



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

Geneva, 25-27 November 2020

Item 4 of the provisional agenda

Carbon neutrality as a pathway to sustainable energy**Policy recommendations from Pathways to Sustainable Energy****Note by the secretariat****I. Introduction**

1. This document presents for endorsement by the Committee on Sustainable energy focused policy recommendations that emerge from the “Pathways to Sustainable Energy” project (Pathways project). A fuller version of the policy recommendations was presented to the 28th session of the Committee (ECE/ENERGY/2019/1).

2. The Pathways project was conceived to contribute to climate change mitigation and sustainable development by helping countries of the ECE region deploy energy policies that support their commitments and by improving their understanding of the perspectives, objectives and actions of other countries. Keeping global temperature rises below 2°C while attaining sustainable development will require reducing net greenhouse gas emissions while assuring access to affordable energy services. Current policies do not deliver comprehensively on countries’ climate and development commitments and objectives.

3. The analysis of technology and policy choices in the Pathways project optimised costs and attainment of the objectives of the 2030 Agenda within specific constraints established in alternative scenarios of future developments. The key outcomes of the quantitative analysis showed:

(a) Even in a scenario that meets the 2°C objective, fossil fuels will account for at least 56% of primary energy in 2050 in the ECE region. Reducing net carbon intensities will involve deploying not only energy efficiency and renewable energy technology, but also the full spectrum of other no-carbon, lower-carbon and carbon-reducing technologies;

(b) Delivering the 2030 Agenda requires accelerated improvements in the energy performance of buildings and in industrial energy productivity. Commercialisation of new technology is expected to drive decarbonisation of the transport sector, and urban mobility can be addressed with proper planning of cities and transport infrastructure;

(c) Renewable energy potentials remain untapped and more effective institutional investment and transaction frameworks are needed;

(d) To achieve the objectives of the 2030 Agenda and the Paris Climate Agreement efficiently, cost-effectively, and socially responsibly, there is a clear need for countries to

approach technology choices and policy options neutrally based on agnostic appraisal of the economic, environmental, and social implications.

4. Achieving the objectives of the 2030 Agenda will involve:
 - (a) Pursuing systemic efficiencies. Improved efficiency and productivity should be at the core of future energy systems;
 - (b) Cutting CO₂ emissions significantly by 2050. Commitments can only be achieved with reduced and negative carbon emission technology to bridge the gap until innovative, next generation technology is available and can be deployed widely;
 - (c) Optimising existing fossil-based infrastructure and integrating renewable energy-based technology, while mitigating negative socioeconomic consequences of reducing fossil fuel use;
 - (d) Accelerating deep transformation of the energy sector. Place a price on greenhouse gas emissions; commercialise decarbonised gases; establish regulatory frameworks for big data, smart grids and an integrated systems approach; deploy information and communication technology; and design energy markets to promote innovative, sustainable and flexible business models;
 - (e) Advocating efficient integration of energy markets, rather than energy independence, to ensure energy security, facilitate cross-border cooperation, and introduce and scale up low-carbon technology;
 - (f) Promoting sustainable resource management that embraces circular economy principles and the full spectrum of the 2030 Agenda's goals and targets.
5. The Committee is asked to endorse the following policy recommendations.

II. Policy Recommendations¹

A. Near-term priorities that are cost-effective and impactful quickly and at scale

6. Pursue energy efficiency and productivity as the core of the future energy system:
 - (a) Improve the efficiency of production, transmission, distribution and consumption of energy;
 - (b) Deploy high performance buildings² urgently;
 - (c) Initiate national programmes to improve industrial energy efficiency;
 - (d) Deploy minimum energy performance standards for energy-using equipment;
 - (e) Reduce the carbon intensity of transport.
7. Reduce the environmental footprint of energy:
 - (a) Establish sustainability criteria for energy investments, including investment guidelines for the range of low- and no-carbon technologies. Modernize existing energy infrastructure to accelerate the transition to carbon neutral solutions;
 - (b) Disseminate guidelines on best practice for carbon capture and storage (CCS) and carbon capture use and storage (CCUS) and accelerate deployment;
 - (c) Deploy best practice guidance on methane management in extractive industries;
 - (d) Deploy a full-fledged United Nations Resource Management System.

