# D. 3.2 – Preparatory Briefing on Brazil

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Abstract: The preparatory briefing on Brazil is the result of the collection of relevant cluster information in the country, including business and sector trends, cluster policies and programmes, as well as a cluster mapping. It concentrates on the so-called *Arranjos Produtivos Locais (APL)*. This document is intended to provide a good overview of the country's opportunities for European cluster organisations and SMEs.

## Disclaimer

*This document reflects only the view of the author(s) and the European Commission cannot be held responsible for any use which may be made of the information contained herein.*

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# 1 Objective of the report

The aim of this "preparatory briefing" is to provide up to date information on the cluster landscape in Brazil in order to support European cluster organisations and their (SME) members to familiarise with the country and explore its potential for collaboration and market opportunities. More specifically, this briefing paper provides an overview of the country's economy and sectoral trends/strengths where clusters contribute. In addition, it aims at giving an idea of the existing cluster community, the cluster policies /local support to clusters and the cluster programmes - including their historical development in short and internationalisation activity where applies.

A complementary report, "discussion paper", will be available within short time that will provide an overview on the existing EU-Brazil cluster cooperation, present related good practices/success stories and opportunities for future exchange, including recommendations for an EU-Brazil cluster policy dialogue (non-public information).

The information of this report is provided through desk research and confirmed through collecting information from:

- *Associação Nacional de Pesquisa e Desenvolvimento das Empresas Inovadoras* (ANPEI - National Association of Research and Development of Innovative Companies), which promotes technological innovation through dissemination of culture on innovation, capacity building and publication;
- *Grupo Permanente de Trabalhos para Arranjos Produtivos Locais* (GTP-APL - Permanent Working Group for Industrial Clusters), which coordinates the integrated policy for Brazilian Industrial Clusters;
- *Financiadora de Estudos e Projetos (*FINEP - Financing Agency of Studies and Projects), which provides non-reimbursable funds for research to both profit and non-profit organizations on every stage of the scientific and technological development cycle.

# 2 Brazil Economy: focus on sectoral trends

## 2.1 Overview

Brazil's economy, characterized by its inward-oriented strategy, is considered to be the **largest in South America** and the second largest of the Western Hemisphere. From 2000 to 2012, Brazil's economy was also considered one of the fastest-growing economies. However, as a result of the commodity prices downfall, Brazil is currently going through a deep recession. Last year Brazil's GDP decreased by 3.8%[1]. Brazil is part of the BRICS, the association of five major emerging national economies that is becoming more and more influential in international negotiations and potentially investment-wise.

The diplomatic relations between the EU and Brazil started in 1960. Over the years the relations have continued to strengthen and culminated in 2007 with the **establishment of the EU-Brazil Strategic Partnership**, which covers economic growth, cooperation on key foreign policy issues and global challenges[2].

Currently, the EU is Brazil's most significant trading partner. The EU accounts for 19.5% of Brazil's total trade; while Brazil is the EU's tenth leading trade partner, representing 2.0% of total EU trade and 2.2% in terms of exports (2014)[3].

The EU is also the largest foreign investor in Brazil: between 2008 and 2012, about 50% of the FDI originated from the EU[4]. The confidence of EU investors has however decreased over the past four years due to the unstable politics and corruption scandals[5,6]. For foreign investors, the level of investments in Brazil will be largely dependent on how politics will evolve in the future.

[1] World Bank - Brazil Overview (2016): www.worldbank.org/en/country/brazil/overview
[2] EEAS, Delegation of the European Union to Brazil, Brazil and the EU, 2016. http://eeas.europa.eu/brazil/index_en.htm
[3] EU trade policy with Brazil, DG Trade website; http://ec.europa.eu/trade/policy/countries-and-regions/countries/brazil/
[4] Forbes, « Global Investment Guide: How To Invest In Brazil », 2016. www.forbes.com/sites/sarazervos/2016/04/19/global-investment-guide-how-to-invest-in-brazil/#22425f256573
[5] Bloomberg, Article « Brazil's Foreign Investors See a New President as Last Best Hope », 2016. www.bloomberg.com/news/articles/2016-03-17/brazil-investors-cheer-prospect-of-new-government-saving-economy
[6] Forbes, «Putting Brazil's Political Risk in Perspective», 2015. www.forbes.com/sites/kenrapoza/2015/03/13/putting-brazils-political-risk-in-perspective/#5649b1bf10d0

## 2.2 Opportunities for Europe – investment, trade and Science, Technology & Innovation cooperation

There are several investment and trading opportunities for EU in Brazil due to its large economy and strong openness to international trade. These opportunities are further enhanced by the establishment of a series of cooperation agreements between Brazil and the EU over the past decade.

Brazil's economy is one of the largest economies in the world and the largest in South America, with a per capita GDP of $11,384 (€8,559[7]) in 2014[8]. The trend of the economy is however uncertain. As aforementioned, the economic growth has declined in 2013. Its growth rate went from 2.7% in 2013 to 0.1% in 2014 with a projected negative growth rate until 2017, when some recovery is expected in spite of the political difficulties domestically.

Brazil has a moderate openness to international trade, organised as a free market economy along with capitalist lines. Although Brazil is open to foreign investment in equal conditions for national and foreign capital, in practice, the characteristics of the Brazilian legal context for the foreign investors deserve particular attention. The main barriers to foreign investment are: the control and registration of the investment by the Central Bank of Brazil; the restrictions on the acquisition of land by foreign capital; the existing limitations on business management by non-residents; and the non-compliance of Brazil to some international business conventions (e.g., Agreements on the Promotion and Reciprocal Protection of Investments)[9].

Despite its declining economy and existing legal barriers to investment, Brazil is still one of the most attractive countries in the world for foreign investors. According to the 2014 report on World Investment of the United Nations, Brazil stood in fourth place in the world ranking on foreign investment, receiving investment of $64 billion (€48 billion[10]) in 2013. The EU is Brazil's largest foreign investor. In 2014, the volume of direct EU investment in Brazil accounted for nearly 250 million euros, approximately 45% of all foreign investment in the country[11].

The European Commission's latest Reports (2014 and 2015) on Potentially Trade Restrictive Measures indicate Brazil is among the countries that have resorted to the highest number of new potentially trade-restrictive measures[12]. However, due to its membership in Mercosur, where the country holds a key position in determining its success, Brazil participates in the EU's ongoing negotiations for a free trade agreement between both regions. According to the EC, a "future EU-Mercosur Association Agreement, currently under negotiation, should provide a boost to regional trade integration among the countries of Mercosur and stimulate new opportunities for trade and investment with the EU by

[7] Average exchange rate in 2014: $1.00 equal to €0.75
[8] World Databank, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD/countries
[9] ELAN, Fact Sheet ELANBiz: Invest in Brazil, 2015 www.elanbiz.org/documents/20182/56028/Invest+in+Brazil
[10] Average exchange rate in 2013: $1.00 equal to €0.75
[11] ELAN (op.cit.).
[12] DG Trade, European Commission "About Brazil". http://ec.europa.eu/trade/policy/countries-and-regions/countries/brazil

removing tariff and non-tariff barriers to trade and FDI". The EU-Mercosur Association Agreement is also expected to "cover, among other issues, trade in goods and services, investment, intellectual property rights aspects including protection of geographical indications, government procurement and technical barriers to trade"[13].

