D. 3.2 – Preparatory Briefing on Brazil

Project name	Supporting international cluster and business network cooperation through the further development of the European Cluster Collaboration Platform
Project acronym	ECCP
Deliverable title and number	D 3.2. (2) – Preparatory Briefing on Brazil
Related work package	WP3
Deliverable lead, and partners involved	SPI
Reviewed by	inno TSD
Contractual delivery date	M36
Actual delivery date	M12 – September 2016 (updated: October 2018)
Start date of project	September, 23rd 2015
Duration	2 years
Document version	V2.0

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.

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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 a brief general account 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 European Union (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 organisations on every stage of the scientific and technological development cycle.

2 Brazil Economy: focus on sectoral trends

2.1 Overview

Over the past two decades, economic growth combined with social progress have made Brazil the largest economy in South America and the second largest of the Western Hemisphere, despite the long recession that began in 2014 and from which the economy is still recovering[1]. In 2017, Brazil's Gross Domestic Product (GDP) grew 1% when compared to 2016 and the Central Bank lowered benchmark interest rates from 13.7% in 2016 to 7%[2].

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. Moreover, the country is also a member of the Common Market of the South (Mercosur)[3], a trade bloc that includes Argentina, Paraguay and Uruguay.

The diplomatic relations between the EU and Brazil started in 1960. Over the years this relationship has 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[4]. Currently, the EU is negotiating a Free Trade Agreement with Brazil as part of the EU's Association Agreement negotiations with the Mercosur countries[5].

Since the establishment of the EU-Brazil Strategic Partnership the investments have grown from one side to another, which mutually benefits both regions. The EU is Brazil's second biggest trading partner, accounting for 18.3% of its total trade; while Brazil is the EU's eleventh-biggest trading partner, accounting for 1.7% of the EU's total trade in 2017[6]. Moreover, the EU is the largest foreign investor in Brazil with investments in various sectors. In 2017, the EU's foreign direct investment (FDI) into Brazil totalled around €373 billion[7].

In recent years, the confidence of EU private investors has decreased due to an unstable political environment and corruption scandals that have been affecting negatively the country's economy. For foreign investors, the level of investments in Brazil will be largely dependent on how the government is able to promote a stable and more open regulatory environment for European investors and traders[8].

[1] https://www.oecd.org/eco/surveys/Brazil-2018-OECD-economic-survey-overview.pdf
[2] https://www.cia.gov/library/publications/the-world-factbook/geos/br.html
[3] http://www.mercosur.int/
[4] EEAS, Delegation of the European Union to Brazil, Brazil and the EU, 2016. http://eeas.europa.eu/brazil/index_en.htm
[5] http://ec.europa.eu/trade/policy/countries-and-regions/countries/brazil/
[6] EU trade policy with Brazil, DG Trade website; http://ec.europa.eu/trade/policy/countries-and-regions/countries/brazil/
[7] http://ec.europa.eu/trade/policy/countries-and-regions/countries/brazil/
[8] http://ec.europa.eu/trade/policy/countries-and-regions/countries/brazil/

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

There are several investment and trading opportunities for the EU in Brazil due to its large economy and 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 with a GDP *per capita* of $9,821 (€8,409[9]) in 2017[10]. In the same year, the service sector accounted for 67%, the industrial sector represented 27.5% and the agriculture accounted for only 5.5% of the country's GDP. Brazil is currently recovering from the 2014 recession, which was caused by a commodity prices drop following the 2008 international financial crisis, accentuated by high unemployment rates, a decrease in domestic consumption, a rise in inflation[11], and a domestic political crisis.

Concerning international trade, Brazil has a moderate openness, 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). Moreover, some sectors remain closed to foreign investment, with emphasis on sectors related to nuclear energy, health services, aerospace, banking and insurance[12].

Brazil is a highly attractive country for international investments due to its large domestic market, easy access to raw materials, diversified economy, and strategic geographic position. In 2017, FDI into Brazil increased by 2% when compared with 2016, and reached approximately €53.7 billion. Brazil was the fourth economy in terms of global FDI inflows and the first in Latin America, accounting for more than 40% of the total inflows of the region. Acquisitions by foreign companies and high consumer spending were the main drivers of Brazil's FDI inflows in 2017[13]. As abovementioned, in 2017, the EU was Brazil's largest foreign investor with a total investment of €373 billion.

