

## ZEF POLICY BRIEF NO 43

# THE BIOECONOMY IN ARGENTINA: LESSONS FOR ITS DEVELOPMENT AND SUSTAINABILITY

*Melisa Deciancio (Institute for Political Science, University of Münster)*  
*Pablo Mac Clay (Center for Development Research, University of Bonn)*

### Summary:

- Argentina has faced institutional and economic limitations that hindered the advance of bioeconomy strategies to expand to more sectors and more complex value chains.
- From an economic perspective, agricultural technology and biotechnology advances have proven successful.
- However, there seems to be a lack of an overarching strategy to align its early-stage developments in different areas of the bioeconomy with the environmental and social sustainability of those processes and expand the bioeconomy to other sectors besides agriculture.
- From a socio-political perspective, concerns over the socio-environmental impacts of agricultural expansion haven't echoed beyond social movements and academics.
- The country faces the challenge of developing more complex bio-based applications while preserving the environment and promoting local development.

### The bioeconomy in Argentina

Argentina has promising opportunities to foster a transition towards a bio-based economy, given its combination of biomass availability, productive land, and well-developed research capabilities <sup>1</sup>. The bioeconomy concept was introduced in the country in the mid-2000s. Initially, the concept was mainly associated with the biotechnological and well-established agricultural sectors <sup>2</sup>. This circumstance reduced the approach and definition of the bioeconomy, excluded the emergence of other visions and even raised criticism from civil society and environmental groups. Nevertheless, the country has been promoting several bioeconomy agendas in the last 20 years and attempted to develop some policy guidelines designed by private and public actors <sup>3</sup>.

The bioeconomy is being embraced by different actors around the globe as a pathway to promote sustainable growth <sup>4</sup>. However, the bioeconomy is a broad concept that can be tackled in many ways and have multiple definitions. Both from the European and the Latin American views, we see two conceptual lines that seem to converge: On the one hand, the idea of knowledge-intensive innovation as a base for diversification <sup>5</sup> and the combination of biotechnologies and digital technologies to improve production

- processes and reduce emissions<sup>6</sup>. On the other hand, understanding and mimicking natural processes is seen by regional organisations as the base for a sort of agroecological transition to promote nature-based solutions within the framework of the bioeconomy <sup>5,6</sup>.

- In Argentina, its supporters consider the bioeconomy a suitable and desirable development strategy. They highlight the benefits it would bring to the country's economic growth and the potential of the installed capacities in the agricultural, food and biotechnological sectors to add economic value. In this vision, the bioeconomy emerged as an opportunity for the country to transcend the traditional division historically established between agriculture and industry and transition to the industrialisation of agriculture. There is a strong emphasis on the bioeconomy as an instrument to produce local development and create local employment through the cascading use of biomass. The overall driver of the bioeconomy would be to address economic development and existing inequalities within the country. As such, it would help overcome some of the fundamental problems identified by dependency theorists related to the country's international insertion into the world economy.

- Several stakeholders related to the bioeconomy

in the country have pointed out their understanding of the bioeconomy in the country in terms of policy strategy, economic opportunities and sustainability impacts to obtain insights into its status and future development.

This policy brief summarises the different views and voices collected during a Stakeholder Workshop on Argentine Bioeconomy in 2021 hosted by the project SABio (Transformation and Sustainability Governance in South American Bioeconomies). The workshop brought together a diverse group of around 40 professionals from the private sector, public offices and research institutions to discuss the status and future developments of the Argentinean Bioeconomy.

## Understanding what the bioeconomy is

The bioeconomy is a broad and diffuse concept that includes several definitions, sectors and projected outcomes. Because the bioeconomy is such a broad concept that can be interpreted in different ways, prior to the workshop, we asked the participants to give their perspectives on the definition and main challenges of the bioeconomy. The overall examination of the results displayed the following concepts (Figure 1):

- Biological resources / Biomass
- Environment
- Knowledge / Innovation / Biotechnology
- Human beings / Humanism / Local communities
- Development of products and solutions
- Integration of technology and biological resources



**FIGURE 1:** First question: *¿Como define/entiende usted, personalmente, el concepto de bioeconomía? (How do you define/understand the concept of bioeconomy?)*

