

## CURRENT ASPECTS OF ENERGY SYSTEMS IN ACHIEVING DECARBONIZING OBJECTIVES

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**Abstract:** The sustainable development is based on secure access to clean and affordable energy for human security. Sustainable development is a balance between energy security, equity and affordability for environmental sustainability. Fossil fuels are by far the most widely traded primary energy sources. Energy transition is in a strong tie with wider set of decarbonizing due to the main challenge of world for climate change.

**Key words:** decarbonizing, sustainable development, climate, efficiency.

### 1. INTRODUCTION

The key for a modern life is representing by clean power, clean heat and clean fuel as a modern energy. The sustainable development is based on secure access to clean and affordable energy for human security. Sustainable development is a balance between energy security, equity and affordability for environmental sustainability. [1]

Energy transition is in a strong tie with wider set of decarbonizing due to the main challenge of world for climate change. The electricity is representing more than 20% of final demand. Sequestration retrofitting and utilization of carbon capture are representing a rough way and requires a major injection of capital and a long period of time to retrofitting with unproductive downtime for power plants. There is necessary to think for re-purposing or re-using the existing power plants than building new infrastructures. The nowadays trends are representing of decarbonizing, digitization, decentralization, electrification. [2]

For many transmission companies as well as for energy companies in general, the pandemic has accelerated digital transformation.

International cooperation and concerted action are necessary to reinforce useful energy access and simultaneously develop, diversify and decarbonize whole economies.

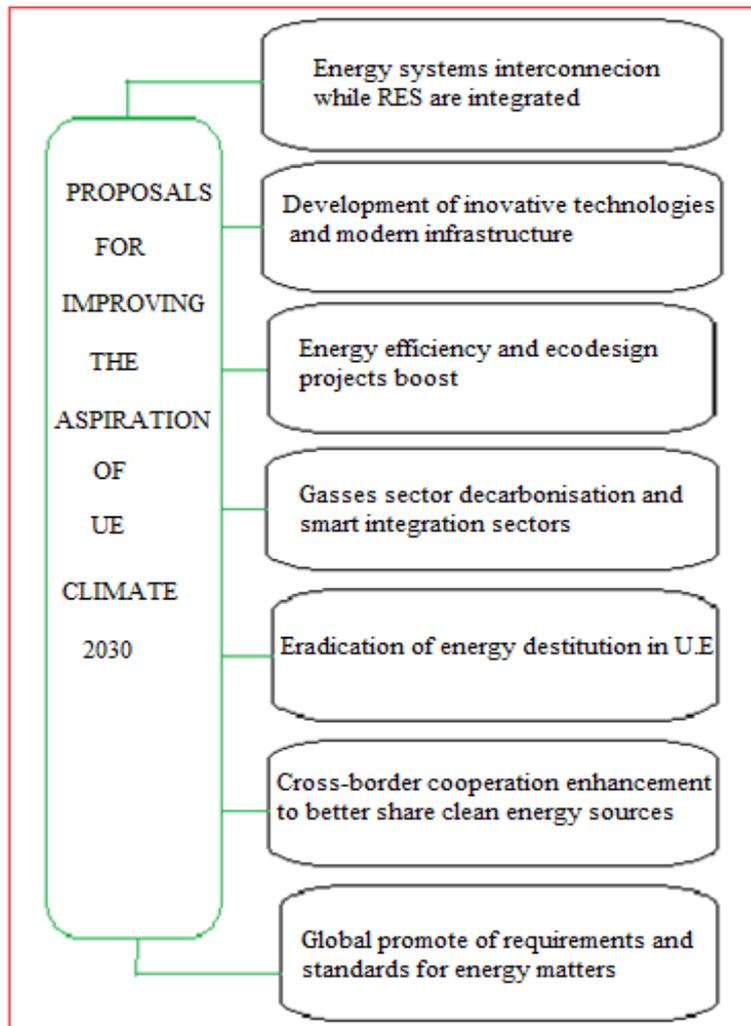
### 2. PROPOSALS FOR CLIMATE 2030

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The 2030 climate and energy framework establish points of view for reducing through cutting greenhouse gas emissions and rising the share of clean energy and energy efficiency. Under the energy union, UE is working to integrate Europe's energy markets for ensuring security in power energy, improving the energy efficiency and decreasing carbonize of economy. International cooperation and concerted action are necessary to reinforce useful energy access and simultaneously develop, diversify and decarbonize whole economies. [3]

The ultimate target is essential to reach the objectives in the climate field (figure 1).



**Fig.1** Some proposals for climate 2030

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The three main directions are [4]:

- Priority statute grant for energy efficiency and develop the energetic sector based on renewable sources because the energy production and operating represent about 75% from CO<sub>2</sub> emissions; the pressure on the fossil fuel industry will be increased due to regulatory of limiting the Carbon emissions.
- UE supplier with secure energy security at accessible and competitive prices; in according with Renewable Energy Agency the cost of renewable sources energy will be cheaper than fossil fuel worldwide.
- An integrated, interconnected and digitalized UE energy market.

Final energy consumption reached about 18% in EU from renewable sources, up from 17% in 2018 and about double 2004 (8,5)%. Sweden has the highest consumed energy from renewable sources (54,8%), followed by Finland (41,2%), Latvia 40,3%, Denmark (36,1%) and Ostrich (33,4%). Romania has 0,1% away from own national framework objectives.

Romania will reach 27,9% of final consumption from renewable energy and improve the energy efficiency with 37,5% (Integrated National Plan in the field of Energy and Climate Change).

