

1. Summary for publication

Background

Energy Campus: Energy to Excel is a project submitted by the Universitat Politècnica de Catalunya · BarcelonaTech (UPC) in response to the International Campus of Excellence (CEI) call (Order EDU/903/2010 of 8 April). The Campus was awarded the CEI designation as the sponsor institution, with the Catalonia Institute for Energy Research (IREC) and the Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT) participating as strategic allies.

The Energy Campus demonstrates the UPC's leadership in the energy field, which is evident in a broad range of areas: teaching, research, and knowledge transfer and application; the transformational power of the Campus and its surroundings, based on the introduction of specific technologies; and the core values of sustainability, transparency and social responsibility.

The project is underpinned by three key elements: the UPC's determination to be an international leader in the energy field, the tools available to the institution as the coordinator of the Co-Location Center Iberia of KIC InnoEnergy, and the construction of the Research and Development Complex on Campus Diagonal Besòs.

Most of actions initially planned within the framework of the project were carried out between December 2010 (the start date) and June 2012. Based on synergies developed within the consortium, new actions that contribute to the achievement of the strategic objectives for the Energy Campus were defined. In view of their particular significance, these actions are also covered in this report.

Academic improvement and adaptation to the EHEA

The main objective in this area is to **boost investment in order to broaden the range of programmes offered and attract new international students**. During the period covered by this report, efforts focused on offering an attractive selection of postgraduate courses, complemented by high-quality spaces and infrastructure that effectively meet student needs. The catalogue of courses offered by the Campus at all levels was updated.



The aim of this overhaul was to provide a broad course offering for students around the globe seeking a leading university in the energy field in southern Europe.

The updated course offering includes new international master's courses in energy, new Erasmus Mundus courses, and new master's degrees with professional pathways that have three distinctive features in common: a compulsory mobility programme involving the universities where each course is taught, a scholarship programme to help students pursue their studies, and an introduction to aspects of business management that gives students an edge in their professional careers.

Universities and centres of excellence such as the École Polytechnique (ParisTech) in Paris, the Instituto Superior Técnico (IST) in Portugal, the Royal Institute of Technology (KTH) in Sweden, AGH in Krakow, INP in Grenoble, KIT in Karlsruhe, KUL in Leuven, TU/e in Eindhoven, and UU in Sweden participate in the various partnerships and the mobility programmes run by the educational consortia to which the Energy Campus belongs.

The new programmes launched are **RenE** – MSc Renewable Energy, **EMINE** – MSc Nuclear Energy, and **SENSE** – MSc Smart Electrical Networks and Systems. In addition, the Master in Environmental Pathways for Sustainable Energy Systems (SELECT) was recognised as an Erasmus Mundus course, and the postgraduate course Electric Vehicles and Other Propulsion Technologies, offered through the UPC Talent School, was launched. The postgraduate course Electric Vehicles and Other Propulsion Technologies Applied to Automation—a pioneering programme in Spain designed to meet new needs in the automotive industry—will be offered for the first time in the 2012-2013 academic year.

Facilities were adapted **to meet the needs of students enrolled in postgraduate programmes** with the aim of ensuring that they are fit for purpose and attractive enough to allow the Campus to pursue its mission. The facilities are specially designed for use by **international students enrolled in energy-related master’s and doctoral courses**.

The Doctoral School was reorganised and the UPC has been recognised as the Spanish university with the most Erasmus Mundus doctoral courses (three at present). In the next academic year, the School will participate in five of the thirty-four doctoral courses included in the European Union programme.

A programme set up to provide grants for research staff training (FPI-UPC) facilitated the hiring of **20 new trainee researchers to work on the Energy Campus**.

The UPC and La Caixa savings bank signed an agreement that provides a framework for collaboration aimed at broadening the scope of the training students receive on the Campus and encouraging intellectual exchanges with teaching and research staff around the globe. The initiative contributes to the recognition of the Energy Campus as an International Campus of Excellence. In the energy area, the focus of the programme was on giving impetus to the KIC InnoEnergy and Energy Campus projects, which encompass education, scientific output and technological innovation.

One of the actions now well underway is the **construction of the new Research and Development Complex on Campus Diagonal Besòs**.



Designed to serve as the future Energy Campus, the complex will be home to energy-related studies and to research groups and centres that work primarily in this area. The new complex is expected to be operational in 2015.

Work is currently being done to complete the ground level of all the buildings, and the frames of the teaching, research and transfer, and services buildings (building A, buildings C and I, and building J, respectively) are now being put up.

Scientific improvement and knowledge transfer

The strategic objective in this area is to strengthen applied research in the energy sector and shift from simple cooperation between actors to a real strategic partnership. The main lines of action are the Living Research Lab, development of the energy area of the UPC Technology Centre (CIT UPC), and strengthening of the Valorisation Programme in the energy area.

