



## **CASE STUDIES**

### **CLIMATE-KIC**

# **Summer School: the Journey UK Co-location Centre**

**ENTREPRENEURSHIP DEVELOPMENT IN  
TEACHING AND LEARNING**

**PATHWAYS FOR ENTREPRENEURS**

## INTRODUCTION

The European Institute of Innovation and Technology (EIT) was established, on 11 March, 2008 by the European Parliament and the European Council. Its aim is to become a flagship for excellence in European innovation. EIT is the first European initiative to fully integrate the three sides of the 'Knowledge Triangle' (higher education, research, business innovation). EIT seeks to stand out as a world class innovation-oriented reference model, inspiring and driving change in existing education and research institutions. EIT was conceived to support future societal needs and has a market driven focus.

Educationally, several Knowledge and Innovation Communities, so-called, KICs were designed to address some of the challenges of the European education system. The motto was "The best innovation will occur between silos, not in the silos", as pointed out by Alexander von Gabain, Chairman of the EIT governing board. It was hoped that introducing new practice would influence the overall system and create joined up networks and practice across Europe. This includes creating a very active education arm for technology transfer,. Climate-KIC was one of three KICs created in 2010, the other two were in ICT, and Energy. <http://eit.europa.eu>.

Climate-KIC is now Europe's largest public-private partnership addressing climate change. Climate-KIC operates in more than 13 European countries.–In 2014 it delivered 6 Journey summer schools in 18 locations with 272 participants and 3 Thematic PhD summer schools with 72 participants. Nurtured 50 new business ideas and celebrated the first 40 EIT Climate-KIC Masters graduates. [www.climate-kic.org](http://www.climate-kic.org) Climate-KIC is focused on mitigating and adapting to climate change. Climate-KIC consists of dynamic companies, renowned academic institutions and the public sector.

Climate-KIC aims to provide the innovation, entrepreneurship, education and expert guidance needed to shape Europe's climate change agenda. The vision is to spark and deliver innovative and imaginative solutions to climate change via a dynamic alliance of European partners drawn from academia, industry and the public sector. Climate-KIC organises its education, research and innovation activities around broad themes working across Europe to produce the people, products and services required to address climate change.

A good summary of the initiative is gained by looking into its strapline, as stated on the Climate – KIC website: "Entrepreneurship needs to become part of the way the institution behaves. As this is a new area there are no prejudices and so opens up new scope. The programme attracts early adopters, and people with a social conscience. Participants need to be serious about creating value. This is about changing the game and leading the way".

The Climate-KIC provides an additional opportunity for students who have been accepted onto an existing Master's programme which has been EIT approved, enabling them to graduate with a Masters degree plus a certificate from EIT. The Climate-KIC programmes are designed to engage students into a Journey, which allows them to:

- discover how the latest climate change science is being transformed into new products and services;

- examine market drivers of climate innovation, including policy, legal and financial incentives or constraints; and,
- explore the potential for launching start-up business venture with support from Climate-KIC business coaches and the Greenhouse ( pre-incubator).

This case study presents this Journey from the perspective of the UK Co-Location Centre (CLC) which is hosted by Imperial College London (Imperial), London.

Climate-KIC at Imperial delivers climate innovation programmes, which add complimentary value to existing Masters' programmes at Imperial. The integral elements of this programme, which are common to all academic partner institutions within the Climate-KIC EIT Label<sup>1</sup> are:

- The Journey, a five-week intensive climate innovation summer school,
- SPARK! a series of thought-provoking talks and seminars,
- The development and delivery of a climate innovation project.

