

# CDTI - SPAIN'S NATIONAL INNOVATION AGENCY

*"FOSTERING INNOVATION-DRIVEN R&D COOPERATION BETWEEN SPAIN AND INDIA"*



The Centre for the Development of Industrial Technology - CDTI -, Spain's National Innovation Agency, was incorporated in 1977 as a public entity currently under the Secretariat of State for Research, Development and Innovation, Ministry of Economy and Competitiveness, Government of Spain. CDTI is charged to promote business RDI, raise Spanish companies' technological level by funding their R&D projects, both at national and international level. CDTI is the public agency in Spain financing industry-driven R&D projects (industrial research, experimental development) developed by Spanish companies, and promoting Spanish technologies in foreign markets via innovation and technology adaptation projects.

In 2013, CDTI earmarked 833 million euros in direct funding which translated into 1,450 financial commitment transactions to support R&D activities in Spain and served to mobilise 1.147 million euros of private investment in R&D (16% of the total business R&D performed during 2012, in Spain). From CDTI's support and financing commitment a total number 1,296 company benefited, out of which 835 were SMEs, and 586 accessed to CDTI funding for the first time. Similarly, it has been calculated that CDTI's funding in 2013 stimulated job creation of 10,123 new jobs (3,803 direct / 6,320 indirect) in the Spanish economy. Amongst the activities supported by CDTI: funding of individual business R&D projects (56%) or in collaboration (21%), innovation projects, seed capital and capital risk in support of generation and consolidation of new tech-based companies, as well as assistance for participation in international technological co-operation programmes (25%).

CDTI's budget allocation for 2014 continues growing up to 1.1 billion euros, registering a growth of 32% in comparison to 2013 levels; reflecting the importance that the Spanish Government confers to innovation as national priority, to play its role in the knowledge-based economy and society.

CDTI's main lines of action in support of Spain's industrial competitiveness, innovation and entrepreneurship consist basically in: a) Evaluating and financing RTD and innovation projects developed by Spanish companies; b) Providing support services to the development of RDI projects, internationalisation of R&D and commercial exploitation of R&D results in foreign markets; c) Promoting technology transfer and public private partnerships; d) Supporting the development of new tech-based firms (seed capital, risk capital); e) Representing, managing promoting the participation of Spanish companies in international technological cooperation programmes; f) Managing and pursuing the award of industrial contracts of high technological content in favour of Spanish companies.

Based on the paradigm of open innovation, CDTI manages the participation of SPAIN at HORIZON 2020 and multilateral programmes promoting Industrial R&D cooperation such as EUREKA, IBEROEKA and EUROSTARS. Similarly and, CDTI has entered into agreements with several R&D funding agencies in Asia and developed Industrial R&D funding programmes with countries like Japan (NEDO), China (TORCH), South Korea (KIAT) and India (DST-GITA, DBT, MNRE, TDB) aimed at promoting and financing industry-driven and market-oriented R&D projects/collaborations between entities from Spain and from the respective countries.

▪ **BILATERAL FUNDING MECHANISM FOR INDUSTRY-LED R&D COLLABORATIVE PROJECTS WITH INDIA: *INDIA & SPAIN INNOVATING PROGRAMME (ISIP)*.**

Currently CDTI (Spain) manages 3 programmes/initiatives with several public R&D funding agencies from India with the main objective of promoting and funding innovation-driven research and technology development collaborative projects between Spanish companies and Indian entities. Eligible projects should be market-oriented, basically consisting in the development of new products, processes or services, or substantial improvement of the same.

To date, 23 joint technology co-operation projects have been certified under the ISIP Program representing a total budget of 23.3 million euros in sectors such as chemistry, smart textiles, machine-tools, low voltage technologies, ICT, hot-melt technologies, agribiotechnology, nutraceuticals, biosensors, bio plastics and renewable energy technologies and applications (wind, photovoltaic and CSP), urban mobility, e-health and flexible electronics, amongst others.

