Pioneers into Practice
Annex 07. Placement Activity Report (PIONEER)

This form aims to capture the main aspects of your placement in terms of your experiences and learning. Please provide as much information as you see appropriate although 300 words per answer would be a general rule.

Parts A-D must be completed by the pioneer.
Part E will be fulfilled by the pioneer only when the coach agrees upon, after careful consideration of whether the progress achieved over the placement may represent a Key Performance Indicator (KPI). The coach will provide support as needed.
Part F will be completed by the coach before this annex is submitted to the PiP regional coordinator and will remain confidential.

Date of the Placement (dd/mm/yy):	05/05/2014 – 05/06/2014
Name of the Pioneer:	Jason Selvarajan
Name of the Host: **Department / Division:** **Contact person / telephone:**	Goethe University Westend Campus Facility Management Unit / Bereich Immobilienmanagement denecke@ltg.uni-frankfurt.de +49 1523 421 7357
Name of the Coach: **Innovation Group:**	Alice Bauer Team 6: Climate Change Hub

PART A: PROJECT GOALS

A.1. BRIEF DESCRIPTION OF THE PROJECT. How did you tackle the climate change challenge during your placement?

I performed an inventory and proposed a modernization strategy for improving the energy efficiency of the exterior lighting of Campus Westend, Goethe-Universitat, Frankfurt.

Lighting can account for up to 10% of a buildings energy demand. I think for a large facility like Goethe University the outdoor lighting only accounts for less than 1-2% of the overall energy demand. None the less this value is huge compared to domestic energy consumption and so even a 1% saving can reap monetary and environmental rewards.

The inventory was completed by walking around the campus and categorizing and mapping different lamp types and correlating it with (old) CAD lighting diagrams. At least 50 new lamps were added. After this the lighting periods were analysed to get an idea of total lighting time per year after which total annual energy consumption could be calculated.

I then studied different types of LED lighting technologies and what companies where offering in Germany and abroad. From the various options I decided that by changing the bulbs the retrofit would be the cheapest possible option and most likely the only one that would be considered by the department, since outdoor lighting has only a small cost saving factor in relation to optimizing heating and cooling systems with the buildings and indoor lighting.

My proposal was to order bulbs directly from China (since that's where the German suppliers get there bulbs from anyway) to conduct quality tests and to see what power rating is required to

achieve sufficient lighting on the campus grounds at night.

I also changed around 15 bulbs on the campus (with an electrical engineer) which required the electronic ballast to be bypassed and so took slightly longer than a simple bulb change but that also revealed that maintenance times would be greatly reduced due to less frequent maintenance visits.

The results of my investigation were very promising and revealed that with the reduced cost of LED lighting at present ROI is well under 2 years. The results are also promising because the same study can be used as a basis to modernize indoor lighting as well, which would offer 10-100x more savings in costs and carbon emissions.

A.2. What was the goal of your placement and how did that fit into the general aims of the organization and division?

The goal was to produce a feasible strategy to reducing the environmental impact of the lighting system. I worked in the facility management department of the University, which is responsible for maintaining these systems. The staff obviously has a lot of tasks to carry out on a daily basis and by introducing a more efficient lighting system with longer life spans I could also reduce the overall workload of the electrical engineers. Further more the idea was to reduce the overall energy demand of the outdoor lighting system. A reduction in electrical consumption anywhere on campus results in a reduction in the overall energy consumption of the campus, which is obviously good. The campus was a large investor in a local wind farm so all energy consumption can be regarded as semi-carbon neutral, though as everyone ought to know, you don't actually pick which electrons power your devices and so the best thing to do, in any case, is to reduce energy consumption by as much as possible, and then use renewables (and in that order as it's easy to cut down on wastage). By performing the inventory I gave an example of how an inventory and audit can be done, in case the staff wasn't familiar with the methodology. It also allowed them to see what types of lamps where being used and where they were being used. Obviously the technicians replacing these lamps already knew what they where and where they where. However, there are probably over 30 different kinds of bulbs throughout the campus and likely somewhere between 10000-20000 light bulbs in total. So a descriptive map can save a lot of time, especially for newer workers. Total energy consumption from lighting had obviously never been performed beyond a simple 5-minute calculation; my precise study should offer a strong baseline to compare alternatives and my retrofitting proposal.

PART B: PERFORMANCE

B.1. Main achievements. What did you do and what were your results?