All the Climate-KIC programmes use a wide range of external stakeholders in both the detail of programme design and the actual events and delivery of educational programmes. During the Journey summer school, the instructional partners host visits to give the students greater reality on enterprise in practice. These academic partners involved in the design and delivery include DTU – Technical University of Denmark, Chalmers University of Technology, ETH Zurich, TU Delft and UPMC Paris. Industrial partners which host student visits are innovation orientated in sunrise organisations such as GDF Suez, Amsterdam Airport Schiphol, KLM, Bayer, Velux and Grundfos. For full list see <http://www.climate-kic.org/partners/>

The KIC has provided a context in which non-traditional and innovative approaches to teaching and learning, supported by EIT and the pan-European aspect of the KIC Masters, can be piloted. This is an exciting aspect from an educator's perspective since the Journey has a high profile through the external EIT endorsement and can be widely disseminated across the European network. Since the accreditation for the Journey is given by EIT and is for complimentary courses, experiments in educational process can be made without the immediate disruption of existing practice and internal accreditation systems, which often hinders education innovation and reform. The Journey provides a show-case of what students can achieve when supported by different approaches to pedagogy.

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<sup>1</sup> Currently EIT label operates in 7 EU states with a number of prestigious universities

## ENTREPRENEURSHIP DEVELOPMENT IN TEACHING AND LEARNING

### **The higher education institution is structured in such a way that it stimulates and supports the development of entrepreneurial mind-sets and skills**

Climate-KIC programmes are designed to enable students to discover how the latest climate-change science is being transformed into new products and services, both within the UK and across the whole Climate-KIC through local SPARK talks and seminars during the 5 week Journey climate innovation summer school, which builds the European and international context. All students on the EIT Masters programme follow the same core programme elements. Imperial signed up to this commitment when it became part of the EIT KIC. Recruitment to the programme attracts future minded people. The gender balance is very equal with 50 % male and 50% female participants.

The summer school programme (the Journey) is intensive, and often the most personally developmental aspect of the EIT label Master's Programme. The Journey takes place over five consecutive weeks at the end of the second semester of the student's core Master's programme.

During the Journey, every student will attend three European locations during the 5 weeks. The Journey is structured as two-week blocks, followed by a single week. During week One and Two, i.e., the first block, Climate-KIC focuses on imparting knowledge and information about climate change. This knowledge is delivered through a variety of platforms including scientific and policy lectures by some of the best researchers and professors in Europe, European site visits, incubator visits, networking opportunities and soft skills training.

The breadth and depth of exposure opens up students to a multiplicity of different approaches and ways of thinking. These approaches include active hands-on interaction with people who are recognised as being at the top of their specific fields. An important aspect of the Journey process is the realisation that these top people, whilst having a depth and breadth of expertise, still have to be creative in the application of their knowledge. They don't know all the answers, but rather have ways of shaping possible and workable solutions. This is highly inspiring and confidence building for the KIC students. It starts to make the creation of new solutions to existing and new climate challenges more real, more attainable and for many students more exciting. This is a significant boost to creative thinking and personal motivation and confidence.

In the first two weeks of the Journey the students form teams and choose challenge-driven business cases with climate impact for further development during the five-week programme. Weeks three and four (i.e., block 2) build on the scientific insights and content from the opening weeks, allowing students to get deeper understanding of personal entrepreneurial qualities, entrepreneurial mindset and business development tools. During block 2, much more time is allocated to business coaching and development of the group's business plan. Week 5 (block 3) concludes the Journey experience by bringing together two parallel Journeys, i.e., two groups who have taken different Journey paths through different European locations. During this week each group finishes work on their business concept, draws up a business plan and presents to a panel of high level experts who offer new perspectives on the presented work. Continuity during the 5 weeks is delivered through business coaches who travel to the three locations with their specific team.

By the end of the Journey students have gained the ability to combine scientific insights with new entrepreneurial and innovation skills to deliver a business plan for a sustainable product that would

offer a comprehensive solution to combating the climate change challenge. The slide below summarises the context and impact of the journey, from EIT vision to student impact.

At Imperial, Climate-KIC provides an additional opportunity for students who have already been accepted onto an existing climate-KIC approved Master's programme from the existing Imperial College portfolio. Students follow the core MSc and add the compulsory KIC elements. This means that access to the KIC Masters at Imperial is restricted and only open to students from specific Imperial Masters programmes. Whilst the KIC team do not have a say on admissions to the two approved Masters programmes, they have a proactive process for choosing who from the eligible students is selected for the Journey programme. Partaking in the Journey requires significant additional work for the student and an extra 6 months of study. The commitment to this additional period of intensive study supports the development of a determined and focused mindset.

