EM Nantes

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# Master of Science in Project Management for Environmental and Energy Engineering (PM3E)

2nd July 2009

Béatrice NEDELEC
Centre Scientifique et Technique du Bâtiment
CSTB (Nantes, 44, France)

## Pollutant emissions from residential heating devices using wood/biomass as combustible.

CSTB is a state-owned industrial and commercial corporative, placed under the joint supervision of Ministry of Housing and the Ministry of Ecology, Energy, Sustainable Development and Town and Country Planning, the Directorate General for Urban Development, Housing and Construction. It works for improvement, well being and safety in buildings. The four complementary trades are research, advanced engineering, quality assessment and the dissemination of knowledge. CSTB is involved in the main European research programs. It is composed of eight departments dealing with society issues, structures and comfort, construction products and techniques and information technology industry.

The project is to study pollutant emissions from a residential heating appliance using biomass (wood) as combustible. Influences of operating conditions are going to be studied, such as the impact of sampling and measuring conditions on results obtained. To do such a study, gaseous (CO, CO2, THC, SO2, NOx) and particulate matters (TSP, PM10, PM2.5, PM1 and size distribution) generated during combustion will be measured. A bibliography on treatment processes for reducing such pollutants will also be made. This project is included in an overall research program led by CSTB.

## Yu WANG

### Institut des Matériaux Jean Rouxel (Nantes, 44, France)

### Role of the copper and sodium as a holder about the crystallization quality of composing photovoltaic CIGS.

The Institute of Materials Jean Rouxel is an entity within the French National Organization for Scientific Research (CNRS) and the University of Nantes. Research activities focus on: synthesis of new materials, study and optimization of their properties, their application, and development of new methods of analysis.
Photovoltaic cells based on compounds of the family CIGS formed a complex assembly of thin layers of different semiconductors. One of these layers is formed of CIGS compound in which the absorption of photons of light gives rise to electric current. The performance of the photovoltaic cell depends on many factors and especially the quality of crystallization of the CIGS layer. Experience shows that a slight excess of copper in the preparation of this layer and the presence of a small proportion of sodium are favorable conditions for obtaining high grain size and well crystallized. The question is what are the mechanisms involved during the growth process and what the exact role of excess copper is and sodium. Therefore, we propose to study the impact of these two factors on the crystallization of the compound to the CIGS powder by using the techniques which are those conventionally used in solid state chemistry: X-ray diffraction, elemental analysis in scanning electron microscopy, Raman spectroscopy.

## Nitin PAGARE

### GoodPlanet (Paris, 75, France)

### Managing and developing Voluntary Emission Reduction projects.

ActionCarbone is a programme of the non-profit organisation GoodPlanet. This organisation has been initiated by a world-renowned and acknowledged French photographer Yann Arthus-Bertrand and also supported by the French Environment and Energy Management Agency (ADEME) to raise public's awareness on climate change and promote sustainable development.
ActionCarbone funds energy efficiency and renewable energy projects, developed by Non-governmental organisations (NGO's) in Southern countries. The six-month internship at ActionCarbone includes managing and co-ordinating projects with NGO's in India, China, Senegal, Bolivia and Peru on biodigesters and improved cookstoves projects in the rural community. The internship includes assisting these NGO's to gain the carbon credits through the Voluntary Emission Reduction (VER) market by providing technical assistance to calculate the Greenhouse Gas (GHG) emission reductions by the projects per year. The calculations of the GHG's emission reductions are carried out as per available methodologies, which involve surveys to determine the fossil fuel consumption, non-renewable biomass analysis and monitoring study of the projects.

## Felipe TIBOCHA CALA

### BIO Intelligence Service (Ivry-sur-Seine, 94, France)

### Eco-design requirements for Energy using Products.

Bio Intelligence Service is a leader in environmental and health assessments both in the private and public sectors. BIO specialises in life cycle assessments, environmental labelling and environmental policy analysis.
In this context, the major objective of the project is to improve the environmental performance of major commercial refrigerating and freezing equipment within the framework of the European Ecodesign Directive (2005/32/EC). The Methodology for Ecodesign of Energy-using Products (MEEuP) is used for analysing the environmental impacts and improvement potential of the products throughout the entire life cycle of the product. This methodology is a common approach used for all products under the Ecodesign Directive.
The duration of the project is approximately 23 months. The six months internship will be mainly focused on the following tasks: definition of the scope of the study, economic and market analysis, user behaviour analysis, and assessment of base cases (i.e. average European products). Thanks to the participation of a great variety of actors (e.g. manufacturers, environmental NGOs, industry associations, etc.), integral recommendations will be generated in order to reduce the overall environmental impact of these types of products.