Details of the Programs:

1. Sector focused initiative in BIOTECHNOLOGY: Indo-Spanish Joint Programme (PoC) for Technological Co-operation in the field of Biotechnology implemented by DBT (India) and CDTI (Spain).
2. Sector focused initiative in RENEWABLE ENERGY: Indo-Spanish Joint Programme (PoC) for Technological Co-operation in the field of Renewable Energy implemented by MNRE (India) and CDTI (Spain)
3. MULTI SECTOR INITIATIVE: Programme of Co-operation on Industrial R&D between Spain and India implemented by DST-GITA (India) and CDTI (Spain).

Under these programmes Calls for Proposals are regularly launched and supporting activities such as assistance in matchmaking, partner identification, coordination of inbound/outbound delegations, bilateral workshops and seminars co-organised by the implementing agencies.

These programmes work on a decentralized financing basis, meaning that CDTI will provide financing to Spanish counterparts in awarded projects as per its internal conditions and regulations and the Indian implementing agencies (DBT, MNRE, DST-GITA) would fund the Indian counterparts in the consortia as well, as per its internal conditions and regulations.

As for CDTI, Spanish companies participating in awarded projects under these programmes may access to preferential funding (soft loan + grant in aid) and as per the following conditions:

- Minimum budget: 175,000 euros
- Soft loan of up to 75% (exceptionally 85%) of their budget in the project at very low interest rate (presently between 0-1%)

- 30% out of the 75% loan will be non refundable.
- Loan repayment in a period of 10 years with initial moratorium of 2-3 years
- Possibility of advance payments of the loan of up to 25%

▪ **CDTI OVERSEAS NETWORK - CDTI DELEGATION IN INDIA**

**The mission of the overseas network of CDTI** is to help innovative Spanish entities come to have a good technological position in the international arena. Therefore, it offers support to Spanish entities interested in developing technological cooperation projects with companies and entities of other countries, facilitates the identification of technological opportunities and R&D partners outside the EU, promotes technology transfer and public-private partnerships.



The overseas network of CDTI has presence in 27 countries, promotes the establishment of institutional partnerships with counterpart agencies/ministries with competencies in R&D, intermediate agents and platforms from different countries in order to promote and foster tech-based alliances and collaborations of Spanish companies with R&D stakeholders of third countries.

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**SPAIN'S S&T CAPACITIES IN TARGETED SECTORS.**

- a) **ELECTRONICS, INFORMATION AND COMMUNICATION TECHNOLOGIES.**
- b) **BIOMEDICINE, BIOINFORMATICS AND BIOMEDICAL ENGINEERING.**
- c) **SOLAR ENERGY.**
- d) **ENVIRONMENT (WATER TECHNOLOGIES, WASTE MANAGEMENT AND TREATMENT).**

**a) ELECTRONICS, INFORMATION AND COMMUNICATION TECHNOLOGIES.**

The Spanish ICT sector registered one of the greatest growths in Europe, ranked 5th worldwide by turnover in 2012, and Spanish companies hold a competitive edge in technologies, products and solutions in fields such as advanced technology solutions in the travel sector, mobile content development and distribution, software and computer protection, artificial intelligence, 3D radars and flight simulators, E-government and electronic identification technologies, electoral services domain, videogames and industrial production of grapheme.

▪ **MAIN ICT SECTOR DATA (2012):**

- Market size: 91.97 billion euros (ICT - 77.366 / Digital Contents - 14.604).
- Number of companies (\*2011): 24,779 (ICT - 17,119 / Digital Contents - 7,660).
- Employment: 397,579 (ICT - 319,447 / Digital Contents - 78,102).
- Investment: 15.638 billion euros (ICT - 12.831 / Digital Contents - 2.807).
- Over 80 operative software factories and centres of excellence in Spain.
- 81 technology parks hosting 6,030 companies.

▪ **S&T CAPACITIES:**

Spain was the 5th largest recipient of EU funding in FP7 (EU Research and Innovation Funding Programme) ICT, with a strong industrial participation. Main R&D strengths concentrated in technological areas such as Future Networks and Internet, Software, Services and Internet, but also application areas such as ICT for health and energy efficiency.

▪ **ELECTRONICS:**

The professional electronics industry in Spain is an international leader for simulation equipment, as well as electronic equipment for infrastructures (traffic and aviation), control systems for energy distribution networks, parking meter solutions and border surveillance.

Spanish companies are world leaders in developing and implementing electronic identification technologies and biometric solutions. Spain's electronic ID card and passport, implemented by *Indra*<sup>1</sup>, is one of the world's most ambitious and pioneering initiatives in this field.