Since the establishment of the strategic partnership between the EU and Brazil in 2007, high-level meetings have been held in the annual EU-Brazil summits to discuss the required actions to enhance cooperation in different areas, including in the area of innovation[1415]. In the 6th EU-Brazil Summit in 2013, the following three organisations launched a joint working group to explore options to advance the bilateral trade and investment agenda[16]: the Association of European Chambers of Commerce and Industry (Eurochambers)- which represents over 20 million enterprises in Europe; BusinessEurope, - the leading advocate for growth and competitiveness at European level, standing up for companies across the continent; and the *Confederação Nacional da Indústria* (CIN - the National Confederation of Industry-Brazil) - which represents 27 Brazilian industry federations in the states and federal districts, over 1000 associated employers unions and almost 100,000 industrial establishments.

Brazil is amongst the main international target countries of the European Strategic Cluster Partnerships - Going International (ESCP-4i) under COSME Programme with ten ESCP-4i targeting the country, namely: AdPack-Future Materials and products for advanced smart packaging, BioXclusters+- Personalised Healthcare, EACP ABROAD-Activities and Businesses for Aerospace Developments , EU4FOOD-Global Alliance for the Development of International Food Bio-Based Clusters, MOVE-Moving the Future, NATUREEF, New Frontier in Food-New Frontiers for Emerging Industries in Food, PERES-Promoting European Rail Excellence outSide EU, REINA PLUS-Renewable Energy Internationalisation, and WIINTECH2020[17]. Likewise, Brazil is hosting the EU FPI project Low Carbon Business Action on a wide range of fields across environmental and renewable energy technologies[18].

With regard to investment cooperation a major step was the establishment of an Ad-Hoc Working Group to systematically analyse bilateral economic issues. The creation of the said Group was agreed in the scope of the VI EU-Brazil Business Summit held in Brasilia in 2013. The aim was to further strengthen the bonds between the EU and Brazil and promote bilateral trade and investment, as well as exchanges in innovation, research and development to show the great potential for economic cooperation with Brazil. The inauguration meeting took place in the context of the VII EU-Brazil Business Summit held in Brussels in 2014.

In terms of Science, Technology and Innovation (STI), EU-Brazil's policy governance has not changed significantly in recent years. The EU-Brazil cooperation is governed by several agreements: the EC-Brazil Framework Cooperation Agreement, the EU-Brazil Agreement for Scientific and Technological Cooperation and the Cooperation Arrangement between the European Commission's Joint Research

[13] Ibid.
[14] DG Growth, European Commission. EU-Brazil cooperation. https://ec.europa.eu/growth/industry/international-aspects/cooperation-governments/eu-brazil_en
[15] R. Dominguez, R., "EU Foreign Policy towards Latin America." 2015.
[16]6th EU-Brazil Business Summit Joint Business Declaration http://ec.europa.eu/DocsRoom/documents/7528?locale=en
[17] Source ECCP: www.clustercollaboration.eu
[18] www.lowcarbonbrazil.com/index

Centre (JRC) and the *Ministério da Ciência, Tecnologia e Inovação* (MCTI - Brazilian Ministry of Science, Technology and Innovation).

- The EC-Brazil Framework Agreement for Cooperation, established between the Economic European Community and the Federative Republic of Brazil, has been in force since 1992 and aims to expand and diversify trade between the parties and to step up cooperation in trade, economic matters, science and technology (S&T) and financial matters[19].
- The **EU-Brazil Agreement for Scientific and Technological Cooperation**[20], signed in 2004 between the European Community and the Federative Republic of Brazil, established in 2007 and renewed in 2012, aims to encourage, develop and facilitate cooperative activities in areas of common interest by carrying out and supporting scientific and technological research and development activities. **Thirteen areas of common interest** have been identified: biotechnology; information and communication technologies; bio-informatics; space; micro/nanotechnologies; materials research; clean technologies; sustainable management and use of environmental resources; biosafety; health and medicine; aeronautics; metrology, standardisation and conformity assessment; and human science[21].
- The Cooperation Arrangement between the European Commission's JRC and the MCTI was signed in 2013 during the 6th EU-Brazil Summit and aims to **strengthen and further structure scientific and other cooperative activities** in the areas of: disaster prevention and crisis management; climate change and sustainable management of natural resources and ecosystem services; energy, including bioenergy and smart grids; food security; bio-economy; information and communication technologies (ICT); as well as nanotechnologies[22].

Other sectoral agreements exist: in 2015, the EU Commission signed the Atlantic Ocean Research Cooperation declaration with Brazil and launched a coordinated call on bio-fuels together with FAPESP (the Research Funding Agency of the State of São Paulo), CONFAP (the Council of State Foundations for Research) and the Brazilian Ministry of Science, Technology and Innovation.

Key EU-Brazil projects in the S&T field resulting from the aforementioned partnerships are indicated in the Annex - Table 1.

[19]Link to the Framework Agreement : http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=417

[20] This agreement opened the way for Brazil to participate in the European Union's Framework Programmes for research.

[21]Link to the Framework Agreement: http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=2041

[22] DG Research and Innovation, EC: http://ec.europa.eu/research/iscp/index.cfm?amp;pg=brazil

## 2.3 Sectoral strengths

Traditionally, Brazil's economy relies on the manufacturing industry and the commodities sector, such as livestock, food & beverages, textile and clothing, vehicle manufacturing, and aeronautics. However, as a result of several government initiatives to foster technology and innovation of Brazilian companies, now Brazil's economy also rests largely on technologically advanced industrial sectors[23,24,25], such as aeronautics and oil & gas.

A variety of technologically advanced industrial sectors currently present a market opportunity for the EU. Particularly, there are three sectors of common interest for the EU and Brazil that are in great expansion in the Latin-American country: Biotechnology, Renewable Energies and Information and Communication Technologies (ICT). Thematic areas and sectors such as smart cities, aeronautics and biodiversity for sustainable chemicals and environmental technologies applications, media and creative industries are also significant areas for bilateral cluster cooperation, which are not elaborated upon in this report that concentrates on a more limited set where EU-clusters appear recently more active.

**Biotechnology sector**

Brazil is now one of the most favourable countries for the development of biotechnology. According to the *Centro Brasileiro de Análise e Planejamento* (CEBRAP - Brazilian Analysis and Planning Centre), the Brazilian economy will rely largely on this sector of activity, which extends from medicine (equipment, pharmaceutical manufacturing, and diagnostics) to cosmetics and energy (biofuels). The biotechnology sector in Brazil is still young, but it has been continually growing since the 1990s. Today, approximately 250 to 350 Brazilian companies active in the biotechnology sector are located in Brazil, earning an annual income of about 4 billion reais (in reference to $180 billion globally). Most of the specialized biotechnology companies are small and medium enterprises (SMEs) with a turnover rarely exceeding 2 million reais (€770,000) and more than 86% of them are importers. The latest statistics point out a value of over €385 million spent on imports mainly coming from the United States and Europe[26].

