



# **Roundtables in the new Member States and Associated Countries**

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## ***Executive summary***

# ROUNDTABLES IN THE NEW MEMBER STATES AND ASSOCIATED COUNTRIES – EXECUTIVE SUMMARY

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# 1. INTRODUCTION

SusChem - the European Technology Platform for Sustainable Chemistry<sup>1</sup> - has developed a "Vision for 2025 and Beyond"<sup>2</sup> for the development of sustainable chemistry and industrial biotechnology in Europe, followed by a "Strategic Research Agenda"<sup>3</sup> giving recommendations on priority R&D topics to be pursued to support the long-term development of this sector.

The implementation of the Strategic Research Agenda has started at EU level with the 7<sup>th</sup> Framework Programme<sup>4</sup> and in the Member States and associated countries via their national research programmes, some of them integrated in a "ERA-net for Industrial Biotechnology"<sup>5</sup>. However to develop a competitive Knowledge-Based Bio-economy (KBBE), it was also necessary to understand the barriers to innovation and market access and to develop recommendations to overcome these. This resulted in the "Industrial Biotechnology Policy Agenda for Europe"<sup>6</sup>, which was provided key input to the European Commission's Lead Market Initiative for bio-based products<sup>7</sup>.

As part of the FP6 specific support action (SSA) supporting the SusChem - IB Technology Platform, EuropaBio<sup>8</sup> organised nine roundtables in the new Member States and associated countries. The main purpose of the roundtables was to discuss the development of the bio-based economy through research and innovation programmes and via policy support, to identify how industrial biotechnology could be further developed, and how implementation and coordination could be improved between the new Member States and the EU.

The first part of this report explains the rationale of these roundtables as well as their objectives and organisation. The second part gives a global analysis of the situation of the industrial biotechnology sector in the new Member States and associated countries. Finally, some recommendations are expressed with the aim to further develop and strengthen industrial biotechnology in these Member States.

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<sup>1</sup> <http://www.suschem.org> SusChem brings together a wide spectrum of organisations and individuals looking to boost sustainable chemistry, industrial biotechnology and chemical engineering research, development and innovation in Europe. It seeks to boost chemistry, biotechnology and chemical engineering research, development and innovation in Europe.

<sup>2</sup> [http://www.europabio.org/TPWhite/IB\\_Vision.pdf](http://www.europabio.org/TPWhite/IB_Vision.pdf)

<sup>3</sup> [http://www.europabio.org/TPWhite/SRA\\_final\\_141206.pdf](http://www.europabio.org/TPWhite/SRA_final_141206.pdf)

<sup>4</sup> <http://cordis.europa.eu/> The Seventh Framework Programme for research and technological development (FP7) is the European Union's chief instrument for funding research over the period 2007 to 2013.

<sup>5</sup> <http://www.era-ib.net> In the European Research Area network (ERA-NET) "Towards an ERA in Industrial Biotechnology" partners from 12 different countries join forces to reduce fragmentation of national research efforts in the area of Industrial Biotechnology.

<sup>6</sup> [http://www.europabio.org/TPWhite/policy\\_agenda\\_web.pdf](http://www.europabio.org/TPWhite/policy_agenda_web.pdf)

<sup>7</sup> <http://ec.europa.eu/enterprise/leadmarket/leadmarket.htm>

<sup>8</sup> <http://www.europabio.org> EuropaBio is the European Association for Bioindustries. It has 68 corporate and 5 associate members operating worldwide, 5 Bioregions and 25 national biotechnology associations representing some 1800 small and medium sized enterprises.

## 2. ORGANISATION AND OBJECTIVES OF THE ROUNDTABLES

### 2.1. Objectives

The main objective of the roundtables was to discuss at a national level the research and policy agendas brought forward by the different stakeholders at the European level, and their adequacy with regards to local priorities and ongoing actions, and to define the best way to implement these strategies. We also tried to identify how industrial biotechnology could be further developed and how implementation and coordination could be improved between Member States and the EU.

