



Legume-supported cropping systems for Europe

Legume Futures comments on the BIOECONOMY 2030

Towards a European Bioeconomy that delivers sustainable growth by addressing the grand societal challenges ('BECOTEPS')

White paper – Official Draft 1 – Part 1 of 2

Summary

This document provides comments on the 'BECOTEPS' white paper (Part 1) from the Legume Futures research consortium.

Legume Futures is an EU FP7 research project that examines how European agricultural systems can be improved using legume crops. It comprises 18 research partners from across Europe. More details can be found on the Legume Futures website (www.legumefutures.eu).

The White Paper is well written and broadly identifies the right technical and environmental challenges for food and agriculture. The rounded presentation of these challenges from this commercial perspective is refreshing. The elucidation of the innovation challenge is good and the argument that delivering technical change in Europe from research and development is lagging behind the USA is well made. Most agricultural scientists, engineers, economists and most of the hundreds of thousands of people operating European farm businesses would have no problem supporting the ideas and arguments set out.

Success in addressing the challenges will depend on what happens on European farms, forests, and in the related supply systems. The farm business environment is dynamic, changing constantly in response to market and policy signals and in response to technical developments and opportunities. The key question is what generic levers accessible in this R&D context can be used to address these challenges. A major weakness of the paper is it overlooks the role of public policy in shaping agriculture, the rationale for which is agriculture's huge influence on public goods, including food security.

Against this background, the White Paper sets out a list of the recommendations with calls for more research, more SME involvement, more investment in 'innovation'. However, the real world rationale for such investment is not clearly set out and the paper risks underpinning research policy driven by contemporary research policy buzz-words and sound-bites. In setting out a vision for the 'Bioeconomy' the paper scarcely acknowledges the knowledge, understanding, know-how, technologies and public infrastructure developed over decades in the agriculture, food, and forestry (AFF) sectors that already address these challenges. Therefore we believe there is a risk that the paper might suggest to some not so familiar with AFF that there is a universe parallel to agriculture food and forestry called 'The Bioeconomy' which has wealth creating potential untapped by AFF. This risks a fruitless debate about refocusing research away from questions



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(Legume Futures)

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relating to agriculture, food and forestry to the 'Bioeconomy' with a new model for driving 'innovation'.

So our main points are:

- The 'bioeconomy' is nothing new. It is what we call agriculture, food and forestry (AFF).
- Agriculture, food and forestry are very intertwined with public goods and policies. It would be a mistake to assume that research and innovation paradigms that operate in for example pharmaceuticals can be applied to a 'bioeconomy' to deliver wealth that remains untapped wealth by agriculture and forestry.
- The White Paper overlooks the crucial role of public policy and related public research.
- Research and innovation policies need to be rooted in the real world researchable challenges addressed at the full range of time and system scales.
- Addressing the challenges needs to focus on levers and opportunities in AFF systems.

The Grand Challenges and realities

The Grand Challenges set out relate mostly to public goods and interests, but the proposals for addressing these challenges are focused on private goods and markets. This is to be expected as the paper is rooted in the private sector through the Technology Platforms. Indeed, this can be seen as strength in that the paper considers first what the private sector and markets can deliver as the foundation for public intervention. However, the White Paper gives the impression in places that there is a special market economy called the 'bioeconomy' based on natural resources that differs to what we know as 'agriculture, fisheries and food'. It is suggestive of wealth potential so far untapped by agriculture, food and forestry. The recommendations overlook the interaction between 'the bioeconomy' and the huge range of public goods affected by agriculture, food and forestry and the infrastructure already in place to deliver this unique combination of public and private goods. As a consequence, the paper fails to acknowledge the role of public policy, for example the Common Agricultural Policy and the wide range of directives affecting the use of these natural resources. The paper risks leading the policy community to conclude that the 'bioeconomy' functions just like other sectors of the private sector such as pharmaceuticals or telecommunications. Therefore the same paradigms for extracting economic value from research and development can be applied to unlock wealth creation through 'innovation', all enabled though proprietary knowledge and technology.

Our main message is that the policy community and those planning public investment in responding to this White Paper should avoid being led by suggestion that there is something new in terms such as 'bioeconomy' and 'innovation'. There is potential in our land based industries but this potential does not exist parallel to what we all call agriculture, food and forestry. We need research and innovation policies rooted in the realities of sustainably using and enhancing the natural resources on which these industries depend. We need research that support strategic capability relevant to a wide range public and private goals operating across short and long timeframes in this sector. In particular, we need research policy which gives equal weight to reductive basic research and research aimed at understanding and enhancing systems at the field, farm, national and global scales.

Gaps

We believe that the White Paper does not highlight with sufficient vigour the important role of agriculture systems, agricultural systems-based research, nor does it make direct recommendations in relation to key agricultural and research policies. It should be noted that the 'grand societal challenges' relate in practice to processes that are well known in the established AFF research community - for example nutrient use efficiency, crop improvement, improved animal nutrition, livestock housing and so on. There are also economic and technical challenges such the consequences of the application of private standards in markets leading to increased waste, and the consequences of production specialisation driven by technologies that reduce direct costs. In particular, the white paper overlooks the role of public policy. For example, the

Common Agricultural Policy (CAP) is not mentioned. So rooted perhaps in the idea that the 'bioeconomy' is a parallel universe to agriculture and forestry, the paper fails to highlight the real world drivers and practical solutions to the grand challenges.