More than one third of the biotechnology companies are in the human health field (Figure 1). They are mostly dedicated to: the development of new medications (small molecules and biological); diagnostics; vaccines; cell therapy; regenerative medicine and tissue engineering; advanced methods for assisted reproduction; and genetic and molecular testing. The last five years have been marked by the implementation of industrial policies favouring companies in the health and life science areas, with

[23] Tech Crunch, Article, 2015. https://techcrunch.com/2015/09/27/as-brazilian-economy-descends-into-crisis-tech-is-growing-double-digits/

[24] The Next Silicon Valley, Article, 2016. www.thenextsiliconvalley.com/2016/04/20/8705-brazilian-tech-innovation-sector-booming-despite-political-and-economic-crisis/

[25] www.scienceforbrazil.com/biotech-brazils-big-high-tech-industrial-hope/

[26] Source: ECCP deliverable -"An Overview of Strategic Markets to Develop Cooperation Brazil, Mexico, India, Japan, South Korea, Morocco and Tunisia",

the approval of non-reimbursable funds, establishment of government programmes to support internationalisation of the sector and progress in university-industry interaction mechanisms[27].

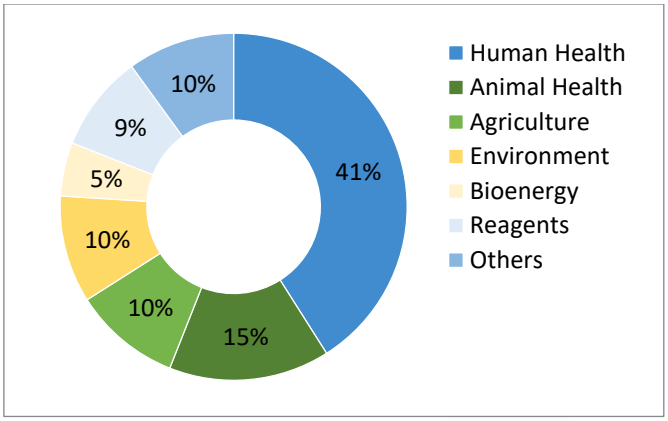


FIGURE 1 – DISTRIBUTION OF COMPANIES ACROSS DIFERENT BIOTECHNOLOGY SUB-SECTORS BRAZIL[28]

**Renewable Energy sector**

The Brazilian Renewable Energy industry is well-established today, with almost 50% of Brazil's total energy consumption currently derived from renewable sources. Despite a relatively high use of renewable source compared to the rest of Latin America, Brazil is dedicated to renewable energy expansion; the government aims to increase renewable energy consumption at least 10% by 2020. Beyond promoting greener, more sustainable energy sourcing to meet the expanding needs of Brazil, the government also seeks to diversify renewable resources as 80% of the country's current electricity is fuelled by hydroelectric power. According to the Brazilian Energy Research Company, in the past five years electricity generated from biomass grew over 120%, while wind energy generation jumped almost 700% (Figure 2). The Global Wind Energy Council expects Brazil's wind energy capacity to grow at least another 450% this year. Such high level of renewable energy growth in Brazil is not only predicted in a short-term basis. Opportunities for the expansion of the renewable energy industry are expected in the next ten years as the market continues to develop.

A comparison of Brazil's current energy consumption to other competitive markets demonstrates an opportunity to increase per capita consumption as well as expand production and availability to decrease energy costs. Abundant natural resources (including ideal solar and wind profiles), strong government incentives, compelling financing options and facilitated logistics make Brazil one of the most attractive global markets for renewable energy (detailed in section 4.2). The Brazilian market

[27] www.nccommerce.com/Portals/5/Documents/ITD/Biotech%20Market%20in%20Brazil.pdf

[28] Gouveia, P., Fraunhofer Moez, The life science industry in Brazil, Working paper Nr.5, 2012. www.imw.fraunhofer.de/content/dam/moez/de/documents/Working_Paper/Working-Paper-5.pdf

offers major opportunities to develop cooperation in this sector, particularly in the solar and wind sub-sectors[29].

By recognizing the need to further strengthen energy cooperation between Europe and Brazil, in 2007, the European Commission and Brazil agreed to reinforce their bilateral relations on the basis of a sectoral policy dialogue in the field of energy. The main aims of the established the EC-Brazil Regular Energy Policy Dialogue are:

- to exchange information, experiences and views on issues of common interest regarding energy policy strategies for a sustainable, competitive and secure energy;
- to study the future development of fossil and renewable fuel chains consistent with the objective of sustainable development; and
- to discuss the various possible strategies for the development of a secure and sustainable energy and define specific projects for future EC-Brazil bilateral cooperation in order to help achieve this objective[30].

An import output of this dialogue is the launch of the Low Carbon Business Action (LCBA) in Brazil, a European Union-funded-initiative that aims to contribute to sustainable development and greening of Brazilian industries through the adoption of low emission technology. This is an opportunity for European clusters and SMEs to establish cooperation activities in the country, since this action is expected to engage 720 small and medium-sized enterprises (SMEs) from Brazil and from the 28 Member States of the EU through a series of business matchmaking missions to be held between August 2016 and December 2017[31]. These business missions will promote the exchange of innovative experiences, support companies in their transition to low carbon technologies and resource efficient processes in eight target sectors: Agriculture, Aquaculture, Forestry, Renewable Energy Production and Consumption, Industrial Processes, Waste Management, Biomas, Energy Efficiency in Buildings and in the Industry[32].

So far, over than 300 participants from the EU and Brazil took part in the seven missions organised by LCBA Brazil. The missions focused in areas such as biogas and biomethane, solid waste management, energy efficiency in buildings and industry and renewable energy (Sao Paulo, Brazil), low carbon agriculture (Riberao Preto, SP, Brazil) and clean energy (Lyon, Europe). Overall, more than 460 cooperation partnership agreements (CPA) have been signed to pursue collaborations mainly for joint project development (54%), research & development (14%) or exports and imports (11%). The majority of cooperation are expected to be implemented during 2017.[33]

[29] "An Overview of Strategic Markets to Develop Cooperation Brazil, Mexico, India, Japan, South Korea, Morocco and Tunisia", ECCP, 2013.

[30] EC-Brazil Regular Energy Policy Dialogue, Terms of Reference, 2007. https://ec.europa.eu/energy/sites/ener/files/documents/ec.brazil_terms_of_reference_en.pdf

[31] Some 366 partnerships agreements between SMES have been signed as of January 2017

[32] LCBA Brazil: www.lowcarbonbrazil.com/_site//doc/pr-and-info/LCBA%20Project%20Brief_English.pdf

[33] Langerber,D., Cooperation Partnership Agreements Assessment and Follow-Up. Analysis of CPAs signed during Matchmaking Missions 1-4", 2017. Preliminary report. www.lowcarbonbrazil.com/_site//doc/LCAB-publications/LCBA_CPA%20Assessment%20Report_Consolidated.pdf