## Federico PRIESEMUTH RUEDAS
### Energie-Cités (Besançon, 25, France)
### Display® Campaign.

The internship is done in Energie-Cités, Association of European local authorities promoting local sustainable energy policies. The main objective of the internship is to work on the Display® Campaign. The Display® Campaign is a voluntary scheme designed by energy experts from 20 European towns and cities. It is aimed at encouraging local authorities to publicly display the energy and environmental performances of their public buildings using the same energy label that is used for household appliances.
The internship's goal is to support the project manager of the Campaign to source the cities that can apply for the "Towards Class A award". For that, the intern should face some challenges like: remind all the cities about the deadline to submit their information, contact the cities which submitted their information, analyze the information, prepare the information for the project managers, contact the jury members, prepare the jury meeting which took place in Brussels, present the information to the jury, prepare information for the award ceremony, prepare certificates and prepare for the pending award ceremony. At the same time, the intern should work on providing overall statistics of the Campaign and contribute to the monthly newsletter called Display NEWS.

## 15th July 2009

## Uchenna Kennedy KESIEME
### Energy Research Center of Netherlands – ECN (Petten, The Netherlands)
### Cost Estimates for liquid hydrogen based supply concepts for hydrogen refueling stations.

ECN, the leading Dutch energy research institute, is at the cutting edge of European efforts in the development of new technologies that meet tomorrow's energy demand. My research thesis is to estimate the cost for liquid hydrogen supply concept for hydrogen refuelling stations. It is part of the Dutch THRIVE project (Meaning Toward a Hydrogen Infrastructure for vehicle) lead by ECN and joined by TNO, Linde and Shell hydrogen. The activities of ECN are aimed at stimulating and analyzing the development /growth of hydrogen vehicles penetration and build up of networks using an allocation model which takes into account car replacement rate, local and global availability of hydrogen, availability of hydrogen cars, mobility pattern and existing refueling stations infrastructure. These activities are complemented by technological and socio-economic research conducted by ECN and other partner. Within the project use of concept based on liquid hydrogen play an important role. This thesis project contributes to the THRIVE project by giving an insight on the consequence of the use of liquid hydrogen in terms of options for introduction of "green" hydrogen and the cost of hydrogen.

## Zhafira DARMASTUTI
### ALSTOM Power System (Vaxjo, Sweden)
### Novel Sensor for Air Quality Control System.

Alstom is an expert in power generation and rail transportation sector. In Environmental Control Division, Alstom Power works on the study, design, development, and construction of systems and products for flue gas purification in power and industrial applications. As an expert in air quality control, Alstom offers different types of equipment for removal of particulate, sulfur dioxide, nitrogen oxides and other environmentally harmful substances in flue gases. System development in CO2 capture and oxy-fired combustion has also intensively been done.
The objective of this project is to find a new method to utilize the latest sensor technology and use it to improve different processes in air quality control system in Alstom. The works include the following:
- Study, analysis, and review of different process stream in various air purification equipment and CO2 removal processes
- Study about the latest sensor technologies that are used for related measurement and comparison with the system that currently being used
- Identification and suggestion of new method of using old and/or novel sensor
- Preliminary testing of the most viable options in laboratory, workshop, and/or the pilot plant

## Llyod Lishandu CHINJENGE
### Royal Institute of Technology – KTH (Stockholm, Sweden)
### Security of Energy Supply.

The Department of energy technology at the Royal institute of technology covers wide areas of energy conversion and utilization from thermodynamics, heat transfer to engineering applications in heating and ventilation of buildings. This research project on security of energy supply is being hosted at the department.
As soon as there is a significant interruption of some kind in energy a part of the modern society can break down. For example when the electricity supply breaks down almost everything stops. It is not possible to pay any bills, buy anything, pump gasoline, pump fresh water etc.
The thesis project is first directed towards establishing (among other issues), a general view of the EU's directive regarding security of energy supply to Europe; secondly the future needs for energy on the continent and how much new production capacity will be needed until year 2030 up until 2050. As a third step the energy supply to and from Sweden shall be studied from different perspectives. As the fourth step will focus on vulnerable spots which exist in the energy system, both related towards an abnormal weather condition as well as a possible man-made disturbances, and which redundancies exist.

## Farrukh RAEES
### Energy Research Center of Netherlands – ECN (Petten, The Netherlands)
### Energy efficiency improvement in Dutch pulp and paper industry.

The Energy research Centre of the Netherlands (ECN) is the largest Dutch centre for study into energy. ECN Policy Studies carries out independent policy research and studies for governments, industries and non governmental organisations. The core products of the group 'National Energy and Emission Strategy' are scenarios and projections of energy use, energy efficiency and emissions monitoring, and integrated studies on energy and emission policies. Analyses of industrial energy use and emissions are also performed by this group.
As a part of national energy policy group at ECN, which is intensively involved in predicting energy scenarios specifically for the national policy makers, the work will try to find technical opportunities of increasing the energy efficiency in the paper and pulp industry and the role of national policy to facilitate the implementation of these opportunities. When any policymaker has to choose whether to implement or leave the specific energy policy, it is important, not only to know the energy savings but also the competitiveness of these investments with the other opportunities. So the report will provide the amount of energy saving and the emissions reduction in case of implementation of the energy efficiency improvement options along with the calculation/prediction of the yield of investment (IRR).

