, how do the costs and use of resources compare with other similar projects (within UNECE, other regional commissions, other UN agencies, or other organizations and initiatives)?
 16. How was the difference between planned and actual expenditure justified (if any)?
4. **Sustainability**
 17. To what extent will the benefits of the project continue after its completion, without overburdening recipient countries and stakeholders?
 18. How is the stakeholders' engagement likely to continue, be scaled up, replicated or institutionalized?
 19. To what extent do the partners and beneficiaries 'own' the outcomes of the work?
 20. How has the project built-in resilience to future risks?
 21. What are the major factors which influence the achievement or non-achievement of sustainability of the project?
 22. To what extent are the objectives of the project still valid? How can the project be replicated in the UNECE region? Or in other regions?

V. Methodology

The evaluation will adopt a theory-driven, utilization-focused and gender and human rights responsive approach. The evaluator is required to use a mixed-method approach, including qualitative as well as quantitative data gathering and analysis as the basis for a triangulation exercise of all available data to draw conclusions and findings.

The evaluation will be conducted on the basis of:

1. A desk review of all relevant documents over the period including:
 - All relevant documents including materials developed in support of the activities (agendas, plans, participant lists, background documents, final reports and publications)
 - Reports and briefs prepared under the project implementation
 - Proposed programme budgets covering the evaluation period
2. A tailored questionnaire will be developed by the evaluator in consultation with the project manager to assess the views of stakeholders: Parties, experts, staff from ECE, other regional commissions and relevant counterparts in the United Nations System and other international organizations.
3. The questionnaire will be followed by interviews of selected stakeholders (methodology to be determined by the evaluator in consultation with ECE programme management unit and the project manager). These will be carried out via phone or other electronic means of communication. Results of the survey will be disaggregated by gender.

The report will summarize the findings, conclusions and recommendations of the evaluation. An executive summary (max. 2 pages) will sum up the methodology of the evaluation, key findings, conclusions and recommendations.

All material needed for the evaluation, will be provided to the consultant. In addition to the documents mentioned above in 1), the project manager will provide the list of persons to be interviewed by telephone. ECE will provide support and further explanation to the evaluator as needed.

The evaluation will be conducted in accordance with the [ECE Evaluation Policy](#). A gender-responsive methodology, methods and tools, and data techniques will be selected. The evaluation findings, conclusions and recommendations will reflect a gender analysis.

VI. Evaluation schedule¹⁴

2 August 2022	ToR finalized
15 August 2022	Evaluator selected
31 August 2022	Contract signed. Evaluator starts the desk review
19 September 2022	Evaluator submits inception report including survey design
3 October 2022	Launch of data gathering
19 October 2022	Stakeholder interviews start
7 November 2022	Evaluator submits draft report
30 November 2022	Evaluator submits final report

VII. Resources

The resources available for this evaluation are USD 12,000 (all inclusive). Payment will be made upon satisfactory delivery of work.

The Programme Management Unit (PMU) will manage the evaluation and will be involved in the following steps: Selection of the evaluator; Preparation and clearance of the Terms of Reference; Provision of guidance to the Secretary, Aarhus Convention and to the evaluator as needed on the evaluation design and methodology; Clearance of the final report after quality assurance of the draft report.

The Project Manager, Sustainable Energy Division, in consultation with the Division Director, will be involved in the following steps: Provide all documentation needed for desk review, contact details, support and guidance to the evaluation consultant as needed throughout the timeline of the evaluation; Advise the evaluator on the recipients for the questionnaire and for follow-up interviews; Process and manage the consultancy contract of the evaluator, along the key milestones agreed with PMU.

VIII. Intended use / Next steps

The evaluation will be consistent with the UNECE Evaluation Policy. The results of the evaluation will be used in the planning and implementation of future activities of the Sustainable Energy

¹⁴ Final timetable to be agreed following engagement of the evaluator

subprogramme in support of the realization of the 2030 Agenda for Sustainable Development and Paris agreement.