This was done during the roundtables by:

- Identifying measures to stimulate research and innovation at the national level
- Identifying policies to develop a strong and competitive bio-based economy
- Presenting ongoing European research and innovation programmes on the bio-based economy, so that industrial biotechnology actors in the Member States can more easily take part in European initiatives.
- Identifying possible cooperation with other Member States and discussing specific issues (including financing for pilot and demonstration plants) where transnational cooperation and coordination at the European level is needed.

The roundtables also represented an opportunity to gain a better understanding of the industrial biotechnology sector in the new Member States and associated countries (Turkey and Croatia), what kind of public funding for research is available, what kind of policies exist, what are the possibilities in terms of access to finance, etc.. This knowledge has been used to develop a report<sup>9</sup> on the state of industrial biotechnology in Europe.

Finally, the roundtables were useful as a communications tool, to inform decision makers in the Member States about the economic and environmental potential of industrial biotechnology.

### 2.2. Organisation of the roundtables

Roundtables were organised in seven new Member States and two associated countries.

- Czech Republic, Brno, 15 and 16 May 2008.
- Slovenia, Ljubljana, 21 May 2008.
- Croatia, Zagreb, 12 June 2008.
- Slovakia, Bratislava, 16 June 2008.
- Poland, Warsaw, 04 July 2008.
- Lithuania, Vilnius, 04 September 2008.
- Estonia, Tallinn, 05 September 2008.
- Turkey, Istanbul, 24 September 2008.
- Hungary, Budapest, 04 December 2008.

The general framework of the roundtables consisted of two parts: a series of presentations followed by a discussion session.

Presentations were given on European initiatives including the Strategic Research and Policy Agendas developed by SusChem – IB, the place of the Knowledge-based Bioeconomy (KBBE) in the 7<sup>th</sup> Framework Programme, as well as on national initiatives including innovation policy, the place of biotechnology in the national research programme, etc.

The second part of the roundtable consisted of a discussion between participants about the national situation in the fields of research, innovation, access to market for bio-based products, and the ways the national situation could be improved. Participants represented national ministries responsible for agriculture, economy and industry, research and innovation, and the

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<sup>9</sup> The report can be found on: [http://www.bio-economy.net/bioeconomy/member\\_states/index\\_bioeconomy\\_member\\_states.html](http://www.bio-economy.net/bioeconomy/member_states/index_bioeconomy_member_states.html)

environment, as well as research councils or research funding agencies, academics, industry and farmers associations. At the European level, representatives from the European Commission (DG Research) and EuropaBio were present.

### **2.3. Outputs of the roundtables**

Recommendations for the national authorities were generally developed during the discussion phase. The recommendations aim at further developing and implementing industrial biotechnology in the visited Member States and associated countries. These are available, sorted by country, on the bio-economy website<sup>10</sup>. A global analysis of the situation in the new Member States and associated countries is included below (see both the Analysis and Recommendations sections)

Information gathered during the roundtables was used in the development of a global overview of industrial biotechnology activities in terms of research and policy in Europe. Country profiles as well as an executive summary analysing globally the situation in Europe were developed. These reports are also available on the bio-economy website<sup>11</sup>.

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<sup>10</sup> <http://www.bio-economy.net>

<sup>11</sup> Idem.

### 3. ANALYSIS

Each roundtable produced a SWOT<sup>12</sup> analysis of the national situation in terms of (industrial) biotechnology<sup>13</sup>. There was commonality - points raised during the analysis and discussions were similar for a majority of the Member States where roundtables were held. The analysis in this Executive Summary looks at these similarities but also emphasise differences between the different countries.

#### 3.1. Global – General

Industrial biotechnology is very limited in the new Member States and associated countries. In the majority countries where roundtables were held, industrial biotech activities exist mainly at the research level while the production and commercialisation of processes and bio-products is nearly non-existent. In Croatia, there is no production and commercialisation of industrial biotech products. However, in some countries, such as Lithuania and Slovakia, some companies (Sicor Biotech, Fermentas, Evonik...) are producing and commercialising bio-based products. In general, companies active in the white biotech sector are spin-offs or young SMEs recently created via national research institutes and universities.

