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Analyzing The Social Parameters And The Advantages Of Local Energy Cooperatives Regarding The Energy Transition And The Expansion Of Renewable Energy Sources

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Abstract—The social acceptance of the renewable energy sources is an important factor for the success of the energy transition. The feedback of the citizens of the local communities needs to be taken into account in the decision making procedure. The energy cooperatives, especially at the local level, have a major role and can put the society in the center of the renewable strategies. For this reason, the presentation of specific scientific data, the life cycle sustainability assessment and the dissemination of good practices are critical for the expansion of the renewables in a positive and sustainable way, by taking into account the emergence of climate crisis.

Keywords—European Green Deal; climate crisis; renewable energy sources; social reactions; good practices; energy cooperatives; carbon footprint; biodiversity; circular economy; solidarity; life cycle sustainability assessment.

I. INTRODUCTION

It's clear: the humanity is living beyond the planet's limits [1] and this fact has as a result the climate crisis, which is a salient threat to the civilization survival itself. As the consequences of the climate crisis intensify, the risk increasingly impacts the humankind. Since the problem originates from the consumerism and the luxuries of the developed world, the climate crisis becomes unfair to socially vulnerable and economically weak groups worldwide. Because of these circumstances, pursuing a new strategy – a key pillar of sustainability – is more important than ever to protect the planet, providing balanced development and equal opportunities, without exceptions, so no one will remain on the sidelines.

II. ANALYSIS

In this context, the EU presented the European Green Deal (EGD) at the end of 2019 [2], aiming at zero net greenhouse gas emissions by 2050, stating that no man and no region will be left behind [3].

As a follow up of the EGD, the European Commission announced a new plan for the energy

[4], which proposes to increase Europe's offshore wind power from the current level of 12 GW to 60 GW by 2030 and 300 GW by 2050, adding an additional 40 GW of ocean energy and other emerging technologies, such as floating facilities of wind and solar energy by 2050 [5].

Given that in Europe there are already existing offshore wind parks, it is crucial to respect the ecosystems, so that the goal of a climate-neutral Europe does not have a negative impact on the conservation of biodiversity. The European Commission has set a framework [6] and it must be followed in every country.

The wind farms in mountainous areas have provoked many social reactions, especially in cases where the local communities were not involved in order to express their point of view and become a part of the decision making procedure. Therefore, the holistic analysis of the existing social data is crucial for the energy transition to make it fair for everybody and to minimize the environmental impact on the one hand and the energy poverty on the other, so that the citizens can become active participants of the new energy reality and not just observers.

The scientifically proven optimal location of the wind farms (onshore and offshore) is in any case a crucial issue. Absolute respect is crucial for: a) Natura 2000 areas [7], b) Migration flows and the seasonal routes that are followed by birds, fish, mammals, c) Areas of habitat/nesting species of marine flora and fauna, especially the endangered and endemic ones. At each stage of possible projects (design, construction, operation, maintenance, restoration and recycling after the end of the life cycle), it is obvious that the sensitive areas should be excluded from the nuisance, which will be defined by relevant certified scientific groups (biologists, ichthyologists, ornithologists, marine scientists, environmentalists, etc).

The dramatic experience of the pandemic crisis and the role of scientists, should also be taken under serious consideration. The current worldwide situation would certainly be different if the voice of science was heard on time. It is worth mentioning that even from 1896 the Nobel Prize Winner Laureate Svante

Arrhenius was warning about the threat of the climate crisis [8].

Furthermore, the case of the Environmental Association: "National Audubon Society" in the USA, whose work has been dedicated to the protection of birds and ecosystems, having a network of scientists since 1905, is characteristic. Articles of this Organization emphasize that due to the climate crisis 2/3 of the birds in North America are threatened [9], stating at the same time that properly sited wind power can help protect birds from climate change [10]. From their side, scientists are constantly analyzing and proposing new ways of minimizing the effects of wind energy [11], [12], [13], [14], [15], which are necessary to be studied before any decision.

