International Campus Of Excellence 2011
University of Castilla – La Mancha

Energy and Environment Science and Technology Campus

PROPOSAL OVERVIEW
INDEX

I. Introduction

II. Vision & Mission of the project

III. Strategic Objectives of the proposal

IV. Aggregations

V. Actions of the proposal
   A. Actions for the teaching improvement and adaptation to the EHEA
   B. Actions for the scientific improvement and transfer of knowledge
   C. Actions for campus transformation
Introduction

The University of Castilla-La Mancha has been one of the basic institutions that has formed the backbone of the Autonomous Community of Castilla-La Mancha since it was launched in 1985. This integrating capacity provides a good opportunity for defining a regional strategy for sustainable economic development.

Social and economic development is closely linked to the capacity of a given region or country to diversify its energy sources in order to reduce external dependence through more efficient use of fossil fuels and the use of local resources, all with the smallest possible impact on the environment.

We must remember that the European Union is highly energy-dependent, a reason for the general recognition of the importance of energy in our societies’ stability and economic growth; today, in fact, secure energy supplies have become one of the EU’s greatest concerns. Public opinion is also ever more aware of the impact of the use of energy on the environment, and particularly the question of climate change and its possible adverse effects. Furthermore, the cost of energy and the operation of the countries’ energy sectors is constantly growing in importance and affects their ability to compete in a globalised world. Therefore, the development of instruments and regulations (SET-Plan, green package, others) that allow countries to deal with the problems of secure supplies, the full realisation of the domestic energy market, sustainability and the fight against global warming and the competitiveness of the energy mix has become one of the main concerns of the European Union. This problem is more serious in the case of Spain due to its greater dependence on foreign energy and the uncontrolled growth of its energy intensity, which not only demonstrates that we have not managed to make use of our capacity in a changing sector where our renewable sources play a
key role, but that the policies on the demand side aimed at improving energy efficiency have not achieved the expected success. Greater efforts still must be made to enable the right policies and programmes to be made to cover our priorities and needs as a country, and to foster our position in Europe with a much more active participation in the different European initiatives in this area (European Technological Platforms, Knowledge and Innovation Communities, European Energy Research Alliance, Joint Technological Initiatives, etc.). In addition to nurturing and enhancing our R&D and technological capacities in the field of energy and the environment, the main players in energy research in our country are basically universities, research centres and small technology companies, so the developments are sporadic and cannot easily be extrapolated on an industrial scale that allows social and economic growth.

In this situation, Castilla-La Mancha in recent years has occupied a leading position in the country through the investment of the Regional Government. Energy accounts for 5.1% of GDP in the region and has a 6.6% participation in the national energy sector. Being a region with high natural resources (mainly renewable) and in full reformation of the agricultural sector, it needs to provide the productive sector with tools that offer longer-lasting alternatives and generate wealth. In addition to the importance that the efficient use of fossil fuels has had on Castilla-La Mancha, and especially the local sources such as coal (the ELCOGAS CCIG plant in Puertollano being a world pioneer in coal power generation through high efficiency gasification processes), the importance of clean energies in the community is unquestionable, and this is the Spanish region with the highest installed capacity in renewable and energy efficiency with respect to the national average, with very a high rate of power supply self-supply of 41% as compared to the 20% national average. However, the region still has a high rate of energy intensity (the ratio between energy consumption and GDP), and makes a large contribution to CO2 emissions, 6.5% of the total of the country, while its contribution to GDP is only 3.4%. With all of this, there is a crucial need for the UCLM to contribute its expertise in energy and environment to regional development.

The aspects discussed above, along with the need to design industrial processes based on the principles of sustainable chemistry (i.e. developing techniques, methodologies and raw materials that reduce the formation and emission of substances that are harmful to the environment and living things) largely motivated by the existence of a large chemical industry in the region, make the proposed UCLM ICE necessary and multidisciplinary, and something which allows progress in scientific and technological knowledge to ensure sustainable development throughout the energy chain, from efficient management of energy resources to the impact on the environment (air, soil and water) of the use of such resources and energy transformations.
Fig. 1 shows the singular centres and companies related to the proposed Campus of Excellence in Castilla-La Mancha, and which constitute a basic pillar for alliances in the proposed ICE.