On completion of the Journey, students have the possibility of continuing with their ideas through the Greenhouse. The Greenhouse is a pre-incubation facility. The Greenhouse facilities are open for anyone who has an idea related to climate change innovation, they don't have to be following a KIC masters or PhD, however the Greenhouse programmes are designed to follow on from, and are hence aligned with, the 5 week KIC summer school. In the pre-incubator, Osterwalder's Business Model Canvas is used as a central model for coaching and idea development. Funds are available per project for initial market research. The funds available for students are used for market and business education rather than company start-up.

### **Staff take an entrepreneurial approach to teaching in all departments, promoting diversity and innovation in teaching and learning**

In 2009, EIT issued a mandate to create an innovative, Masters level, education programme based on the principle of "learning by doing". A key requirement was that students must go out, beyond the academic institution, and actively experiment. European mobility had to be built into the programme with a basis for centralised learning. The programme was developed by experienced programme designers, business practitioners and subject experts from across Europe. This was a completely new initiative. Nothing of this scale, with this level of industry and academic collaboration across Europe, and dedicated European funding had been attempted before.

The focus was on developing a new type of Master's graduate, i.e., someone technology-ready to solve new problems, commercially-ready to be part of a team creating new business, and culturally-ready to work in a pan-European context. This required taking an innovative approach to programme design with a focus on empowering students to take deep responsibility in innovative ways for their learning and development and for staff to take on support rather than leadership roles. The breadth and depth of learning could not be delivered in a conventional academic lecture format, since the learning required is at least as much about skills and individual development as scientific and theoretical content.

This required changes in the ways learning is organised; new educational inputs were needed. Students had to have and accept responsibility for their own learning, including much of the knowledge element. This meant that they had to learn while doing, whether they were aware of the development, or not. Many of the activities could be described as "immersion in the real world of the future", that is, tackling tasks from the perspective of the future responsibility and future social contexts that these students may find themselves in. The process is managed (kept on track) through the introduction of business coaches who are process experts and who facilitate progression rather than acting as subject or business experts. Coaches were needed who had real world business experience and credibility, and yet could work with, and understand, the academic context from which the

students were emerging. The Climate-KIC summer school ‘the Journey’ is central to the development of student entrepreneurial capacity and confidence.

On the Journey, the role of the coaches and mentors is to ensure that the students stick to the brief and hold the narrative. Finding the content is the students’ responsibility. Business development is supported through one-to-one coaching. The technical innovation element is addressed by bringing in experts who are at the top of their field. There are drop-in sessions that the students can attend to develop their business and soft skills e.g. marketing and communication.

The pedagogic dimensions of the Climate- KIC Journey are built around student activity, active reflection and low levels of academic contact time. Typically in a day, the specialist (technology/ climate expert) component of the programme comprises 1-3 hours of specialist input followed by a minimum of 6-7 hours of the students working on their own, and with their coaches, in teams. They do this day after day and in doing so develop both personal confidence and competence. The teams once formed, in block 1, work together throughout the Journey alongside two dedicated coaches. Mentors are used to challenge the commercial feasibility of proposed design solutions. The programme lasts for 5 weeks in three different European countries.

Journey tasks are designed to be real and challenging. For example, for an urban city transport planning challenge the students attended a lecture on the 5 types of urban transport (trains, buses, trams, metros, trolley-buses) then each group took a different specified city and did research into the current predominant transport system in that city and then determined how this could be improved.

All projects require active research, analysis and innovation in a short time-bound context. The students may be given a particular role to adopt during the project e.g. they assume the role of energy minister for a given country, research the current agencies, estimate future demands and determine their strategy.