In terms of eGovernment, *Indra* is a leader in the electoral field, managing over 350 processes worldwide, serving 3 billion voters in 22 countries, including the United

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<sup>1</sup><http://www.indracompany.com/en>

Kingdom, Norway, France and Peru. Spain is also becoming an international leader in the field of eHealth, the healthcare technology sector, with revenue in excess of €7.4 billion, (0.7% of GDP), out of which 20% comes from exports.

▪ **INFORMATION AND COMMUNICATION TECHNOLOGIES:**

Spanish Companies have been leaders for important projects on security and antivirus systems, electronic administration, e-health, online banking services and near-shore services, with a global reputation. International Leader in High Technology Projects (3D Radars, Flight Simulators, Air traffic and telecom satellite systems, pioneering in industrial production of grapheme, digital video broadcasting, terrestrial and by satellite, and videogames).

The largest European company in revenues and sixth in asset capitalisation is Spanish, *Telefónica*<sup>2</sup>. With a presence in twenty four countries and a client base of three hundred and sixteen million accesses in 2012, it is the world's largest comprehensive telecommunications company in number of accesses outside its home market. The company has a strong presence in Europe and Latin America and holdings in China Unicom and Telecom Italia, with whom it has a total of 871 million clients; in addition, it has collaborations with Bouygues, Telecom, Sunrise and Etisalat). *Telefónica* ranks 27 out of EU's top 1000 companies and 1st company in Spain by R&D investment, focussing on research areas such as Mobile Systems, Big Data, Distributed Systems, User Modelling and Machine Learning, HCI and Mobile Computing, Multimedia Analysis Privacy Reputation and Trust, Network Economics.

*Institute IMDEA Networks*<sup>3</sup> is an international networking research institute located in Madrid with extensive experience in network architectures and protocols, Internet economics, wireless and wired communication media, access control, mobility, routing, congestion control security and energy-aware networking. The *IMDEA Software Institute*<sup>4</sup> (the Madrid Institute for Advanced Studies in Software Development Technologies) was Spain's first Software Research institute employing 63 researchers from 18 different nationalities with main R&D lines in modelling, software and security systems, verification and validation, programming and optimization

*BSC-CNS*<sup>5</sup> hosts *MareNostrum*, the most powerful supercomputer in Spain, ranking 29th out of the top 500 list of fastest supercomputers based on Intel SandyBridge processors, iDataPlex Compute Racks, a Linux Operating System and an Infiniband interconnection.

*GMV*<sup>6</sup>, leader in turnkey systems for urban public-transport management with project references in numerous countries. *Indra* is a premier Information Technology company in Spain and a leading IT multinational in Europe and Latin America. It is ranked as the second European company in its sector according to stock market capitalisation, and it is one of the three Spanish companies with more investment in R&D.

*Amadeus*<sup>7</sup> is a Spanish company leader in global distribution systems(GDS) and the largest transaction processor for the worldwide travel and tourism sector. It is also the

<sup>2</sup><http://www.telefonica.com/en/home/jsp/home.jsp>

<sup>3</sup><http://www.networks.imdea.org/>

<sup>4</sup><https://software.imdea.org/>

<sup>5</sup><http://www.bsc.es/>

<sup>6</sup><http://www.gmv.com/en/>

<sup>7</sup><https://www.amadeus.net/home/>

leading technology supplier in the field of activity, with an extensive catalogue of airlines solutions.

*Panda Antivirus*<sup>8</sup> is promoting most advanced virus antisoftware, named by Gartner as “the first Endpoint Protection Platform vendor to fully embrace cloud delivery of security services”. The company has over 20 years of experience in anti-malware solutions for consumers and corporations. Their products are used daily in millions of computers in over 200 countries worldwide, with offices in over 50 countries.

## b) BIOMEDICINE, BIOINFORMATICS AND BIOMEDICAL ENGINEERING

The bioeconomy in Spain contributed to 7.8% of GDP in 2012. In this year, Spanish biotech companies have launched 126 new products to the market, out of which 60% correspond to the health biotechnology subsector.