## Ian KUWAHARA
### BIO Intelligence Service (Ivry-sur-Seine, 94, France)
### Life cycle analysis of solid fuel combustion installations in Europe

Bio Intelligence Service is a leader in environmental and health assessments both in the private and public sectors. BIO specialises in life cycle assessments, environmental labelling and environmental policy analysis.
The goal of the industrial project is to support the life cycle analysis of solid fuel small combustion installations under the eco-design Directive of the EU. Specifically, this involves a review of solid fuel small combustion installations on the market, an analysis of their current environmental impact and possible improvement options so as to develop implementing legislation to reduce their environmental impact. The topic is significant because solid fuel combustion represents a major share of domestic heating energy use in many European countries. Moreover, the topic is challenging since the environmental impacts and energy consumption of these products are complex and difficult to estimate. Of particular concern are direct emissions to air, including particulate emissions. The life cycle assessment of the products involves eight tasks: scope definition, market analysis, consumer behaviour analysis, technical analysis, implementation of the life cycle tool, analysis of best available and not yet available technologies, development of improvement policy scenarios and recommendations. The work includes performing analysis, writing reports, attending meetings, soliciting feedback from stakeholders and managing stakeholder comments.

## Gulrez MUMTAZ

### ALSTOM, Corporate Head Quarters (Levallois Perret, 92, France)

### Deployment and Enhancement of the Environment, Health and Safety Roadmap.

ALSTOM is global leader in Transport and Power Generation Infrastructure, with more than 80,000 employees in 70 countries. ALSTOM has developed its own reference document for assessment of Environment Health and Safety (EHS) performance called the EHS Roadmap. This tool has been largely deployed on various sites of ALSTOM and has proven to be efficient in terms of improving EHS indicators.

We manage regular site assessments of ALSTOM sites around the world based on the EHS Roadmap standards. The audits are either done by internal accredited assessors or by outsourcing it to consulting company. Managing assessment organization involves discussions with EHS Managers, Lead Assessors, Co-assessors and defining the clear scope of the audit based on site activity.

EHS Group is also carrying out revision of Roadmap standards for 2009. We organized web conferences with EHS Managers across the world, analyzed the comments and suggestions received from EHS community to improve the effectiveness of the Roadmap standards and finally issued the new version.

ALSTOM has web based reporting tool where the sites report their energy consumption and environment data. We use this data to analyze the trend of energy consumption and environment figures of the site. Based on this reported data, we review with site EHS Managers, appropriate solutions for increasing energy efficiency and reducing environmental impact.

## Soul Annie LEAL MEZA

### Total Exploration & Production (Pau, 64, France)

### Development of a best practice guide for waste management for the Exploration and Production affiliates.

The Exploration & Production (E&P) branch of Total group develops all activities concerning the exploration of oil and gas reservoirs, the construction and operation of production sites to get oil and gas as tradable raw materials and the site decommissioning.

E&P activities generate waste that must be handled, treated and/or disposed in a manner that avoids and minimises the impact to environment or human health and that complies with local or international environmental regulation, and company requirements.

The internship project aims to develop a review of experience on waste management, treatment and disposal of Exploration and Production affiliates in order to identify best practices applied or applicable, improvement opportunities and to consolidate a best practice guide for waste management for all affiliates under the format of an intranet site.

## Alexander THORNTON

### BIO Intelligence Service (Ivry-sur-Seine, 94, France)

### Energy efficiency and life cycle analysis of energy-using products.

Established in 1989, Bio Intelligence Service is one of Europe's leading consulting firms in the field of energy and environmental management. BIO develops recommendations for clients in the private and public sectors to help in finding answers to the environmental challenges faced by them. BIO is involved in a wide range of projects of development, analysis, and implementation of environmental policies and programmes at the EU and Member State levels. BIO also has a strong scientific and technical expertise in the field of eco-design of products, life cycle assessment, and health & nutrition analysis.

The tasks involve working on two projects for the European Ecodesign Directive. They are ENTR LOT 2: Distribution and Power Transformers and TREN Lot 19: Domestic Lighting – DLS (Directional Light Sources). The methodology for analysing the product groups starts with the definition of the scope (task 1), market analysis (task 2), aspects of user behaviour and related barriers for ecodesign (task 3), technical analysis of real products identified as representative of the European situation (task 4), environmental assessment of average products defined as base-cases (task 5), in depth technical analysis of best available (and not yet available) technologies (task 6) and possible improvement potential achievable through product design (task 7), and policy and scenario analysis (task 8).