Moreover, the capacity to integrate individuals and organisations demonstrated by the University since its foundation bears witness to its just claim to becoming a Campus of academic and scientific excellence at international level. The Campus stakes on energy and the environment because its contribution to scientific development in recent years, both in basic research and transfer of knowledge, has been consistent and fruitful.

Therefore, partly motivated too by the Government of Castilla-La Mancha’s strong stake on the use of renewable energies and on attracting energy companies to the autonomous community, CYTEMA makes use of the energy and environmental R&D+i strengths of the university and the business sector surrounding it to accelerate the development and consolidation of new sustainable energy technologies. CYTEMA’s intention is therefore to integrate the existing capacities in public centres and companies and to establish stable, efficient bonds between the public and private sector. Considering the priority areas of energy and environmental development established both in European programmes and in the National Plan, and the scientific and technological capacities offered by the research centres and groups of the UCLM, CYTEMA lines up the public-private interests in energy R&D+i and the fight against climate change by conceiving it with the active participation of large companies of
the energy sector (such as ELCOGAS, REPSOL, EON, SOLARIA), singular research centres that enable Spain to achieve European leadership in certain future sectors that in many cases have got away (CNH2, ISFOC, the Science and Technology Park of Albacete) to promote and enhance both the transfer of knowledge to the industrial sector and the creation of technology companies that accelerate the necessary innovation in the development of energy products (rather than processes) and, finally, leading European universities in the sectors of energy (TU/e) and environment (Paris-Est Créteil). This will allow the UCLM to be better positioned internationally and close collaboration to be achieved in aspects of R&D and highly qualified training required to increase the competitiveness of the sector companies (according to a recent study by the ISTAS on Renewable Energies and Employment, 16% of Spanish renewable energy companies found difficulty in finding qualified technical personnel).

Unlike other Spanish companies carrying out R&D+i in the energy and environment sectors, CYTEMA escapes from sporadic, isolated efforts to offer a comprehensive view of the energy chain and integrated solutions at the hand of the business sector and other public research bodies to enable industrial development and the creation of new competitive products.

The main ideas of the UCLM ICE2011 are:

- that it is built through strategic aggregation with the Paris-Est Créteil (UPEC) and Eindhoven Technological (TU/e) Universities; with the CNH2 and ISFOC Research Centres; with the companies Elcogas, Indra and Solaria; and with the Foundation of the Science and Technology Park of Albacete.
- that it promotes intellectual and productive growth and production through research and transfer of knowledge in the areas of energy and the environment, and which causes a growth in GDP in Castilla-La Mancha, in reference to the Sustainable Economy Act 2/2011 (art. 64.2)
- that it is created through Open Innovation processes from the University management to different economic, social and political representatives (ref: art. 64.1)
- that it promotes processes of information and participation of people in the field of energy and the environment.
- that has the support of over a hundred Spanish and foreign companies, universities and institutions.
- that it will be achieved through the recruitment of talent inside and outside the University, the true protagonists of change.

Thus, the call to the ICE 2011 marks the guidelines on the strategic priorities that universities should work. Namely, i) teaching improvement and adaptation to the EHEA, ii) Science improvement and transfer of knowledge and iii) Transformation of the campus.

The "Teaching improvement and adaptation to the EHEA" axis is for the University of Castilla-La Mancha, the opportunity to launch 2 new promoter centres: one that promotes
postgraduate studies, and another that allows vocational training on the university campus itself. These are future investments that strengthen European education policies. As an institutional support for this strategic area, the project requires a budgetary effort to raise the internationalisation of the UCLM and allow further adaptation to the EHEA. It is also considered necessary to enhance a large annual event that puts the University on the world map of science for a few days, reinforcing the teaching structure of the new postgraduate centre.