The European Commission's (EC) 2017 Report on Trade and Investment Barriers indicates that Brazil is among the countries with the highest number of new potentially trade-restrictive measures[14]. 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. This agreement will cover key issues such as: trade in goods and services; investment; intellectual property rights (IPR); government procurement; and technical barriers to trade. Thus, according to the EC this

[9] Oanda, 1 US $ = 0.86 euro, September 2018
[10] World Databank, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD/countries
[11] https://www.worldatlas.com/articles/the-richest-countries-in-south-america.html
[12] ELAN, Fact Sheet ELANBiz: Invest in Brazil, 2015 www.elanbiz.org/documents/20182/56028/Invest+in+Brazil
[13] http://unctad.org/en/PublicationsLibrary/wir2018_en.pdf
[14] DG Trade, European Commission "About Brazil". http://ec.europa.eu/trade/policy/countries-and-regions/countries/brazil

agreement should create new opportunities for trade and investment by removing tariff and non-tariff barriers to trade and FDI[15].

Furthermore, the EU and Brazil have been holding frequent summits at the highest political level, focusing on global challenges. The last EU-Brazil Summit, organised in 2014, emphasised the importance of cooperation on research and innovation in order to address shared economic, environmental and societal challenges[16].

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 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 increase cooperation in trade, economic matters, science and technology (S&T) and financial matters. This agreement has been fostering cooperation and sectorial dialogues in several fields including agriculture, IPR, environment, climate change, air, maritime transport, education, non-proliferation, financial services, energy, and space cooperation[17, 18].

- The EU-Brazil Agreement for Scientific and Technological Cooperation, signed in 2004 between the EU 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 R&D activities[19]. Thirteen areas of common interest have been identified: biotechnology; information and communication technologies (ICT); 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[20].

- The Cooperation Arrangement between the EC Joint Research Centre (JRC) and MCTI was signed in 2013 during the 6th EU-Brazil Summit and aims to strengthen and further structure

[15] Ibid.
[16] https://ec.europa.eu/research/iscp/pdf/policy/br_roadmap_2017.pdf
[17] Link to the Framework Agreement : http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=417
[18] https://ec.europa.eu/research/iscp/pdf/policy/br_roadmap_2017.pdf
[19] This agreement opened the way for Brazil to participate in the European Union's Framework Programmes for research.
[20] Link to the Framework Agreement: http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=2041

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[21].

- The Implementing Arrangement, which was signed in 2016 by the EC and the Brazilian National Council of State Funding Agencies (CONFAP), aims to enhance cooperation between Brazilian researchers and teams funded by the European Research Council (ERC). This agreement allows Brazilian researchers to do multiple short or one long term research visit to ERC funded teams in Europe[22].

Furthermore, in May 2018, the EC, the Brazilian National Council for Scientific and Technological Development, the Brazilian Funding Agency for Studies and Projects and the CONFAP signed an administrative arrangement on mechanisms to support EU-Brazil cooperation activities in research and innovation. This agreement establishes a co-funding mechanism for Brazilian participation in Horizon 2020, extending to the entire country the co-funding that was only available for eight Brazilian states. The agreement also defines the operational steps for launching coordinated calls and for twinning of projects in areas of shared interest. Thus, this agreement is expected to increase the participation of Brazilian organisations in the EU's Framework Programmes[23].

The European Network of Research and Innovation Centres and Hubs, Brazil (ENRICH in Brazil), a project funded by European Framework Programme Horizon 2020, aims to strengthening cooperation in research, innovation, and business between Brazil and Europe by exchanging innovative practices, experience, and knowledge between all involved. ENRICH in Brazil's goal is to become a hub and contact point for European and Brazilian Science, Technology, and Innovation (STI) actors aiming at bilateral cooperation, as soon as 2021. Therefore, ENRICH in Brazil can represent a key instrument and a potential entry point for EU clusters that aim to cooperate with Brazilian counterparts[24].