I proposed a strategy that can reduce energy consumption by ~50% with a ROI of 1 year. By purchasing LED lamps from the supplier that would fit existing sockets. The suppliers where from Chinese factories. There may be environmental and social concerns here, but I was looking for the cheapest available option. There are not very many companies manufacturing LEDs in Europe besides Philips, and even on their side it would be difficult to asses for instance the carbon footprint of the production process. So to keep it simple I would stick to my recommendation.

I also did some comparative tests by changing existing lights to LEDs to measure performance and required work time to perform a retrofit. We changed over a dozen lamps by rewiring the socket to avoid the electric ballast, which is used with the traditional compact fluorescent bulbs as LEDs can be powered directly from the 240V power lines. I also took images of the lamps in operation during the night time. Energy consumption was decreased by 60% while there was no major difference in lighting quality.

I also introduced the option of using a mapping system – Mapbox, which is an online GIS system. I proposed the it could be used to identify luminaires that require repairs which would provide the technicians with additional useful data such as when a lamp was changed last, what type it is and it's energy consumption among other things. This would enable statistical analysis of the system to find systematic problems that could be the cause of faulty wiring or something similar (which was also discovered during the 15 LED lamp upgrade).

It seemed that most knowledge was simply from familiarity and there was no single depository of information on a set system. I only really understood the lighting network and how it operated by the end of the placement and even then I was probably unaware of many more procedures.

I may or may not have laid out a template for performing energy audits of similar systems such as heating and cooling or use of electrical appliances, etc. The main benefit would be the same procedure could be used to measure the impact of the indoor lighting system, which is far more significant than the outdoor lighting as it is likely an order of magnitude large in terms of energy consumption.

B.2. What was especially new for you or for your host?

I used a GIS system called Mapbox to catalogue the lights across the campus which can also help the host manage and upkeep the exterior lighting system, as well as other facility management related operations. The boss of the department asked for a tutorial on the software because they wanted to use it to map pickup and drop-off points for garbage collection throughout the campus as part of a project that was trying to reduce the amount of vehicles driving around the campus.

The German education system was new to me and working closely with my host I learned a lot about the process. Also I saw many of the class rooms and even some lectures, which differed a bit from Finnish ones so that was somewhat new.

At some points I experienced resistance when requesting information for the staff. Things that where somewhat critical for a step to move forwards. At some point I had to exert what little authority I had to insist that I be given the information that I needed. In the past it has always been much easier for me to get the information that I needed and people have luckily been very helpful. It wasn't major issue but it was a bit of a growth experience to realize that I could make someone do something for me even if they didn't really want to.

B.3. What did you learn?

I learned a hundred little things about lighting and control systems.

How lamps are classified, the efficiencies of different lighting technologies, how large facilities wire their luminaires, how building management systems are operated, etc?

I also learned that not everyone updates their CAD files and having a systematic monitoring tool is not very new.

I learned a lot about luminaires, lamps and lamp sockets as well as the current commercial costs of LED lighting systems. I was happy to discover that everyone is complaining for no reason. LED lighting is quite cheap. Perhaps 25% of the implementation cost would be from the installation, but just like the bulbs the total amount of changes and so work time would be reduces as the lamp last for much longer. So even those costs are recouped in the long run. If slight changes in colour temperature where not considered to be a problem I would implement a change slowly where lamps that break are simply replaced with an energy efficient LED. Even

with a little extra time needed for rewiring within 2-4 years all of the CFLs should have broken and would have been replaced by LEDs. By gradually changing the bulbs the average colour temperature might even be more even and no extra staff would be needed to make the change. Also no additional trash is produced since after switching from CFLs to LEDs what are you supposed to do with the CFL. Most likely they would end up in the trash but that would be wasteful. Its better to make the change slowly, create a system for monitoring and observe the behaviour of the lighting.

B.4. Which were the main challenges/problems? How did you manage them?

One challenge was to get relevant information despite my poor understanding of German with some staff that didn't speak much English. Due to the technical nature of the work I was able to communicate without too much trouble. In fact on one of the last days at the office everyone began to show me more about their own work (perhaps they saw my enthusiasm or had finally understood what my purpose was all together). There was an older gentleman speaking in German and showing me how the room control software worked and what problems there were with the software and hardware and saying what changes need to be implemented to fix those problems. While my host was translating for me I was able to finish the conversation with him without translation because I could read the technical diagrams and understand by his gestures and tone what was happening. I understood basic words like energy, electricity, heat, etc. so the conversation went along just fine.