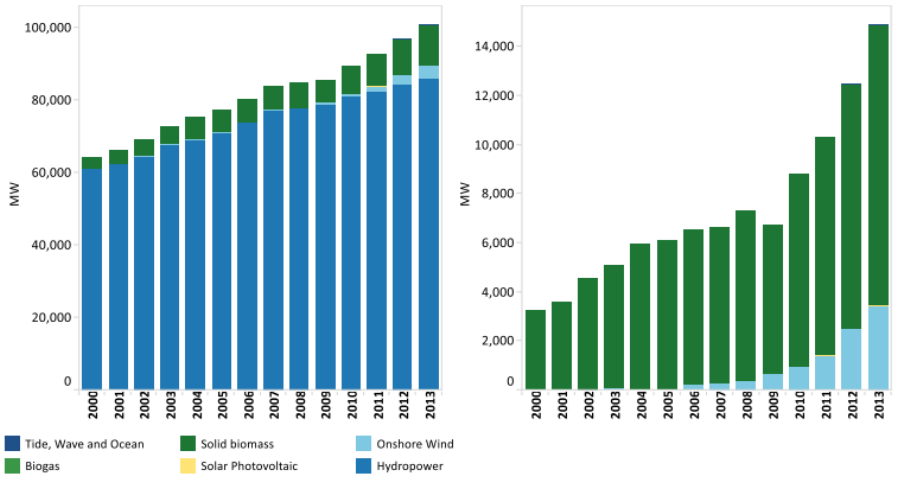


FIGURE 2 – RENEWABLE POWER CAPACITY IN BRAZIL FROM 2000 TO 2013[34]

**Communication & Information Technology (ICT) sector**

Brazil is the 6th largest ICT market in the world. However, whether it is hardware, software or services, the industry still depends heavily on imports, and most domestic production is geared towards the local market. Multinational firms have long offshored R&D by setting up subsidiaries in other industrialized countries; while Brazilian companies have traditionally offshored R&D services to meet local market demand, to access knowledge, to increase their supply of talent or to engage in wage arbitrage. In order to encourage local R&D spending, the government has created the Informatics Law, and has recently intensified efforts to attract multinational firms to set up global R&D centres within its borders (more details in Chapter 4).

Despite the political and economic challenges Brazil has faced throughout 2016/17, organisations continued to invest in technology as the local industry saw growth above global average in 2015, according to a report from IDC in partnership with the Brazilian Association of Software Companies (ABES). The Brazilian IT industry grew by 9.2% last year. The most expressive growth was seen in the software segment, 30.2% ($12.4 billion out of €11.2 billion[35])[36]. Figure 3 indicates the main trends in the ICT sector according to the International Data Corporation (IDC).

In the context of the EU-Brazil Strategic Partnership launched in 2007 (The Agreement for scientific and technological cooperation between the European Community and the Federative Republic of Brazil – indicated in section 2.2), a Strategic Partnership between the EU and Brazil was launched in the area of Information Society. This partnership is referred as the EC-Brazil Information Society

[34] IRENA, 2015 - www.irena.org/DocumentDownloads/Publications/IRENA_RE_Latin_America_Policies_2015_Country_Brazil.pdf

[35] Average Exchange rate in 2015: $1.00 equal to €0.90

[36] EU-Brasil, 2014. www.eubrasil.eu/en/2014/11/05/brazils-ict-sector-among-those-with-most-growth-in-the-world-despite-slowing-economy/

Dialogue and aims to cover aspects of research & development, policy and regulation in the sector of ICT[37].

1. **DX:** Medium to large organisations will be undergoing a digital transformation (DX), creating new applications to run on cloud and provide an end-user experience across all platforms.
2. **Device Sales:** Although prices of devices are high, sales are expected to be strong throughout the year, with around 40 million mobile phones, six million PCs and five million tablets to be sold.
3. **IoT:** The Internet of Things (IoT) market is still under development in Brazil, but will see significant growth in 2016.
4. **Mobile Payments:** This is a rapidly growing area and will grow from the 30% of all financial transactions. There are 40 million enabled devices in the country.
5. **Telecom:** The "traditional" voice continues to slow and will be surpassed by other services.
6. **Enterprise Mobility:** Emphasis will be on security solutions, as companies provide more mobile services for their employees.
7. **Cloud:** Continues to be strong with new players expected and growth of 20% by 2020.
8. **Security:** Big emphasis on security as a new generation of products.
9. **Big Data:** Growth area, although lack of trained professionals could hold development back until 2017.
10. **Social Business:** Greater investment in user experience designs to help companies stand out from the competition.

FIGURE 3 – MAIN ICT TRENDS IN BRAZIL, ACCORDING TO INTERNATIONAL DATA CORPORATION (IDC)[38]

[37] EEAS, Brazil and the EU, Information Society Dialogue. http://eeas.europa.eu/delegations/brazil/eu_brazil/information_society_media/information_society_dialogue/index_en.htm

# 3 Cluster community in Brazil

In Brazil, clusters are known as *Arranjos Produtivos Locais* (APL - local production systems in English). According to the definition given by the *Serviço de Apoio às Pequenas e Médias Empresas* (SEBRAE - Brazilian Service to Support Micro and Small Enterprises), APLs are clusters of firms within the same administrative area (e.g. municipality) that share a particular specialization. Firms within each cluster maintain ties of cooperation and learning both among themselves and with other stakeholders such as government, business associations, lenders, and teaching and research institutions. An APL is characterized by the existence of a group of firms operating in the same economic activity[39].

Some clusters are represented by a formal cluster organisation. In this regard, 47 Brazilian cluster organisations were registered on the (old) ECCP platform[40] and some of them have public institutions and RDI organisations as members. On the other hand, many of the cluster communities are represented by public and/or private associations that aim to promote competitiveness and innovation in the sector, including business associations, which can be instrumental for EU cooperation in innovation-driven developments.

APL Observatory is the official database of APLs. It aggregates information about Brazilian cluster communities, providing information on the cluster environment, geography, sectors and main cluster cities, among others[41].

## 3.1. Cluster mapping

The number of Brazilian APLs (S&T clusters) has grown quickly over the past 15 years. According to the MCTI, there are currently 774 APLs, a value almost 80 times superior than in 2000 (Table 2 in Annex). About one fifth of APLs are concentrated in the southern and southeaster regions of the country, a reasonable share considering these regions have the largest number of inhabitants, best infrastructure conditions and also the largest GDP in the country[42].

Figure 4 indicates the location of some of the key APLs and the main sectors in which they are mostly focused.

[39] http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=37273326
[40] ECCP Cluster Mapping, www.clustercollaboration.eu
[41] Grupo de Trabalho Permanente para Arranjos Produtivos Locais – GTP APL, http://portalapl.ibict.br/apls/
[42] Innovation Norway, *Technology Clusters In Brazil,* 2015. https://innovationhouserio.wordpress.com/2015/02/04/technology-clusters-in-brazil/

**São Carlos** has been awarded with the title of the technology capital of Brazil due to a high number of R&D institutions
Relevant institutions: Sao Paulo University (USP São Carlos), Federal University of São Carlos (UFSCar) and University Centre of Central São Paulo (UNICEP)
Main sectors: Engineering, agriculture, biotechnology, computation and physics

**Santa Rita do Sapucaí** is one of the main clusters in the field of telecommunications and electronics
Relevant institutions: Electronic Technical School (ETE), Inatel and Management and Informatics College (FAI)
Main sectors: ICT and electronics

**Londrina** and **Curitiba** are other important clusters, partly because they offer tax exemptions to companies that promote R&D

**Campinas** is regarded as the Brazilian Silicon Valey due to the large concentration of technology development institutes and companies and because it was the first city in Brazil to provide tax incentives to startups
Relevant institutions: Center of Research and Development in Communication (CPqD)
Main sectors: ICT, electronics, mechanisms and biotechnology


