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Review of:

“Europe – Energy – Climate; The quest for the clean energy transition in the EU”

an edited monograph **by Agnieszka E. Rządowska**

Reviewer: Monica Oliphant AO, MSc (Physics London), DUniSA

This is a very opportune publication coming as it does at a time of two major global events: the release of the latest IPCC report with strident warnings of the urgent need to accelerate reductions in global greenhouse gas emissions and the Russian invasion of the Ukraine that has focussed the collective mind of the EU on external fossil fuel dependencies. These current events enhance the importance of the main themes that emerge from reading this impressive work - the urgency to accelerate reductions in fossil fuel use, how to negotiate a fair just clean energy transition and the great need for security of energy supply and reliable supply chains.

The Monograph is divided into 5 parts each containing 9 or 10 chapters/papers:

1. Current energy situation in Europe
2. European energy policy
3. The context of climate change
4. Clean energy technological developments
5. Clean energy transition, security and its global context

The work has been a mammoth task with 12 chapters being written by the Editor, Agnieszka Rządowska, along with 31 chapters by other authors. A total of 43 chapters and almost 1200 pages. Though predominantly about the EU the work is placed in a global context. The chapters are covered by many leading European and international experts with academic and specialised backgrounds in the fields of policy, analysis, strategic planning, as well as technology. In this way the publication presents different perspectives and enables the reader to develop personal opinions based on being acquainted with different aspects of climate issues.

At the beginning of each section Agnieszka Rządowska provides a very thoughtful and comprehensive review of the topic providing us with great insights and in-depth reports. These can act as a very good source of topic reference as the writing is always detailed, referenced, and accompanied by relevant tables, graphs and an extensive bibliography.

The Monograph is structured well and starts in Section 1 by taking us through a thorough discourse of the current status of energy, and in particular renewable energy (RE), in the EU and globally. Included are the various policy initiatives that have been employed to cut emissions. We know that there is great urgency to decarbonise the energy sector if we are going to prevent irreversible changes to our fragile ecosystems and keep temperature rises to below 1.5C .

So how is it going?

- In the electricity sector the EU had a 2020 penetration of 39% Renewable energy (RE) whereas globally it was only 28%.
- In final energy consumption, (heating and cooling, transport and power). The EU had a 2020 target of 20% RE but exceeded this and achieved 22% RE whereas globally it was only just over half this at 11.5%. A global increase of merely 2.5% achieved over the past 10 years.

Ultimate target is carbon neutrality by 2050, so there is a long way to go for both the EU and globally and the aim is for the EU to lead the way!

Currently in the EU the installation of RE capacity is exceeding that of fossil fuels – but not at sufficient rate. However, what is additionally hindering a more rapid decarbonisation progress globally is that the large coal consuming countries, in particular China and India, though reducing coal use, are doing so at a rate that results in their new RE additions being still less than those of new fossil fuel installations. Consequently, even though annual solar and wind capacity installed in China is by far the highest globally – the result is an overall increase in global emissions.

Section 2 discusses in detail the central pivot of current energy policy in the EU, which is the European Green Deal; A strategic policy to make the European Union the first climate neutral continent by 2050. The program not only aims to strengthen Europe's position as a leader in green transformation in the world, showing other countries the right and responsible path with its own example, but also to change the climate challenge into an opportunity for economic development through innovation and supporting Europe to secure a leading global market and technology position in this field.

In Section 3 on “The context of climate change” – Agnieszka Rządowska has put together a review, in her initial 2 chapters, an almost stand-alone document on climate change drivers, EU strategies and targets plus global warming scenarios relating to both the EU and globally. She then ends up with a short introduction to the United Nations Framework Convention on Climate Change (UNFCCC) and its Conferences of the Parties (COPs), a detailed discussion of the Kyoto Protocol and the Paris Agreement with additional commitments of the UNFCCC, then concludes with an European climate targets outlook – a useful reference to have in one place.

This Section then provides supporting papers that include discourses on building integrated PV, fostering green jobs, energy trading EU energy poverty and heat policies amongst other topics.

Section 4 is on “Clean energy technological developments”. Though this has a definite bias towards solar technologies and in particular PV, the papers do cover solar thermal developments and the other RE technologies of wind, biomass, and hydrogen ending up with a Chapter on digital technologies.

There is a trend currently that suggests that in order to reach the 2050 goal of carbon neutrality we should “electrify everything”. However, there are certain end uses in the final energy mix that are more suitably addressed by other means – eg some heavy industry industrial processes, including, production of steel, aluminium and cement and industrial process heat plus heavy transport, shipping and air transport. Also diversification of energy sources reduces risks. Therefore, I found the papers that did address industrial processes especially interesting and in particular there is a very good paper on “Hydrogen in a future integrated energy system”. Hydrogen and hydrogen research is an increasingly important area of study.

Section 5 is on “Clean energy transition, security and its global context “. Reading this section led me to reflect on the following:

The Russian invasion of the Ukraine has highlighted the vulnerability of the EU to reliance on outside fossil fuel supplies, particularly gas and oil. On the policy side this has led to an increase in the EU 2030 RE target from 32% to 45% - a positive outcome.

However, what I found extremely interesting but worrying is that dependencies on fossil fuels are slowly being displaced with new dependencies on raw materials with resource rivalries, governance challenges and vested interests.

Currently China is the largest user and manufacturer of solar PV, wind generators, electric vehicles and Li-ion batteries. In fact about 90% of PV panels and over 50% of wind generators are made in China. The remaining 10% of PV panels are mainly manufactured in USA and EU. As the world almost exponentially increases its installations of solar and wind power there will be increased reliance on RE supply chains from China.

China has also invested in expanding its control on critical raw materials worldwide, of which the EU has only limited supply. Today China controls the mining and processing of 85% of the rare earth's elements used for wind turbines, is the main producer of minerals such as germanium and indium, used for solar power, and graphite, used for fuel cells and batteries and holds 1/3 of the patents in clean energy technologies. In addition, 50% of cobalt mines in the world are managed by China and processing and refining facilities for critical minerals are also geographically concentrated with 80% of the world's rare earths processing capacity held by China. Also the country is set to dominate the lithium-ion production for the next decade, and has remit over neodymium and dysprosium, that are other critical ingredients for car batteries. (Note: Today, lithium-ion represent 95% of the global stationary energy storage solutions.)

Although I have laboured the above, we know that to achieve the necessary decarbonization drive, massive penetration of clean energy technologies and solutions is imperative. These technologies all rely on new type of resources, and their uninterrupted supply. Diversity of supply is essential and research into new technologies that do not have single country dependencies is a priority.

Finally, I would like to congratulate the Editor of *“Europe – Energy – Climate; The quest for the clean energy transition in the EU”*, Agnieszka Rządowska. It is a very scholarly publication on a topic that she obviously feels very deeply about together with the contributing authors and that has had a lot of work put into it to make it a useful addition to literature on energy and climate in the EU.

M. V. G. J. /

Monica Oliphant AO, April 2022

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