The Journey is active innovation with an entrepreneurship orientation done for a real challenge in the climate context, or clean tech context. The students are thrown in the deep-end and take responsibility for their own learning, including learning how to use the technical support and mentoring resources within the programme. They learn through their mistakes. For all students, this process is repeated a minimum of three times during the summer school programme.

**Entrepreneurial behaviour is supported throughout the higher education experience: from creating awareness and stimulating ideas through to development and implementation of new ventures**

EIT has created an institutional environment, which has innovation and enterprise at the core of its mission. This provides a greater (European) context, which must be complied with by the staff and students engaged in KIC education programmes. The KIC label and the future orientation of the challenges of climate change provides the context of the programmes and sets the expectation for innovation, different approaches and the need for different behaviour. This context combined with the enthusiasm of the KIC staff for the three strands of effective education, enterprise/innovation and addressing the challenges of climate change, tends to attract people, staff and students who care and are keen to make real future impact.

This enthusiasm creates a culture of hope and future mindedness around all three KIC educational activities SPARK, the Journey and the Greenhouse (the pre-incubator programme).

The KIC activities at Imperial are part of a pan-European programme of activities within the academic, research and business Climate-KIC partners. This creates a clear format and infrastructure for promoting events, programmes, scholarships and disseminating successes across the network. The KIC at Imperial therefore taps into two significant systems for dissemination of their events and successes, the Imperial College website and the KIC web presence. KIC branding is clear and consistent across the European network. This provides a strong platform for showcasing the success of Climate-KIC students.

The Journey provides a complete experience of enterprise exploration and development in which students are systematically challenged and stretched in multiple ways, new people, new countries, new learning approaches, personal interaction with European and International experts in the scientific disciplines that inform climate change solutions, all managed within very tight time lines.

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Kate Hofman (Climate-KIC graduate) advises "Don't worry about making mistakes! It happens all the time, especially when you're doing something new and solving difficult problems. You just have to learn from those mistakes and do things differently next time."<sup>2</sup>

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<sup>2</sup> Kate Hofman, CEO/ co-founder of GrowUp Urban Farms, winner EIT CHANGE Award for Climate-KIC, 2013.

## HEINNOVATE PATHWAYS FOR ENTREPRENEURS

### **The higher education institution raises awareness of the value/ importance of developing entrepreneurial abilities amongst staff and students**

Climate-KIC has provided a context in which new, potentially controversial, approaches to teaching and learning, can be piloted and externally endorsed as best practice by EIT. KIC successes provide engaging examples for dissemination across the Climate-KIC network. In this way the Climate-KIC leverages the resources of EIT to support enterprise development in the home institution. KIC education programmes provide excellent examples of what students can achieve when supported by different approaches to pedagogy. The implementation of the Climate-KIC programmes in the UK CLC offer a dynamic and complementary adjunct to existing research and teaching activities.

GrowUp Urban Farms is a Climate-KIC success story. Kate Hofman began her company during the Journey, the Climate-KIC summer school that she credits for giving her the skills and confidence to set up her own business. Admittance into the Climate-KIC Accelerator followed, where the Climate-KIC team helped Kate to transform GrowUp Urban Farms from an idea into a commercially viable business. This close relationship with the EIT and Climate-KIC has brought a variety of rewards to both Kate and GrowUp Urban Farms. "Probably the best benefit for us has been our fantastic Mobility intern Mandy!" Kate enthuses. "Having another Climate-KICer on the team has been invaluable – someone who shares our passion for innovation and meeting the challenges of climate change.

### **The higher education institution actively encourages individuals to become entrepreneurial**

EIT was established to become a flagship for excellence in European innovation. EIT was conceived to respond to market needs. EIT supports and develops sustainable economic growth and job creation throughout the European Union by generating new skills, products, services and businesses responding to public demand and to the needs of the knowledge economy. Under the EIT vision, the KICs were designed to develop more innovation and develop an innovation culture for Europe, which included creating an active education arm for technology transfer, away from issues IP. This is important to support excellent scientists to stretch their thinking beyond the normal paradigms of academic publication and the conflicts and issues of IP.

