

Commentary | Received 17 July 2023; Accepted 26 February 2024; Published 6 March 2024
<https://doi.org/10.55092/rse20240002>

Bioenergy development in a deadlock?

Christian Rakos

World Bioenergy Association, Franz Josefskai 13, 1010 Wien, Austria

E-mail: christian.rakos@worldbioenergy.org

1. Executive summary

Many facts seem to point towards a successful take off of bioenergy towards becoming a key source of energy for humanity: dynamic market growth, at least of some modern forms of bioenergy use, amazing technology developments and increasingly committed policies to mitigate GHG emissions. However, campaigning against bioenergy has reached a level that is starting to have a decisive influence on policy makers. The future is uncertain — will bioenergy use be discredited to a point where it will not play a relevant role apart of traditional decentralized use? Will we see humanity heading straight into runaway greenhouse effect as alternatives to today's fossil energy use are blocked or will a reasonable and sustainable use of bioenergy finally prevail?

2. Technology advances

Bioenergy is delivering almost two thirds of global primary energy from renewable resources, 9% out of 14% in 2021 according to IEA [1]. Bioenergy has seen impressive technology developments across all scales of use. At the smallest scale cookstoves are available, that burn almost as clean as LPG cookers — so called top lit updraft gasifiers (TLUD) using pelletized biomass. Domestic heating equipment for biomass fuels has reached efficiencies of 95% of lower heating value and emissions close to zero, the same applies to commercial and industrial scale combustion equipment. Gasification processes have been developed to convert biomass into syngas and a wide range of renewable hydrocarbons. Some biorefineries are operated by paper industries to make use of different fractions of biomass. Biomass fired, combined heat and power plants, are supplying large cities with energy and are making plans to capture and store the emitted CO₂ to create negative carbon emissions. From the point of view of advances in technology bioenergy has been on a path of success over the last decades.



Copyright©2024 by the authors. Published by ELSP. This work is licensed under Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium provided the original work is properly cited.

3. But use of modern bioenergy is still limited

Three quarters of global bioenergy use is still more or less traditional use of firewood and charcoal. A significant part of that could be considered unsustainable, as it is associated with heavy pollution and health problems as well as overuse of resources. Modern forms of bioenergy use are still advancing at a relatively low pace and restricted to a small number of countries that are focal points of market development. These countries typically have an abundance of biomass resources and supporting policies that have helped bioenergy use to take off, in spite of low fossil fuel prices.

The most rapidly growing form of upgraded biomass are pellets, currently mainly made from residues from timber processing or low grade wood that cannot be used for timber. In the future agricultural residues will also be used. Between the year 2000 and 2022 this market grew from two million tons to over 45 million tons [2], not including the production in China. Pellet production in China is poorly documented but has reached 20 million tons according to personal communication from Chinese experts.

Together this amounts to 65 million tons or an energy content of 1.1 EJ which is about 1.5% of global bioenergy use which according to IEA is 60 EJ.

4. Towards a bright future?

All scenarios that try to develop a consistent vision of an energy future with net zero emissions, bioenergy plays a key role and is one of the three most important energy technologies, together with wind and PV. The International Renewable Energy Agency IRENA predicted in its World Energy Transition Outlook 2022 [3] that bioenergy will need to contribute 153 EJ, to reach a climate neutral energy supply.

The Net Zero scenario of IEA [4] considers a contribution of 103 EJ, which is also significantly more than today and assumes a rapid replacement of inefficient traditional use of bioenergy can be realized.

Also, political commitments to reach carbon neutrality by mid century have been made in Europe, in China and most recently in the USA. So great times ahead for bioenergy?

5. Turning the tide – industrial bioenergy use and campaigning against bioenergy

Until about 2010, many environmental organizations have regarded bioenergy as part of the solution for greenhouse gas mitigation and were supportive of its development. Then came the industrial use of bioenergy. A few utilities operating coal fired power plants in Belgium, the UK and the Netherlands found, they could replace coal with wood pellets to produce renewable energy-based electricity with their existing assets. Their demand for long-term stable wood supplies opened the possibility to invest in large scale pellet production facilities in the most abundant fiber baskets, the US southeast and western Canada. The scale at which they were consuming wood pellets raised the concerns of environmental organisations. Indeed, a single power plant that burns 8 Million tons of biomass per year seems like a threat

to forests, particularly if it is considered a role model and more and more plants follow its example.