¹ See ECE/ENERGY/2019/1 for full presentation of these recommendations

² UNECE High Performance Buildings Initiative:
https://www.unece.org/fileadmin/DAM/energy/se/pdfs/geee/Booklet_HPBI_June19/HPBI_Brochure.pdf

8. Initiate transformation of the energy system and monitor progress:
 - (a) Institute a real price on greenhouse gas emissions;
 - (b) Improve legal and regulatory frameworks as needed to contribute to implementation of the 2030 Agenda and the Paris Climate Agreement and to support emergence of new business models;
 - (c) Accelerated deployment of information and communication technology to improve demand-side participation in energy markets, to improve system coordination and efficiency and to enable greater penetration of intermittent renewable energy;
 - (d) Accelerate the energy transition in low-income countries through capacity building, direct investment and exchange of best practices;
 - (e) Facilitate cooperation to set national targets and develop action plans towards sustainable energy. Develop regional and national early warning systems to monitor progress and indicate adaptive responses to achieve sustainable energy.

B. Policy recommendations with longer lead times for implementation

9. Promote mutually beneficial economic interdependence to accelerate attainment of the 2030 Agenda:
 - (a) Advocate an interconnected system in which supply, demand, conversion, transport and transmission interact freely and flexibly;
 - (b) Facilitate technological and regional cross-border cooperation to strengthen best practice exchanges. Introduce and scale up low-carbon and carbon-reducing technologies with joint investments;
 - (c) Identify sub-regional opportunities for joint energy system planning to strengthen national and regional grids, improve energy security and provide integrated planning of resources (such as water, energy and agriculture);
 - (d) Establish investment framework conditions that encourage investment and operations aligned with the 2030 Agenda and with the Paris Climate Agreement.
10. Accelerate the energy transition by modernizing existing energy infrastructure while embracing the three pillars of sustainable development:
 - (a) Address the social and economic impacts of phasing out fossil-based infrastructure;
 - (b) Ensure technology-neutral policies that allow investment in carbon neutral technology and persist with efforts to phase out market-distorting subsidies;
 - (c) Enable integration of intermittent renewable energy into networks; develop international standards addressing the interplay of fossil fuels and renewable energy;
 - (d) Facilitate regional discussions on the regulatory frameworks for big data, smart grids and a systematic approach support the energy transition;
 - (e) Ensure capacity for implementation of digital economy and maintenance of the renewable energy infrastructure.
11. Promote a low-carbon circular economy and implement sustainable resource management practices:
 - (a) Facilitate policy discussions on storage technology, commercialization of renewable gases; and waste-to-energy technology;
 - (b) Facilitate policies and standards to limit losses of methane;
 - (c) Considered improved quality of life from better air quality in energy transition investments;
 - (d) Explore options to use CO₂ within a circular economy as a feedstock for petrochemical and inorganic materials;
12. Encourage new business models and innovation:

- (a) Consider energy market designs that promote new business models and create needed regulatory and investment frameworks to foster the energy transition;
- (b) Implement alternative low-carbon approaches in cities in transport, buildings, and services to optimize energy use while enhancing quality of life, decreasing air pollution and improving transport systems.

III. Conclusions

13. At its twenty-ninth session, the Committee will be invited to:
- (a) endorse the foregoing policy recommendations;
 - (b) request EXCOM to submit the document to the next Economic Commission for Europe session to develop concrete commitments in concertation with other sectoral committees on comprehensive approaches that recognize that interconnected solutions, including circular carbon economic approaches, can facilitate attaining the objectives of the 2030 Agenda;
 - (c) request the Economic Commission for Europe to inform ECOSOC of the region's strategic options to attain sustainable energy and the links to the 2030 Agenda;
 - (d) note the conclusions on where the region is headed, endorse steps to accelerate progress towards attaining the energy-related SDGs based on different strategic options and make recommendations for the future work of the sustainable energy subprogramme;
 - (e) request the secretariat to continue implementation of the "Pathways to Sustainable Energy" programme if additional funding can be secured;
 - (f) request member States and other interested stakeholders to fund the various elements of the Phase 2 of the Pathways Programme;
 - (g) request the secretariat to draft project proposals for the various elements of Phase 2 of the "Pathways to Sustainable Energy" project to be discussed with potential donors;
 - (h) welcome the readiness of donors to fund a regional deep dive on Central Asia;
 - (i) request to reach out to ESCAP for their possible involvement in a joint undertaking in Central Asia and the Caucasus;
 - (j) request the secretariat to reach out to ECE's sister regional commissions for more global application of key findings in a cooperative manner and to take steps for a potential joint undertaking to implement the policy recommendations;
 - (k) request the organisation of a high-level political dialogue with countries provided a host-country and supporting funds can be found.