Another challenge was that a vast amount of information and documentation was missing so I had to individually track down and label many lamps myself. This is why I used Mapbox, so that I could visually catalogue and update missing documentation.

Information was inconsistent and contradictory at times, but using multiple sources and my brain I managed to get as clear a picture as I could on the whole scenario.

B.5. Please confirm your participation in the PiP activities linked to this placement (domestic or international)

Domestic Placement	
Introductory Workshop	X
Crucible I	X
International Placement	
Innovation Festival	
Crucible II	

PART C: COOPERATION AND SUSTAINABILITY

C.1. Which possibilities do you see in continuing the collaboration with your host organisation?

I may be able to complete the project by assisting in the retrofitting of the existing lighting system. I would be an asset as I have spent a lot of time learning how the system works and what should be done in order to maintain or improve the existing light performance.

I also made contact with the suppliers and could act even manage the ordering of the desired bulbs. I would also be able to manage the entire retrofitting process where I would also implement a new documentation scheme (Mapbox) so that the quality of the bulbs could be

monitored and so the ROI could be assessed properly.

The outdoor retrofit would be invaluable for assessing the risks and potential of implementing a similar scheme indoors. As mentioned previously the indoor lighting is an order of magnitude greater in the quantity and energy consumption so something that should be looked at ASAP. If the ROI outside is only 1-2 years then it would likely be around the same range indoors. Lighting can account to 10% of a buildings energy consumption which would account to over 0.1-0.3 million euros that could be saved each year. Not exactly pocket change anymore.

C.2. What is the link with your own work? Which part of your placement experience did you take home?

I'm all about energy efficiency and approaching a low carbon economy as quickly and affordably as possible. I will upgrade my own home lighting system and help others. The technical side of the project was already quite familiar to me on a basic level, adjusting my knowledge on energy auditing for lighting only required reading but a lot of details on facility management where new to me. Unfortunately because I wasn't working with every body in the department I only know about a fraction of what actually goes on around the campus.

As I've iterated multiple times already, the fact that LED lighting is affordable and has an incredibly fast ROI is a big lesson and even after telling people they don't believe me. I would recommend they look at my work and make their own calculations instead of repeating the same false facts as everyone else. It certainly takes longer for people attitudes to change than it does for technology or the price of it.

C.3. How will you share what you have learned within your organisation and externally?

I will give a lecture at Metropolia University of Applied Sciences in Vantaa Finland to environmental engineering students. I will also publish my report and slide show for others on my organizations webpage.

I will also use the knowledge to keep the energy consumption of my offices and labs at a minimum. While I was already doing that, I have a different set of rules by which I can asses the effectiveness of my/our actions.

C.4. Please provide an overview of the sustainability of your placement activities/projects

Lighting will always be necessary but I tried to implement a plan that uses the Best Available Technology for the given system and reduces energy consumption while making it as affordable as possible to reduce the threshold needed to make the right decision to optimize the existing system. With my assessment we could drop energy consumption by around 80% and reduce carbon emissions significantly in that sector. The system would actually use so little power that it would be possible to power it with solar panels placed on one of the empty rooftops on the campus. Less waste would also be produced in the long term and by keeping existing luminaires no additional waste creation was proposed.

I also happened to travel to and from the campus with buses and a bicycle that was lent to me by the department, which was great. We also worked to keep our own energy consumption from lighting as low as possible by maximising the use of natural sunlight when possible.

PART D: QUESTIONNAIRE

Please answer the following query, taking into account 1 is fully disagree and 5 is fully agree

Experience assessment

Have you contributed to some improvements in the host entity or in its environment?	1	2	**3**	4	5
Have you gained knowledge, contacts, and experience during your placement that will be used in your future professional career?	1	2	3	**4**	5

Do you think this experience can contribute to the fight against climate change?	1	2	3	4	**5**
Have you received enough assistance before and during the placement in order to properly fulfil your commitments with the programme?	1	2	3	4	**5**
Will you recommend this experience to others?	1	2	3	4	**5**

Placement assessment

Have you enjoyed a safe and comfortable work environment?	1	2	3	4	**5**
Have you had an easy integration in the host environment?	1	2	3	4	**5**
Has the host contributed to the development of the project?	1	2	3	4	**5**
Please, assess the overall experience during the regional placement	1	2	3	4	**5**

