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## Economic Commission for Europe

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# Report of the Committee on Sustainable Energy on its twenty-ninth session

**Addendum**

# Achieving carbon neutrality through synergies between gas and renewable energy

## I. Introduction

1. Deep transformation of today's energy system would be facilitated greatly by enhancing the synergies between the traditional energy sector and the one that is emerging. Specifically, harnessing synergies between natural gas and renewable energy is an area of opportunity. Natural gas infrastructure can accelerate deployment of variable renewable energy (VRE) sources, and renewable, low carbon and decarbonized gases are likely to become an important energy vector.

2. A study undertaken by the Group of Experts on Gas of the United Nations Economic Commission for Europe (ECE), in consultation with the ECE Group of Experts on Renewable Energy, presents trends, outlooks, and case studies of interactions between natural gas and intermittent renewable energy sources. A summary of the study is provided in the document "Carbon neutrality through synergies between gas and renewable energy" (ECE/ENERGY/2020/9[1]). It offers a set of guiding principles for enhancing interactions between gas and renewable energy.

## II. Guiding principles

3. VRE and fast-response generation technologies such as simple-cycle natural gas turbines are highly complementary and should be installed jointly to cut emissions while ensuring a stable and resilient power supply. Gas-fired power generation historically has enabled VRE deployment by providing reliable and dispatchable capacity to balance the variability of renewable supply.

[1] http://www.unece.org/fileadmin/DAM/energy/se/pdfs/CSE/comm29_Nov.20/ECE_ENERGY_2020_9_Gas_and_RE_Final.pdf

4. As the share of VRE in the energy mix reaches higher levels, the flexibility of the overall power system must be commensurate with the resulting variability. Innovations in countries investing significantly in VREs show that power systems can be operated with very high shares of VRE in a secure and economical way. The needed flexibility can be provided through a number of technological options. Least-cost options available to any given grid will depend on the generation mix (including the renewable energy penetration), regulatory structure, presence or absence of markets including balancing markets, operational practices, and institutional structures.

5. Certain generation technologies are inherently more flexible than others, for example gas-fired generation provides cost-effective flexibility compared to other flexibility options (including demand-side management, pumped storage, compressed air, flywheels, or batteries). New, low-carbon gases will be crucial in integrating VRE while advancing in the decarbonisation process. The new gases will facilitate decarbonisation of different economic sectors, especially those more difficult-to-abate.

6. Sector coupling and sectoral integration offer important opportunities in decarbonizing the energy system by moderating flexibility requirements and improving energy system reliability.

# III. General recommendations to ECE member States, the energy industry, and other stakeholders

7. A successful transition to affordable and clean energy will require that both traditional (in this case natural gas) and emerging (renewable energy/electricity) sectors fulfil their decarbonization potential. The recommendations from the study on Carbon neutrality through synergies between gas and renewable energy take a wide perspective on how gas could improve the energy efficiency of the energy system:

(a) Recognize the value of the flexibility provided by gas-fired power plants: In some countries with low demand growth, the shift to high shares of VRE has led to a considerable reduction in use of conventional power capacity;

(b) Consider the impact of variability from VRE on natural gas demand as the variability in gas-fired power generation that results from increasing the share of VRE can have implications on gas demand and the capacity factors of the gas infrastructure;

(c) Establish a policy/regulatory framework to enable a hybrid energy system;

(d) Implement an adequate regulatory framework for VRE integration;

(e) Institute flexible planning processes;

(f) Anticipate short-term imbalances;

(g) Deploy the flexibility of the natural gas system;

(h) Promote sectoral integration: couple the electricity, gas and end-use sectors;

(i) Foster research, development and innovation since they are needed to develop the existing technologies and facilitate pilot projects;

(j) Establish principles for how to transport new gases (hydrogen, biomethane and others) whilst maintaining a non-fragmented market where all gases can be traded;

(k) Clarify market access and grid access rules for renewable, decarbonised and low carbon gases to the gas grid, as well as technical rules for their injection and blending with natural gas;

(l) Manage gas quality in a proper way: with the penetration of new gases, a coordinated approach for managing the changes and possibly fluctuating gas compositions would be appropriate;

(m) Implement standardised certificate frameworks across the ECE region for renewable, decarbonized and low-carbon gases;

(n) Support the development of a hydrogen market which will be needed to ensure sufficient cost-reductions for hydrogen to play a significant role in the future energy system;

(o) Widen the concept of "renewable energy": this requires a change of mind-set. The "renewable energy" concept should no longer be commonly identified with variable renewable electricity (basically solar and wind) but it should be enlarged to cover both electric and non-electric renewable energy (such as biomethane and renewable hydrogen);

(p) Introduce a "new gases" terminology: introduce the terms renewable, decarbonised and low-carbon gases in legal texts and include them as part of the solutions to achieve climate and energy goals,

(q) Enable synthetic methane to be classified as a renewable energy. However, guidance is needed to avoid double counting of $CO_2$ reduction between the provider and the user of $CO_2$;

(r) Deploy a digitalization environment: managing properly this element is an essential task to achieve the accomplishment of a Hybrid Energy System (gas and electricity);

(s) Share knowledge and experiences across the ECE region: Countries beginning to deploy VRE should implement well-established best practices to avoid integration challenges, especially when moving beyond VRE specific shares (>10%) of annual VRE generation.

# IV. Further information

8. ECE in cooperation with its Groups of Experts on Gas and on Renewable Energy organized a Workshop on "Decarbonization through harnessing synergies between renewable electricity and gas" on 23 September 2020.[2]

9. Further information on ECE's work on gas and on renewable energy is available on the UNECE Sustainable Energy website.[3] [4]

[2] https://unece.org/sustainable-energy/events/joint-gere-and-geg-workshop-decarbonization-through-synergies-between

[3] https://unece.org/sustainable-energy/natural-gas

[4] https://unece.org/sustainable-energy/renewable-energy