Business and Industry Advisory Committee to the OECD - Comité Consultatif Economique et Industriel Auprès de l'OCDE

In Committee

BIOTECHNOLOGY: A KEY CONTRIBUTOR TO SUSTAINABLE ECONOMIC GROWTH

A Vision Paper by the BIAC Biotechnology Committee

INTRODUCTION

Sustainable economic growth is one of the key strategic challenges for the 21st century. Innovative technological change has raised living standards, improved quality of life and enabled mankind to combat hunger, disease and environmental degradation. The expansion of biotechnology in a growing number of economic sectors has played an important role in contributing to this change and has enormous potential to improve a broad range of human activities.

As this technology continues to develop and rapidly change a wide range of activities from the delivery of vaccines to manufacturing processes, growing numbers of governments and international organisations have increased their attention on how to stimulate its development. The goal of this vision paper is to identify the strategic priorities from the perspective of the international business community. It is meant to serve as guidance to both industry and the public sector as international biotechnology policy is debated and formulated. Relying on BIAC's formal role with the OECD, this paper will pay particular attention to those actions the OECD can and should take to help achieve these priorities.

BIOTECHNOLOGY APPLICATIONS

Biotechnology has benefits to society in the health, environmental, agricultural and food sectors. In the pipeline, there are products that can help address famine and malnutrition, improve human health and reduce the environmental impact of industrial activities. Biotechnology provides an increasing range of tools for industry to improve economic and environmental performance beyond what could normally be achieved using conventional technologies. The contribution of the following applications should be considered in the debate on biotechnology:

> **Food**

Developments in the biosciences (genomics, bioinformatics, bioengineering and diagnostics) have an impact on society. The food industry is no exception. The genetic transformation of crops as an example of the

application of biotechnology to food has been the focus of much attention but is only one of the ways in which biotechnology can contribute to innovative food products, which deliver benefits to both consumers and society as a whole. That is, foods that are safe, maintain health and well being and provide individual consumers with solutions to their needs. It is essential to promote the use of science and technology in the food industry and to ensure an appropriate, robust and harmonised regulatory framework. Against this background, we must also clearly spell out what we are doing in order to promote an appreciation by consumers of the benefits that the application of biotechnology can bring to food production.

> Health

The enormous potential of biotechnology for healthcare and medicine in the mid- to long-term future is obvious. Biotechnology in health care promises to provide novel treatments and better therapies for various diseases, the facilitation of drug development through new assays and models, new diagnostic tools for early detection of diseases or risk factors and more efficient ways of delivering medicines based on pharmacogenomics research. These developments, which will create healthier societies, should improve the economic viability of current health insurance systems and related aspects of intellectual property and benefit sharing.

> Environment

Biotechnology has several promising applications for the environment. The application of biotechnology to agriculture will result in further gains in yields and reduction in land use, new higher value-added products and the development of environmentally accepted ways to manage weeds, diseases and insect pests. Future applications may include forestry, animals and fish. In the area of environmental applications, biotechnology may also offer aid in pollution control, waste management, mining, clean-ups through bioremediation and water management. Applications may offer sustainable bio-based fuels as an alternative to fossil fuels. The potential products vary considerably, but all require environmental biosafety reviews as part of product development. Biosafety reviews, both risk assessment and risk management, will require harmonisation to promote trade in a global economy.

> **Industrial**

Biological sciences are likely to have the same impact on the formation of new industries in this century as the physical and chemical sciences have had on this past century. The impact will be felt in three areas: a) the use of renewable raw materials; b) bioprocesses; and c) bioproducts including fuels, chemicals and materials. All of these applications will distinguish themselves by the contained use of microbial systems to transform, process or produce these manufactured goods. New enzyme and whole cell systems are in development to convert biomass (plant matter) into fermentable sugars. Once commercialised, this technology will enable "biorefineries" to take their place alongside oil refineries. Bioprocesses can be used to replace traditional chemical process steps in a variety of industrial settings to make a wide variety of organic compounds and other chemicals.

Finally, a wide array of bioproducts will continue to expand their market penetration. Besides fuels and chemicals, new plastics and other high performance polymers are entering the market. In general, when bioprocess and bioproducts replace those manufactured via traditional chemistry, raw materials are used and converted with greater efficiency, water and energy are saved, less hazardous waste is produced and more renewable carbon is used instead of fossil carbon. As industry makes more non-food use of agricultural products, rural economies will benefit. The combined impact of these applications will contribute to sustainable development.

> **Emerging opportunities**

In addition to the above-mentioned applications, a number of emerging opportunities arise when considering biotechnology. For example, the explosion of new information and data about genetics and the development of a robust genomic "toolbox" filled with new technology platforms such as combinatorial chemistry, bioinformatics, proteomics, biochips, and high-throughput screening provide not only truly transformative technologies but also emerging applications for business.

Genomics (the study of the structure and function of genes) and proteomics (the systematic analysis of protein expression and function) have created a broad range of emerging applications for businesses where information or technology rather than a chemical or biochemical entity is the product. For example, there are a large number of information providers of

different types in all sectors of today's biotechnology. Some are sophisticated database companies which recognise that much of the economic value in biotechnology comes not only from providing essential genomic information, but also from helping to find complex patterns and linkages among vast quantities of data through data mining and other technologies. Others are information providers operating in emerging markets such as pharmacogenetics where companies are generating value from the exploitation of information on human and plant genetic variation, susceptibility to disease, and response to drugs or plant treatments. Still others are engaged in bioinformatics - the convergence of information technologies and systems solutions with biotechnology.