**Recife** has become one of the main clusters of ICT companies due to the presence of Porto Digital, an ICT cluster
Relevant institutions: Recife Center of Studies and Advanced Systems (C.E.S.A.R.)
Main sector: ICT

**Belo Horizonte** is home to the largest biotechnology cluster in Brazil
Relevant institutions: Federal University of Minas Gerais (UFMG)
Main sectors: Biotechnology

**Florianópolis** is one the most recognized technology clusters in the ICT sector, home to the technological parks Alpha and Sapiens and to the incubators CELTA and MIDI
Relevant institutions: Federal University of Santa Catarina (UFSC)
Main sectors: ICT

**Rio de Janeiro** is home to one of the largest technological parks, located inside the campus of the Federal University of Rio de Janeiro (UFRJ)
Relevant institutions: UFRJ
Main sectors: Energy, informatics and environment

**Porto Alegre** is known to be one of the most import technological parks, Tecnopuc
Relevant institutions: Pontifical Catholic University of Rio Grande do Sul (PUCRS)
Main sectors: ICT, environment technology and creative industry

**São José dos Campos** is the main center for the development of aeronautical technology
Relevant institutions: Aerospatiale Technical Centre (CTA) and Institute of Aviation Technology (ITA)
Main sectors: Aerospace technology

FIGURE 4 – BRAZIL CLUSTER MAPPING[43]

[43] Source: Map figure taken from: http://thelearningprofessor.wikispaces.com/; content from: http://techinbrazil.com/technopoles-in-brazil

# 3.2. Clusters in biotechnology, renewable energy and ICT

Regarding clusters, biotechnology, renewable energy and information & communication technology (ICT) offer the most promising opportunities for the EU. Details of some key clusters in these three sectors are provided in this section.

**Biotechnology clusters**

**Biotechnology cluster of Minas Gerais**

According to the National Association of Biotechnology and Life Sciences Companies (Anbiotec), Minas Gerais is the state leader in terms of biotechnology innovation. The Federal University of Minas Gerais is the Brazilian university that generates the highest amount of patents, and around 60% of these patents are in the biotechnology field. Minas Gerais is also home to about one third of the biotechnology companies in Brazil. These companies are distributed in three APLs: the *APL de Biotecnologia da Região Metropolitana de Belo Horizonte* (APL BIOTEC RMBH - Biotechnology APL of the metropolitan region of Belo Horizonte), the *APL de Biotecnologia do Triângulo Mineiro and Alto do Paranaíba* (APL BIOTEX TMAP - the Biotechnology APL of Triângulo Mineiro and Alto do Paranaíba), and the *APL de Biotecnologia da Viçosa* (Biotechnology APL of Viçosa)[44]. The companies are 80 in total and are mostly focused in the fields of human health, animal health, environment and agro-business[45].

**Bio-Rio park**

Bio-Rio Park is an APL located in the *Universidade Federal do Rio de Janeiro* (UFRJ - Federal University of Rio de Janeiro) with the aim of promoting research and development of biotechnology products. When it was created, in 1988, Bio-Rio Park was the first Biotechnology cluster in Latin America. Currently, it comprises about 200 national and international institutes, 20 companies and 21 start-ups. Companies and start-ups located in Bio-Rio Park together generate an annual revenue of approximately $383 million (€342 million[46])[47].

**Renewable energy clusters**

**Technology Park of UFRJ**

Technology Park of the Federal University of Rio de Janeiro (UFRJ), located inside the campus of UFRJ, is considered to be one of the main S&T initiatives in the country and one of the biggest technology clusters in Brazil. It was built in 2003 with the aim of accelerating innovation by strengthening the linkage between the students and academic staff from UFRJ and companies. Since then, the

[44] ADEVI, Arranjo Produtivo Local em Biotecnologia. http://adevi.org.br/programas-e-projetos/arranjo-produtivo-local-em-biotecnologia/

[45] Mapeamento da cadeia de valor do APL de biotechnologia da RMBH – uma nova abordagem, March 2012. www.ibedess.org.br/imagens/biblioteca/884_BIOTECNOLOGIA.pdf

[46] Current Exchange rate (August 2016): $1.00 equal to €0.89

[47] Bio-Rio Park website - www.biorio.org.br/en/

government has invested more than 1 billion reais (€280,000)[48]. It is estimated that until 2017, 200 companies will be stablished in UFRJ Technology Park, working directly with the university and important technology research centres in the energy and environment sectors, such as: *Instituto de Engenharia Nuclear* (IEN - Nuclear Engineering Institute); *Centro de Pesquisas de Energia Elétrica* (CEPEL - Electric Research Centre); and *Centro de Pesquisas Leopoldo Américo Miguez de Mello* (CENPES – Research Centre of *Leopoldo Américo Miguez de Mello*)[49].

**Technology Park of Bahia**

Technology Park of Bahia is a technology cluster mostly dedicated to the energy and biotechnology sectors[50]. It is located in the state of Bahia, where the energy potential generated from wind is equivalent to the energy potential produced by the six largest hydroelectric plants in the world and where the government is estimated to invest more than 10 billion reais (€2.8 billion[51]) in Eolic energy till 2017[52]. The technology Park of Bahia was created in 2012 and is still under expansion. Currently, it is home to more than 40 companies and 56 research groups in the energy field. Due to an agreement between the *Secretaria de Ciência, Tecnologia e Inovação do Estado da Bahia* (SECTI- Bahia state department of Science, Technology and Innovation) and the Neoenergia Group, it will be also home to the laboratories for the national certification of components for the generation of solar energy[53].

**Information Technology clusters**

**Vale da Eletrônica**

Vale da Eletrônica (Brazilian Electronic Valley) is located in Santa Rita do Sapucaí (state of Minas Gerais), a city with one of the highest income per capita in Brazil's hinterland. This cluster has been created due to the presence of recognized institutions, such as the Brazilian Technical School in Electronics, the first Brazilian technical school in electronics in Latin America and the seventh in the world. Private institutions have been crucial for the growth of this APL, in particular *the Instituto de Desenvolvimento Integrado de Minas Gerais* (INDI - Institute for the Development of Minas Gerais) which has supported several investments since its creation. Currently there are more than 150 companies established in this APL cluster, most of them in the Telecommunications, Electronics, IT and Safety Technology sectors[54].

[48] Current Exchange rate (August 2016): R$ 1.00 equal to €0.28
[49] Parque Tecnológico da UFRJ: https://ufrj.br/parque-tecnologico
[50] Parque Tecnológico da Bahia presentation:www.secti.ba.gov.br/parque/institucional/parque-tecnologico-da-bahia/
[51] Current Exchange rate (August 2016): R$1.00 equal to €0.28
[52] Bahiaciencia (N°1), 2014. http://docplayer.com.br/16468620-Um-territorio-de-inovacao-parque-tecnologico-da-bahia-interior-baiano-pode-se-tornar-grande-exportador-de-energia-eolica.html
[53] FNE, Parque Tecnológico vai ganhar novo prédio com foco em Energia Solar, 2016. www.fne.org.br/index.php/todas-as-noticias/3272-parque-tecnologico-vai-ganhar-novo-predio-com-foco-em-energia-solar; Revista Primeira Pagina, 2016. www.revistaprimeirapagina.com.br/noticias/parque-tecnologico-da-bahia-tera-laboratorio-de-certificacao-para-placas-solares/
[54] Folha de S. Paulo, 2016. www1.folha.uol.com.br/mercado/2016/06/1787101-com-40-mil-habitantes-vale-da-eletronica-vira-polo-de-start-ups-em-mg.shtml