Work carried out at the Living Research Lab focuses on three key areas. In the first, Living Lab for electricity generation research, progress has been made on the production of energy from microalgae used to treat wastewater, on the development of new photocatalysts for hydrogen that work with sunlight at room temperature, and on control mechanisms for micro wind turbines.

The second avenue of research being pursued at the Living Research Lab is energy efficiency. A new laboratory that focuses on bioclimatic architecture and heat transfer processes was constructed, and an ultra-low energy building known as LOW3 was built and validated. The LOW3 project won one of the contests at the Solar Decathlon competition.

In the third key research area, smart energy management, the focus was on consolidating the SIRENA UPC programme, which involves monitoring the energy consumption of all classrooms and laboratories, and on investigating virtualisation strategies for the University's servers.

The energy area was also developed at the UPC Technology Centre (CIT UPC), which brings together the energy-related UPC research groups that are most active in transfer activities. Total invoicing for these groups in the 2011-2012 period was €1.25 million, of which €819 million corresponds to 2011 and €360 million to the first half of 2012. During the same period work was done on developing a specific communication plan for this area.

A valorisation programme that comprises two main actions and two secondary actions is being implemented in the energy area. The two main actions are the launch of the Technology Offers catalogue and the completion of the K2M GAIA Ecosystem. The secondary, indirectly related actions are the introduction of training for doctoral students in transversal competencies related to the valorisation of energy research, the establishment of pilot programmes on valorisation of energy research for vocational training students (CFGS), and the creation of "My Business Game", a videogame that centres on business ideas and career prospects in the energy sector.



Transformation of the Campus

The Energy Campus's third area of activity is concerned with **social responsibility, accountability, regional economic and social sustainability, and entrepreneurship**, principles that are shaping the transformation of the future Campus.

Four actions in this area were carried out between December 2010 and June 2012. First, work was started on a new services building for the UPC community, located in the Research and

Development Complex on Campus Diagonal Besòs. Second, the seal of excellence in energy efficiency was obtained for Campus buildings. Third, a high percentage of classrooms were adapted to meet EHEA energy efficiency standards. Finally, a number of education and information programmes on energy were launched with the aim of making children and young people more aware of the importance of energy savings and efficiency.

The project to construct a **services building for the university community** on the new Vampus Diagonal Besòs (one of four UPC campuses in Barcelona) was partially executed during this stage. The funding received was used to complete the detailed design and construct the retaining walls that will surround the eight buildings and prevent groundwater infiltration.

With respect to the certification of the buildings for **excellence in energy efficiency**, priority was given to opportune investments that generate a media impact. Lastly, work was done on the new university residences planned for Sant Cugat and Castelldefels. One of the buildings was awarded level A certification for energy performance and will be the first building in Spain to receive the Swiss MINERGIE certification.

Governance

Since Energy Campus brings together entities of different sizes and legal structures chose the governance model that better suits the consortium is a key point. Given that internalisation of universities is the most important strategic area of the project, it makes sense to link the governance of Energy Campus with KIC InnoEnergy, whose co-location centre Iberia is coordinated by UPC.

Regarding the decision-making mechanism, the model chosen considers a Presidency held by the vice-rector of science policy and the vice-rector of international relations, since both positions are essential pillars of the project. The strategic alliance (IREC and CIEMAT) takes part in the Directorate General of Energy Campus, and in addition, a recruitment process was opened in December to incorporate a figure of international renown in the field of energy.

Finally, both the UPC's Strategic Projects Office, as executive body of the policy established by the Presidency, and the Energy Observatory, as advisory body, set up the Management Unit

Future milestones by area

Within the **academic improvement and adaptation to the EHEA** area, in the coming years the project shall work on strengthening the coordination between the UPC Doctoral School and the KIC Energy PhD School, both recently created. In the same area, Energy Campus must also work to achieve the Erasmus Mundus certification for the Master courses already launched, being the MSc in Energy Engineering the closest to that achievement.

Within the **scientific improvement and knowledge transfer** area, encouraging project submission by campus partners to the call on energy innovation launched by KIC InnoEnergy (EIT), and increasing partner's participation in European projects funded by the upcoming Horizon2010, are two of the actions that Energy Campus shall insist the most. Both actions share similar mechanisms, so it is expected to find synergies and to improve process efficiency. The development of the Energy Observatory is also one of the actions to deploy in parallel to the implementation of the governance model, recently set up.

Within the **transformation of the Campus** area, the most relevant action is the construction of the future Campus Diagonal Besòs, devoted in full to energy topics. The works are expected to end in 2014, in particular the building to host the services addressed to the university

community. The works progress smoothly once overcome the financial and architectural issues.

Also in this area, but to a lesser extent, the second phase of the videogame “My Business Games” will be developed as an awareness campaign focused on energy.

Finally, the Energy Campus governance model will experiment a boost with the consolidation of a common structure – of decision and execution – between KIC InnoEnergy and Energy Campus, and with the international expert in energy that will join the team as advisor.