Currently, there is one second generation European Strategic Cluster Partnership Going Global (ESCP-4i) under COSME programme that targets Brazil, namely New Frontiers in Food Fast Forward (NF4)[25]. The NF4 project is an internationalisation fast track accelerator for new frontiers innovation-intensive food SMEs, managed by a 5-Food Clusters alliance: Clusaga (ES); Food Valley (NL); Valorial (FR); Vitagora (FR) and Wagralim (BE). This project aims to promote cooperation activities with Brazil, which are expected to include a matchmaking event in São Paulo (Brazil)[26]. In addition, there are several key EU-Brazil projects in the S&T field, which are indicated in the Annex - Table 1.

[21] DG Research and Innovation, EC: http://ec.europa.eu/research/iscp/index.cfm?amp;pg=brazil
[22] https://erc.europa.eu/sites/default/files/document/file/agreement-EC-CONFAP.pdf
[23] http://ec.europa.eu/research/iscp/index.cfm?amp;pg=brazil
[24] http://brazil.enrichcentres.eu/
[25] https://www.clustercollaboration.eu/escp-profiles/nf4
[26] https://www.clustercollaboration.eu/escp-profiles/nf4

2.3 Sectoral strengths

Traditionally, Brazil's economy relies on the manufacturing industry and the commodities sector, including textiles, shoes, chemicals, cement, lumber, iron ore, tin, steel, aircraft, motor vehicles and parts, and other machinery and equipment[27]. However, as a result of several government initiatives to foster technology and innovation of Brazilian companies, Brazil's economy also rests largely on technologically advanced industrial sectors[28,29, 30], 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 this Latin-American country, namely Biotechnology, Renewable Energies and ICT.

Biotechnology sector

Brazil is 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 has been continually growing since the 1990s. In 2017, the Brazilian biotechnology industry revenues totalled approximately $13.1 billion (€11.1 billion), which represents a compound annual growth rate (CAGR) of 4.6% between 2013 and 2017. The medical/healthcare segment was the biotechnology industry's most lucrative segment in 2017, with total revenues of around $4.3 billion (€3.7 billion), representing 33% of the industry's total value[31].

Brazil has the largest healthcare market in Latin America, with the biggest universal healthcare system in the region. Recent partnerships between international pharma companies and Brazilian SMEs have contributed to the success of the country's healthcare industry. In addition, the recent creation of accelerator programs within the country is expected to foster domestic production and innovation[32].

In 2017, there were approximately 155 Brazilian high-tech companies active in the biotechnology sector, especially in the areas of agriculture, bioenergy, environment, animal health, and human health. Most of the specialised biotechnology companies are SMEs. Furthermore, the states of São Paulo, Minas Gerais and Sul are the ones with the highest concentration of biotechnology companies[33].

Moreover, Brazil is home to around 300 biotech start-ups, which are typically based within science parks and various biotech business incubators in Southwestern Brazil. These start-ups are mainly

[27] https://www.cia.gov/library/publications/the-world-factbook/geos/br.html
[28] Tech Crunch, Article, 2015. https://techcrunch.com/2015/09/27/as-brazilian-economy-descends-into-crisis-tech-is-growing-double-digits/
[29] The Next Silicon Valley, Article, 2016. www.thenextsiliconvalley.com/2016/04/20/8705-brazilian-tech-innovation-sector-booming-despite-political-and-economic-crisis/
[30] www.scienceforbrazil.com/biotech-brazils-big-high-tech-industrial-hope/
[31] https://www.marketresearch.com/MarketLine-v3883/Biotechnology-Brazil-11840846/
[32] http://www.biotech-now.org/health/2018/05/makehistory-highlighting-history-brazils-global-footprint
[33] http://www.bioblog.com.br/mercado-de-biotecnologia-no-brasil-aponta-grandes-oportunidades-de-crescimento/

focused in the industrial, environmental, agriculture and healthcare fields. It is also important to highlight that Brazil has one of the most active entrepreneurial biotech environments in the world.

Renewable Energy sector

Brazil is Latin America's largest renewable energy market, with approximately 75% of the country's electricity deriving from renewable sources. In recent years, wind and hydropower have been the main source of Brazil's renewable energy expansion[34]. In fact, Brazil has the largest capacity for water storage in the world, which explains the importance of hydropower to the country, Figure 1. Moreover, the country has a wind power potential of more than 350 GW, which can represent an alternative to the energy generated by the hydropower.