Annex I

Pathways to Sustainable Energy, Phase 1

I. Introduction

1. This Annex sets forth the concept for the next phase of the Pathways programme. The Pathways project was conceived to contribute to climate change mitigation and sustainable development by helping countries of the ECE region deploy energy policies that support their commitments and by improving their understanding of the perspectives, objectives and actions of other countries. Keeping global temperature rises below 2°C while attaining sustainable development will require reducing net greenhouse gas emissions while assuring access to affordable energy services.

II. Planning Phase 2 of the Pathways Programme

2. The Committee has stressed the need for continuing dialogue on pathways to sustainable energy. As such, Phase 1 of the Pathways project was only the starting point for more in-depth policy and technology analyses in the ECE region. It initiated a process with a view to developing recommendations for ECE countries on the different options that are available to achieve a desired future. The concept for a Pathways Programme Phase 2 comprising multiple inter-related projects follows. At the conclusion of Phase 1 of the Pathways Programme:

- A fully vetted modelling architecture is in place
- A first set of results has been obtained
- A concept for an early warning system has been developed

3. The results point to a need for critical appraisal of input assumptions and for closer consideration of both regional specificities and alternative policy approaches.

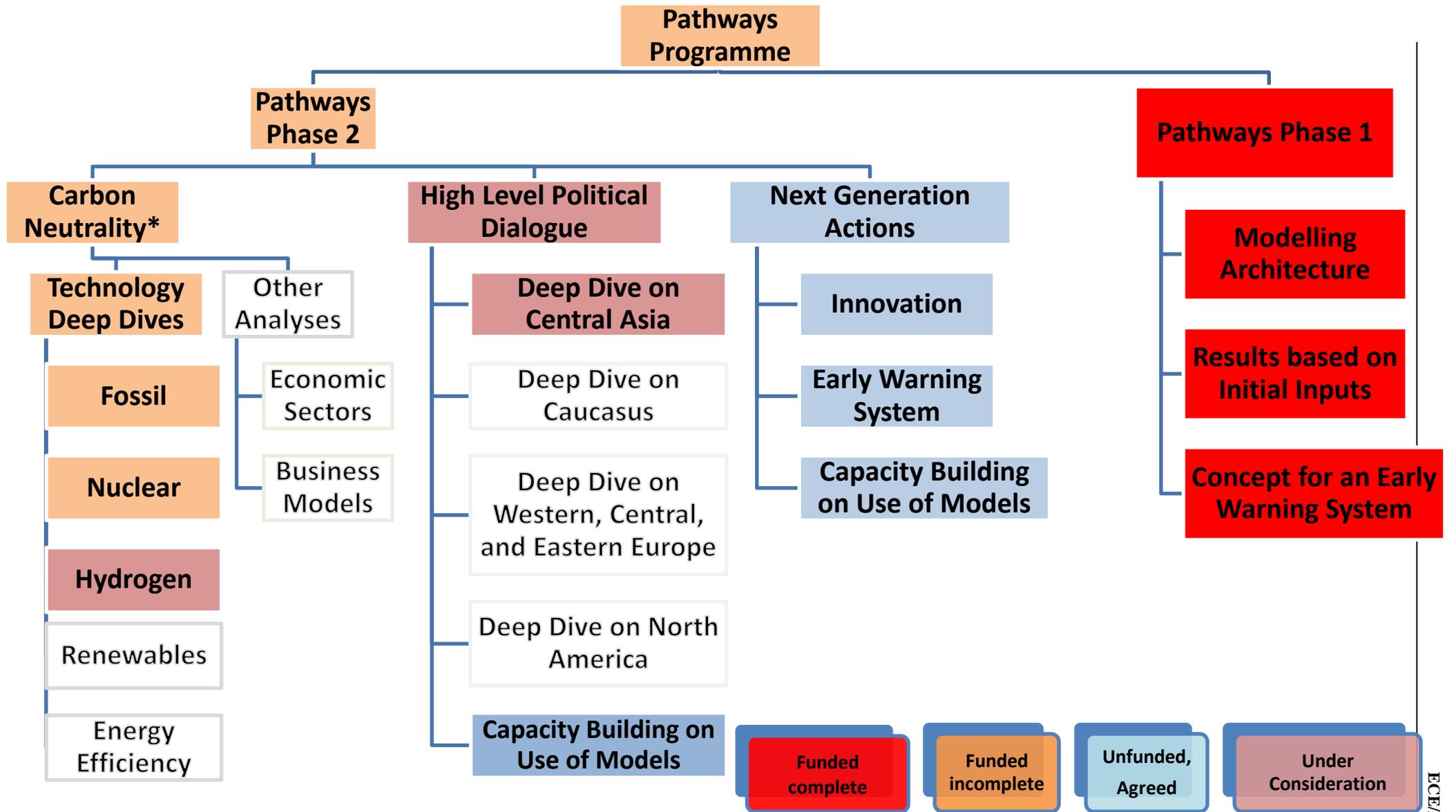
4. Phase 2 of the Pathways programme is conceived to respond to the issues that emerged from Phase 1: closer appraisal of input assumptions and closer consideration of both regional specificities and alternative policy approaches. There has been recognition in the conceptualization of phase 2 that an intermediate step on the pathway to energy for sustainable energy is achieving carbon neutrality:

(a) A concept for a deep dive on Central Asia has been developed. The deep dive would include an assessment of specific opportunities and challenges in Central Asia (including reflection on relevant alternative technologies and policy approaches), testing strategic options using the outcomes of the regional assessment, and dialogue and dissemination; capacity building to assist member States in using the analytical architecture developed in phase 1, further development of an early warning instrument to permit energy experts to test adaptive responses using the developed modeling capability. The project is still under consideration but has not been funded. The next steps will involve engaging with ESCAP regarding collaboration on a deep dive analysis and dialogue on Central Asia and discussions with potential donors regarding the financing of that deep dive. If the full range of regional deep dives is conducted, then the stage will be set for broader high-level political dialogue among ECE member States;

(b) The Committee requested that the Group of Experts on Cleaner Electricity Systems oversee a project on achieving carbon neutrality. The project has been developed, funded, and approved by EXCOM, and it is underway under the auspices of the Group of Experts on Cleaner Electricity Systems. The project involves appraising fully the input assumptions used to develop the first results of the Pathways project and reconfiguring the modelling to prioritize achieving carbon neutrality as opposed to achieving the full spectrum of energy objectives of the 2030 Agenda. The objective is to identify the least cost options for achieving carbon neutrality while respecting social contracts. Additional funding is sought for deep dives on hydrogen, renewable energy, and energy efficiency, each supported

by its respective expert group. A generic hydrogen proposal is in development and will accompany this concept note. In addition, experts have expressed an interest in closer analysis of economic end-use sectors, alternative business models, and management of natural systems. Upon conclusion, the results of the carbon neutrality project should be brought into the Pathways Phase 2 project of the Committee and should inform future strategic planning for the sustainable energy subprogramme;

(c) Project proposals have been developed for funding of various elements of Pathways Phase 2, including sub-regional analyses as well as assessments of technology options, progress tracking, and further development of the early warning system.



• Project managed by the Group of Experts on Cleaner Electricity Systems as per ECE/ENERGY/123 paras 34-42

Annex II

Pathways Project

Deep Dive on Central Asia

I. Background

1. The overall objective of what has become known as the Pathways project has been to support ECE countries to develop and implement national sustainable energy policies aligned with international agreements and track attainment of objectives. The project has explored countries' strategic options for closing the gaps between current efforts and both the commitments they have made under the 2030 Agenda for Sustainable Development and the Paris Climate Agreement and what is needed to meet long-term sustainability objectives.

2. During the course of the Bureau call held on 16 December 2019, Germany, the Russian Federation, and the United States agreed in principle to support a sub-regional deep dive in Central Asia.

3. Each country has its own starting point in terms of resources, infrastructure, legislative and regulatory framework, and cultural heritage. Consequently, each country has a distinct set of options for how to proceed. It is essential for countries to explore their options and to consider individually and collectively how the objectives of energy for sustainable development might be achieved.