Regarding the strategic focus of "Science improvement and transfer of knowledge", the proposed UCLM ICE 2011 focuses its efforts on the implementation of R&D Programmes of Excellence designed to make groups and researchers from around the world collaborate and work on Energy and Environment to achieve highly competitive results, which are difficult for a single university to obtain. To do this, innovation laboratories and talent attraction programmes are launched in support of the achievement of these ambitious goals. Various talent development and recruitment programmes will commit the prestige of the University of Castilla-La Mancha in the training of students, in involving highly competitive researchers in achieving the complicity of companies and social institutions.

As for the third strategic axis, the "Transformation of the campus", the project presents informative-communicative programmes that seek a rapprochement with the region and its citizens, because "excellence is in people" and the Campus must be a space for all members to grow intellectually, professionally and enterprisingly in the areas of Energy and the Environment that are so typical of it. The following diagram (Fig. 2) gives a visual and abstract understanding of all of the strategies and actions and gives meaning to the vision and mission of the project.

II.- Vision and Mission

Specifically, the project's VISION sums up the idea of:

"The University of Castilla-La Mancha as a European benchmark in energy and environmental science and technology in 2020”.

The VISION begins with an excellent position regarding the academic and research activity of the UCLM in the areas of knowledge of energy and environment, the future potential and the guidelines and criteria that are followed by the ICE 2011 call.

To achieve and fulfil the VISION, the project is set realistic strategic targets and proposes ambitious actions to achieve them.
Therefore, the project's MISSION is to make the UCLM a campus of academic and scientific excellence, internationally recognised for its ability to integrate people and organisations on energy and the environment. It also assumes the great opportunity to approach the scientific and technological evolution of hydrogen as an energy source of the future, a field in which Spain can still be an international benchmark by launching initiatives such as the CNH2, working hand in hand from applied research and with researchers from other universities with leading companies and institutions in Spain. A great challenge for CYTEMA.

III.- Strategic Objectives of the Proposal

To carry out the mission of the project, a series of actions will be launched based on five strategic objectives:

I. To position the UCLM position as a prestigious centre for postgraduate studies through the Senior School of Postgraduate Studies.

II. To enhance the interdisciplinary nature of research beyond the borders of the UCLM through Excellence Programmes of R&D, encouraging the movement of the most talented researchers between different national and international centres and groups (E2TP & Energy Talent Environment Program) and giving further impetus to the current UCLM talent recruitment programme or through its alliances with the Regional Government and the INCRECYT programme.

III. To participate in first class knowledge networks through Open Innovation laboratories (Energy Innovation Lab, Green & Sustainable Lab) in which entrepreneurs and scientists experiment and analyse trends in the fields of energy and the environment through partnerships with institutions and companies that integrate in the ICE.

IV. To bring citizens to the reality of teaching and research of the UCLM, its links with business and the scientific community through informative and participatory policies (Info-Ene and Terri-Resp programmes).

V. To increase the degree of energy and environmental sustainability in the campus and buildings of the UCLM to a competitive level among European universities on the verge of 2020.

The intention of this Campus of Excellence project is therefore to consolidate a territorial and social integrator model through participatory policies that increase the levels of social responsibility and environmental policy with the environment.
IV.- Alliances

It should be noted that the UCLM ICE 2011 shows no stable addition to another Spanish university, for it is an example of a Spanish territorial University that invested in the development of Castilla-La Mancha in a single public college.

The strategic aggregation for consolidating the UCLM ICE refers to the 8 institutions and companies that form the CYTEMA Foundation: Paris-Est Créteil University; Eindhoven Technological University; National Centre of Hydrogen and Fuel Pile Technologies Experimentation (CNH2); Institute of Photovoltaic Concentration Systems (ISFOC); ELCOGAS, INDRA and SOLARIA; and the Foundation of the Science and Technology Park of Albacete.

