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Educational Pill

The Strategy for Energy System Integration.

1. An integrated energy system for a climate-neutral Europe

The European Green Pact is a package of policy initiatives aimed at setting the European Union (EU) on the path towards a green transition, with the goal of achieving climate neutrality by 2050 in line with the objectives of the Paris Agreement and in line with the United Nations 2030 Agenda for Sustainable Development.

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This is to be achieved through a deep decarbonization of the economy, as well as a reduction of greenhouse gases (GHG) by 2030. The energy system is central to the achievement of this objective, as it accounts for 70-80% of total GHG emissions in the EU.

It is currently still based on parallel and vertical energy value chains, with specific energy supplies highly dependent on specific end-use sectors. For example, petroleum products are the main energy source in the transport or industry sector in the same way that coal and gas are mainly used for electricity generation.

Consequently, the Strategy for Energy System Integration proposes the coordinated planning and operation of the energy system to achieve effective decarbonization. It is based on renewables, market transformation and rapid technological innovation.

2. The concept of energy system integration

The strategy proposed by the Commission is based on three complementary concepts. Firstly, it aims for a circular and energy-efficient energy system, exploiting waste heat from the system and synergies between sectors.

Secondly, a direct electrification of end-use sectors is sought using heat pumps for heating or the massive incorporation of electric vehicles.

Thirdly, in those sectors where electrification is not possible (such as industry or air and maritime transport), the development and incorporation of renewable and low-carbon fuels such as biomass or other energy carriers such as hydrogen is envisaged.

Finally, an integrated energy system should also be based on multi-directionality by including consumers in energy supply through initiatives such as the production of biomethane from organic waste, injected into gas networks at local level.

3. Benefits of energy system integration

An integrated energy system will contribute to the reduction of GHG emissions in sectors that are difficult to decarbonize and have high emission rates such as road transport, maritime, aviation or certain industrial processes. In addition, primary energy demand is expected to be reduced by one third by improving the efficiency of end-use technologies and increasing the reuse of waste heat.

The European economy will also benefit from being more competitive by relying on more sustainable and efficient technologies. Incentives will be given to service companies to offer services at local and regional level with an emphasis on territories and Member States with a more difficult transition reality, through the Just Transition Mechanism.

The development of renewable energies will allow independence from imported oil products and gas, creating a more resilient and autonomous European economy.

4. Proposed Action Plan

- **Energy efficiency at the core**

This will involve prioritizing demand-driven solutions where they are more cost-effective than investments in energy supply infrastructure. In addition, action should be taken in line with the Circular Economy Action Plan, which foresees the re-use of waste heat from industrial installations or other potential emitters. This reuse can be done on-site, by returning the heat to the production plant, or through a district heating and cooling network. Similarly, the reuse of wastewater, waste and biowaste to produce bioenergy, such as biogas, is envisaged, which

can be exploited directly as a substitute for fossil fuels or upgraded from biomethane to allow its injection into the natural gas grid.

- **Accelerating the electrification of energy demand**

The Commission envisages the electrification of the economy to achieve climate neutrality, which will result in a considerable increase in demand to 30% by 2030 and 50% by 2050. The achievement of these objectives will be pursued through an increase in the production of marine renewable energies, together with other land-based technologies such as solar and wind. This will entail large investments that in the short term can be covered by the Next Generation EU recovery instrument in combination with the new EU funding mechanism for renewables.

Regarding transport, the Sustainable and Intelligent Mobility Strategy establishes the total decarbonization of the sector by 2050, which means that the competitiveness of electric vehicles must be achieved and complemented by the installation of recharging and refueling points accessible to the public.

The challenges surrounding this Strategy are manifold, as storage and autonomy technologies, smart charging, and vehicle-to-grid services (which will allow managing grid

congestion) will have to be developed, as well as reforming the rules on grid tariffs and taxation. The electrification of areas not connected to the continental grid should also be managed and synergies between Trans-European Energy Network and Trans-European Transport Network policies should be strengthened.

- **Developing low-carbon renewable fuels**

During decarbonization there will be some sectors where electrification is not feasible or too costly, where the use of renewable or low-carbon fuels such as biogas, biomethane and sustainable biofuels such as green hydrogen is envisaged.

Firstly, these biofuels account for only 3.5% of total gas consumption and are based on forage food crops, so their massive deployment should avoid clashing with the Biodiversity Strategy, which outlines the problematic use of whole trees and food crops for energy production, which should be minimized.

Secondly, hydrogen produced by electrolysis with renewable electricity, or "green" hydrogen, is a potential energy carrier, which can contribute to integrating variable generation from renewables by relieving grid congestion during periods of abundant supply. The Hydrogen Strategy envisages that it could be implemented

in sectors such as aviation, heavy transport, and shipping. Priority will be given to green hydrogen, although blue hydrogen derived from electrolysis produced by non-renewable fuels may be used in transitory stages.

Finally, in sectors where it is not possible to eliminate CO2 emissions, the development of technologies such as carbon capture and storage (CCS) is envisaged, although the current state of their viability is low due to the risks involved.

- **Adapting energy markets to decarbonization**

In many EU Member States, electricity is taxed at a higher rate than coal, gas or diesel. The current Energy Taxation Directive should therefore be reviewed to ensure that non-energy price components contribute to the decarbonization of all energy carriers.

- **Integrated energy infrastructure**

Synergies between energy and transport infrastructure will be ensured by revising the TEN-E and TEN-T Regulations with the aim of achieving a more integrated and cross-sectoral approach, for the gas and electricity sectors.

5. CONCLUSIONS

The energy transition is crucial to achieve a climate-neutral Europe whose actions are consistent with the obligations undertaken by the States regarding the Paris Agreement and the European Green Pact. The integration of the energy system proposes a series of actions aimed at achieving this by 2030 and 2050, exploiting the potential of energy efficiency, integrating renewable energies, deploying the development of decarbonized fuels, and achieving circular energy production.