

Towards a systematic “topography” of the complex biomass terrain - Mapping complexity as a policy and decision support tool

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A Magnificent Gift?

An alien space-ship lands somewhere in Europe; its crew members disembark, and their leader addresses the following speech to the Europeans crowded to welcome the extraterrestrial beings on Earth: “People of the Earth, we are coming as friends and, to prove our friendship, we are bringing you a magnificent gift. Based on our long observations from space, we have noted that your part of the Earth - what you call ‘Europe’ - is plagued by a number of serious problems. Our gift is meant to help you face most of these problems at once! And here is how: Our gift makes possible for you to ‘trap’ large amounts of solar energy and store it in usable forms for as long as you plan and wish. This ‘trapping’ is accompanied by consumption of carbon dioxide and, on the top of that, by production of extra oxygen. If and when you decide to use it, a great number of possibilities are open to you, including energy (heat and electricity) and fuels, fibre and other materials, chemicals, as well as various useful fine and bulk products. All these products and uses are environmentally friendly and could hopefully substitute some of your ecologically troublesome activities. Local people can find stable employment in all those new production and conversion units, your agriculture could be rationalised, and your rural regions could so enter a period of new, balanced growth. I should add that each European area can choose the form of the gift that suits best its needs and strategies, and its peaceful complementarity with trade partners and neighbours.”

A Notorious Complexity

The gift of our “extraterrestrial” visitors is, of course, biomass. In EUREC’s Position Paper on Biomass [1] we have attempted to formulate a constructive and comprehensive response of the Europeans to that “magnificent gift,” while taking into account both opportunities and barriers, and avoiding over-simplifications of the kind, e.g., of “too expensive” or “not technically mature yet,” that still dominate the corresponding European debates. As repeatedly stated at the last Biomass Conference of the Americas [2], the main role of an updated biomass strategy should be to make possible the “harvesting” of all these potential benefits of non-food bioresource uses. In the US, authorities and other major actors are in the process of facing this challenge; Europeans should be also appropriately mobilised to receive a “gift” which, if it had not existed, we could have prayed for.

The crucial problem of the whole European biomass field consists in the low market penetration of bioenergy vectors (i.e., less than 3% in almost all EU market areas), especially those based on new conversion technologies, despite the high potential of the biomass feedstocks (permitting a 2-10 times increase), and major technological improvements. A major consequence is that the significant socio-economic, environmental, social, regional, structural, etc. potential benefits of biomass cannot be “harvested” by European actors.

As the high complexity and the other conceptual peculiarities of the biomass field have been earlier recognised as a significant barrier for efficient decision- and policy-making [3, 4], a new strategic mapping of the bioenergy territory could be useful as a support “tool” to promote market penetration of bioenergy (bioheat, bioelectricity, biofuels) and other bioproduct vectors.

¹ This paper is based on EUREC’s Position Paper on Biomass [1], composed by the same author who is currently EUREC’s Bureau member responsible for biomass.

A Multi-dimensional Topography

According to the approach proposed by EUREC's Position Paper, the several "dimensions" of the whole biomass field are first defined and, then, the particular aspects - i.e., prospects and limitations, actors and factors, etc. - are classified and analysed within this new framework. The "nerves" of the biomass terrain are multi-step production and processing chains, consisting of, at least, three main stages: resources -> conversion -> end-uses.

Specifically, the critical issue of the feasibility of biomass-based schemes is analysed in three distinct "dimensions":

- ?? Techno-economic: how to build a feasible production chain under specific market conditions;
- ?? Techno-political: how to bring the new applications closer to the market with the use of the existing policy framework, e.g., that of R&D policy; and
- ?? Socio-technical: how to consolidate upon social acceptance and other societal attitudes the bioproduct market take-up.

Each of these dimensions is further mapped in a matrix form, depicting the particular structural rules governing each field. Thus, techno-economic matrices relate bioenergy vectors to production chains; techno-political matrices link bioproduct vectors and/or chains to specific policy areas and fields, e.g. R&D, energy, environmental; finally, socio-technical matrices permit the understanding of critical societal aspects, e.g. social acceptability or societal concerns, vs. various biomass-related elements of the other dimensions (vectors, chains, policies, etc.).

Concluding Remarks of Strategic Nature

A number of research goals can be defined for each component of this complex, multi-dimensional "map," illustrated in the paper with examples of specific RTD efforts. In this way, several already set research policy goals can be clarified and/or re-oriented, and new research pathways can be identified and opened. Major examples include research tasks focusing on biomass sustainability, market diffusion mechanisms, targeted education and training, and policy synergies.

Overall, the road to a sustainable European bioenergy market needs to be paved with strategic "stones" of three "colours," i.e., belonging to three types of strategic elements: a "defensive" one in support of traditional biomass uses, an "aggressive" element in search of new market opportunities, and an "exploratory" one in pursuit of future promising developments.

References

- [1] EUREC Agency, Position Papers on the Future of Renewable Energies, to be published by James & James, London, 2001.
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- [4] EUREC Agency, *The Future of Renewable Energy*, James & James, London, 1996.

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