Moreover, issues that are related to offshore wind facilities such as: fishing, sea tourism, maritime service, visual disturbance, noise, electromagnetic field can be addressed, predicted and solved [16], even before the construction period. At the same time, new activities can be designed, based on the sea wind mills that can attract new visitors [17], like innovative ecotourism activities, or even creating new ecosystems [18], [19]. In any case, the consultation with the local communities and the in-depth consideration of scientific studies is imperative [20], [21].

There is important European experience, which is worth considering, in order to avoid mistakes and omissions of the past and to gain experience. The case of an offshore wind farm in Copenhagen is characteristic, which is half-owned by the city-owned utility company and half-owned by 8,553 people from all over Denmark [22], forming the energy community: "Middelgrundens Vindmøllelaug (Middelgrunden Wind Turbine Cooperative) [23]". Each share of the Cooperative represents a production of 1000 kWh/year and was sold for €570 [24]. Also, this Cooperative participates in the European federation of citizen energy cooperatives (REScoop) [25]. Citizens' active action in such projects represents a protection for energy democracy, transparency and joint decision-making, which can tackle energy poverty and raise public awareness [26]. Such possibilities for cooperation of energy communities with wider participation of citizens, both at National and European level, would be desirable to be considered in future renewable energy projects, in order to strengthen the idea of "no one to be left behind", which is of major significance in the concept of EGD as mentioned before, while facilitating broader access to financing tools.

It is certainly clear that whatever option is chosen for energy production, the goal must be twofold: a) access for everyone to cheap electricity, so that no one is left without meeting their energy needs, especially in times of crisis, as we are experiencing today with the COVID-19 and b) commitment to the goal of zeroing the carbon footprint, primarily through resource and energy savings, promoting the model of solidarity and modest prosperity, against the present egocentrism and reckless consumerism. A study of offsetting the carbon emissions has been employed to

the Orthodox Academy of Crete, in order to improve the sustainability of the Foundation's Conference and Research Center [27].

In addition, reducing Europe's unemployment must be taken into account. This is why incentives for European production of renewable energy systems must be provided, so that energy needs can be met by utilizing as many local resources and as much manpower as possible. In addition, important sectors of the circular, social and solidarity economy should be developed such that they respect the environment and operate by taking into account the life cycle sustainability assessment [28]. Furthermore, the case of photovoltaic systems should be taken into account again by analyzing the most environmental friendly solutions, again, by using life cycle analysis [29].

III. CONCLUSION

Consequently from the above session, the use of renewable energy respecting the environment and people, can be an opportunity for substantial progress. The importance of conserving biodiversity should be realized to the fullest extent without neglecting the needs of all people and for decent living conditions. The energy transition can be an opportunity not only for environmental reasons but also for our social awareness: the principles of solidarity and coexistence/cooperation should be promoted by the neighborhood, the village, the municipality, the prefecture and beyond.

As Ioannis Makrygiannis (1797-1864), one of the protagonists of the Greek Revolution of 1821 [30], used to say, we have to move from "I" to "we" [31]. We should make another revolution today, 203 years later [32]; a "green revolution", because, as His All Holiness the Ecumenical Patriarch Bartholomew I emphasizes: "The protection of the common good, of the integrity of the natural environment, is the common responsibility of all inhabitants of the earth" [33], [34], [35].

REFERENCES

- [1] Joseph Stiglitz, "Is Growth Passé?, Project Syndicate, 09.12.2019: <https://www.project-syndicate.org/commentary/climate-change-demands-transition-to-green-growth-by-joseph-e-stiglitz-2019-12>
- [2] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, "The European Green Deal", Brussels, 11.12.2019: https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF Annex:https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_2&format=PDF
- [3] European Commission, "A European Green Deal – Striving to be the first climate-neutral continent":

https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

[4] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, "An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future", Brussels, 19.11.2020: https://ec.europa.eu/energy/sites/ener/files/offshore_renewable_energy_strategy.pdf