Identifying products and services that address the challenges of climate change and clean tech encourages both staff and students to be future-minded, innovative and possibility thinkers. The Climate-KIC activities build on the more conventional activities of existing Masters and PhD programmes, offering students the chance to attend enterprise events and workshops during the year, including the summer school, and developing their projects into active businesses through the Greenhouse incubation programme.

The student selection process includes an interview. Final selection is based on motivation, academic grades, nature and level of involvement in extra-curricular activities, entrepreneurial spirit, recommendation and reference letter, climate change attitude, fluency in English. All programmes are taught in English. Successful applicants are split equally between male and female, despite this being in a scientific area. It is thought that this due to the innovation and future orientation of the programme. The KIC programme, including travel and residential accommodation, is free of charge to the student.

There is an e-learning platform, which offers "the climate change innovation primer" which is both a stand-alone course and a preparation for summer school. The community stays connected and continues to grow through the Climate-KIC Alumni Association a European community of highly skilled individuals. This alumni network as has its own mentoring programme.

The Climate-KIC can draw on the unique co-operation of European partners in education, research, business and policy. Helping scientists commercialise their knowledge, either themselves or through business partners is supported by taking scientists out of their labs to see how they could be making a difference to society by responding to demands in the market.

The Greenhouse is a pre-incubation facility, which has funds to support the business and market education aspects of start-up. The greenhouse facilities are open for anyone who has an idea around climate change innovation, they don't have to be following a KIC masters or PhD although the Greenhouse programmes were designed to follow on from the 5 week KIC summer school. Funds are available per project, through the Greenhouse for initial market research. The actual usage can be broader, e.g. coaching, travel for international teams to meet face to face (travel and accommodation)

### **Mentoring by academic and industry personnel is available**

Active mentoring is made available both through the 5-week summer school and the Greenhouse pre-incubator. The Journey is designed to maximise exposure to a wide range of expertise and view points, including engagement with business, top researchers and entrepreneurs.

The KIC 5-week summer school, the Journey, uses coaches to support the student project teams throughout the five weeks. The coaches are drawn from outside academia and travel with the teams to all three European locations. The role of the coaches and mentors is to ensure that the students stick to the brief and hold the narrative of the context. Business development, in the Greenhouse, is supported through one-to-one coaching.

The specialist (technology/ climate expertise) component of each Journey module comprises 1-3 hours of specialist input and then at least 6-7 hours of the students working on their own, assisted by coaches and in teams. The mentors are used to challenge the commercial feasibility of the design. The innovation element brings in specific experts who are at the top of their field.

Drop-in sessions are available which the students can attend to develop their skills e.g. marketing and communication. Part of the Journey includes site visits to businesses already operating in Climate and clean-tech industries. Overall there are 250 partners in the KIC. Students potentially can interact with experts throughout this network.

## **LESSONS LEARNED**

Getting things up to speed in an established institution, means taking pragmatic decisions and working with existing systems and criteria. However, such solutions can fail to integrate with the host's mainstream programmes and apparent success may fall short of sustainable collaboration and gaining traction within the institution. Even in the world of sophisticated IT, Skype and virtual

working, face to face meetings are essential. This needs a viable travel budget, and one which is accepted by the host institution.

It can be easier to get collaboration with research initiatives than with teaching initiatives. This may be due a higher acceptance of uncertainty within research and a comfort with project based activity and funding. EIT support and funding, and the activities needed in the set-up phase, can be more aligned to the mind-set and systems of large-scale academic research activities. These systems are designed to receive large sums of money from external sources to deliver new activities, and designed to accommodate external reporting requirements. This could be why it seemed easier to get research departments interested in the KIC programme and harder to get system alignment and buy-in from educational systems and staff.

However large research grants are often transient in nature and may not be treated as being part of on-going programme sustainability.

Some existing Masters programmes have been slow to accept the KIC affiliation as they see little direct need or benefit in the KIC affiliation. It is easier to build alliances when a new Masters programme is being developed than to influence a programme that is already up and running. Word of mouth from students who have been through the Journey has helped the proliferation of new Master programmes as course directors understand the positive impact the students experience.