The next question asked to the participants was to select five words that, in their views, better relate to the bioeconomy. As a result, we elaborated a list of concepts by order of appearance (Figure 2):

1. Sustainability
2. Innovation
3. Development
4. Biotechnology
5. Regional Economies
6. Biodiversity
7. Decarbonisation
8. Productivity
9. Agroecology
10. Agribusiness
11. Science
12. Entrepreneurship
13. Re-primarization



**FIGURE 2:** Second question: *Indique cinco (5) palabras que, a su entender, estén asociadas al concepto de bioeconomía (Point out five words that in your understanding are related to the bioeconomy concept)*

The analysis of the definitions of the bioeconomy and the inputs we received from the stakeholders showed that the bioeconomy concept in Argentina has two main cornerstones:

- (i) innovation and knowledge-based economy and
- (ii) the challenge of sustainability

## Knowledge and Capacities

One of the cornerstones of the bioeconomy is the introduction of new technologies that allow the transformation of biomass into new products and contribute to replacing fossil-based materials. For this purpose, knowledge and capacities are critical aspects of the development of the bioeconomy. For the case of Argentina, the main goal during the workshop was to understand the leading technologies and skills available in the country to develop the bioeconomy and those that are still absent and need to be pursued. Below we highlight the main points raised during the discussions with stakeholders.

### Technological innovation

**The creation of value in downstream activities.** Argentina has a solid knowledge of the leading tech-

nologies for primary production. In the country, farmers often incorporate biotechnologies in crops production and yields are high. Nevertheless, it is crucial to step forward into creating applications downstream in the value chains. This, in turn, will allow these technologies to be licensed globally. A solid and consistent regulatory framework for intellectual property is needed for this purpose.

**The problem of scale.** Argentina has a scale problem in terms of technological development. The issues are not related to skills but rather to the scale required in the relevant knowledge areas. The size of a market like Argentina is not attractive for venture capital, which poses challenges in funding and market development for emerging companies.

**The need for more explicit links between the bioeconomy clusters.** So far, bioeconomy strategies in Argentina have mostly placed the emphasis on agriculture and the primary production of biomass. However, Argentina has promising developments in other areas such as (1) human health, (2) ecosystem services, and (3) bioeconomic services, including laboratories for genetic analysis, assisted reproduction (i.e., human, animal, plants), gene therapies, and mutagenesis. These nodes can create knowledge externalities over each other. However, they appear isolated and disconnected, with few concrete synergies.

## Skills and knowledge

**The need for a stronger nexus between scientific knowledge and the entrepreneurial world.** Argentina has high-quality scientific capacities, but this is not automatically reflected in the creation of new companies. Researching is not the same as entrepreneurship, and new knowledge is not necessarily translated into practical applications. Bottlenecks may emerge in validating new technologies (the prior stage to scaling up and adopting the technology).

**Having adequate regulation of intellectual property is imperative.** As new technologies emerge, they might enter a regulatory space that is poorly defined. Patents can protect scientific knowledge but does not ensure value creation in advance. Developing a patent may be an initial incentive for researchers, but additional capabilities are required for value creation.

**Adoption rates for several new bio-based technologies remain low.** In many cases, technologies are available, but private actors are not clear about what problems those technologies can solve and how to implement them. In the case of bio-inputs, for example, the networks of agricultural producers and the link with the technology developers are essential to facilitate their adoption. These networks could be replicated in other contexts to favour private-sector adoption.

## Social and Environmental Sustainability

The sustainability of the bioeconomy is another crucial aspect of its development. The transition to the bioeconomy needs government regulation and clear governance mechanisms to avoid undesired environmental damage. In Argentina, the sustainability of the agricultural sector has been highly questioned by different actors, mainly focusing on its socio-environmental impacts, such as health issues related to the inappropriate use of agrochemicals, rural displacements, deforestation, and land degradation and concentration, among others. To understand stakeholders' vision of the sustainability of the bioeconomy in the country, we sought to understand if Argentina has the conditions for a sustainable transition to a bioeconomy and which are the main risks that this entails, both from the environmental and social perspectives.