As per the OECD indicators 2012, Spain ranks 2nd OECD country by number of biotech firms, 3rd by R&D expenditures. Furthermore, Spain contributed in 1,79% to the total number of patents filed by Spanish companies under the Patent Co-operation Treaty (PCT 2008-2010).

### ▪ Main biotech sector data 2012 (Source: ASEBIO Report 2013<sup>9</sup>):

- Number of enterprises: Number of enterprises: 3,070 (625 Biotechnology Enterprises / 2,444 user enterprises of biotechnology).
- Number of personnel employed: 202,976.
- Estimated turnover (2010): 80.312 billion euros.
- Internal Expenditures in R&D: 523,344 million euros.
- 52% of enterprises related to human health, 32% related to agro-food and 15% related to industrial processing.

It is a sector with huge future growth potential and a high degree of R&D. The Spanish biotechnology sector is a young sector, existing for a mere 15 years. The biotechnology in Spain has experienced an astonishing 350% growth in the last four years.

The biotech sector in Spain benefits from a strong government support and boasts top level infrastructures and scientific excellence.

### ▪ S&T CAPACITIES:

- Network of science parks (bioclusters). The Major biotech Clusters are *AndalucíaBioregión*<sup>10</sup> (Cell therapies, functional foods, biofuels, biology pest control in agriculture) *Biocat*<sup>11</sup> (oncology, Nanomedicine, structural biology, genomics), *Madrid*<sup>12</sup> (oncology, cell therapy, human health diagnosis, neurology), *Bio Basque*<sup>13</sup> (personal medicine, biosensors, bioengineering), *BIOVal*<sup>14</sup> (Functional foods, reproductive medicine, regenerative medicine, molecular diagnosis).

<sup>8</sup><http://www.pandasecurity.com/>

<sup>9</sup>[http://www.asebio.com/en/documents/ASEBIOREPORT2012\\_final.pdf](http://www.asebio.com/en/documents/ASEBIOREPORT2012_final.pdf)

<sup>10</sup><http://www.andaluciabioregion.es/en/>

<sup>11</sup><http://www.biocat.cat/en>

<sup>12</sup><http://www.madridnetwork.org/Estructura.aspx/RedDeClustersOpcion4>

<sup>13</sup><http://www.biobasque.org/aBBW/web/en/index.jsp>

<sup>14</sup><http://translate.google.com/translate?u=http://www.bioval.org/&sl=es&hl=es&tl=en>

- Research Facilities like the *Synchrotron Alba*<sup>15</sup> (third light generation Synchrotron), the *Supercomputer Mare Nostrum*<sup>16</sup> and the *National Institute of Photonics, ICFO*<sup>17</sup> enable experimental science and technology development in the field.
- *CNIO (Centro Nacional de Investigaciones Oncológicas)*<sup>18</sup>, number one cancer research centre internationally as per number of scientific publications and its impact.
- Nanobiotechnology and nanomedicine are some of the strongest new R&D areas in Spain, with high research output.

#### ▪ **BIOMEDICINE:**

Some examples of leading companies in the field are *Grifols*<sup>19</sup> specialised in plasma derived products and therapies, *Orizon*<sup>20</sup> which focusses on the development of new chemical molecules (NCEs) directed against new targets identified in epigenetic biomarker discovery programmes in the area of neurodegeneration and cancer and *Pharmamar*<sup>21</sup>, leader in the development of antitumor drugs of marine origin.

Similarly *PRBB*<sup>22</sup> (*Barcelona Biomedical Research Park*) is one of the largest hubs of biomedical research in southern Europe. PRBB has more than 100 research groups from the different centres investigating areas such as: biomedical informatics and systems biology, gene regulation and epigenetics, cell and developmental biology, pharmacology and clinical physiopathology, human genetics and evolutionary biology, epidemiology and Public health.

Another example is *BITA*<sup>23</sup> "*Proyecto de Biomedicina, S.L.*", owner entity of all the patents which materialize form the research carried out in the *Centre for Applied Medical Investigation (CIMA)*<sup>24</sup> in Pamplona (Navarra).

#### ▪ **BIOMEDICAL ENGINEERING:**

*Sociedad Española de Ingeniería Biomédica* (SEIB)<sup>25</sup> has more than 30 research groups in different areas such as Biomedical signal processing, Nano medicine, Biomechanics, Evaluation and diagnosis systems, clinical engineering, biomedical systems modelling and simulation, evaluation of health technologies, simulation and surgical planning.