Recently, solar energy and biomass have also been playing a key role in Brazil's renewable energy industry. Thus, Brazil has abundant biomass resources, holding an estimated 50 Terawatt hour (TWh) *per year* of potential power generation from solid waste. Furthermore, the country's solar photovoltaic (PV) capacity is foreseen to grow at a CAGR of 47% between 2015 and 2025[35]. In this context, opportunities for the expansion of the renewable energy industry are expected in the next ten years as the market continues to develop.

Abundant natural resources, strong government incentives, compelling financing options and facilitated logistics make Brazil one of the most attractive global markets for renewable energy. The Brazilian market offers major opportunities to develop cooperation in this sector, particularly in the wind sub-sectors[36].

Moreover, it is also important to highlight that Brazil is a member of the global initiative Mission Innovation (MI), co-leading the Innovation Challenge (IC) on Sustainable Biofuels, and participates in the following ICs: Smart Grids; Off-Grid Access to Electricity; Converting Sunlight (co-led by the EC); and Affordable Heating and Cooling of Buildings (also co-led by the EC)[37].

By recognizing the need to further strengthen energy cooperation between both regions, in 2007, the EC 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

[34] https://www.export.gov/article?id=Brazil-Renewable-Energy

[35] www.arena-international.com/Uploads/2017/11/27/r/c/j/Free-Brazil-Renewable-Energy-Policy-Handbook-2017.pdf

[36] https://www.ft.com/content/a20b74bc-7eb4-11e7-ab01-a13271d1ee9c

[37] https://ec.europa.eu/research/iscp/pdf/policy/br_roadmap_2017.pdf

- 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[38].

An important output of this dialogue was the launch of the Low Carbon Business Action (LCBA) in Brazil, an EU-funded initiative that supports European-Brazilian business partnerships on low carbon and resource efficiency projects. Under this initiative, during the years of 2016 and 2017, several matchmaking events in Brazil and Europe resulted in the signing of 640 business partnership agreements of which 90 projects were selected to receive technical assistance to develop commercially viable results and facilitate their access to green funds. The LCBA contributes to reducing Greenhouse Gas (GHG) emissions in Brazil.

Furthermore, the EC and Brazil have agreed on a set of priority areas for S&T cooperation, which include renewable energies. In this context, two coordinated calls on biofuels have been launched. These calls funded by EU Horizon 2020 and by FAPESP, CONFAP and MCTIC exploit mutual synergies on the development of advanced biofuels. In 2017, this resulted in one project financed on each side[39].

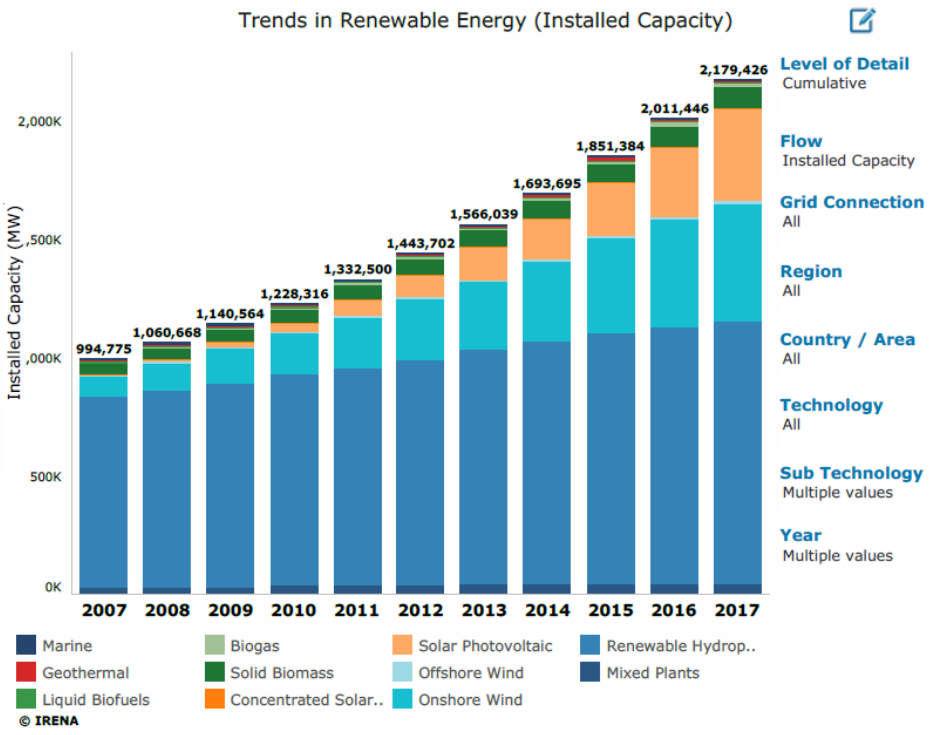

FIGURE 1 – RENEWABLE POWER CAPACITY IN BRAZIL FROM 2007 TO 2017[40]