**Porto Digital**

Porto Digital, located in Recife, is considered by the A. T. Kearney consulting firm to be the biggest technology cluster in Brazil, both in terms of the number of companies and revenues generated. Since its creation in 2000, more than 90 million reais (€25 million[55]) have been invested in this cluster. Currently, it is home to more than 200 companies, including several multinational companies such as Motorola, Borland, Oracle, Sun, Nokia, Ogilvy, IBM and Microsoft. About 75% of the companies are in the ICT sector. Companies are dedicated to the development of software for business management, solutions for the financing or health markets; while start-ups are mostly dedicated to the development of games, creation of websites and intranets and identification of mechanisms for traffic management and patrimonial safety. By serving these products to more than 300 clients (e.g., MTV, Petrobras, Banco do Brasil and Sebrae), Porto Digital companies generate in total an annual sales revenue of almost 1 billion reais (€280,000 euros[56])[57].

[55] Current Exchange rate (August 2016): R$ 1.00 equal to €0.28
[56] Current Exchange rate (August 2016): R$1.00 equal to €0.28
[57] Olhar Digital, 2012. http://olhardigital.uol.com.br/noticia/voce-conhece-o-porto-digital/24156

# 4 Cluster policies and programmes in Brazil

## 4.1. The APL policy in Brazil

According to the Inter-American Development Bank, "the importance of APLs in Brazil's industrial policy is illustrated by the fact that cluster support is recognized as one of the key pillars of Brazil's Industrial, Technological, and Foreign Trade Policy (PITCE), and of the Brazilian Industrial Development Agency (ABDI)". The development of policies to support APLs is mainly guided by the federal government through the **APL Permanent Working Group (GTP-APL)**. This agency was created in 2004 within the Ministry of Development, Industry and Foreign Trade (MDIC) and aims to promote the coordination among the various federal and state agencies working with APLs.

The purpose of the integrated APL policy coordinated by the GTP-APL is to **stimulate local development through competitiveness and sustainability projects** in territories where there has been some kind of pre-existing agglomeration of SMEs. Some of the selection criteria for APLs include: capability and possibilities of operating and collaborating with other organizations; the existence of local governmental institutions capable of coordinating collective actions; socio-economic relevance of the main activity of the APL; and capability of generating new opportunities for social and economic development and innovation.

Although GTP-APL coordinates the integrated APL policy, the **ministries as well as governmental and non-governmental agencies** play a key role in the development and implementation of the policy actions of each APL. Initially, private and public agents jointly elaborate strategic development plans for the organization and consolidation of the APL. At this stage, the public agents are responsible for facilitating interaction between the various agents involved and designate local leaders for the execution of each plan. Once the action plans are designed, public agents support the recently consolidated APL through different instruments aimed at increasing competitiveness of the productive chains. During this period, direct investment is dedicated to infrastructure, equipment, specific training and technology transfer programmes, implementation of sectorial technology centres, design offices, export promotion programmes, and information systems for monitoring and evaluation.

Once the APLs are implemented, the GTP-APL promotes their development mainly through two routes. The first route consists in biannual meetings with other private and public national institutions (33 in total), which also aim to accelerate the development and innovation of APLs (e.g., *Banco Nacional de Desenvolvimento Económico e Social*[58]*, Financiadora de Estudos e Projetos*[59] and *A Agência Brasileira de Promoção de Exportações e Investimentos*[60]*)*. The main objective of these meetings is to ensure that

[58] Or BNDES - National Bank of Social and Economic Development: www.bndes.gov.br
[59] Or FINEP - Financing Agency of Studies and Projects: www.finep.gov.br
[60] Or APEX – Brazilian Agency for the Promotion of Exportation and Investment: www.apexbrasil.com.br/home/index

all institutions are working towards the same specific goals and that their efforts are not being duplicated. The second route corresponds to production of strategic development plans. These plans are developed by the GTP-APL representative in each Federal State and consist in medium-term strategies (typically 2 years) for the development of the APLs located in that particular state.

Overall, the APL policy actions developed by the GTP-APL aim to: promote economic development, reduce social and regional inequalities; accelerate technological innovation; expand and modernize the productive base; foster employment and income; reduce the failure rate of SMEs; improve education and training; and increase productivity, competitiveness and exports[61]. The *Ministério do Desenvolvimento, Indústria e Comércio Exterior* (MDIC - Ministry of Development, Industry and Foreign Trade) of the Federative Republic of Brazil has signed a Memorandum of Understanding (MoU) with the European Commission (EC) in 2011 to promote SME's competitiveness in the global market through clusters. Both parties have committed to enhance bilateral co-operation, and more specifically:

- to strengthen the exchange of information by facilitating the exchange of information on clusters, innovation and SMEs policies through the establishment of communication channels; and
- to improve the framework conditions of clusters and SMEs policy initiatives by reducing the administrative burden, increasing access to finance, opening access to international market and removing barriers to trade [62].

Building on this MoU, the GTP-APL signed a Clusters Cooperation Agenda (CCA) with the European Cluster Collaboration Platform (ECCP) in 2011. This initiative aims to strengthen business, research and technological cooperation and promote SME internationalisation by encouraging clusters from Brazil and Europe to collaborate. In December 2013, a new CCA was signed between GTP-APL and the ECCP where emphasis is given to:

- EU-Brazil cluster internationalization and collaboration in the field of biotechnology and personalized medicine; and
- EU-Brazil cluster internationalization and collaboration through SMEs of other emerging industries such as ICT, bio-economy (green chemicals, biomass, cosmetics, etc.), renewable energy and energy efficiency[63].

As a result of the MoU and CCA, a first match-making event was held in 2013 to promote business, research and technological cooperation between European and Brazilian clusters in the biotechnology

[61] IDB WORKING PAPER SERIES No. 360, 2012. https://innovationpolicyplatform.org/sites/default/files/rdf_imported_documents/Assessing_the_Impact%202012.pdf

[62] Memorandum of understanding between the ministry of development, industry and foreign trade of the federative republic of Brazil and the European Comission. http://ec.europa.eu/DocsRoom/documents/13442/attachments/2/translations

[63] ECCP-GTP-APL MoU, 2013. www.clustercollaboration.eu/sites/default/files/international_cooperation/mou-brazil-english_2013.pdf

sector. Details of this event, exclusively dedicated to the sector of biotechnology, are provided in an ECCP report[64].

## 4.2 Biotechnology policies and programmes

Biotechnology is considered by the government to be one of the most promising sectors for the economic growth of Brazil. It covers agro-food, human health and biodiversity for sustainable chemicals. As a result, several policies have been implemented in this sector, including:

- The *Política de Desenvolvimento da Biotecnologia* (Development of Biotechnology Policy, 2007), which together with the *Política Industrial, Tecnológica e de Comércio Exterior* (PITCE - Industrial, Technological and Foreign Trade Policy), aims to promote the development of the biotechnology industry by supporting the incorporation of biotechnology in Brazilian industrial processes[65].
- The *Lei da Biosegurança* (Biosafety Law, 2005) which imposes that any genetic modified organism (GMO) needs to go through a careful evaluation by the *Comissão Técnica Nacional de Biossegurança* (CTNBio - National Technical Commission on Biosafety), an agency under the MCTI. The CTNBio, a group of doctors, specialists in biotechnology-related areas designated by the MCTI, assesses each application for research or marketing of GMOs in Brazil[66].