*The Institute for Bioengineering of Catalonia (IBEC)*<sup>26</sup> is a centre of excellence Severo Ochoa, with the objective of developing research of excellence in the fields of bioengineering and nanomedicine. It consists of 15 research groups and 250 researchers and staff from 20 different countries.

<sup>15</sup><http://www.cells.es/en>

<sup>16</sup><http://www.bsc.es/marenostrum-support-services>

<sup>17</sup><http://www.icfo.eu/>

<sup>18</sup><http://www.cnio.es/ing/index.asp>

<sup>19</sup><http://www.grifols.com/en/web/international/home;jsessionid=gDvnJhhH2sXBy898vvtkfqqdbVJhcff8xmd4QnvrCyWdg11gRG>

<sup>20</sup><http://www.oryzon.com/es/inicio>

<sup>21</sup><http://www.pharmamar.com/company.aspx>

<sup>22</sup><http://www.prbb.org/>

<sup>23</sup><http://www.proyectobiocima.com/en/index.asp>

<sup>24</sup><http://www.cima.es/cittil/index.html>

<sup>25</sup><http://seib.org.es/en/>

<sup>26</sup><http://www.ibecbarcelona.eu/>

- **BIOINFORMATICS**

*National Institute of Bioinformatics (INB)*<sup>27</sup>. In the field of functional genomics advanced data analysis support has been provided to a wide range of projects in the areas of agro-alimentary research, cancer and other diseases, regenerative medicine, human reproduction, evolution, SNP analysis and transcriptomics.

c) **SOLAR ENERGY**

Spain has a privileged geographical situation, being the European country with highest solar irradiation (average of over 1,600 Kwh-m<sup>2</sup>). Through *CECRE (Control Centre of Renewable Energies)*, an operation unit integrated into the *Electrical Control Centre (CECOEL)*<sup>28</sup>, the generation of renewable energy producers set up in Spain is managed and controlled. *CECRE* is the world's first centre that controls renewable energy generation and is operated by Red Eléctrica de España.

- **SOLAR PHOTOVOLTAIC**

Regarding total installed power, Spain is the 2nd country in the world, only after Germany, with 3,787 MW installed at the end of 2010. In 2012, 393 MW were installed and connected to the grid.

The sales volume in the Spanish solar PV sector accounted for 1.4 billion euros, with around 700 companies and 13,700 employees developing related professional activities. Spanish companies embrace all the activities related to the industry, covering the entire silicon production chain and all the electronic processes for producing polysilicon, ingots, wafers, cells and modules. There are approximately thirty centres (universities, private and public centres) which are devoted to R&D in photovoltaic energy.

In the field of concentrated solar energy in 2011, Spain had the largest market share in the world, with 65% of the total, followed by the USA and Australia. From a technological point of view Spain is pioneering technology developments in Concentrated Photovoltaic Energy through the *Solar Energy Institute of the Polytechnic University of Madrid*<sup>29</sup>. Similarly, with the establishment of *ISFOC*<sup>30</sup> - Concentrated Photovoltaics Systems Institute, Spain has impressively boosted this technology at worldwide level, with the setting up of demonstration plants by different manufacturers and establishing itself as a reference in the industrial development model of this technology.

- **SOLAR THERMAL:**

In 2010, the total capacity in operation was 2,366,534 m<sup>2</sup>. Despite the building sector crisis, Spain is still the third country in Europe in terms of installed capacity in 2010 with 349,000 new m<sup>2</sup>. There are over 40 local manufacturers of solar thermal collectors employing over 6,000 people, as well as at least 60 companies dedicated to the marketing and distribution of thermal collectors.

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<sup>27</sup> <http://www.inab.org/>

<sup>28</sup> <http://www.ree.es/en/educaree/infographs-and-interactives/cecoel-virtual-tour>

<sup>29</sup> <http://www.ies.upm.es/index.php?id=69>

<sup>30</sup> <http://www.isfoc.net/index.php/en>

- **CONCENTRATED SOLAR POWER (CSP):**

In 2011, Spain had 21 operating plants with a total power of 852 MW. Additionally there are 27 plants in construction phase with a total future capacity of 1,302 MW, as well as 13 authorised plants which will be built over the next few years; to end 2014 with a total power installed capacity of 2,525 MW. Spain is the world leader in terms of total CSP capacity installed, as well as in CSP project being developed.