Industrial biotechnology activities are also limited in the new Member States and associated countries surveyed, because companies that could be involved in large scale industrial biotechnology (chemical, fermentation...) are usually carrying out basic (conventional) production activities. As labour costs are still lower in new Member States and associated countries (Croatia and Turkey), large industrial companies are investing in labour intensive production units and prefer to keep and create innovative companies in more developed countries (EU-15 and North America).

#### 3.2. Education, Research and Development

According to participants in the different roundtables, the general level of education in the new Member States and associated countries is good. However, in some countries, it seems that the small number of science and engineering degrees awarded is a major barrier for the development of biotechnology. This was particularly apparent in the Czech Republic, Hungary and Croatia where students still prefer to study the humanities rather than science. In Estonia, where there are enough Master in Science (MSc) awarded, there are relatively few PhD students. In Hungary, participants noted that another barrier for the further development of industrial biotechnology was the fact that people tended to be uninterested in science and did not understand science very well.

In Slovakia, the Czech Republic, Estonia, Lithuania, Poland, Turkey and Croatia there is a strong conventional biotechnology and fermentation R&D tradition. Estonia and Hungary are deeply involved in healthcare biotechnology. Turkey provides 20% of the world's baker's yeast; there is an important institute for biotechnology in Lithuania and the University of Tartu in Estonia is a leader in the field of healthcare biotechnology as well as an active player in the ScanBalt network. This tradition and experience has been used to start innovative industrial biotechnology research -though this is still limited.

In all the countries where the roundtables were organised, the level of infrastructure was considered a barrier to research activities. Although structural funds were used to update some existing infrastructure or build new factories in some new Member States, it seems that there are insufficient funds to make sure they run properly.

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<sup>12</sup> Strengths, weaknesses, opportunities and threats

<sup>13</sup> Those individual analyses can be found in the summary of the roundtables on the bio-economy website <http://www.bio-economy.net>

During all the roundtables, participants stressed that research activities and funding tend to be oriented too much towards basic research. The fact that researchers are only evaluated on their publications and their patents are not considered, was mentioned as a barrier for innovation. Researchers are not encouraged to protect their inventions and to work on the possible commercialisation of the outcomes of their research.

Three countries (Estonia, Turkey and Croatia) called for more international cooperation in the field of research. In Estonia, researchers and universities are well aware of international cooperation possibilities but, at least for industrial biotechnology, are not involved in projects. In Turkey and Croatia, even though they take part in the 7<sup>th</sup> Framework Programme, very few researchers are involved in cooperative projects due to a lack of information but also because of visa problems (Turkey). In Hungary, participants pointed out that information could be circulated via other channels than information days, etc.

In several countries, such as Slovakia, Lithuania and Turkey there is a lack of funding for research and development. There is a strong funding system for R&D in Slovenia, Hungary and the Czech Republic but as the funds are fragmented among many programmes and priorities, the support for industrial biotechnology, a high capital demanding sector, is limited. Lithuania was the only visited Member State where the Government has adopted a special programme for industrial biotechnology research. The programme runs from 2007-2010 with a budget of € 8,7 million.

In most Western European countries the share of R&D spending as a ratio of State support : private investments is 1:2 to 1:3. In countries where roundtables were organised, private sector involvement in R&D is low – the ratio of state support to private sector support in these countries is 2:1 to 1:1<sup>14</sup>. In some Member States, some encouraging measures are under discussion (such as compensation of patenting related expenses and tax incentives in Lithuania), but in the majority of them, no special measures have been established to encourage the private sector to get more involved

### **3.3. Innovation**

Bringing research results to marketable products was a major problem in all visited countries. Innovation as such is usually not easy but the problem is exacerbated for industrial biotechnology as the sector is highly innovative and capital intensive.

There are very few pilot plants in new Member States and in Turkey and Croatia that can be used to scale up industrial biotech processes. Existing pilot plants are nearly all private and closed. It is therefore difficult for researchers to prove the concept of their projects to investors. The situation for demonstration plants is even worse which prevents the development of new products.