[38] 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

[39] https://ec.europa.eu/research/iscp/pdf/policy/br_roadmap_2017.pdf

[40] IRENA, 2018 - http://resourceirena.irena.org/gateway/countrySearch/?countryCode=BRA

Communication & Information Technology (ICT) sector

Brazil is Latin America's largest information and technology (IT) market. In 2017, Brazil's ICT business market (hardware, software, services, cloud, and exports) achieved a turnover of approximately €41 billion, which represented an increase of 12.7% when compared to 2016. In addition, telecom (voice, mobile and data) and in-house IT markets' turnover accounted for around €98 billion. In total, in 2017, the Brazilian technology market totalled 7.1% of the GDP and is expected to grow 5.5% in 2018[41]. Data communication in mobile devices, cybersecurity, cloud computing, Internet of Things (IoT), infrastructure for cloud-based services, big data and analytics are considered the main ICT trends in Brazil and, therefore, investments in these areas are also forecasted to increase[42].

However, whether it is hardware, software or services, the ICT 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 industrialised countries; while Brazilian companies have traditionally offshored R&D services to meet local market demand, access knowledge, and increase their supply of talent. The offshore of R&D services may represent an opportunity for EU-Brazil cluster cooperation since the Brazilian ICT sector is open to international cooperation opportunities.

Furthermore, European companies may face some challenges accessing the Brazilian ICT market. Government procurement law can be considered a barrier to international cooperation since Brazil's regulations on the procurement of ICT goods and services require federal agencies to give preference to locally produced computer products based on a complicated price/technology matrix. Taxes and tariffs can particularly represent an obstacle to international cooperation due to the fact that foreign software and IT products can face significantly higher taxes in comparison to domestically developed software or IT products[43].

In order to promote international cooperation in strategic ICT fields, the EU and Brazil launched a strategic partnership in the area of Information Society. This partnership is referred as the EC-Brazil Information Society Dialogue and aims to cover aspects of R&D, policy and regulation in the sector of ICT[44].

Moreover, the EU and Brazil have also been cooperating in ICT R&D activities. In this context, four joint calls have been implemented with the MCTI, through CNPq and Brazilian National Research and Education Network (RNP), which act as funding agencies for the Brazilian partners. The forth call was part of H2020 ICT work-programme 2017 and addressed 5G, Cloud Computing and pilots for IoT[45].

[41] https://www.telecompaper.com/news/brazil-ict-sector-grows-127-in-2017-growth-to-slow-to-5-in-2018--1241146

[42] https://www.export.gov/article?id=Brazil-Information-Technology-Computer-Software-and-Hardware

[43] https://www.export.gov/article?id=Brazil-Information-Technology-Computer-Software-and-Hardware

[44] 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

[45] https://ec.europa.eu/research/iscp/pdf/policy/br_roadmap_2017.pdf

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 specialisation. 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 characterised by the existence of a group of firms operating in the same economic activity[46].

Some clusters are represented by a formal cluster organisation. In the past, 47 Brazilian cluster organisations were registered on the (old) ECCP platform[47] (but none are profiled on the current ECCP website yet) 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[48] 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[49]. Annex 1 – Table 2 provides the number of clusters by region.

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 778 APLs with activities in 52 different sectors. 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[50].

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

[46] http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=37273326
[47] ECCP Cluster Mapping, www.clustercollaboration.eu
[48] http://portalapl.ibict.br/
[49] Grupo de Trabalho Permanente para Arranjos Produtivos Locais – GTP APL, http://portalapl.ibict.br/apls/
[50] http://portalapl.ibict.br/apls/index.html

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 Valley 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 2 – BRAZIL CLUSTER MAPPING[51]

[51] 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

The clusters in biotechnology, renewable energy and ICT are considered the ones that 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 leading state 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:

- *APL de Biotecnologia da Região Metropolitana de Belo Horizonte* (APL BIOTEC RMBH - Biotechnology APL of the metropolitan region of Belo Horizonte)[52];
- *APL de Biotecnologia do Triângulo Mineiro and Alto do Paranaíba* (APL BIOTEX TMAP - the Biotechnology APL of Triângulo Mineiro and Alto do Paranaíba)[53]; and
- *APL de Biotecnologia da Viçosa* (Biotechnology APL of Viçosa)[54].