In terms of R&D&I, Spain boasts excellence in CSP and related R&D infrastructures. The Solar Platform of Almeria (PSA)<sup>31</sup> has been developing technology, infrastructures and new components since the 80's, and is considered EU's largest R&D and test facility for CSP technologies. The Centre of Excellence for Energy, Environment and Technology Research (CIEMAT), is a public research body focussing on the generation and application of scientific and technological knowledge contributing to sustainable development. Furthermore, there is a network of technology centres (*CENER, IREC, CIRCE, CTAER*) and Universities that have been working for years with significant success. *CENER*<sup>32</sup> is a technology centre with cutting-edge technological infrastructures specialized in applied research and in the development and promotion of renewable energies, including solar pv, energy in buildings and renewable energy grid generation. 2 Spanish centres (*CTAER*<sup>33</sup> and *PSA-CIEMAT*) lead EU Solaris initiative aimed at fostering, contributing and promoting scientific and technological development of solar thermo electric technologies in Europe, and integrated in the frame of the European Strategy Forum on Research Infrastructures (ESFRI<sup>34</sup>).

On the technology deployment side, Spanish *Abengoa*<sup>35</sup> designed the Solúcar Complex (PS10, PS20, Solnova), largest solar complex in Europe on the outskirts of Seville. This is a solar thermal and photovoltaic installation complex with currently 183 MW in operation. PS10 is the first commercial plant in the world to use tower technology with a generation capacity of 11 MW. PS20 world's second commercial power tower with a generation capacity of 20 MW, features technological advancements such as more efficient receivers, improvements in the control and operational systems, as well as an improved thermal energy storage system. Solnova plant use parabolic trough technology and has a generation capacity of 50 MW. Similarly, Gemasolar plant also in Seville province, designed by Spanish company SenerIngeniería y Sistemas<sup>36</sup>, is also the first commercial scale plant in the world to apply central tower receiver and molten salt heat storage.

- **ENVIRONMENT (WATER TECHNOLOGIES, WASTE MANAGEMENT AND TREATMENT)**

As per the estimations of the Observatory of Sustainability the environmental sector in Spain is believed to be worth 11 billion euros, employs 420,000 people, of whom 140,000 are employed in waste management and 58,000 waste water treatment.

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<sup>31</sup><http://www.psa.es/webeng/>

<sup>32</sup><http://www.cener.com/en/>

<sup>33</sup><http://www.ctaer.com/en>

<sup>34</sup>[http://ec.europa.eu/research/infrastructures/index\\_en.cfm?pg=esfri](http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri)

<sup>35</sup><http://www.abengoa.com/web/en/index3.html>

<sup>36</sup><http://www.sener.es/about-sener/en>

- **WATER TECHNOLOGIES:**

In 2012, the water sector in Spain represented by value 10.159 billion euros and employed 58,601 persons.

In the field of wastewater there are currently more than 1,300 wastewater treatment plants treating more than 4,000 hm<sup>3</sup> of wastewater per year. Spain with 45 facilities in operation is together with Italy and the United Kingdom, one of the leading countries in the European Union in the number of membrane bioreactor facilities for the treatment of urban wastewater.

Spain is number one in Europe and number two in the world for reused water, outstanding in terms of legal framework as well as in technology with a 500 hm<sup>3</sup>/year of capacity producing reclaimed water (from agriculture, golf course watering, street cleaning and environmental issues) for reuse.

Spain is the leading producer of desalinated water in Europe and America. In the reutilization of treated water, Spain ranks number four in the world for desalination capacity (three million/cubic meters per day).

Spanish companies are at the head of desalination infrastructures throughout the world: *Acciona*<sup>37</sup>, *Abengoa Water*<sup>38</sup>, *ACS*<sup>39</sup>, *Aguas de Barcelona*<sup>40</sup>, *Cadagua*<sup>41</sup>, *Aqualia*<sup>42</sup>, *OHL*<sup>43</sup>, *SACYT*<sup>44</sup> (of *SACYR*), and *TRAGSA*<sup>45</sup>. Seven of the twenty largest international desalination companies are Spanish. *Acciona* is the world leader in desalination of seawater and saltwater by reverse osmosis and in the construction of desalination plants.