The main source of electricity, located in the Oltenia basin, produces about 40 TWh / year, based on an excavation of about 21 million tons of lignite per year. All the plants in the Oltenia basin are modernized. There are still many challenges for these plants, as to the impossibility of giving up this energy source but also by the financial difficulties caused by an uncontrolled evolution of the price of green certificates from 7€ /tons CO<sub>2</sub> to 29 - 30€/tons CO<sub>2</sub>. Practically 45% of the benefits obtained by coal producers, are used to purchase green certificates that limiting the possibilities for investment and modernization. To face the competition in the market the operator has adopted a clear strategy to reduce emissions in which it is obliged to reduce by 1600 MW the capacity on lignite. [5]

The gross final energy consumption of all energy sources, covers total energy delivered for energy purposes to final consumers as well as the transmission and distribution losses for electricity and heat. National energy security has traditionally been characterized by the robustness of energy systems and strategic oil stocks. The shift to digital, decarbonized, and decentralized energy systems raises new energy security challenges – including extreme weather, grid visibility, reliability and resilience. In the next few years, the decisions which taken in Europe will influence in the strongly way the model of the world responds to the challenges of climate.[6]

In order to ensure a fair and just transition to E.U ambitions, some aspects must highlight:

- The coal regions must be founded in specific boost for facing the toughest challenges;
- Energy efficiency is a vital principle for the clean energy transition;

- Smart sector integration with stronger integration of the electricity, heating and cooling, transport, gas, industry is efficiency through incorporate renewables into all parts of the energy sector.

The world needs to capture as much as 6 billion metric tons of CO<sub>2</sub> by 2050, according to modeling done by the International Energy Agency, the energy giant's shareholders are pressuring the company to take steps to ensure climate change doesn't convert their investments into stranded assets. And to scale up, the cost of carbon capture needs to come down.

For example, in 2020, the electrical energy production from wind and solar farms has increased with 64TWh at 600 TWh and for the first time has overtaken the electrical energy production produced in coal power plants with 100 TWh. The wind farms supplied with 14% more energy in 2020 than 2019, while solar farms recorded a growth of their production with 7%. On the other hand, the electrical energy production has decreasing with more than 6% due to dryness weather. Viewing the new annual capacities about 16,8 GW was installed in wind farms and more than 16,5 GW in solar farms.

Energy transition is in a strong tie with wider set of decarbonizing due to the main challenge of world for climate change. Key trends and uncertainties affecting electricity transmission determine some features as (fig.2) [7]:

The transition to a low carbon involves:

- penetration of variable renewables such the wind and solar;
- new technologies such as utility scale batteries and hydrogen;
- fossil fuel powered generators close and disconnect from the system.

The point of view of decentralization:

- connecting a range of new technologies and new prosumers;
- changes in supply and demand patterns;
- prosumers and electricity being produced closer of where is consumed.

Customers as active elements of the system:

- electrification of end-uses as industry, heat and mobiles;
- demand response programs included smart devices and distributed energy storages;
- new demand patterns with the emergence of flexibility providers.

More automated operation of the system:

- the evolution and using the intelligent or smart metering, remote control and automation system;
- forecasting capabilities development;
- optimization and aggregation platforms as future trends.

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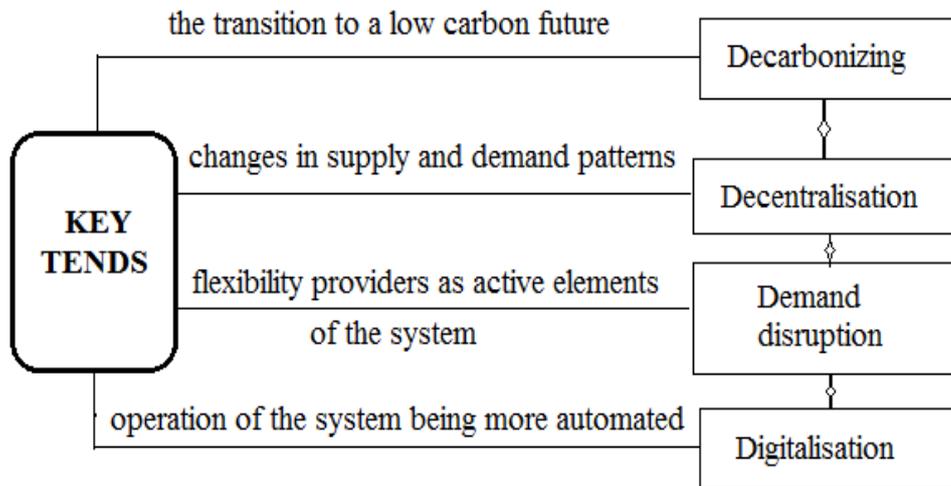


Fig.2. Key trends and uncertainties affecting electricity transmission companies

In 2020, global investment in the low-carbon energy transition summed \$501.3 billion, up from \$458.6 billion in 2019 and just \$235.4 billion in 2010. This figure includes investment in projects, such as renewable power, energy storage, EV charging infrastructure, hydrogen production and CCS projects – as well as end-user purchases of low-carbon energy devices, such as small solar systems, heat pumps and zero-emission vehicles.[8]

For Romania are necessary huge harmonize efforts through coordination the national policies with neighboring countries. Next new challenges can be regulated for assuring the real participation to market mechanisms and climate reduction:

- The appearance of energy agregators;
- The evolution of energy storage units;
- The appearance of prosumers;
- Efficient renewable sources integration.

### 3. CONCLUSIONS

Among all, two valid solutions for reducing CO<sub>2</sub> emissions have been identified as being most relevant: energy efficiency improvements and generation by renewable energy sources. The sustainable development is based on efficient energy using. The energy efficiency increasing in different operations of energy and decreasing the harmful emissions level help the human society to have a cleaner atmosphere, a better health and more related comfort.

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