4. A sustainable energy future will reconcile a tight emissions pathway with the global development imperative by exploring synergies and partnerships between low and no carbon alternatives and traditional fuels in terms of technology, policies, market structure, and best practices. Adapted framework conditions are needed to mobilize investments that align with the objectives of the 2030 agenda and that drive the needed transition. Rational economics and systemic improvements in efficiency throughout the energy chains lie at the heart of the sustainable energy agenda. 80% of today's energy is fossil-based, and fossil energy underpins quality of life today. Even under a scenario that meets a 2°C objective, in 2050 fossil fuels will still represent 56% of the primary energy mix in the ECE region. The number of countries and the number of people whose national incomes and livelihoods depend on fossil energy is important, and we cannot expect them to abandon their quality of life ambitions. At the same time, the world currently is on a path to global average temperatures that are 4-6°C above pre-industrial levels, levels that are considered a catastrophic, existential threat. There is a critically urgent imperative to find a sustainable balance among competing interests.

II. Regional deep-dives: Conception and Objectives

5. Based on the discussions at the session, the Committee made a number of requests regarding the Pathways project. These are set forth in full in the report ECE/ENERGY/123. The Committee requested the secretariat to continue implementing the Pathways project until its completion and requested the secretariat to prepare a concept note for Phase II of the project for approval by the Bureau, followed by consultations with member States at the EXCOM level before official presentation to EXCOM. The Bureau requested that the Phase II project be launched with a detailed exploration of ECE member States in Central Asia. This concept note has been prepared in response to that request.

6. As noted at the project's initiation, the objectives of the pathways project are to appraise countries' strategic policy and technology options, to provide support for a high-level political dialogue, and to develop an early warning system as conceptualized in Phase 1. The underlying logic for Phase 2 is that much work has been undertaken to develop a tool

that can now be used for deeper assessment of policy and technology choices, notably at the sub-regional level, and to both confirm and synthesize the project outcomes for consideration by high-level decision makers. Proposed work in Central Asia is to be coordinated and developed in close cooperation with United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) that has broadly similar activities underway.

7. The regional deep dive in Central Asia will include the following components:

(a) Assessment of specific opportunities and challenges in Central Asia. The appraisal will consider contributions of relevant alternative technologies and policy approaches;

(b) Testing strategic options using the project's models and the outcomes of the regional assessments, looking specifically at possible energy innovations that can be applied;

(c) Capacity building to assist member States in Central Asia in their own use of the analytical architecture developed in the project to test their choices;

(d) Development of an early warning instrument to permit energy experts to test adaptive responses using the developed modelling capability;

(e) Dialogue on the project outcomes and dissemination of the project results.

A. Assessment of the specific opportunities and challenges in Central Asia, including consideration of contributions from alternative technologies and policy approaches

8. Every country has its own endowment of resources and its unique cultural, regulatory, and legislative heritage. As a consequence, each country will pursue its own pathway to meet its commitments under the 2030 Agenda and the Paris Climate Agreement. The assessment proposed in Phase 2 will explore specific opportunities and challenges in Central Asia and develop more detailed strategic options specifically relevant to regional situation in terms of resource endowment and existing infrastructure. The assessment will include interactive workshops with experts in the ECE member States in the region.

9. The analyses to be conducted in Central Asia in Phase 2 would validate the input assumptions and policy options from a modeling perspective by engaging key players in workshops to confirm the assumptions made and to explore policy choices. The workshops also would provide capacity building training in the use of the modeling and analytical tools developed. The exploration process will confirm countries' policy options.

10. The activities to deliver this component include:

(a) Conduct 2-day expert workshops in the Central Asia sub-region to:

(i) review input assumptions on technologies, natural resources, and economic structural outlooks;

(ii) review and develop strategic options including relevant energy innovations;

(iii) provide updates of modelling input assumptions; summary report for use by modellers.

(b) Prepare a summary report.

B. Testing strategic options using the project's models

11. The outcomes of the sub-regional assessments, above, will be integrated into a developed set of assumptions for central Asia to be tested under the different scenarios developed in the project using the project analytic architecture and modelling capability. The strategic options will be confirmed and summarized in a final report on Central Asia.