Also, the availability of seed funding and venture capital is very limited. This was particularly underlined in Turkey, the Czech Republic, Slovakia and Lithuania. The lack of tax incentives to stimulate research and innovation was also stressed in Hungary, Lithuania and Slovenia. However, in those countries as well as in others, there are some projects to improve the situation. Discussions are underway in Lithuania to establish tax incentives (such as reducing the amortisation process to 2 years or providing tax relief for investments into new technologies up to 12% of the taxable amount). Also, in many Member States, parts of the science and technology strategies and action plans that have just been adopted or which are still under discussion aim at increasing private support.

In some countries, there are additional regulatory barriers to enter the market. As an example, in Slovenia, the legal framework does not allow academic institutions (universities, institutes) to set up spin-offs and start-ups.

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<sup>14</sup> OECD, Main Science and Technology Indicators (2008/2<sup>nd</sup> edition)

Another major problem is the patenting system which is not always working properly. Even if there are differences between Member States, the number of inventions patented is still lower than the EU-15 average. This problem was especially highlighted in the Czech Republic, Slovakia and Slovenia where the systems are either too complex or too expensive.

In Turkey and Lithuania the collaboration between industry and academia is limited. While the situation is changing slowly in the Czech Republic and in Hungary, this is a major problem in Croatia. This lack of cooperation is often seen as a key hurdle to the further development of industrial biotechnology, as the research does not correspond to the needs and expectations of industry.

For participants in Turkey, the country's strength in the fermentation sector represents an opportunity to further develop and strengthen the industrial biotech sector. In Slovenia and Hungary, the absence of a well established industry sector which could help catalyse industrial biotechnology is seen as a factor that slows down the development of this technology.

Management skills were emphasized several times as necessary for the establishment of new companies which could eventually develop and commercialise bio-processes and bio-products. Participants from the Czech Republic, Hungary and Slovenia evaluated available management skills as too low to support the development of the biotech business. In all countries, the need to educate managers to deal with factors specific to industrial biotech, including the need for a scientific background for researchers involved in the sector as well as the intense capital demands to develop industrial biotech, were mentioned as being key to successfully transforming inventions into marketable products. In Turkey, Slovenia, Estonia and the Czech Republic, the lack of success stories to encourage scientists and students was mentioned as barrier to innovation.

In Slovenia, Croatia and Estonia newly established incubators and clusters were seen as important in the process of innovation. Clusters gather all actors from the value chain in one geographical area and help in creating synergies while incubators often help researchers in their scale up process. The absence of clusters was noted as a particular problem in the Czech Republic, but following the roundtable white biotech actors began discussing the establishment of such an initiative with the Czech Government.

### **3.4. Policy**

Public authorities can promote the quick take-up of industrial biotech innovations by implementing a number of "instruments" or policy initiatives.

In Slovakia, Slovenia, Lithuania and the Czech Republic, participants regretted the lack of awareness and understanding on the part of the government and public authorities of sector specific issues, including the need for a long research arc and the capital intensity of the sector. More generally, the lack of awareness by decision makers about the economic and environmental potential of industrial biotechnology and bio-based products was mentioned in all of the visited countries.

The lack of awareness about the potential of white biotechnology seems to affect also managers of industrial sectors which could endorse white biotech (textile, tanning, food, etc.). In all countries, participants mentioned the lack of communication campaigns on the benefits and potential of (industrial) biotechnology. This was particularly emphasised in Slovakia, Lithuania, Hungary, Slovenia and the Czech Republic.

In a very few countries (Estonia, Poland and Slovakia), there is a constructive dialogue between the Government and the (industrial) biotechnology actors or their representative associations. In

Estonia and in Slovakia, the two national biotechnology associations developed a biotechnology strategy that has been presented to the Government. However, in all other countries, the dialogue is very limited or nearly inexistent.

Bureaucracy and limited access to funding was particularly stressed in Estonia, Lithuania and Hungary as key barriers for the development of (industrial) biotechnology.

In Slovakia, the Czech Republic and Slovenia the fragmentation of the different policies and support instruments is slowing down the development of the (industrial) biotech sector. Often, the instruments exist but are managed by several institutions and are used in non-homogeneous ways which prevent their good utilisation. In the Czech Republic, Hungary and Turkey, the political instability was seen as an additional threat for further development of the sector.