### Environmental sustainability

**Every actor in the bioeconomy needs to understand and respect the complexity of ecosystems.** The bioeconomy must be understood as the application of biological sciences to production systems. This definition highlights the relevance of agroecology and its integration into the bioeconomy. In biological systems, all components are naturally interrelated (i.e., soil, water, insects, etc.). Therefore, human-developed innovations should consider the nexus among interdependent biological systems.

**A regional approach in harmony with biome diversity.** A well-understood bioeconomy requires a territorial approach that applies the most appropriate technologies to each region. Argentina should make use of its vast biodiversity to move the bioeconomy forward. It is necessary to value native species and the ecosystem services that are currently generated. Regulation should also go in this direction, allowing the valuation of environmental externalities to avoid punishing projects that are not yet competitive against the fossil matrix. The Argentinean legal and tax framework currently favours fossil-based production.

**Market demands and the need for environmental traceability.** Argentina must have a future perspective and anticipate the main markets' environmental requirements for its agri-food products. Thus, it seems necessary to develop traceability and environmental certification processes on a large scale. At the same time, creating an incentive system that favours these practices at the national level is essential.

### Socioeconomic sustainability

**The definition of sustainability.** It is necessary to discuss the concept of sustainability and what it means, in concrete terms, to have a "sustainable bioeconomy".

Implementing and monitoring environmental sustainability dimensions seems more straightforward, while the most significant challenges lie in defining the social dimension. This is especially important given that the bioeconomy has substantial disruptive potential in social terms, favouring regional economies over urban centres. A discussion on the long-term impacts of the bioeconomy on the human and social dimensions is fundamental.

**The reappraisal of regional economies and rural areas.** The bioeconomy requires a serious debate about the quality of life of rural populations. In recent years, Argentina has experienced a profound migration process from the countryside to the cities. Developing the bioeconomy requires increasing the attractiveness for people to relocate to rural communities. In this sense, the bioeconomy offers an excellent opportunity to regenerate regional economies. Argentina needs to improve employment conditions in the different regional value chains, which is today's pending challenge.

### Outlook: Policy recommendations and follow-up questions

- The need for an overarching bioeconomy strategy in Argentina is highlighted. Many sectors within the bioeconomy are currently being developed as disconnected clusters; therefore, the country is not taking advantage of their potential synergies. Which are the most appropriate political mechanisms to create a consistent long-term plan that aligns all these initiatives under a shared view?
- Argentina has the scientific and technical skills to transition to a bioeconomy, but a more consistent nexus between science and business is needed to create real value. Scale and funding are the most critical challenges in this regard. So what are the main ways to promote the dialogue between the scientific community and the entrepreneurial ecosystem?
- The bioeconomy should be considered a development model, integrating different regions and ecosystems. Which is the best matrix of incentives to promote this?
- It is critical to value ecosystem services and to make the best use of the country's biodiversity. However, biological systems are complex and diverse. How is it possible to harmonise the need for innovation and technical improvement concerning the intrinsic characteristics of different ecosystems?
- An agreement over a specific definition of sustainability in the bioeconomy is needed. In concrete terms: what do we mean when we argue that the bioeconomy needs to be sustainable, and how can we agree on operative indicators for measuring and monitoring sustainability?
- It is worth exploring a revision of how the country's bioeconomy is defined. This way, we could expand its scope and include more actors that could potentially impact regional development and bring in new sustainability considerations. To what extent would a redefinition of the bioeconomy concept in Argentina contribute to a more sustainable approach to biomass transformation?

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Mac Clay, P., & Sellare, J. (2022). Value chain transformations in the transition to a sustainable bioeconomy. *ZEF–Discussion Papers on Development Policy*, (319), 34.

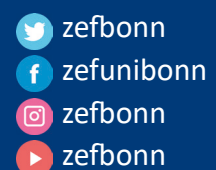
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#### IMPRINT:

Center for Development Research (ZEF)  
Genscherallee 3 | 53113 Bonn | Germany  
E-Mail: [presse.zef@uni-bonn.de](mailto:presse.zef@uni-bonn.de)  
Phone: +49-(0)228 - 73 18 46  
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