Environmental organizations work differently today than in the 1970's. They have grown to multinational organizations with thousands of employees. Funding is being provided by philanthropies, family foundations or individual billionaires that spend literally hundreds of millions of dollars for purposes they find just and appropriate. Ecological campaigning has become professionalized with large funding. As a consequence, campaigning against bioenergy did not develop as a bottom up movement of concerned young activists but as a professionally developed public-relations campaign with all ingredients a successful campaign needs: the backing of scientists, a dramatic narrative, easy to understand arguments, impressive pictures, carefully picked cases of bad practices and a wide network of relationships with journalists carrying the messages towards the wider public and in this way also to policy makers. NGOs have learned from the campaigns of the tobacco industry or the campaigns the oil industry launched against nuclear energy or against climate change policies that scientific backing is critical for credibility, no matter if the involved scientists represent a minority opinion or claim research results that are based on questionable assumptions or methodologies. Their strategy is to repeat the messages of these scientists often enough to give them sufficient weight in the public debate.

Also, the effectiveness of a campaign is not based on whether it's claims are factually correct but if they seem to make sense. It seems to make sense that if you burn a tree it takes a hundred years for it to grow back, it seems to make sense that producing a lot of pellets means burning forests. The presence of illegal logging and the fact that pellets are produced in the same region seems to lead to the conclusion, there is a causal relationship between these two facts. An avalanche of negative stories about bioenergy started to flood European news channels and is continuing to do so.

6. Facts and fiction

An impressive example of how even high-quality media such as the New York Times, repeated a narrative that has almost nothing to do with reality is an article with the title "Europe is sacrificing its old grown forests for energy" [5]. The story suggests illegal logging of old growth forests is being performed to produce pellets in Romania to fuel our hunger for energy. Incidentally the extensive pictures of devastated forests that illustrate the article, depicted a forest damaged by a storm. Romania, is according to FAO data [6], among the countries with the highest annual increment of forest, as less than half of the 58 million m³ of annual increment is harvested (20 million m³). Finally, of the 600.000 t of pellets produced in Romania, 70% come from one company that operates large sawmills and uses the residues for this purpose. Even if all other pellet producers would use virgin wood (which is not the case), the resulting wood demand of 400.000 m³ would be negligible compared to the annual increase of standing wood of 38 million m³.

Another favorite narrative focusses on the supposedly devastating impacts of pellet production in the US southeast. The fact is, that the use of low-grade industrial wood in this

area declined due to declining production of newsprint followed by the closure of 14 pulp and paper mills between 1995 and 2012 [7]. The forest owners have very few options to market trees that are not suitable for lumber production. This creates a large supply base of low-quality wood. Today, pellet production uses 4% of harvests in the US southeast and there is solid scientific evidence, that carbon stocks in US forests of the southeast are increasing [8]. Endlessly repeated claims that pellet production leads to deforestation in the US south east are simply disinformation, supported by nothing else than pictures of individual harvested plots.

In Europe, 87% of pellets used for domestic heating are produced from sawmill residues, as data from the quality certification ENplus show [9]. Nevertheless, heating with pellets has been criticized as an unsustainable practice that increases CO₂ emissions rather than reducing them. The question is, what would have happened with the sawmill residues, if they would not have been used for fuel. Board mills have enough raw material to supply their markets, so probably we would need to landfill them while continuing to use fossil fuels. How could anybody consider that a better option?

A recently published study [10] made an in depth assessment of CO₂ balances of the entire wood use value chain and also assessed the impacts of climate change on European forests. Several scenarios were investigated including a significant reduction of wood harvesting in the forests, business as usual and a significant increase of wood harvests, particularly of softwood forests that are becoming severely stressed by climate change. The result was, that in terms of total CO₂ balance the increased harvesting scenario for softwood forests performed best. The use of wood for energy is always coupled with its use as material to produce timber, plywood, paper *etc.* and all of these uses are replacing fossil energy being used in one way or another. Also, there is a need to replace forests that are softwood monocultures by biodiverse young forests with a significant share of deciduous trees to become more climate resilient and continue to absorb carbon from the atmosphere. The claim it is better from a CO₂ balance point of view to leave trees standing in the forest and continue to use fossil energies and even replace wood products with steel, concrete or plastic cannot be substantiated by any serious scientific evidence.