FP7 recognised these fundamental European agricultural system challenges and is addressing them with some very innovative systems research projects. For example, our project (Legume Futures) is addressing the challenge posed by Europe's dependence on imported protein and is seeking to optimise European cropping systems using legume crops while reducing nitrate and greenhouse gas emissions. FP7 is also investing in promising research to reinvigorate mixed farming systems in Europe to conserve resources while addressing the need for efficient productive agricultural systems. We believe that a return to research policy focused on buzz-words such as 'bioeconomy' would compromise the progress in agricultural research made in FP7 and risks distracting us from real world challenges.

The White Paper is market focused from an industrial viewpoint. One of the grand challenges not addressed is one of supporting more sustainable patterns of food consumption. Europe ranks alongside North America as the societies most characterised by high levels of livestock product consumption with the resulting large food system environmental footprints. This 'Western' pattern of consumption clearly also has negative consequences for public health and is the major consumption determinant of the structure and impact of our agricultural system, i.e. most of our 'bioeconomy'. In this wider public context, the USA 'bioeconomy' can hardly be presented as successful in terms of socio-political outcomes. In addition to supporting very intensive livestock production contributing significantly to air and water pollution, the consequences of our consumption include the effect of European agriculture on the global trade in major commodities and associated impacts such as expansion of agriculture in countries such as Brazil. Thus the grand challenges cannot be addressed by European technology alone operating within European businesses. We need to look at global agricultural systems and at the related flows of resources, including scarce resources such as nutrients. This involves analysing European agricultural systems within a global context, and understanding the interdependence of carbon, nitrogen energy and water flows. Most importantly, we need public research that enables the AFF sectors to address the global challenges so identified. We fear that an abstract debate about the 'bioeconomy' does not foster the focus on such real world processes that we need.

European farming systems have become increasingly polarised. In addressing the consequences (e.g. nutrient excesses), there is currently no strategic approach in most of Europe to nutrient use efficiency. EU policy has boosted the use of arable (food) crops for biofuels and the negative system effects are now becoming clear. Some of these negative consequences mean that biofuels from rapeseed, maize, wheat and sugarbeet may even cause more greenhouse gas emissions than the fossil fuels they replace. The White Paper should signal the global risks associated with increased exploitation of biomass from food crops and the need for systems research in a public policy context generally. This is closely linked to the need to develop strong policies on soil carbon and soil-carbon management and monitoring. The White Paper does draw attention to waste, but is silent on the private sector forces behind the vertical integration of food markets whose current structure leads to loss of resources through overly high private standards and lack of connections between sub-markets. The important message here is that addressing these is a matter as much for the regulation of the private sector as it is for the public support of the private sector through innovation etc.

Research interests

The White Paper makes recommendations to enhance research capability and infrastructure. As has become normal in this community, distinctions are made between fundamental and applied research. We believe this is a mistake.

The distinction being made in the white paper is between research which is led by problems or questions identified by users (so-called applied research) and research that addresses questions identified by researchers (so-called fundamental or basic research). In terms of addressing the 'grand society challenges', the distinction between pure and applied research is unrealistic and

divisive. In the past, this distinction combined with idea that wealth can be unlocked in the 'bioeconomy' by proprietary research outputs (e.g. patents) has driven public investment in 'biotechnology'. Plants and animals produced on land do not function like factories. In all this, the reality that biotechnology products require two conditions for success has been overlooked:

- the 'biotech' product (for example a genetic sequence) is expressed in real crop plants grown in agricultural crops considering plant, field and farming system factors controlling that expression, and
- that these new crop plants or animals function adequately in real farming systems and can compete with the technologies and market opportunities farmers already have.

The white paper rightly draws attention to the role of mid-sized companies in innovation. The current policy to promote SME participation in research misses these important agents of innovation. But at the same time the paper says that the challenge is "to develop new research initiatives that facilitate the uptake of research outputs by European SMEs". This assertion deserves careful scrutiny. We agree that private sector involvement in research can be very valuable in many circumstances, particularly where the main research outputs support new commercial products and processes. In these circumstances, the private sector should be playing a leading role in the research, not just bolted on to meet research funding criteria. But we should ask ourselves why do we need to have 'new research initiatives' to facilitate the uptake of research outputs by European SMEs? Does this mean bolting SMEs into research projects regardless of the nature of the research questions, research outputs and the impacts sought? It should not be overlooked that involving private interests in research consortia actually risks blocking public access to the same outputs of public importance. There are also many situations where the private sector has a collective interest in research which cannot be served by the involvement of individual SMEs in research consortia. We see this position on SME involvement overlooking the reality that much of the knowledge and understanding used to innovate in agriculture and forestry is, or is most effective when considered, a public good in itself. So we advise that SME membership of research consortia should not be regarded as a panacea for improving delivery of impact and that it can risk actually reducing the innovation potential of research.

Research strategy

The 'grand societal challenges' set out are not just imminent, they have arrived. It is questionable if decades of intensive development of research policy at EU and national level has prepared us for the challenge of feeding 9 billion people in a resource constrained world. This shows the need to invest in research and education that maintains and enhances strategic capability rather than running after narrow short-term technical targets and the buzz-words of the day. Research strategy must face properly in several directions – science disciplines and coherent researchable questions; the use of research outputs in different contexts; and the enhancement the same research capability to address the long-term challenges we don't yet know. This is why we say all research is fundamental. There is a current tendency in research and education to focus on today's problems and commercial opportunities rather than on the disciplines that underpin long-term solutions. However, the grand challenges demand multidisciplinary insight rooted in bio-physical disciplines. Solutions based on ecological and bio-physical knowledge are not highlighted by those promoting biotechnology-based solutions. The result is research producing proprietary outputs delivered without the necessary systems and public understanding.

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