The government has a strong influence in the Biotechnology sector through the establishment of strong regulations. The most important governmental institutions are the *Instituto Nacional de Propriedade Intelectual* (INPI - National Institute of Industrial Property) and the *Agência Nacional de Vigilância Sanitária* (ANVISA - National Health Surveillance Agency):

- INPI is a signatory of the Patent Cooperation Treaty, which ensures that companies willing to sell their products in Brazil are able to extend their rights to the country. However, to guarantee patents protection in Brazil, companies cannot automatically extend registration rights from abroad. Instead, they need to register the international patents and trademarks with INPI.
- ANVISA is an autonomous agency linked to the Ministry of Health. It is responsible for all regulations and controls over the management, imports, storage, distribution and retail of health products and services in Brazil. ANVISA has adopted national guidelines for good manufacturing and laboratory practices, following Organisation for Economic Co-operation and Development (OECD) standards. These actions promoted the quality of medicines, which can now be exported without adaptation.

[64] EU-BRASIL Cluster Matchmaking Event - Biotechnology dedicated to human health and personalised medicine September 10-12, 2013 - Rio de Janeiro. Mission report. 2013. http://archive.clustercollaboration.eu/documents/2736637/2945936/Communication-Report+Brazil-VF.pdf/4ce48385-8be2-4716-ade7-d265e6cf4c14;jsessionid=B2FF1F49F461318D972D1BD803E461DF?version=1.0

[65] MCTI, Biotecnologia. www.mct.gov.br/index.php/content/view/3546.html

[66] Conselho de Informaçoes sobre Biotechnologia. http://cib.org.br/biotenologia/regulation

Most companies operating in the biotechnology sector are small and medium size organisations. As a result, most of them are highly focused on research, hence being unable to independently generate enough revenues. For these companies, funding supply, either from public or private investors, is essential. The *Banco Nacional de Desenvolvimento Económico e Social* (BNDES - National Bank of Social and Economic Development) and the *Financiadora de Estudos e Projetos* (FINEP - Financing Agency of Studies and Projects), a research and innovation projects financing agency, linked to the Ministry of Science and Technology, are the most important public funding institutions in Brazil:

- BNDES provides funding charging an interest rate of about 7% in 2017, which is lower when compared to Bank of Brazil's rate of 8.25% in the same year, and
- FINEP is mostly focused on providing non-reimbursable funds for research in order to support both profit and non-profit organisations on every stage of the scientific and technological development cycle[67].

## 4.3 Renewable energy policies and programmes

Renewable energy is a priority sector for Brazilian cluster development policies[68]. Wind-power, biomass and small hydro sub-sectors are currently promoted by several government initiatives and incentive programmes, such as:

- The *Programa de Incentivo a Fontes Alternativas de Energia Elétrica* (PROINFA - Alternative Energy Source Incentive Program), implemented in 2002, that subsidizes the higher cost of alternative energy through a levy on consumer electricity bills;
- The new legislation stablished by the *Agência Nacional de Energia Elétrica* (ANEEL - National Agency of Electrical Energy) that allows independent and individual producers using renewable generation to easily connect to the energy grid and a net-metering Power Compensation System was introduced to offer credits on energy bills; and
- The development programmes, *Programa Nacional de Desenvolvimento Energético de Estados e Municípios* (PRODEEM – National Programme for the Energetic Development of States and Municipalities) and *Luz Para Todos* (Light For All), which encourage development of alternative energy systems in isolated locations of the country.

Other government incentives ongoing in Brazil to promote innovation in the renewable energy sector are detailed in a report produced by the International Renewable Energy Agency (IRENA)[69].

[67] Fraunhofer Moez, Working Paper 5, 2012. www.imw.fraunhofer.de/content/dam/moez/de/documents/Working_Paper/Working-Paper-5.pdf

[68] Eduardo Giacomazzi,*Brazil's Biotech Initiatives,* BRBIOTEC. www.oecd.org/sti/biotech/46381658.pdf

[69] IRENA, Renewable Policy Brief on Brazil, 2015. www.irena.org/DocumentDownloads/Publications/IRENA_RE_Latin_America_Policies_2015_Country_Brazil.pdf

## 4.4 Information & Communication Technology policy and programmes

Since Brazil is the world's 6th ICT market, but still relying on foreign inputs, the government has been enacting a number of programmes and policies since the 90's to accelerate innovation and promote the industrial development in the ICT sector such as:

- The Informatics Law, which has been in force since 1991, established the basic production processes to encourage local production and increase local content in hardware, as well as to stimulate investments in local R&D through captive centres and partnerships with Brazilian partners. The law was renewed in 2001, 2004 and most recently, in 2014[70].
- The Brazil Integrated Circuit Programme, established in 2005, is part of the Brazilian Microelectronics Programme implemented in 2002 and aims to create a network of integrated circuit design houses to work on behalf of domestic and foreign firms and to attract foreign IC design houses like Freescale and Smart.
- The Programme for the Development of the Semiconductor and Display Industry was implemented in 2007 with the aim of developing the local semiconductor fabrication and display production segments of the ICT industry and to simplify the process of acquiring equipment, raw materials and design tools.
- The Strategic Programme for Software and IT Services, stablished in 2011, is a programme which aims to promote training of IT personnel, upgrade Brazilian firms, encourage exports, support start-ups and attract R&D centres. Its most recognised pillars are: the *Start-up Brasil* which supports software start-ups; and the *Innovate in Brazil* which aims to attract global software R&D centres[71].

[70] In its current form, the main benefit obtained is the reduction of the IPI taxes (a reduction of 80% from 2004-2024; 75% in 2025-2026; and 70% from 2027-2029; after which the incentive will be dissolved). Reductions can also be given to areas such as services, raw materials, expenses for real estate property and facilitation of the hiring process of scientists and researchers. - https://ipc.mit.edu/sites/default/files/documents/16-003.pdf

# 5 Conclusion

The strengths of the Brazilian economy both at the Latin American scale and globally, its strong economic ties with the EU, and the existing national policies implemented to support cluster development and internationalisation, present a **significant justification to build greater cooperation opportunities** and ties to the Brazilian industry clusters for the benefit of EU clusters and their SMEs.

**Biotechnology, including human health and agro-food, fine chemistry arising from biodiversity, renewable energy, environment technologies, as the LCBA experience shows, and ICT** are the industry sectors that present more opportunities for technology, innovation and business cooperation between Brazilian clusters and EU clusters. Besides the great economic expansion and technology development in these sectors, they have been recognised in the EU-Brazil Agreement for Scientific and Technological Cooperation (2004) and the JCR-MCTI Cooperation Arrangement (2013) as **industrial sectors of common interest** for both the EU and Brazil.

The Clusters Cooperation Agenda set up between the GTP-APL and the EECP, aiming at strengthening business, research and technological cooperation between Brazil and EU clusters, gives an initial foundation to build on to achieve results.