**CYTEMA STRATEGIC AGGREGATIONS**

<table>
<thead>
<tr>
<th>UNIVERSITIES</th>
<th>RESEARCH CENTRES</th>
<th>COMPANIES</th>
<th>FOUNDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. UPEC</td>
<td>3. CNH2</td>
<td>5. ELCOGAS</td>
<td>8. PCYTA</td>
</tr>
<tr>
<td>2. TU/e</td>
<td>4. ISFOC</td>
<td>6. INDRA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. SOLARIA</td>
<td></td>
</tr>
</tbody>
</table>

V.- Actions of the Proposal

Following the guidelines of the Call to the ICE 2011, the project has several policy proposals for each of the areas covered (Teaching Improvement, Scientific Improvement, and Transformation of Campus). Specifically, 12 activities based on the strengths of the additions of the project. It aims for actions in which the campus is highly distinctive. There follows the list by action types (Table 1) that the project develops:
Creation of Promoter Centre (CPC)
Pedagogical and Disseminative Event (PDE)
Institutional Measure of Support (IMS)
R&D+i (RDI)
Creation of Experimental Platform (CEP)
Informative and/or Communicative Programme (ICP)

<table>
<thead>
<tr>
<th>IMPROVEMENT OF TEACHING AND ADAPTATION TO EHEA</th>
<th>SCIENTIFIC IMPROVEMENT AND KNOWLEDGE TRANSFER</th>
<th>CAMPUS TRANSFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTION 1 (CPC) ENE &amp; ENVIRONMENT DOCTORATE SCHOOL</td>
<td>ACTION 1 (RDI) RDPS PROGRAMMES OF EXCELLENCE IN R&amp;D</td>
<td>ACTION 10 (IPC) INFO-ENE PROGRAMME</td>
</tr>
<tr>
<td>ACTION 1 (PDE) E2KW: ENERGY &amp; ENVIRONMENT KNOWLEDGE WEEK</td>
<td>ACTION 6 (RDI) SIGIEN ENERG AND ENVIR. INF. SYSTEM</td>
<td>ACTION 11 (IPC) TERRE-RESP PROGRAMME</td>
</tr>
<tr>
<td>ACTION 3 (CPC) VT SCHOOL - UCLM ENEG-MAB</td>
<td>ACTION 8 (CEP) ENERGY INNOVATION LAB</td>
<td>ACTION 12 (IMS) MOBILITY AND SUSTAINABILITY PROGRAMME</td>
</tr>
<tr>
<td>ACTION 4 (IMS) UCLM IN THE WORLD PROGRAMMES</td>
<td>ACTION 9 (CEP) GREEN &amp; SUSTAINABLE LAB</td>
<td></td>
</tr>
<tr>
<td>ACTION 9 (IMS)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. List of action types of the UCLM ICE 2011

a.- Actions for improving teaching and adapting to EHEA.

The UCLM ICE2011 focuses its commitment of excellence on the university postgraduate adapted to the EHEA, enhancing doctoral programmes and the official titles and masters in science promoted by the ISC: energy and the environment.

Specific actions that are part of the goal of improving teaching are:

- Action 1. Creation and development of the DOCTORATE SCHOOL

With respect to the characteristics that define the services, we highlight:

- 60 ECTS degrees with additional approval with non-European prestigious degrees.
- English as the main language of teachers and students priority in the degrees.
- UCLM teachers and those of other national and international institutions, with a strong, highly regarded specialist profile.
- Flexibility when switching and combining presence with multi videoconferencing (space) and semestrality vs concentration in a week (time).
- The training model based on the combination and simultaneity of theory taught in the university with practical training in partnership companies.
• **Action 2. Development and hosting of the annual science event ENERGY & ENVIRONMENT KNOWLEDGE WEEK (E2KW)**

The Energy & Environment Knowledge Week (E2KW), aims to be the annual meeting point of scientific and technological progress worldwide in the field of energy science and technologies and the environment. This event organised by the CYTEMA will be held in the vicinity of the Campus Energy & Environment Doctorate School. For each edition, the E2KW will deal with a great thematic challenge, and will bring together leading specialists in the field, trying to spread scientific and technological progress worldwide.