The companies in the abovementioned APLs are mostly focused in the fields of human health, animal health, environment and agro-business[55].

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 R&D activities focused on biotechnology products. Bio-Rio Park was the first Latin American Technological Park dedicated to the segment of biotechnology. Currently, Bio-Rio Park is comprised of about 20 companies, 21 start-ups and manages 460 projects. Companies and start-ups located in Bio-Rio Park together generate annual revenue of approximately €342 million and create approximately 1300 direct jobs[56].

Furthermore, Bio-Rio Park cooperates with national and international partners in order to promote the advancement of biotechnology in Brazil. In this context, the park international partners include BioMaryland, California Life Sciences Association, Business France and bioXclusters[57].

[52] http://www.gipmercosur.org/clusters/apl-de-biotecnologia-da-regiao-metropolitana-de-belo-horizonte
[53] http://www.gipmercosur.org/clusters/apl-de-biotecnologia-do-triangulo-mineiro
[54] http://portalapl.ibict.br/noticias/noticiasAPL/noticias-2013/julho/Biotecnologia-de-Vicosa.html
[55] 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
[56] Bio-Rio Park website - www.biorio.org.br/en/
[57] http://www.biorio.org.br/parceiros/#

Renewable energy clusters

Technology Park of UFRJ

The Technology Park of the Federal University of Rio de Janeiro (UFRJ), located inside the campus of UFRJ, is considered one of the main S&T initiatives in the country and one of the biggest technology APLs in Brazil. The Park was built in 2003 with the aim of accelerating innovation by strengthening the linkage between academia and industry.

The Park comprises research centres from 16 companies, nine SMEs, as well as nine UFRJ laboratories. Coppe/UFRJ Business Incubator, which is also located in the Park, includes 27 start-ups. Another 66 technology-producing companies were developed in the incubator. In addition, GE and L'Oréal research centres are also located in this innovation ecosystem[58].

Technology Park of Bahia

The Technology Park of Bahia is a technology cluster mostly dedicated to the energy and biotechnology sectors[59]. It is located in the state of Bahia, which is one of Brazil's most favourable regions for the development of solar and wind projects[60, 61]. In 2017, the National Bank for Economic and Social Development (BNDES) approved around €180 million in financing for the construction of eight wind farms in the state of Bahia[62]; while the Brazilian Government will also provide funding for the development of a 120-MW solar power plant in the state[63].

The Technology Park of Bahia was created in 2012 and it is home to more than 40 companies and 56 research groups in the energy field. The Park also includes a business incubator that aims to transform ideas into successful businesses[64]. Moreover, the Park will launch a solar energy certification laboratory, named LabSolar, which aims to promote the development of R&D activities in renewable energies. This laboratory is a partnership between Secti, Coelba and Universidade Federal Bahia (UFBA) and has an investment of around €400, 000[65].

[58] http://www.parque.ufrj.br/en/

[59] Parque Tecnológico da Bahia presentation:www.secti.ba.gov.br/parque/institucional/parque-tecnologico-da-bahia/

[60] https://www.enel.com.br/en/stories/a201709-a-brazil-reborn-in-bahia.html

[61] http://www.brazilgovnews.gov.br/news/2017/02/bndes-approves-r-847-million-in-financing-for-wind-farms-in-bahia

[62] Ibid.

[63] https://renewablesnow.com/news/brazil-approves-usd-300m-investment-package-for-renewable-projects-607795/

[64] http://www.secti.ba.gov.br/parque/

[65] http://tibahia.com/tecnologia_informacao/conteudo_unico.aspx?c=NOT_GOV&fb=B_FULL&hb=B_CENTRA&bl=LAT1&r=NOT_GOV&nid=47414

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 APL has been created due to the presence in the region of recognised institutions, such as the Brazilian Technical School in Electronics, the National Institute of Telecommunications, and the Industrial Association of Santa Rita do Sapucaí. The name of this APL was inspired by the American ICT cluster Silicon Valley since the APL wanted to create a similar innovation ecosystem.