7. Arriving in a deadlock

In parallel to public relations campaigns against bioenergy use, heavy lobbying of European policy makers started, repeating the deforestation narrative. Several “Letters of scientists” were published that were signed by hundreds of signatures of frequently unrelated scientists that supported what seemed to be a just cause — saving forests from being burned.

While the focus of attacks was the use of biomass in power plants in the beginning, they gradually extended to other uses of bioenergy as a similar amount of pellets is used for domestic heating in Europe as for power plants.

This process has started to have very real impacts. The European Parliament has suggested to freeze and to gradually reduce the amount of biomass from forests used for energy. Renewable energy has become synonymous with using wind or PV but hardly ever includes bioenergy. Green policy makers in Germany have made a 180 degree turn withing

a year, from offering abundant subsidies for changing to pellet heating systems to making it almost impossible to get subsidies — leaving industries that have invested in production facilities with huge stranded investments and consumers confused.

When the war in Ukraine started, European policies continued to support and subsidize coal, oil and gas imports from Russia but banned pellet imports from Russia and Belarus which lead to chaotic market distortions and price spikes that have eroded consumer confidence in pellet heating, leaving very few options left to change away from fossil fuels. Suggesting to rapidly reduce fossil fuel use while excluding more than half of renewable energy use from the picture literally means to steer into a deadlock.

8. Welcome to an increasingly hotter world!

As global societies collectively continue to increase the global CO₂ levels in the atmosphere at a pace of 2–3 ppm per year we are currently on a path for a 4-5-degree increase of global temperatures. The latest report of the Club of Rome “Earth for all” states, the greatest threat to humanity is not climate change but societies’ collective inability to distinguish between facts and fictions. The recent developments around bioenergy are a vivid illustration of this statement.

My hope is that that some journalists might find it rewarding to research and publish, how public opinion as well as policy makers in Europe were systematically manipulated to turn away from a critical technology for combating climate change. We need a wake up call.

Conflicts of interests

The author declares no conflict of interest.

References

- [1] Word Energy Outlook 2022. Available: <https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf> (accessed on 7 March 2023).
- [2] Statistical Report 2022. The leading source of bioenergy statistics since 2007. Available: <https://bioenergyeurope.org/statistical-report.html> (accessed on 7 March 2023).
- [3] World Energy Transitions Outlook 2022. Available: <https://www.irena.org/Digital-Report/World-Energy-Transitions-Outlook-2022> (accessed on 7 March 2023).
- [4] Net Zero by 2050. Available: <https://www.iea.org/reports/net-zero-by-2050> (accessed on 7 March 2023).
- [5] Hurtes S, Cai W. Europe Is Sacrificing Its Ancient Forests for Energy. Available: <https://www.nytimes.com/interactive/2022/09/07/world/europe/eu-logging-wood-pellets.html> (accessed on 7 March 2023).
- [6] The State of the World's Forests (SOFO) 2022. Available: <https://www.fao.org/publications/sofo/2022/en/> (accessed on 7 March 2023).
- [7] Wood Supply Market Trends in the US South 1995–2015. Available: https://www.forest2market.com/hubfs/2016_Website/Documents/20151119_Forest2Market_USSouthWoodSupplyTrends.pdf (accessed on 7 March 2023).
- [8] Dale VH, Parish E, Kline KL, Tobin E. How is wood-based pellet production affecting forest conditions in the southeastern United States? *For. Ecol. Manag.* 2017, 15:143–149.

-
- [9] Pellets Statistical Report 2021. Available: <https://bioenergyeurope.org/article/328-pellets.html> (accessed on 7 March 2023).
- [10] Röder H. Climate-efficient management of Forests and use of wood-based resources (KlimaHolz). Available: <https://www.hswt.de/forschung/projekt/1915-klimaholz> (accessed 14 February 2024).