Following the issuance of the final report, the Project Manager, Sustainable Energy Division, in consultation with the Division Director, will develop a management response for addressing the recommendations made by the evaluator. The final evaluation report, the management response and the progress on implementation of recommendations will be publicly available on the UNECE website.

IX. Criteria for evaluation

The evaluator should have:

- An advanced university degree or equivalent background in relevant disciplines, with specialized training in areas such as evaluation, project management and social statistics.
- Specialized training in areas such as evaluation, project management, social statistics, advanced statistical research and analysis.
- Knowledge of and experience in working with intergovernmental processes, energy policy, environmental policy, water and energy nexus, and/or sustainable energy concepts.
- Relevant professional experience in design and management of evaluation processes with multiple stakeholders, survey design and implementation, project planning, monitoring and management, gender mainstreaming and human-rights due diligence.
- Demonstrated methodological knowledge of evaluations, including quantitative and qualitative data collection and analysis for end-of-cycle project evaluations.
- Fluency in written and spoken English. Knowledge of another language may be an advantage.

Evaluators should declare any conflict of interest to ECE before embarking on an evaluation project, and at any point where such conflict occurs.

Annex II. Persons Interviewed

#	Persons Interviewed	Title	Organization
1	Ms. Iva Brkic	Project Manager	UNECE-CNP
2	Ms. Chiara Giamberardini	Management and Programme Analyst	Programme Management Unit, UNECE
3	Mr. Denis Hicks	Director / Management Advisor	High Delta Limited, U.K.
4	Mr. Sigurd Heiburg	Chairperson, Petronavit and a Member of the UNECE Expert Group on Resource Management (EGRM)	Petronavistas
5	Ms. Maria Carolina Coll Mijares	Principal Industry Specialist	IFC
6	Mr. King Lee	Director	World Nuclear Association
7	Mr. Vladimir Budinsky	Director Vice-Chair, CEZ Group	Entrepreneurs' Association of Mining and Oil Industry of the Czech Republic UNECE CES
8	Mr. Furudzog Usmanov	Tajikistan Country Coordinator for the CASA-1000 Project	Ministry of Energy & Water Resources, Tajikistan
9	Mr. Artan Lesovilku	Head of Norms and Regulations Unit, SEC	National Energy Agency, Ministry of Infrastructure and Energy, Albania
10	Mr. Einars Cilinskis	Senior Expert	Department of Sustainable Energy Policy, Ministry of Economics of the Republic of Latvia
11	Mr. Alex Krowka	Consultant	United States Energy Association
12	Mr. Stefan Buettner	Chairperson, Group of Experts on Energy Efficiency	

Annex III. List of Documents Consulted

1. UNECE Technical Cooperation Project Form for “Enhancing understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050”;
2. Quarterly Implementation Reports 1 (1 July – 30 September 2020) to 10 (January 2020 - December 2022);
3. Interplay of technologies for effective, flexible power grid operation, Briefing Document for the UNECE Group of Experts on Cleaner Electricity Systems, Dr. Andrew Minchener Obe, General Manager, IEA Clean Coal Center;
4. UNECE Technology Brief on Nuclear Power;
5. UNECE: Carbon Neutrality in the UNECE Region: Integrated Life-cycle Assessment of Electricity Sources;
6. UNECE: Geologic CO₂ storage in Eastern Europe, Caucasus and Central Asia: An initial analysis of potential and policy;
7. UNECE Technology Brief on Hydrogen;
8. UNECE Technology Brief on Carbon Neutral Energy Intensive Industries;
9. UNECE: Building Resilient Energy Systems: Actions for Achieving Greater Energy Security, Affordability and Net-zero in the UNECE Region;
10. UNECE: Committee on Sustainable Energy - Group of Experts on Cleaner Electricity Systems: 18th session, Geneva, 19-20 September 2022, Item 12 of the provisional agenda, Report of the Group of Experts on Cleaner Electricity Systems on its eighteenth session;
11. UNECE: Committee on Sustainable Energy - Group of Experts on Cleaner Electricity Systems: 18th session, Geneva, 19-20 September 2022, Item 6 of the provisional agenda, Financing clean energy infrastructure;
12. UNECE: Committee on Sustainable Energy - Group of Experts on Cleaner Electricity Systems: 18th session, Geneva, 19-20 September 2022, Item 8 of the provisional agenda, Digitalization: Accelerating the Electricity System Transformation. Joint Paper by the Task Force on Digitalization in Energy of the Group of Experts on Energy Efficiency and the Group of Experts on Cleaner Electricity Systems;
13. Presentations for Workshop I – 19-20 May 2020;
14. Presentations for Workshop II – 24-25 September 2020;
15. Presentations for Workshop III – 24-25 November 2020;
16. Presentations for Workshop IV – 24 March 2021;
17. Presentations for Workshop V – 14 April 2021;
18. Files for Almaty International Forums 2021.