# 6 Annex

TABLE 1 – EU-BRAZIL RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS[72]

| Project | Description |
|---|---|
| ENRICH Brazil | This H2020 project intends to establish and deploy a Centre for Europe-Brazil Business Innovation Cooperation. The Centre will connect and support European Research & Innovation & Business (R&I&B) organizations in the Brazilian market, while strengthening the European Union's position as a world leader in Science, Technology and Innovation. The Centre will achieve these goals by sustainably offering a diverse set of services, including networking and partnering.<br>Website: www.cebrabic.eu |
| INCOBRA | The overall objective of INCOBRA is to focus, increase and enhance Research & Innovation (R&I) Cooperation Activities between Brazil (BR) and European Union (EU) R&I actors, so that both regions get the best value out of the mutual cooperation. INCOBRA´s overall objective is built on three dimensions: focus on better targeted R&I cooperation activities addressing BR-EU R&I cooperation areas (agrofood, marine research, energy, nanotechnology, ICT) and anticipating trends and opportunities; increase R&I cooperation activities; and enhance the sustainable framework conditions for developing R&I cooperation activities.<br>Website: www.incobra.eu |
| CLIM-AMAZON | A joint Brazilian-European scientific initiative supported by the EU (European Union) through the FP7 (Seventh Framework Programme for Research and Technological Development) under the INCO-Lab scheme. This co-operation aims at fostering exchanges between Brazilian and European scientists in the area of geosciences and environmental studies, by means of scientific meetings, visits of experienced European researchers in Brazil, PhD and Post Doc calls open to European universities proposing to develop new research approaches in the Amazon region, a world-class example for climate research.<br>Website: www.clim-amazon.eu |
| B-Bice+ | The European partners are the Development Research Institute of France (IRD), the International Bureau of the German Federal Ministry of Education and Research (BMBF) and the Greek Foundation for Research and Technology Hellas (FORTH). The Brazilian partners are the National Council for Scientific and Technological Development (CNPq), the *Fundacao Universidade de Brasilia* (UnB) and *Associação Nacional de Entidades Promotoras de Empreendimentos inovadores* (Anprotec).<br>Website: www.b-bice-plus.eu |

[72] http://ec.europa.eu/research/iscp/index.cfm?amp;pg=brazil

| Project | Description |
|---|---|
| B.BIC+ | It is a successor project to both the B-Bice and APORTA projects that aims to improve the cooperation in Science, Technology and Innovation between Brazil and the EU. It has a quarterly newsletter and a website and developed a Competency Map of the Brazilian Institutions created to help expand the knowledge of the Brazilian competencies in the EU. In the new phase of the project, it also has a work package for the relations between the EU and the Member States as well as enhancement of SME's and enterprise participation in the new Horizon 2020 Programme.<br>Website: www.b-bice-plus.eu |
| INCO-Net ALCUENET | Brazil is a partner of the INCO-Net ALCUENET - Latin America, Caribbean and European Union Network on Research and Innovation, 2012-2016. Coordinator Ministry of Science and Technology (Argentina). The European countries involved are: Austria, Spain, Finland, France, Portugal and Norway. The Brazilian counterpart is the Ministry of Science, Technology and Innovation (MCTI).<br>Website: http://alcuenet.eu |

TABLE 2 - NUMBER OF CLUSTERS BY REGION[73]

| Region | Number of clusters/ APL | Number of sectors |
|---|---|---|
| Goiás | 82 | 28 |
| São Paulo | 73 | 29 |
| Minas Gerais | 65 | 24 |
| Rio Grande do Norte | 49 | 19 |
| Piaurí | 38 | 16 |
| Rio de Janeiro | 34 | 16 |
| Paraná | 34 | 13 |
| Mato Grosso do Sul | 33 | 14 |
| Ceará | 32 | 17 |
| Pará | 31 | 21 |
| Rio Grande do Sul | 30 | 16 |
| Santa Catarina | 25 | 17 |
| Paraíba | 25 | 21 |
| Tocantis | 22 | 14 |

[73] OBAPL, http://portalapl.ibict.br/menu/itens_menu/apls/apl_o_que_sao.html

| Region | Number of clusters/ APL | Number of sectors |
|---|---|---|
| Bahia | 22 | 20 |
| Alagoas | 22 | 14 |
| Espírito Santo | 20 | 13 |
| Rondônia | 18 | 10 |
| Mato Grosso | 17 | 8 |
| Amazonas | 17 | 12 |
| Pernambuco | 17 | 17 |
| Sergipe | 17 | 13 |
| Amapá | 15 | 14 |
| Acre | 14 | 12 |
| Maranhão | 13 | 8 |
| Roraima | 9 | 7 |
| ***TOTAL*** | ***774*** | - |

TABLE 3 – RELEVANT ORGANIZATIONS IN BRAZIL

| Sector | Organization | Website |
|---|---|---|
| All | Inter-American Development Bank – Office for Strategic Planning and Development Effectiveness | www.iadb.org/en/about-us/departments/about,1342.html?dept_id=SPD |
| | Ministry of Science, Technology and Innovation (MCTI) | www.mcti.gov.br |
| | Ministry of Development, Industry, Foreign Trade and Communication (MDICC) | www.mdic.gov.br |
| | Ministry of Mines and Energy (MME) | www.mme.gov.br |
| | Brazilian agency for industrial development (ABDI) | www.abdi.com.br |

| Sector | Organization | Website |
|---|---|---|
| | National Association of Research and Development of Innovative Companies (ANPEI) | http://anpei.org.br/ |
| | Permanent Work Group for APLs (GTP-APL) | http://portalapl.ibict.br/menu/itens_menu/gtp_apl/gtp_apl.html |
| | National cluster observatory (OBAPL) | http://portalapl.ibict.br |
| | Brazilian Micro and Small Enterprises Support Service (SEBRAE) | www.sebrae.com.br |
| | Financing Agency of Studies and Projects (FINEP) | www.finep.gov.br |
| | National Bank for Development (BNDES) | www.bndes.gov.br |
| | Brazilian Agency for the Promotion of Exports and Investments (Apex-Brazil) | www.apexbrasil.com.br/home/index |
| Biotechnology | National Association of Biotechnology and Life Sciences Companies (Anbiotec), | www.anbiotec.org.br |
| | Biominas Foundation | http://biominas.org.br/en/home/ |
| | National Commission of Ethics in Research (CONEP) | http://conselho.saude.gov.br/web_comissoes/conep/index.html |
| | ANVISA | http://portal.anvisa.gov.br/ |
| | Brazilian Association of Biotechnology (BRBIOTEC) | www.brbiotec.org.br |
| Renewable energy | International Renewable Energy Agency (IRENA) | www.irena.org |
| | Brazilian Association of Energy Conservation Services (ABESCO) | www.abesco.com.br |
| | Brazilian Association of Eolic Energy (ABEEólica) | www.portalabeeolica.org.br |

| Sector | Organization | Website |
|---|---|---|
| | Brazilian Association of Solar Energy (ABSOLAR) | www.absolar.org.br |
| | Brazilian Association of Biofuel (APROBIO) | http://aprobio.com.br/ |
| | Brazilian Association of Biomass and Renewable Energy Industry | www.biomassabioenergia.com.br/. |
| ICT | Brazilian Association of ICT companies (Brasscom) | www.brasscom.org.br |
| | Brazilian Association of companies in the ICT field (ABRAT) | www.abrat.com.br |