## Shivaji RAMALINGAM

### The QUESTOR Centre (Belfast, Northern Ireland)

### Reducing the operating cost of the sludge treatment and Risk Assessment of the waste water treatment process.

The QUESTOR Centre is an international environmental research co-operative that serves a select membership made up of environmental regulators and environmentally responsible companies, ranging in size from large multi-national corporations through to forward looking SMEs. QUESTOR provides member organizations with a highly focussed environmental research program, delivered by a multi-disciplinary staff at world class environmental research institutions.
Sewage sludge is the remaining organic matter and excess microbial biomass produced as a result of biological wastewater treatment processes. Disposal of sewage sludge is a growing problem across Europe as more stringent wastewater treatment regulations have led to increased sludge generation from sewage treatment works. Restrictions on the options for disposal of this material have led to the need to find alternative methods of handling and effectively reducing the amounts of sewage sludge produced. Research in QUESTOR has indicated that the quantity of sludge solids produced in sewage treatment could be reduced by inducing activated sludge microorganisms to increase their metabolic rate and generate less cellular biomass. pH stress has been shown to cause increased respiration and poly-phosphate accumulation in a range of activated sludge microorganisms. The outcome of the research will give the opportunity to be involved in the monitoring, analysis, risk assessment and troubleshooting of a pilot-scale wastewater treatment plant. This will involve analytical lab work and on-site demonstration activities collaboration with water industries in the UK.

## Gisela Ivette MARTINEZ RODRIGUEZ

### Suez Environnement (Le Pecq, 78, France)

### Operational performance report of waste services and energetic over consumption analysis for waste water treatment plants.

SUEZ Environnement is a leading global player in water treatment and waste management services. The Environment and Technical monitoring Department of SUEZ Environnement mission is to organize and develop an expertise network that assists the different business units. It benchmarks the activities that have been developed throughout the years while carrying out different reports.
Waste Service Observatory: annual operational performance report.
The aim is to create an annual report about the waste activities operated within the group. The activities are to collect, analyse, review, clarify and summarise the waste operational business indicators. The report should be useful for all the group levels from managers to technicians.
Waste water treatment plant (WWTP) energy over consumption analysis.
Pioneer energetic evaluation tool has been added to the annual quality reporting of WWTP. The aim is to identify the WWTP that require specific energetic auditing while saving operational expenditures and time.
These internal analyses should be useful for decision making and technical best practices comparison. The challenges are to be able to apply correct technical, communication and managerial skills. The opportunities are to be able to acquire know how of the best practices and to work within a team of experts.

## Sandeep PAHAL

### ArcelorMittal (La Plaine Saint-Denis, 93, France)

### Energy optimization in steel plants.

ArcelorMittal is the world's number one steel company, present in more than 60 countries. The energy team at ArcelorMittal plays a major role in optimization of energy both by hedging on long term contracts with suppliers and at plant usage levels.
The context of my internship is focused around the following main aspects:
- To identify and determine the opportunities for cross border transmission of electricity between France, Belgium, Luxembourg, Germany and Netherlands. The idea is to have a bundling strategy for ArcelorMittal steel plants in this region and benefit from price differential and increased flexibility in the contracts.
- Gain an understanding about the current status of carbon-dioxide capture, transport and storage market from technology and investment point of view. This will serve to estimate the impact of CCS on electricity prices and the business conditions emerging henceforth.
- Develop an Excel model using VBA for the analysis of Natural gas prices based on oil formulas. This tool aids in the preliminary decision making for long term natural gas contracts at ArcelorMittal.

## Carlos TELLO
## ScottishPower Renewables (Glasgow, United Kingdom)
### Environmental Impact Assessment of the Sound of Islay Tidal Demonstration Array.

ScottishPower Renewables is part of Iberdrola Renewables, the world's biggest producer of renewable energy. It is currently the UK's largest developer of onshore windfarms and is at the forefront of the development of wave and tidal renewable technology.
At present, ScottishPower Renewables is working on the development of a proposed 10MW Demonstration Tidal Site in the Sound of Islay that will have up to 10 submerged tidal stream-generating devices. The purpose of this internship is to help in the development of the Environmental Statement (ES) of the Tidal Array in conjunction with other departments (Electrical, Mechanical, Public Relations...) and several external consultants. The aim of this ES is to determine the site baseline information and assess the potential environmental impacts of this development as part of the overall Environmental Impact Assessment process.

## 16th July 2009

## Yan-Fei TANG
## ArcelorMittal SA Research (Maizières-lès-Metz, 57, France)
### Feasibility study of DME process in an integrated steel plant.

With over 326,000 employees in more than 60 countries, ArcelorMittal is the world leader in steel production, as well as all major global markets, including automotive, construction, household appliances and packaging. AM is committed to the efficient use and conservation of energy to reinforce its Leadership position and to assume its societal and environmental responsibilities for the benefit of all our stakeholders.
In an integrated steel plant, huge amounts of by-products gases are produced by different process. Nowadays, the surplus of gas is sent to a power plant to produce electricity with low efficiency, or in the worst case the surplus is just flared. The mission of the internship is to evaluate the feasibility and the interest of producing high value chemical products, such as ethanol, or DME (Dimethyl Ether) within a steel plant. State of the art of existing processes dedicated to convert steel gases (mainly H2/CO/CH4 mixtures) into DME is studied. Furthermore, modelling with simulation software (Aspen Plus) of one or several processes will be carried to obtain the accurate guideline data. Finally the technical-economical feasibility of DME process within an integrated steel plant will be performed and conclusion will be drawn as a basis for the project promotion.