[5] European Commission, "Boosting Offshore Renewable Energy for a Climate Neutral Europe", Press Release, Brussels, 19.11.2020: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2096

[6] European Commission, "Commission issues guidance on reconciling wind energy developments and nature", 19.11.2020: https://ec.europa.eu/environment/news/commission-issues-guidance-reconciling-wind-energy-developments-and-nature-2020-11-19_en

[7] European Environmental Agency, Natura 2000 data - the European network of protected sites: Data: <https://www.eea.europa.eu/data-and-maps/data/natura-11> Map: <https://natura2000.eea.europa.eu>

[8] Svante Arrhenius, "On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground", *Philosophical Magazine and Journal of Science*, 1896, Series 5, Volume 41, pp. 237-276: https://www.rsc.org/images/Arrhenius1896_tcm18-173546.pdf

[9] National Audubon Society, "Two-thirds of North American birds are at increasing risk of extinction from global temperature rise": <https://www.audubon.org/climate/survivalbydegrees>

[10] National Audubon Society, "Wind Power and Birds – Properly sited wind power can help protect birds from climate change", 21.07.2020: <https://www.audubon.org/news/wind-power-and-birds>

[11] Roel May, Torgeir Nygård, Ulla Falkdalen, Jens Åström, Øyvind Hamre, Bård G. Stokke, "Paint it black: Efficacy of increased wind turbine rotor blade visibility to reduce avian fatalities", *Ecology and Evolution*, 2020, Volume10, Issue16, pp. 8927-8935: <https://onlinelibrary.wiley.com/doi/full/10.1002/ece3.6592>

[12] Sara P. Weaver, Cris D. Hein, Thomas R. Simpson, Jonah W. Evans, Ivan Castro-Arellano, "Ultrasonic acoustic deterrents significantly reduce bat fatalities at wind turbines", *Global Ecology and Conservation*, 2020, Volume 24: <https://doi.org/10.1016/j.gecco.2020.e01099>

[13] Molly Bennet, "How New Technology Is Making Wind Farms Safer for Birds Raptors and wind energy have a fraught history. Could these innovations allow them to co-exist?", National Audubon Society, 2018:

<https://www.audubon.org/magazine/spring-2018/how-new-technology-making-wind-farms-safer-birds>

[14] Scott R. Loss, Tom Will, Peter P. Marra, "Direct Mortality of Birds from Anthropogenic Causes", *Annual Review of Ecology, Evolution, and Systematics*, 2015, Volume 46, pp. 99-120: <https://doi.org/10.1146/annurev-ecolsys-112414-054133>

[15] Olivia Langhamer, "Artificial Reef Effect in relation to Offshore Renewable Energy Conversion: State of the Art", *The Scientific World Journal*, 2012: <https://www.hindawi.com/journals/tswj/2012/386713>

[16] J.K. Kaldellis, D. Apostolou, M. Kapsali, E. Kondili, "Environmental and social footprint of offshore wind energy. Comparison with onshore counterpart", *Renewable Energy*, 2016, Volume 92, pp. 543-556: <https://doi.org/10.1016/j.renene.2016.02.018>

[17] University of Rhode Island, "Offshore wind farm increased tourism on Block Island", *ScienceDaily*, 2019: www.sciencedaily.com/releases/2019/05/190506150138.htm

[18] Nicole DiPaolo, "A New Home for Fish: How Offshore Wind Turbines Create Artificial Reefs", *National Wildlife Federation*, 2019: <https://blog.nwf.org/2019/09/a-new-home-for-fish-how-offshore-wind-turbines-create-artificial-reefs>

[19] Maria Glarou, Martina Zrust, Jon C. Svendsen, "Using Artificial-Reef Knowledge to Enhance the Ecological Function of Offshore Wind Turbine Foundations: Implications for Fish Abundance and Diversity", *Journal of Marine Science and Engineering*, 2020, 8(5), 332: <https://doi.org/10.3390/jmse8050332>