Adopting a new approach to education can mean a new, and institutionally unaligned approach to staff recruitment. Both the Greenhouse and the Summer-school needed coaches from outside the University. This created new areas of complexity in recruitment and the negotiation of the differences in the interface between normal practice within the university and normal practice in a commercial environment. Key challenges included questions such as: "Who to employ?", "What skill set?" "What level of experience?", "What rate of pay?" The programme wants the best coaches, but is not funded to pay top commercial rates, the ideal is to find top coaches who are excited and passionate about the legacy element of the KIC programme and hence will deliver the required work within the available budget. In the Greenhouse coaches are used for about one day per month per team. For summer school, the programme needs a team of coaches who can do the full 5 weeks, and travel to all three delivery sites.

Best intentions can be operationally impractical, especially where there is time pressure to deliver. Initially, in 2011, the team at Imperial intended to create a new dedicated 2 year Masters Programme in Enterprise, in a standard Bologna format. However, this format wasn't aligned with the existing Master's programmes and internal academic approval systems. In the UK, the standard is a one-year Masters Programme of 90 ECTS. The approach to delivering the KIC Masters programme was changed in order to facilitate the internal approval process, and the EIT Masters Programme was built around existing, established masters programmes, such as programmes in Environmental Engineering, Hydrology and the MSc in Sustainable Energy Futures. Programmes were chosen which already had modules, which were in alignment with the overall agenda of the Climate-KIC. This format was agreeable both internally and externally and hence could be implemented quickly.

During the initial launch phase at Imperial the format used existing Master's programmes from the Imperial College portfolio and added the complementary KIC elements. This was a pragmatic solution to getting the programme started, but once established can be hard to change. This model restricts access to the KIC programme to students who have already been approved for acceptance onto these Imperial College masters programmes. The KIC team did not have a say on admissions to these Masters programmes. The requirement for a place on an established programme limited the recruitment base, and took the first level of the selection out of the hands of the KIC team.

Implementation of the Climate-KIC programme faced some challenges in terms of staffing and of systems. Funding of staff posts involves prefunding by the involved HEIs, hence there is a significant upfront investment by each partner. This can be out of alignment with the established university one-year funding cycle, systems and reporting for established Masters programmes.

The initial KIC funding was for seven years, with a commitment to both continuity of delivery and on-going development of programmes over this seven year period. This creates additional challenges for staff joining during the project. They have to get up to speed delivering established KIC activities fast (as the KIC community is busy and multi-faceted) whilst learning the culture of the host HEI, and understanding the local context. The fast paced nature of KIC programme delivery, and the requirement to innovate within the KIC leaves limited scope for new staff, who are new to both the KIC and the HEI host to understand and get familiar with existing systems and cultures in the partner HEIs. This can cause additional tensions between KIC and established institutional systems, teaching programmes and their administrators.

At Imperial, the Climate-KIC team created a new reporting system to work alongside the existing university system. This system was strictly "local", but KIC activities and results needed to be reported back to EIT, in line with other KIC partners, this meant effectively running three different but parallel administrative and reporting systems, one for the university, one for the operational local delivery of KIC targets and one to meet the European project needs.

Decisions on budget allocation and role definition have been treated quite differently in the different centres, and can lead to both misunderstanding and a sense of unfairness between the centres. These differences add to the complexity of administration, collaboration and reporting procedures. This administration load, and the need to respect and comply with different, even conflicting systems in a timely and accurate manner tends to require a different mind and skills set from that typical of a person who is naturally excited by the possibilities promised by an innovative education and society changing project.

The resolve and commitment of staff is key to the delivery of such a high impact education initiative. The alignment to the narrative of the challenge and the employment of sometimes unconventional staff motivated to address the challenge overrides the complexities of the operational model. The key to catalysing such innovations is mostly related to the quality of human capital engaged and the network efficacy of the community created by such initiatives.