## Jean-François B. JAIMES
## Ecofys (Utrecht, The Netherlands)
### Wind Power Innovation Project – New concepts and Technological Breakthroughs.

Established in 1984, Ecofys specializes in energy saving and renewable energy solutions. As part of the Econcern group, it offers research and consultancy services as well as product development. Its experts are organized to develop balanced and cost-effective solutions. Ecofys is always at the forefront of climate and energy market developments and leads the way in applying advancements in its projects, activities in strategic research and its contributions to international and local policy development.
For this project, Ecofys wants to obtain a state of the art view on wind power technology developments from the following three perspectives. First, the identification of specific areas in which technological developments can create a breakthrough for cost reduction in wind power. Second, the short listing of technological developments, companies, projects in the world for investment consideration, all related to wind power. Lastly, reporting on how wind power projects and consultancy will be influenced by technological developments.
The result of the wind power innovation project will be a list of interesting, specified and analyzed innovations useful for Ecofys and Econcern to generate growth by participating in other companies and by keeping the consultants on the edge of the technology. Results are to improve flow through knowledge and insight within Econcern.

## Vindhya Rani CHIRUMAMILLA
### ArcelorMittal SA Research (Maizières-lès-Metz, 57, France)
### Modelling of Rotary Hearth Furnace for ironmaking and by-products recycling.

ArcelorMittal is the world's largest steel company producing 10% of the total steel production of the world. The "Process Engineering Group" of ArcelorMittal R&D aims at developing innovative process at reduced cost and improved quality and also strives for the sustainable development by reducing the process environmental impacts.
My task as an intern here is to construct a process model for Rotary Hearth Furnace to produce Directly Reduced Iron (DRI) along with Smelter Furnace to transform the DRI into hot metal. The model is developed in commercial flowsheet software, emphasizing the energy, economical and environmental aspects of the RHF to evaluate green house gas emissions, energy consumption and costs. This model can be adapted for ironmaking as well as for by-products processing with varied chemical compositions and reactivities and also creating a user friendly interface which automatically generates energy and mass balance reports including CO2 emissions. The model will be validated using the literature data.
This model will be used by ArcelorMittal in decision-making related to the construction of new plants or increasing the capacity of existing plants using the RHF as an iron making tool and for the evaluation of by-products treatment routes.

## Diego PERELMAN
### Ecofys (Utrecht, The Netherlands)
### Sea Water Air Conditioning: Feasibility Analysis - Cape Verde Islands.

Established in 1984, Ecofys specializes in energy saving and renewable energy solutions. As part of the Econcern group, it offers research and consultancy services as well as product development. Ecofys has conducted extensive research and completed projects for many energy companies, housing corporations, building companies, international and local authorities, and energy consumers around the world. With more than 350 employees in thirteen countries, we're one of the largest consultancy firms in sustainable energy and climate policy.
The project consists of a feasibility assessment of the potential of using deep cold seawater to provide air conditioning (AC) to hotels and other buildings in the Cape Verde Archipelago. The projected economic development of the islands for the next 20 year period suggests a steep increase on the AC demand. This, coupled with the geographical isolation of the area and its lack of fossil fuels, opens the door for the use of local renewable energy sources. The purpose of this project is to determine whether or not there is technical and economic merit to proceed with further development towards the implementation of Sea Water Air Conditioning system in Cape Verde as a part of a sustainable energy strategy for the better development of the area.

## Alexandre HUCHER
### Solar Ventures (Paris, 75, France)
### Decision model for the choice of the technology for the French Market.

Solar Ventures is specialized in the financing, the development and the operation of large-scale photovoltaic power plants, and is one of the leaders in the Mediterranean region. In addition to taking part in the development of the company in France, the mission was to build a decision model expected to be used in concrete situations to compare and assess different photovoltaic technologies in term of technical, economical and environmental performances, according to the different climate conditions existing in France.
In a first part, we remind the basis of photovoltaic, from the photoelectric effect to the structure and properties of a cell, and we present the evolution and characteristics of the French photovoltaic market. Then, after having identified specific climate criteria that have significant impacts on module efficiencies, the climate in France is analyzed and several "similar" regions are identified. The use of different technologies/modules in each of them is simulated and a series of conclusions related to the relevance of each technology in those regions are drawn.
Finally, we try to determine how the predicted evolution in performances and costs of modules will affect the model.

## Srinivasan NARAYANASAMY
### Ecofys Germany GmbH (Berlin, Germany)
### Simulation of steady state and transient behavior of wind farms in power systems.