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, most of them in the Telecommunications, Electronics, IT and Safety Technology sectors[66].

Porto Digital

Porto Digital is one of the main technology parks and innovation ecosystems in Brazil. Currently, it is home to more than 267 organisations in ICT fields, including several multinational companies such as Motorola, Borland, Oracle, Sun, Nokia, Ogilvy, IBM and Microsoft. These companies are mainly dedicated to the development of software for business management and solutions for the financing or health markets. Moreover, the Park is also home to start-ups mostly dedicated to the development of games, creation of websites and intranets and identification of mechanisms for traffic management and patrimonial safety. The Park employs around 8,500 highly qualified professionals, 500 of those being entrepreneurs. Porto Digital companies generate in total an annual sales revenue of almost €290,000[67].

[66] http://www.valetronica.com.br/
[67] http://portodigital.org/home

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 recognised 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 MDIC and aims to promote the coordination among the various federal and state agencies working with APLs.

The purpose of the integrated APL policy, which is 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 organisations; 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 organisation 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 approaches. The first approach 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*[68]*, Financiadora de Estudos e Projetos*[69] and *A Agência Brasileira de Promoção de Exportações e Investimentos*[70]*)*. The main objective of these meetings is to ensure that all institutions are working towards the same specific goals and that their efforts are not being duplicated. The second approach corresponds to the creation of strategic

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

development plans. These plans are developed by the GTP-APL's 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[71]. The policy support to Brazilian clusters is a robust one at the Federal, State and local level[72].

The MDIC signed a Memorandum of Understanding (MoU) with the 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 facilitate 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 [73].

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 internationalisation and collaboration in the field of biotechnology and personalised medicine; and
- EU-Brazil cluster internationalisation and collaboration through SMEs of other emerging industries such as ICT, bio-economy (green chemicals, biomass, cosmetics, etc.), renewable energy and energy efficiency[74].

As a result of the MoU and CCA, a few matchmaking missions have been organised to promote the cooperation between the EU and Brazilian clusters:

- Matchmaking event on biotechnology for personalised medicine, Rio de Janeiro, 2013;
- Matchmaking mission on renewable energy, São Paulo, November 2016[75];

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

[72] http://www.mdic.gov.br/index.php/competitividade-industrial/arranjos-produtivos-locais

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

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

[75] www.clustercollaboration.eu/event-calendar/matchmaking-mission-renewable-energy-sao-paulo-brazil-november-7

- Biogas and Biomethane - Matchmaking Mission in São Paulo, October 2016[76]; and
- Matchmaking mission on solid waste management, São Paulo, October 2016[77].

4.2 Biotechnology policies and programmes

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

- The *Política de Desenvolvimento da Biotecnologia* (Development of Biotechnology Policy, 2007) aims to foster the development of innovative biotech products; stimulate a greater efficiency of the national structure; increase the innovation capacity of the biotech companies; and promote the use of innovative technologies[78]. This policy is coordinated by the National Biotechnology Committee, which is composed of 21 members from various spheres of the federal government[79].
- The *Estratégia Nacional de Ciência, Tecnologia e Inovação 2016-2019* (National Science, Technology and Innovation Strategy 2016-2019) is focused on the selection of priority programs, which involve the most important industries, in order to boost the country's economy, including the pharmaceutical and healthcare sectors[80].
- The *Lei da Biosegurança* (Biosafety Law, 2005) 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 assesses each application for research or marketing of GMOs in Brazil[81].

The Brazilian 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

[76] www.clustercollaboration.eu/event-calendar/biogas-and-biomethane-matchmaking-mission-sao-paulo-brazil
[77] https://www.clustercollaboration.eu/event-calendar/eu-brazil-matchmaking-mission-solid-waste-management-october-2016
[78] http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/decreto/d6041.htm
[79] http://www.mdic.gov.br/legislacao/9-assuntos/categ-comercio-exterior/591-comite-nacional-de-biotecnologia-cnb
[80] http://www.senado.leg.br/comissoes/CCT/AP/AP20121128_AdrianaDiaferia.pdf
[81] Conselho de Informaçoes sobre Biotechnologia. http://cib.org.br/biotenologia/regulation

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[82].