[20] Vanja Westerberg, Jette Bredahl Jacobsen, Robert Lifran, "The case for offshore wind farms, artificial reefs and sustainable tourism in the French Mediterranean", *Tourism Management*, Volume 34, 2013, pp. 172-183: <https://doi.org/10.1016/j.tourman.2012.04.008>

[21] The European MSP Platform (financed by the European Commission), Maritime Tourism (incl. local communities) and offshore wind: https://www.msp-platform.eu/sites/default/files/sector/pdf/1_tourism_offshore_wind.pdf

[22] Jens H. M. Larsen, Hans Christian Soerensen, Erik Christiansen, Stefan Naef, Per Vølund, "Experiences from Middelgrunden 40 MW Offshore Wind Farm", *Copenhagen Offshore Wind*, 2005: <https://energytransitionkorea.org/sites/default/files/2019-07/5.%20Copenhagen%20Offshore%20Middelgrunden.pdf>

[23] Official Website of the "Middelgrundens Vindmøllelaug": www.middelgrundens.dk

[24] Website: "State of Green": <https://stateofgreen.com/en/partners/city-of->

copenhagen/solutions/middelgrunden-wind-turbine-co-operative-middelgrunden-vindmollelaug

[25] Official Website of the European federation of citizen energy cooperatives (REScoop): www.rescoop.eu

[26] Hans Chr Sørensen, Stefan Naef, Jens H. Larsen, "The Middelgrunden Offshore Wind Farm", ISBN: 87-986690-3-6:

https://base.socioeco.org/docs/a118_doc1.pdf

[27] Ioannis Vourdoubas, Antonios Kalogerakis and Kostantinos Zorbas, "Sustainability Assessment: Offsetting Carbon Emissions from Energy Use at the Orthodox Academy of Crete (OAC)", American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS), 2020, Vol 72, No 1, pp. 67-80: https://asrjetsjournal.org/index.php/American_Scientific_Journal/article/view/6215/2235

[28] Schlör, H. & Hake, J.F., "Sustainability Assessment Circle", Energy Procedia, 2015, 75, pp. 2641–2648:

<https://www.sciencedirect.com/science/article/pii/S1876610215011297>

[29] Viktor Kouloumpis, Antonios Kalogerakis, Anastasia Pavlidou, George Tsinarakis and George Arampatzis, "Should photovoltaics stay at home? Comparing the environmental impacts of commercial ground-mounted photovoltaic installations against residential roof-mounted using life cycle assessment", Sustainability, 2020, 12(21), 9120: <https://doi.org/10.3390/su12219120>

[30] David Berkey, "General Makriyannis, Aponimonevmata (Memoirs)", Hoover Institution, Stanford University, 2017: <https://www.hoover.org/research/general-makriyannis-aponimonevmata-memoirs>

[31] Ioannis Makriyannis, "The Memoirs of General Makriyannis, 1797-1864", Edited and Translated by H.A. Lidderdale, Oxford University Press, 1966.

[32] Official website for the anniversary of 200 years after the Greek Revolution: <https://www.greece2021.gr>

[33] Message of His All Holiness the Ecumenical Patriarch Bartholomew for the World Day of Prayer for the Care of Creation, September 1, 2020 (official Facebook page of the Ecumenical Patriarchate): <https://www.facebook.com/ecumenicalpatriarchate/posts/-b-a-r-t-h-o-l-o-m-e-wby-gods-mercy-archbishop-of-constantinople-new-rome-and-ec/10158569239964158>

[34] "The Green Patriarch", Becket Films, 2009: <https://www.youtube.com/watch?v=Qmumu80w4Ow> (Documentary film, first presented at the International Scientific Conference on Renewable Energy Sources, at the Center of Mediterranean Architecture in Chania on September 2, 2009).

[35] Ecumenical Patriarchate, "Halki Summit I, II, III, IV", Series of Ecological Conferences (2012, 2015, 2019, 2020): <http://www.halkisummit.com>