Econcern is the holding company of Ecofys, Evelop, Ecostream, and Ecoventures. The mission of these European companies is to ensure 'a sustainable energy supply for everyone'. Ecofys specialises in energy saving and renewable energy solutions offer research and consultancy services as well as product development. Within Ecofys, the group "Power Systems and Markets" focuses on the specific challenges related to integration of renewable energy in electric power systems and electricity markets.
In a mission to find alternative source for energy, the wind energy proved to be a sustainable energy for the future. But with high penetration of wind energy in the power system may pose great challenges to the stability of the grid. The tasks involved are:
- To create wind turbine and wind farm models.
- To simulate the fault ride through capability of wind farms at the point of common coupling.
- To study steady state and dynamic behavior of wind farms connected to the power system using simulation software DIgSILENT PowerFactory.
The deliverable of the work can be used in future studies carried out by Ecofys' Power Systems and Markets group.

## Mia LAFONTAINE
### Climact (Louvain-la-Neuve, Belgium)
### Product Carbon Footprint - its Emergence, Pertinence and Application.

Climact is a carbon management consulting company in Belgium providing strategic and innovative solutions to large corporate customers to diagnose and reduce their impact on climate change. Its primary activities include the calculation of carbon emissions followed by recommendations for reductions, offsetting, and communication.
As an intern with Climact, the focus has been on the research and development of an emerging type of retail information – the product carbon footprint. With different methodologies emerging in Europe and upcoming regulations in the display of such information (eg: France, 2011), this hot topic has many political, scientific and corporate leaders debating over the validity of the data and the methodologies as well as the meaningfulness of the result and its communication to customers. In order to get a better understanding, the task at hand also involves applying the most complete methodology so far, the PAS 2050, to the calculation of the carbon footprint of a chocolate bar, with the collaboration of an existing client. The case study should also allow both Climact and its client to target hot spots where carbon reduction opportunities exist.
In parallel, the tasks also include helping with more typical projects in carbon management, notably for Carrefour, a leading retailer. The project involves calculating the carbon footprint of typical stores of different sizes as well as the logistic operations to target reduction opportunities.

## Irmanda HANDAYANI
### Royal Institute of Technology – KTH (Stockholm, Sweden)
### Analysis of Environmental Performance and Development of Best Environmental Practices in Hotel Facilities.

The research group Sustainable Building System, Royal Institute of Technology, Stockholm, Sweden is currently focusing its work on energy efficiency and conservation in buildings, utilization of renewable energy (systems) in the built environment, and bioclimatic buildings (design and performance). One of the current projects is investigating "energy-efficiency and conservation in hotels". After thorough research in European hotels, in particular in Sweden and Poland, it is now their interest to observe the practices in the region of Asia Pacific.
Designed to offer comfortable and safe shelter for the tourists, hotels consume significant amount of energy and resources in their daily operation, and consequently generate significant amount of waste. Therefore, the study is intended to assess hotel performance by investigating the utilization and management of energy and other resources in hotel facilities e.g. as related to space conditioning, lighting, etc. The study will then continue to explore less resource-intensive facility management/operation alternatives which could result in higher environmental performance including a cost analysis for alternative options. Emphasis will be given to energy conservation and the possibility to utilize renewable energy systems. Visits to hotel in Indonesia will provide example of the practices in the region.

## Rakesh SINGH

### Fraunhofer Institute for Systems and Innovation Research (Karlsruhe, Germany)

### Develop N2O emission benchmarking for the 27 European nations.

The Fraunhofer Institute for Systems and Innovation Research (FhG-ISI) is part of the Fraunhofer Society for Applied Research in Germany, a non-profit corporation, which promotes applied research and assures the link between fundamental and industrial research. By analysis of promising technologies, development of research priorities and monitoring of technology policy programmes, ISI assists decision-making processes in the public and in private sectors.

Benchmarking for CO2 emission has been developed in the earlier phase of EU-Emission Trading Scheme (ETS) and now we are developing the benchmark criteria for N2O (Greenhouse Gas) emission from chemical industries within the context of 27 European nations (EU-27). Concern for Nitrous oxide gas (N2O) arises because it has 310-times more intense Global Warming Potential (GWP) than CO2. The first part of the project consists in the study and analysis of the EU-wide greenhouse gas allocation scheme ETS. After that the major emitter of N2O; viz, nitric-acid and adipic-acid plants within EU-27 have to be quantified in terms of yearly N2O produced with respect to annual capacity and then analysed with parallel installations and technologies and later on developing benchmark based on the best available installations and practices.

## Mulualem GEBREGIORGIS

### Fraunhofer Institute for Systems and Innovation Research (Karlsruhe, Germany)

### The Use Pattern of Low Temperature Heat in the European Industries and the application of Energy Efficient Technologies.

The center is one of the application oriented research institutes in the Fraunhofer-Geselleschaft. It focuses on the investigation of how technical and organizational innovations shape industry and society today and in the future and makes its own contribution towards strengthening European competitiveness.