Finally, the main cause preventing the establishment and development of a bio-based economy and a strong industrial biotech sector is the lack of appropriate specific political support. If in many cases (industrial) biotechnology is mentioned as a key priority for the country (either in political speeches or in science and technology strategies) there is in most of these countries no specific biotechnology strategy and no dedicated plan for industrial biotechnology and bio-based products. The only Member State with a specific programme for industrial biotechnology is Lithuania which has adopted a € 8,7 million research programme for 2007-2010.

### 3.5. Opportunities

In Turkey as well as in countries with an important agricultural sector such as Poland and to a lesser extent Hungary, industrial biotechnology and bio-based products are seen as an important **opportunity for economic development**. As biomass is the raw material for biobased products, this could strengthen the agricultural sector, represent a new source of income for farmers and help in increasing their standard of living.

In Turkey, participants particularly highlighted the opportunities for economic growth and job creation that industrial biotechnology could bring to the agricultural sector as well as to the entire value chain, from research to production and commercialisation of bio-based products.

In the new Member States, **structural funds** were seen as an opportunity for the development and consolidation of a bio-based economy. Structural funds are already used in those countries to update and build new research infrastructure which allows the development, improvement and scale up of new biotech processes. It is also used to establish incubators which, in collaboration with universities and research centres, help the development of marketable products. However, if funds are usually well allocated for the updating and construction of infrastructures, participants often emphasized the lack of financing to ensure that facilities run properly.

In several countries (Turkey, Lithuania, the Czech Republic, Poland), the low **labour cost** was identified not only as an opportunity but also as a weakness. For example, one hour of research in Lithuania is 40% cheaper than the EU-15 average, thus research activities can be carried out at a much lower price. However, this low cost of human resources makes it difficult for companies and research institutes to keep their best employees.

The majority of new Member States are defining new **strategies and action plans for research and development as well as for education and innovation**. These include a science and technology action plan in Slovakia, Estonia and Hungary; industrial biotechnology programme and high-tech programme in Lithuania; reform of the R&D and education system in the Czech Republic, and a new action plan for R&D in Croatia. Many of the new Member States have also identified biotechnology as one of their key priorities. Even though these strategies are focusing on biotechnology in general and a large part of the budgets and actions foreseen are dedicated to

healthcare biotechnology, these plans represent an opportunity for industrial biotechnology actors to obtain more funding and to increase awareness about the bio-based economy.

Finally, all participants recognised the importance of being more **organised and coordinated at the national level**. The presence of active national biotechnology associations (Slovakia, Lithuania, Hungary, Estonia), national technology platforms for biotechnology (Poland, Lithuania) or the participation in international networks such as ScanBalt<sup>15</sup> (Estonia, Lithuania, Poland) were underlined as essential to strengthen and develop the sector in all the countries where roundtables were held. In other countries, initiatives are on-going (national association or cluster in the Czech Republic; technology platform in Turkey).

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<sup>15</sup> <http://www.scanbalt.org/>

## 4. RECOMMENDATIONS

During the roundtable discussions, participants analysed their national situation for industrial biotechnology in term of research, innovation and policy support. Recommendations to be given to national and European decisions makers were formulated. The specific national recommendations are available<sup>16</sup> as part of the roundtable report by Member State. The section below regroups common recommendations to help solve global problems identified in the analysis (see above).