Spain leads the first European initiative to coordinate the water sector, *JPI Water*<sup>46</sup>, created to coordinate European R&D policies regarding water. Similarly Spanish public and private sectors are participating actively in the European Innovation Partnership on Water, aimed at accelerating the development of water innovation, and stimulating the uptake of water innovations by market and society.

TECOAGUA, as an R&D project reference in Spain, with a budget of 18 million euro co-financed by CDTI, aimed at developing sustainable technologies for generating alternative water resources. The project consortia lead by *Abengoa Water* and involving 11 companies and 22 centres from Spain, consisted in analysing and developing advanced technologies for recovering polluted natural resources, the regeneration and reuse of waste water, as well as new desalination processes, among others. The research also focused on how to conserve existing resources and optimize water management in terms of energy efficiency, as well as mitigating climate change.

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<sup>37</sup> <http://www.acciona.com/>

<sup>38</sup> <http://www.abengoawater.com/web/en/>

<sup>39</sup> <http://www.grupoacs.com/index.php/en/>

<sup>40</sup> <http://www.agbar.es/en>

<sup>41</sup> <http://www.cadagua.es/en/home>

<sup>42</sup> <http://www.aqualia.es/aqualia/index.html?lang=EN>

<sup>43</sup> <http://www.ohl.es/en/>

<sup>44</sup> <http://www.sacyr.com/syv/Door.do?OPERATION=portalGrupo&FUNCTION=8&locale=en>

<sup>45</sup> <http://www.tragsa.es/es/Paginas/default.aspx>

<sup>46</sup> <http://www.waterjpi.eu/>

- **WASTE MANAGEMENT AND TREATMENT:**

With annual sales of 5.279 billion euros, the sector represents 13% of the environmental market. It provides direct employment to more than 140,000. Spanish companies have acquired extensively experience and know-how in waste management and treatment, which they have exported with great success. Today 68, 3% of the packaging and nearly all the glass is recycled through advanced integrated management system organizations. The management of urban waste and domestic refuse in Spain is an industry that uses cutting-edge technology, such as for instance SIGRE waste management system for Spanish medication and recycling plants.

Urbaser<sup>47</sup> is Spain's leading company in the field of waste management and treatment, having built and managing more the 56 plants. ACS group, to which Urbaser belongs, manages nearly 6.8 million tons of waste per year at its plants, representing 34% of the approximately 20 million tons of waste generated every year in Spain. FCC is the largest waste management firm in Austria and second in the United Kingdom.

On the technology deployment front, some examples are:

Befesa<sup>48</sup>, is the first company in Europe to recycle steel and aluminium waste, with treatment plants in several countries. Similarly, Abengoa has recently developed a demonstration plant in Salamanca that uses Waste to Biofuels (W2B) technology, with a capacity to treat 25,000 tons of municipal solid waste from which it will obtain up to 1.5 million litres of bioethanol for use as fuel.

Some important centres of excellence and universities actively participating in the generation of scientific and technological developments in the field of water and waste would be *IMDEA Agua<sup>49</sup>*, *CIEMAT<sup>50</sup> (Centre of Excellence on Energy, Environment and Technology research)*, *ICIQ<sup>51</sup>(Institute of Chemical Research of Catalonia)*, *IDAEA-CSIC<sup>52</sup> (Institute of Environmental Assessment and Water Research)* as well as technological centres like *Tecnalia<sup>53</sup>* and *Aimen<sup>54</sup>*.

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<sup>47</sup><http://www.urbaser.es/>

<sup>48</sup><http://www.befesa.es/web/en/index.html>

<sup>49</sup><http://www.water.imdea.org/>

<sup>50</sup><http://www.ceta-ciemat.es/index.php?lang=en>

<sup>51</sup><http://www.iciq.es/>

<sup>52</sup><http://www.idaea.csic.es/index.php?lang=en>

<sup>53</sup><http://www.tecnalia.com/en/>

<sup>54</sup><http://www.aimen.es/index.php?lang=en>