Most companies operating in the biotechnology sector are SMEs. As a result, most of them are highly focused on research, hence being unable to independently generate enough revenues. For these companies, funding supply is essential. Thus, 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) 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[83].
- 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[84].

4.3 Renewable energy policies and programmes

Renewable energy is a priority sector for Brazilian cluster development policies[85]. Wind-power, biomass and small hydro sub-sectors are currently promoted by governmental 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, aims to increase the participation of alternative renewable sources (hydropower, wind power, thermoelectric and biomass) in the production of electric energy, privileging entrepreneurs that do not have corporate ties with generation, transmission or distribution concessionaires[86];
- The *Programa Nacional de Desenvolvimento Energético de Estados e Municípios* (PRODEEM – National Programme for the Energetic Development of States and Municipalities) and the programme *Luz Para Todos* (Light for All) aim to promote the social and economic

[82] http://portal.anvisa.gov.br/
[83] https://www.bndes.gov.br/wps/portal/site/home/quem-somos
[84] Fraunhofer Moez, Working Paper 5, 2012. www.imw.fraunhofer.de/content/dam/moez/de/documents/Working_Paper/Working-Paper-5.pdf
[85] Eduardo Giacomazzi,*Brazil's Biotech Initiatives,* BRBIOTEC. www.oecd.org/sti/biotech/46381658.pdf
[86] http://www.aneel.gov.br/proinfa

development of the regions not supplied by the conventional grid and, therefore, promoting the use of local renewable sources[87, 88].

4.4 Information & Communication Technology policy and programmes

Since Brazil is Latin America's largest 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 *Lei de Informática* (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[89].
- The *Programa de Circuitos Integrados Brasil* (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[90].
- The *Programa de Apoio ao Desenvolvimento Tecnológico da Indústria de Semicondutores* (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 *Programa Estratégico de Software e Serviços de Tecnologia da Informação* (Strategic Programme for Software and IT Services), established 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[91].

[87] http://www2.camara.leg.br/camaranoticias/noticias/59255.html
[88] http://www.pac.gov.br/infraestrutura-social-e-urbana/luz-para-todos
[89] 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
[90] http://www.ci-brasil.gov.br/index.php/en/ci-brasil-program

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.

The size, technology edge and competitiveness standing of APLs are somehow disparate but selectively quite innovative companies can be found there. Often, Industrial Associations, Sector Agencies in Brazil qualify very well for initial scouting the more innovative businesses in clusters for international cooperation of the type EU clusters might envisage. Likewise ENRICH Brazil has the potential to play a gatekeeper role and a potential entry point for EU clusters. Conversely, businesses in APLs represent a massive demand for EU intermediary products and equipment goods.

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, is the initial foundation to build on to achieve more results.

6 Annex

TABLE 1 – EU-BRAZIL RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS[92]

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. Website: http://brazil.enrichcentres.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. 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. 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). Website: www.b-bice-plus.eu
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. Website: www.b-bice-plus.eu

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

Project	Description
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). Website: http://alcuenet.eu

TABLE 2 - NUMBER OF CLUSTERS BY REGION[93]

Region	Number of clusters/ APL	Number of sectors
Acre	14	12
Alagoas	22	14
Amapá	15	14
Amazonas	17	12
Bahia	22	20
Ceará	32	17
Espírito Santo	20	13
Goiás	82	28
Maranhão	13	8
Mato Grosso	17	8
Mato Grosso do Sul	33	14
Minas Gerais	65	24
Pará	31	21
Paraíba	25	21
Paraná	34	13
Pernambuco	17	17
Piauí	38	16
Rio de Janeiro	34	15
Rio Grande do Norte	49	19

[93] OBAPL, http://portalapl.ibict.br/apls/index.html?uf=rr#am

Region	Number of clusters/ APL	Number of sectors
Rio Grande do Sul	34	17
Rondônia	18	10
Roraima	9	7
Santa Catarina	25	17
São Paulo	73	29
Sergipe	17	13
Tocantis	22	14
TOTAL	***778***	-

TABLE 3 – RELEVANT ORGANISATIONS IN BRAZIL

Sector	Organisation	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
	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

Sector	Organisation	Website
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
	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