12. Energy policy cannot be conceived and deployed in isolation from other policy objectives as countries are committed to achieving the range of outcomes set forth in the 2030

Agenda. This assessment will explore the opportunities presented by nexus policy approaches and consider their implications for the energy sector. Nexus approaches would include pursuit of sustainable resource management and circular economy principles, just transition, integrated water-food-energy-ecosystems management, the design and development of smart, sustainable cities, and sustainable mobility, among others as appropriate.

13. Likewise, one of the organizing principles for the scenario analysis in Phase 1 turned on the question of broad economic business models for delivering on the 2030 Agenda. The assessment of business models will explore in more detail the range of alternative business models (traditional, large-scale utilities; distributed generation; energy service companies; green energy; and the like) and their implications for countries' strategic options and financing challenges. The assessment of alternative nexus approaches and business models will engage ECE's expert communities to explore and debate the viability of the alternatives.

14. The activities to deliver this component include:

- (a) Run the models with improved data for central Asia under each scenario;
- (b) Use the models to test alternative strategic options including technology, financing and policy choices and alternative business models/market structures.
- (c) Conduct a workshop the countries to discuss the outcomes;
- (d) Prepare a summary report and presentations.

C. Capacity building to assist member States in their own use of the analytical architecture developed in the project to test their choices

15. As noted in the background section above, one of the important outputs of Phase 1 of the Pathways project has been development of a robust analytical architecture that allows alternative strategies and policies to be tested holistically in the context of the socioeconomic ecosystems of alternative future scenarios. Donors to the Pathways project have requested that experts in selected countries be trained in the use of the analytical architecture to allow them to test their own strategic options. This activity would be undertaken in cooperation with the Organization for Economic Cooperation and Development and UN ESCAP. The capacity building proposed under this activity would make the model available and would engage with experts to train them on the use of the models. Experts will be trained to use the models to provide, for example, independent assessments of scenarios for countries' decarbonization strategies to 2050. The training would include consultations with the modellers.

16. The activities to deliver this component include:

- (a) Capacity building workshops:
 - (i) Kick-off meeting;
 - (ii) In-depth training [training for 30 participants over 10 days]
- (b) Web-site for use [based on the UN ESCAP platform]
- (c) Wrap-up workshop to confirm results

D. Further development of an early warning instrument to permit energy experts to test adaptive responses using the developed modelling capability

17. Phase 1 of the project developed a preliminary sketch of what an early warning system might resemble. The information called for in that work largely depends on the availability of confirmed data and statistics, and the work completed under Phase 2 would endeavor to ensure the availability of quality data on a continuing basis. The early warning instrument called for in Phase 2, building on the work done in Phase 1, will permit energy modelers and

analysis to explore alternative approaches, notably with respect to natural gas and innovation, to getting the region and the sub-regions to get on track to achieve countries' commitments. Central Asia will be used as a case study for testing the early warning system.

18. In addition, reports based on data that emerge from confirmed statistics from national systems of accounts have lag times of one or more years and hence serve more to track results than to provide early warning. Further work in Phase 2 will explore forward looking signposts that can anticipate in advance fundamental shifts (or not) in the energy system.

E. Dialogue on the project outcomes and dissemination of the project results

19. ECE will assemble member States and experts from Central Asia in a high-level political dialogue on the project outcomes. The intent of the high-level political dialogue will be to enhance the awareness of countries' choices with the expectation that the dialogue will lead to tightened commitments and accelerated action on energy for sustainable development. In addition, the dialogue will be expected to shape the activities of UNECE going forward in support of countries' commitments.

20. The activities to deliver this component include inviting experts from central Asia for presentation and discussion of the results at the Committee on Sustainable Energy

21. The final activity under the project will include engagement with countries and stakeholders in the field to disseminate the project results and to discuss the results and implications of the project findings at national and local level.

22. The activities to deliver this component include:

- (a) Preparation of a sub-regional report;
- (b) Conduct of interactive workshops in capitals to discuss findings and implications.

III. Support and Funding

23. Phase 1 of the pathways project has been funded directly by the Russian Federation and by both Germany and the United States through contracts with supporting institutions. Phase 2 of the pathways project, including activities a-e above as well as the other activities described in the Pathways Programme graphic will require sustained support from both countries and industry partners, as well as close cooperation with UN ESCAP. The Committee is asked to approve the suite of activities and to mandate the secretariat to make efforts to solicit and receive the resources needed to complete the work. In each case, the sources and uses of funds would be reported to the Committee and hence to EXCOM.