### 4.1. Education, Research and Development

#### **Improve matching between academia and industry needs; reward excellence in the life sciences**

- National Governments and European institutions should continue to encourage students to enrol in scientific and engineering degree programmes. Promotional campaigns and special programmes during high school could be conducted. More generally, governments and European institutions should increase the awareness of the population towards science and technology via communication campaigns. They could also improve and strengthen life-long learning programmes promoting life-sciences.
- State support for R&D should be increased and be less fragmented. Research fields should be prioritised and governments should define a small number of key priorities on which they should focus their investment instead of spreading support to too many topics.
- International (and even national) cooperation between universities and enterprises should be enhanced. Coordination bodies which could help universities, researchers and SMEs to take part in national and international projects could be established to increase the number of cooperative projects. These coordination bodies could also manage projects and/or train participants to be project managers.
- Academia and industry stressed that more funds for applied sciences are needed and that more incentives should be created to encourage researchers to pass from science to business. The fact that scientists are only evaluated on their scientific papers does not encourage them to patent their inventions and transform knowledge into marketable products. The partial introduction of patents and marketability of discoveries for “scientific evaluation” could help drive this process. This review of the evaluation process could take place as part of the current reforms of the education systems in the new Member States.
- In order to better align academia and industry expectations, investment into R&D in the private sector should be encouraged. Tax incentives seem to be the most appropriate solution to improve cooperation between these “two worlds”.
- The evaluation of R&D projects could be improved. A more appropriate evaluation system of the projects could be established as research activities carried out in universities and institutes often do not correspond to industry needs. Such improved evaluation systems could help to better match the needs of industry and academia.
- Authorities funding research should also take more into account the specific needs of (industrial) biotechnology while assessing projects. These needs include long research to market timelines and capital intensity.

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<sup>16</sup> [http://www.bio-economy.net/bioeconomy/member\\_states/index\\_bioeconomy\\_member\\_states.html](http://www.bio-economy.net/bioeconomy/member_states/index_bioeconomy_member_states.html)

## 4.2. Innovation

### **Innovation: fill the gap between R&D and market**

- The collaboration between industry and academia as well as the flow of information needs to be enhanced to bring these “two worlds” closer. The establishment of national associations or technology platforms gathering researchers from industry and universities or research institutes seems to be a solution as noted in several countries.
- Member States should establish management programmes in universities and as part of life-long learning projects to increase the number of managers or entrepreneurs.
- One major problem in transforming knowledge into commercial products is the lack of financing. A European seed funding programme complementing the already existing Risk Sharing Financing Facility instrument could be established to support innovation.
- A key hurdle to the development of marketable bio-based products is the very limited number of pilot plants in new Member States and the complete absence of demonstration projects. This prevents researchers and entrepreneurs to scale-up processes and to evaluate the viability of their processes and products. Public private partnerships could be envisaged to build these facilities.
- The high cost of patent systems as well as their complexity slow down the development of (industrial) biotechnology. The application of the European “State Aid Rules for Innovation” by Member States as well as their diffusion to the different actors could help increase the number of patented inventions. Also, the harmonisation of intellectual property rights of the 27 Member States would help in this objective.

## 4.3. Policy

### **Policy: promote KBBE and facilitate entrance of bio-based products on the market**

- Industrial biotechnology is a young technology which is often unknown, even by decision makers. There is an urgent need to increase the awareness about the bio-based economy, its challenges and opportunities, notably to industry managers who could endorse it. Broader communication campaigns to the population in general are also missing.
- The establishment of specific public procurements for bio-based products or the integration of measurable technical specifications in existing public procurement could help in the development of a new market for bio-based products and their entry on the market.
- One of the main risks that young businesses face is unpredictability. A predictable, coherent and stable regulatory framework must be in place to support the development of a bio-based economy and to encourage venture capitalists to fund innovative companies. Also, more coordination between decision makers is needed as often instruments and action plans exist but they are not coherent because each ministry has its own priorities and strategy.
- To really develop a bio-based economy and industrial biotechnology at a marketable scale, a strong political commitment is essential. To strengthen this political commitment, the European Strategy for Life Sciences and Biotechnology<sup>17</sup> should be implemented in all Member States, and national strategies should be established. Those policies should be defined in an open process of collaboration with (industrial) biotechnology actors (industry and academia) to ensure their relevance and utility.

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<sup>17</sup> [http://ec.europa.eu/biotechnology/pdf/com2002-27\\_en.pdf](http://ec.europa.eu/biotechnology/pdf/com2002-27_en.pdf)

- Political instability, bureaucracy and the lack of continuity in support are other key barriers for the development of industrial biotechnology which should be avoided. Decision makers should particularly pay attention to those points while defining different reforms.