Annex IV. On-line Survey Questions

Online Survey

1. Name of Interviewee(s)
2. Organization
3. Position
4. Location
5. Date of Interview

Consent and Confidentiality Statement

The UNECE cordially invites you to participate in the independent evaluation of the UNECE's Collaboration with UN and other Partners on the Project "Enhancing understanding of the implications and opportunities of moving to carbon neutrality in the UNECE region across the power and energy intensive industries by 2050" or the Carbon Neutrality Project or CNP for the period of 2020-2022. With this in mind, we are sending you an online questionnaire to fill in.

The information received through this questionnaire will be treated confidentially with no reference made at any stage to the names of the respondents. Completing the survey will only take 15 minutes of your time. This survey will be available from 13 February 2023, until 24 February 2023.

The UNECE would like to thank you in advance for your valuable support and input.

1.1 Where do you work?

- Government (UNECE Body) - UNECE Member State
- Government (UNECE Body) – Non-UNECE Member State
- UN Agency
- Non-Governmental Organization
- Independent Expert
- Academia
- Private Sector
- Other (please specify):

1.2 Gender:

- Female
- Male
- Other
- I do not want to answer

1.3 Please mention the UNECE activities in which you have taken part? (please disclose all relevant activities)

1.4 Is the collaboration of the UNECE's CNP relevant to the needs and priorities of your country in attaining the goals of the 2030 Agenda and the targets of the Paris Climate Agreement?

- Very relevant
- Partially relevant
- Not relevant
- I do not know

Please provide reasons.

1.5 Please select other international organizations or UN agencies with whom you cooperate in the pursuit of attaining the goals of 2030 Agenda and the targets of the Paris Climate Agreement.

- United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
- The United Nations Economic and Social Commission for Western Asia (UNESCWA)
- The United Nations Environment Programme (UNEP)
- The World Bank
- The International Finance Corporation (IFC)
- The United Nations Development Programme (UNDP)
- The European Bank for Reconstruction and Development (EBRD)
- The Organization for Security and Cooperation in Europe (OSCE)
- The United Nations Industrial Development Organization (UNIDO)

Other organizations (please list)

1.6 How relevant is the foregoing collaboration with the UNECE to gender equality and empowerment of women?

- Very relevant
- Partially relevant
- Not relevant
- I do not know

1.7 Do you think that the UNECE advocates for, or contributes to, enhancing gender equality and empowerment of women in the energy sector?

- Yes
- No
- Partially agree
- I do not know

Please provide some examples

1.8 Do you agree with the following statement: “the CNP successfully incorporates the perspectives of vulnerable groups while collaborating with the UN system and other partners”?

- Yes
- No
- Partially agree
- I do not know

Please provide some examples

1.9 Has the collaboration between the UNECE’s CNP team contributed to substantial and meaningful changes in the situations of the most vulnerable groups?

- Yes
- No
- Partially agree
- I do not know

Please provide some examples

1.10 Has the collaboration with the UNECE assisted your country in delivering on carbon neutrality and energy for sustainable development?

- Yes
- No
- Partially agree
- I do not know

Please provide some examples

1.11 What is the likelihood that the benefits arising from the UNECE’s CNP activities delivered through collaboration with the UN and other partners will be sustained over time?

- Highly possible
- Moderately possible
- Not likely
- I do not know

Please provide reasons.