The department has developed an energy demand model, ISI Industry, to analyze the development of the future energy demand of the European Union's Industry on in depths analysis of the technological structure of the different industrial branches. Its main feature is the evaluation of technical energy saving options and to build alternative scenarios for the future. The past modelling work lay on electricity consuming technologies but it doesn't cover the low-temperature heat consumption. The main objective of this research based master thesis is:

- Assessment and quantification of the pattern of low temperature heat consumption in the most energy intensive industrial processes;
- Assessment of the characteristics of emerging energy efficiency technologies in terms of applicability, costs, market penetration, saving potential, etc.
- Quantification of the long-term energy saving potentials and reduction of CO2

## Laurent JOUVIN

### GDF Suez (Saint-Denis, 93, France)

### Economic and Technical Analysis of the Renewable Energy Industries.

GDF SUEZ is one of the leading energy providers in the world. The group is active across the entire energy value chain in natural gas and electricity, taking up challenges such as responding to energy needs and maximizing the use of resources.

The industrial section of the Research and Innovation Department is in charge of supporting industries in optimizing energy utilization and in adapting to environmental constraints. In the context of proposing new energetic offers to reduce energy consumption, the aim of this internship is to realize an Economic and Technical Analysis of the Solar thermal and Heat pump possibilities in industries. The task involves determining the main actors of this field (manufacturers, distributors, installers, public institutions...), performances and prices of the proposed technologies, the final objective being to propose axis of possible developments in those growing markets.

## 27th August 2009

### Ana Maria CARREÑO HOYOS
### United Nations Development Programme (Port Louis, Mauritius)
### Removal of Barriers for Energy Efficiency in Buildings.

UNDP is the United Nations' global development network, connecting countries to resources, to meet development challenges. The Global Environment Facility (GEF) is a global partnership that funds initiatives to assist developing countries in projects related to six focal areas.
The Government of Mauritius with the assistance of the GEF and the UNDP is undertaking a project to overcome barriers for energy efficiency in buildings in Mauritius. As part of the plan to achieve this goal, one of the activities is to develop regulations to define minimum standards of electrical performance for domestic appliances and for labelling this equipment. As per the Terms of Reference, the project will develop standards and labels for a list of 9 electrical appliances that will have the most marked effect in energy savings when the new standards for energy performance and labels are adopted with reference to existing international standards. The purpose of the proposed study is to establish the state of the market for these 9 selected electrical appliances in Mauritius and to assess potential impacts after the implementation of a standards and labelling program.

### Citlalli CEDEÑO VIRGEN
### FIVES Group (Paris, 75, France)
### Corporate Social Responsibility Strategy, Action Plan and Indicators.

Fives is a French group based in Paris with a strong international presence and a network all around the world. The Group has a multi-sector profile providing engineering solutions in industries such as steel, aluminium, automotive, cement, energy, logistics, sugar and glass. In 2008 Fives Group confirms its position to tackle sustainable development, social and societal issues affecting the industry by creating a CSR Department with a policy, strategy and action plan in line with the OECD Guidelines for Multinational Enterprises and the United Nations Global Compact.
Some points of the Strategy and Action Plan of Fives CSR are:
Deploy an efficient and standardized Group-wide HSE management system
- Elaborate an environmental impact assessment for Fives headquarters.
- Develop energy consumption studies and guidelines of good practices to minimize environmental impacts.
- Contribution in HSE standardized directives, regarding intercultural management of good practices and guidelines.
Management of CSR Action Plan and Indicators
- Create, develop and establish CSR indicators and reporting structure (environmental and energy consumption indicators, waste and recycling management systems).
More actions as Carbon Footprint measurement and Eco-design promotion in Fives R&D will be published in the 2009 Annual Report, recalling the achievements of Fives CSR department.

### Abdulaziz ALI
### TOTAL (La Défense, 92, Paris)
### Assistant Vice President of Energy Program in Scientific Division.

Total is a multinational energy company committed to leveraging innovation and initiative to provide a sustainable response to the growing energy demand. The fourth largest publicly-traded integrated international oil and gas company and a world-class chemicals manufacturer, Total operates in more than 130 countries and has 96, 400 employees. The strategically dedicated to meeting the challenges faced by all our businesses when developing natural resources, protecting the environment with civil society. The Energy Program in Scientific Division is new in TOTAL, it is around 6 months and Mr. Jean Paul GOURLIA is the Co-Chairman of Energy Committee also he is Vice President of Energy Program.
The subjects is to Contribute in Energy performance management organisation and identify innovative technologies such as heat pump, heat exchangers, boilers, etc. to improve their energy efficiency in TOTAL plants and their customer; also assisting the Vice President of Energy Program coordinating the daily activities.
And the starting task is now to find new technology of heat pumps for industrial use and contact the companies for the specifications. We are also looking for the new technology organisations to cooperate with Total energy program for improving energy efficiency.

## Fahad AL-TAMIMI

### TOTAL (La Défense, 92, Paris)

### Identify new technologies in energy efficient equipment and create energy efficiency indicators for Total plants.

Total is determined to be as efficient as possible in its processes, minimizing its environmental footprints to be competitive in high energy demand markets and setting new limits for upcoming environmental regulations. For such demand Total reacts.
The division of the scientific development in Total has been established in September 2008. A director has been appointed to contribute to developing energy efficient strategies through research and development of energy efficient processes and equipment.
The challenge is to find new born technologies or designs to be adapted in total plants or their customers. This can be attained through verification of new technology or design and their utility in production. Energy Efficiency indicator will be a useful tool to monitor and evaluate energy efficiency trend.