In addition to information providers, emerging applications for biotechnology are also creating numerous opportunities for businesses that generate technology or provide biotech-related services for other companies or organisations to use. For the future, many businesses are beginning to invest in "molecular electronics" in an effort to have individual molecules process information and, thereby, overcome many of the information processing limitations facing the computer and semiconductor industries in the next decade. Finally, the Internet is increasingly facilitating and improving the management of biological information. The explosion of content in databases, bioinformatics, and biochips is creating a race for distributed applications of biotechnology knowledge. Numerous companies are attempting to add value by using genetic source codes to develop new applications and content in almost all areas of biotechnology.

FUTURE ROLE OF OECD

In all its applications, biotechnology is having an increasingly significant effect on the economy as a whole. The OECD has a successful record in providing science-based analysis and has the relevant expertise in economic and statistical analysis to undertake the essential work in this area more effectively than many other inter-governmental organisations. As a result, biotechnology should be integrated as a high priority topic for the OECD's ongoing work on promoting innovation and global sustainable growth. BIAC recommends the following activities to be undertaken by the OECD:

General Policy Recommendations:

To foster innovation and sustainable economic growth, it is important to: reduce barriers to competition, promote openness in international trade and investment and improve the functioning of markets; encourage an entrepreneurial spirit; mobilise labour resources and invest in high-quality education; and bring international market place realities to policy-making fora. In the area of biotechnology, BIAC recommends that the OECD:

- Integrate biotechnology as a high priority topic into OECD's work on promoting innovation, intellectual property rights and effective science and technology infrastructure;
- Carry out economic assessment of policy options (e.g., opportunity costs of not using biotechnology, etc.);
- Identify the barriers to the development and application of biotechnology, e.g., regulatory requirements, trade barriers, lack of intellectual property protection, and analyse the costs associated with these barriers for both industry and society;
- Contribute to working towards consensus and the harmonisation of technical requirements for scientific assessments;
- Foster outreach and input from non-member economies;
- Develop and disseminate a statistical picture of the sectors that supply biotechnology-related goods and services;
- Facilitate access to valid scientific data, OECD documents and work products to the public and non-member countries;
- Increase co-ordination of biotechnology activities both within the OECD and among inter-governmental organisations on the full range of biotechnology applications.

In addition, we would like to add the following specific recommendations:

> Environment

- Identify scientific principles and foster common methodologies for environmental assessments;
- Document the environmental aspects (e.g., reduction in animal wastes, reduction in pesticide use, land resources conservation) of the various biotechnology applications (e.g., bioremediation, bio-mining, bio-leaching).

> Health

- Analyse the advances in biotechnology related to human health with respect to their broad implications for innovation, economic growth, improved societal health and other key public policy goals;
- Identify health-specific regulatory barriers (e.g., clinical trials, product approvals);
- Establish a link to horizontal issues (e.g., ageing, infectious diseases, sustainability);
- Analyse the economic benefits of plant-derived pharmaceuticals.

> Food

- Carry out economic assessments of policy options in areas of existing food programmes (labelling, traceability);
- Anticipate future developments and prepare needed consensus documents;
- Support the front-line players in informing the public on risks, benefits and operation of the food system;
- Analyse the economic effects of modern agricultural biotechnology on food aid;
- Develop and define the concept of 'novelty' as applied to foods.

> Industrial

- Increase communication outreach of OECD work on the effects of biotechnology on industrial sustainability in order to stimulate a more rapid change to industrial sustainability and improve the understanding of how biotechnology in industrial processes can yield optimal economic, societal and environmental benefits;
- Analyse the economic impacts of industrial biotechnology applications (different sectors, rural communities, small and medium-size enterprises);
- Evaluate the impacts of industrial biotechnology on jobs and GDP;
- Analyse pollution prevention opportunities in process industries;

- Identify and examine the economic effects of policy initiatives (bottlenecks identified for harmonisation or elimination; incentives; regulatory, tax, investment).

> Emerging Opportunities

- Look at key convergence points (e.g., biotechnology and IT, nano);
- Assess the possibility of new materials;
- Explore links to the OECD Futures Programme.

CONCLUSION

Modern biotechnology offers hope for both developed and developing countries that the ambitious goals of sustainable development can be reached. BIAC favours an enhanced role for the OECD in analysing advances in biotechnology related to the previously mentioned applications and considering its broad implications for innovation, economic growth, improved societal health, and other key public policy goals. The OECD's high-quality analytical work and integrated analysis make the Organisation perfectly suited to have a leadership role in this area.

BIAC, as the official representative of the private sector to the OECD, has a unique role in this dialogue. In partnership with the OECD in its ongoing and future activities, BIAC can provide a useful forum for industry to help ensure that biotechnology policy and regulatory structures make the benefits of biotechnology accessible to consumers in a safe, efficient, and sustainable manner. BIAC continues to support the OECD's activities across relevant Directorates to facilitate further discussion, debate and consensus on these issues, and stands ready to partner with the OECD in its further work. Visionary thinking is required to identify the key issues and strategies to be developed in order to move towards a bio-based economy. The OECD and BIAC have an important role to play in this respect.

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