Please point out other comments, suggestions and complaints, if any:

Te other Pioneers are a huge resource that can help international pioneers /outreach pioneers to adapt to a new environment and save countless time and energy showing them the ropes of the city and systems.
I.e. which phone connection is best, where to get the monthly card from, who they could rent a room from or do so as a group, etc…

PART E: KEY PERFORMANCE INDICATORS

The following Key Performance Indicators (KPIs) for the PiP programme relate directly to the KPIs set out by Climate-KIC in its Business Plan 2014:

- At least 180 people on a 'triple-helix' professional development programme.
- At least 360 experiments for place-based learning.
- 50 business cases/models worked on.
- 40 new knowledge transfer agreements.
- 40 novel advances in organisations, services and business plans.

Ideally, the output of a placement should involve, at least, one KPI. One single project/activity may produce more than one KPI, either under the same category or covering different types of KPIs.

E.1. Key Performance Indicators coming up from this placement (related to Climate-KIC Business Plan). If the pioneer has generated or contributed to a KPI, please indicate which one of the following: ☐ New business case / models / project proposals ☐ Knowledge transfer agreements ☐ Novel advances in organisations, services and/or business plans ☐ None Please, describe the key facts of this contribution
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In order to properly identify the achievements reached during the 2014 programme, the following templates have been prepared to be fulfilled by the pioneer only when the coach agrees upon, after careful consideration of whether the progress achieved over the placement may represent a Key Performance Indicator (KPI). The coach will provide support as needed.

KPI 1: Business Cases/Models or Project Proposals

Pioneer (Name & Cod.)	
Host (Name & Cod.)	
Name of the Business Case / Project	
Name of Regional Coach who provides support	
Description of the Business case/model or project proposal worked on (opportunity, target group, contribution to Climate Change, potential impact, etc) (Please quantify) - max. 300 words	
Who will implement the business case/model worked on (who has the property: host, pioneer, third party, combined, partners, etc.)	
When is it foreseen to be implemented (Next steps and estimated schedule of the Business Case/ Project)?	
How has the pioneer contributed to the business case / model worked on. Role of the pioneers in the BC/ Project. (Providing the basic idea, developing a previous idea, collaborating in the documentation gathering, exploring the market situation, etc) (Give references).	
Further information/proofs (Abstract of the business idea with reference to relevant KIC activity; partners / entrepreneurs involved; pictures, website, comments, reactions, reports, letters of support, etc.) This information should endorse the above-mentioned info.	

KPI 2: Knowledge transfer agreement

Pioneer (Name & Cod.)	
Host (Name & Cod.)	
Name of Project	
Name of Regional Coach who provides support	
Description of the Knowledge transfer agreement (type of transfer: patent, trademark, know-how, copyright, etc)	
Who is involved in the knowledge transfer (host, pioneer, third party, combined) **and ttype of contract**: licensing, sales, consultancy	
When it is foreseen to be implemented (Next steps and estimated schedule of the knowledge transfer)	
How has the pioneer contributed to the knowledge transfer (providing the knowledge, developing a previous idea, etc) (Give references)	
Further info/proof: contract with above information (details may be blackened if necessary) or a written statement of the KIC partner adopting the knowledge (with the above information) that states how it is being adopted. This information should endorse the above-mentioned info.	

KPI 3: Novel advances in organisations, services and business plans

Pioneer (Name & Cod.)	
Host (Name & Cod.)	
Name of the Project	
Name of Regional Coach who provides support	
Description of the novel advance (organization, service, business plan) **and how it helps to fight against Climate change** (max.300 words)	
When it is foreseen to be implemented (Next steps and estimated schedule of the knowledge transfer)	
How has the pioneer contributed to the novel advances in organizations, services and products (providing the advances, developing a new service or product, etc)	
Further information/proof (written statement of the KIC partner/host/organization adopting the novel advance pictures, website, comments, reactions, reports, letters of support, etc) This information should endorse the above-mentioned info.	

PART F: VALIDATION

Please provide an assessment of the adaptation, performance and progress of the pioneer over this placement (max. 300 words):

I hereby confirm that the statements and information in this application form are true and correct to the best of my knowledge and belief.

Given its quality, I recommend the adoption of the above-mentioned KPI as outstanding product of this placement. The proofs supporting this KPI have been checked and validated accordingly. [Remove if not applicable]

Date & Coach's signature