1.12 To what extent do you engage with the work of UNECE’s CNP in a sustainable way?

- To a great extent (we regularly participate and contribute to the UNECE’s events/activities relating to sustainable energy)
- To a moderate extent (we regularly receive materials and event invitations, and sometimes contribute to events/activities)
- Poor (we never get any updates or event invitations from the UNECE)
- I do not know

Other (please specify)

Please provide reasons.

1.13 Do you think that collaboration with the UNECE in sustainable energy makes an impact at a global level?

Yes

No

I do not know

If yes, please share some examples

1.14 Have the outcomes of this CNP collaboration led to new policies or policy changes in your country?

Yes

No

I do not know

Please provide some examples

Additional Interview Questions

Relevance

1. To what extent did the Project respond to the priorities and needs of UNECE member States? How relevant were they to the target groups' needs and priorities?
2. How relevant was the collaboration of the UNECE's CNP with other entities in terms of delivering the expected accomplishments and mandated outputs of the Project?
3. How relevant was the collaboration with internal and external stakeholders with regard to gender equality and empowerment of women? Were any challenges encountered in this regard?
4. Did the CNP incorporate the perspectives of vulnerable groups while collaborating with the UN system and other partners? What could be improved in this regard?

Coherence

5. Do you think that the UNECE's collaboration with the UN system was/is coherent in terms of delivering on the Carbon Neutrality agenda? If so, why?
6. Has the collaboration among the UNECE, the UN system and other partners assisted UNECE member states in delivering on building capacities and financing opportunities in Carbon Neutrality?
7. Are the outputs of the UNECE's CNP supported by partnerships with the UN system and other partners?

Effectiveness

8. To what extent has there been a better understanding of carbon neutrality technology deployment and the models that provide adjustments for subregion?
9. What outcomes have been achieved through the collaboration with partners (expected/ unexpected; positive/negative) during the activities of the CNP?
10. What were the challenges/obstacles in the way of achieving the objectives and expected accomplishments? What can be improved in this regard?

11. To what extent has there been a better understanding about technology and policy options to attain carbon neutrality?
12. To what extent has there been identification of lowest cost opportunities across the power and energy intensive industrial sectors that can be further developed as primary opportunities to stimulate a replication or a catalytic effect within a country and region?
13. To what extent did the Project deliver increased awareness and knowledge of carbon neutrality and innovative low and zero-carbon technologies that are necessary for net-zero attainment? Did this promotion deliver increased buy-in for policymakers and is there evidence of behaviour change amongst stakeholders?

Efficiency

14. Have the available resources been used efficiently to foster fruitful collaboration with the UN system and other partners to deliver results?
15. Is the capacity being developed adequately to ensure that institutions/organizations will take over and sustain the contents of the Position Paper? To what extent do partners and beneficiaries participate in and 'own' the Position Paper?
16. Were any efforts made during Project implementation to make use of/build upon pre-existing institutions, agreements and partnerships, data sources, synergies and complementarities with other initiatives, programmes and projects etc. to increase project efficiency?
17. Are there sufficient resources to achieve the intended outcomes in a timely manner? What should be improved in this regard?
18. How could enhanced engagement with partners improve efficiency?

Sustainability

19. What is the likelihood that the benefits of the CNP's activities delivered through collaboration with the UN system and other partners will persist over time? Are there any risks/issues to consider here? What could be improved in this regard?
20. What is the likelihood that the knowledge products of this Project will continue to influence your thinking of carbon neutrality after its completion?

Impact

21. To what extent has the collaboration of the UNECE's CNP with the UN system and other partners made an impact at the UNECE or global levels? Can you share any specific examples/cases?
22. What impact does the position paper reflect policymaker's capacity to present a clear vision of, and to implement investments on climate neutrality by 2050?
23. Were there any unintended impacts of the project (both positive and negative)? To what extent has the Project integrated gender equality, women's empowerment, human rights and South-South cooperation?
24. What has happened because of the Project? Are there any barriers and risks that may prevent further progress towards long term impact of carbon neutrality?