• **Action 3. Creation and implementation of a Vocational Training School which specialises in energy and environmental subjects**

The center will be created with the purpose of intensifying the relations Regional centers that provide vocational training for families related professionals CYTEMA themed, to create a bridge mechanism for mutual transfer of vocational students and first university degree course related to energy and environment as well as to promote and strengthen vocational training productive relationships with businesses and being a European benchmark dual model living in the EHEA and professional studies on campus.

• **Action 4. UCLM in the World Programme**

This action aims to promote the internationalization of UCLM increasing the number of students and teachers involved in the bilateral exchange programs Erasmus and Leonardo, enhancing offering language training and the teaching offer courses in English.

**b.- Science improvement and transfer of knowledge.**

The UCLM ICE 2011 is a determined bid to "selectively" promote the numerous lines of research currently done by the Institutes, Centres and energy and environment Groups led by researchers at the University. Concrete actions that are framed in this objective are:

• **Action 5: Creation and implementation of R&D Programmes of Excellence.**

Is intended to concentrate efforts on multidisciplinary R&D Programmes of Excellence (RDPE), reflecting the strategic focus of excellence. The Campus of Excellence will promote a selective investigation around 5 Energy and Environment RDPE.


iii. RDPE3. Natural resources: sustainability and efficient management. (2013-2016)


v. RDPE5. Green IT: the environmental compromise of the information society. (2013-2016)
The objectives of all 5 RDPEs is to analyse trends and solutions from the experience of the territory of Castilla-La Mancha to other realities and vice versa, to enhance the interdisciplinary nature of the research, to improve the transfer of knowledge generated by the University with business and to promote the internationalisation of energy and environment transfer of knowledge through partnerships between researchers and groups of institutions and foreign universities.

- **Action 6: Design and implementation of an information system for energy and environmental research management (SIGIEM)**

The SIGIEM will become a key element for the efficient management of energy and the environment, in quantity and in quality, so that the different stakeholders (individuals and institutions) can take the best decisions when carrying out their work on energy and environment.

- **Action 7: Creation and implementation of the Energy Innovation Lab.**

The Energy Innovation Lab is a space for Open Innovation in Energy, capable of creating innovative high-performance equipment. Therefore, space and time will be provided in formal and informal surroundings, in which corporations, together with experts and scientists, can receive ideas, concepts or knowledge that will enable them to promote new products or disruptive services.

- **Action 8: Creation and implementation of the Green & Sustainable Lab.**

Similarly to the previous action, is a space for innovation and sustainable development, capable of creating high-performance research teams. The Green & Sustainable LAB is focused on sustainable chemistry, which main objective is the design of processes and chemicals to prevent pollution and risks at source, emphasizing the effectiveness and economy of the process.

- **Action 9: Design and implementation of the E2TP Energy & Environment Talent Programme.**

A programme to attract talent that intensifies the UCLM in this sphere and which has been so successful for the current team of lecturers and researchers.

---

c.- **Campus Transformation**

A strategic objective of CYTEMA is to increase levels of social responsibility and environmental friendliness towards the surrounding environment, with diverse information-provision, mobility-enhancement and integration- and participation-encouraging projects.
• **Action 10. Design and implementation of the INFO-ENE Programme**

The INFO-ENE programme is based on different Communication 2.0 techniques using social networks. Its aim is to introduce the scientific development of energy to people, encouraging a system of feedback that creates new perspectives and trends in the cultural change taking place for decision making.

• **Action 11. Design and implementation of the TERRI-RESP Programme**

Continuing with the informative-based and participation-based approach of the INFO-ENE Programme, the International Campus of Excellence–UCLM is implementing a programme that focuses its efforts on the region’s local institutions, both public and private, to find a new form of interaction.

• **Action 12. Design and implementation of the Mobility and Sustainability Programme 2020**

With firm commitment, the ICE Energy and Environmental Science and Technology Campus 2011 aims to position the UCLM as one of the European universities with a high level of sustainable energy use by 2020.