## Yu YANG

### Qingfeng Chemical Fiber Co., Ltd (Jiangyin, China)

### Project assistant of Qingfeng's foreign trade project for Europe.

The company Qingfeng is producing regenerated chemical fiber from recycled PET bottles. Their products are sold all over China and also sold to Asia market like Japan. Now they want to open the Europe market and starting from Germany. So they need to make their products meet the German standards. Among those standards the most important one is the PAHs (polycyclic aromatic hydrocarbons) concentration, which will do great harm to the environment and to human beings.
So the main job of this internship is to:
1. Analyze the regenerated fiber market status in China
2. Establish the direction of the future development of Qingfeng
3. Find a cost effective way to solve the quality problems (PAHs) of the products
4. Put the resolution into the actual production line
5. Establish the connections with potential clients

## 28th August 2009

## Majid HAZRATI KALBIBAKI

### MVM - Hungarian Power Companies Ltd.

### BME - Budapest University of Technology and Economics (Budapest, Hungary)

### Development of CO2 capture system for a coal fired power station .

Hungarian Power Companies Ltd. (MVM Zrt.) and companies controlled by it constitute Hungary's national power group: MVM Group. As a competitive strategic holding, the Group is a determining integrated player of domestic electricity market in Hungary and it is also active in the electricity industry of wider region.
Increasing price of ETS (Emission Trading Scheme) quota will make necessary to amend existing coal fired power stations with CO2 capture system possibly after 2020. EU is going to support 12 systems with at least 180 MW capacities.
In the industrial project optimal CO2 capture solution has to be selected for a lignite fired power station with wet desulphurization system having 200MW electrical capacity. Conception plan and feasibility study has to be made taking into account existing system and equipments. Modeling of reaction for the efficiency, capacity and reliability has to be performed.

## Saber NASERIFAR

### Chemical and biological Engineering Department – CHBE, British Columbia University – UBC (Vancouver, Canada)

### Attrition and Reactivity Analysis of NiO/NiAl2O4 Particles for chemical looping combustion (Re-Design, construction and instrumentation).

The CHBE department was established at UBC in 1915. The Department has a long tradition of research excellence. It has established a world-class reputation in several areas of chemical engineering science including fluid-solids contacting, pulp and paper engineering, heat exchanger fouling and, more recently, biotechnology.
Chemical Looping Combustion (CLC) is one of the promising methods for inherent $CO_2$ separation without energy penalty. This process is done in two interconnected reactors where metal oxide transfers required oxygen from air reactor to fuel reactor. Selection of a metal oxide, with high attrition resistance and high reactivity, is considered to be very important for CLC. Particles of NiO, supported by $NiAl_2O_4$, have been reported earlier as good catalyst candidates for CLC technology. The first aim of this project is to re-design and construct the attrition test unit and then investigate the effects of high temperature, particle size and process time on catalysts attrition. The second objective is to test the reactivity of metal oxide by the help of TGA apparatus and develop the reaction kinetics of particles.

## Abderrahmane NAJMI

### TOTAL E&P (Luanda, Angola)

### Tools implementation in order to improve continuous monitoring and modelling of wells and networks.

TOTAL E&P Angola operates mainly the fields Girassol and Dalia of the Block 17 located in deepwater at 150 kilometers off the coast of Angola. The production units are based on Floating Production Storage and Offloading (FPSO) vessels and sub-sea production systems. This enables a global production of 490 000 standard barrel per day.
The internship within the well performance team aims at implementing several tools for the well tests validation. Other parts of the internship are to implement the WPM-SS Project (Well Performance Monitoring Sub-Sea) and the Profield Project.
- The WPM-SS pilot for Girassol will provide a new module for monitoring and optimising the well behaviour. It will also deliver validated information in real time regarding the phenomena in the sub-sea networks.
- Profield enables to carry out behaviour simulation on the production network in order to define the wells potentials for short and mid terms
After implementation and test validation of these tools, training sessions will be provided to the teams and handbooks will be written.

## Jennis ANYANWU

### Carbon Limits AS (Oslo, Norway)

### Evaluation of Nigeria's Gas flaring Policies: Achieving Flare reduction in the Petroleum sector through the Kyoto mechanisms.

Carbon Limits is a pioneer player in the development of Greenhouse Gas emission reduction projects in Africa. Its main domain of operation includes identifying, developing and registering such projects with the United Nations (UN), to qualify for carbon credit earnings under the Kyoto's Clean Development Mechanisms (CDM) or Joint Implementation (JI) schemes.
Globally, 400 million tones/yr of $CO_2$ emission is attributed to gas flaring alone. Nigeria is the world's second largest source of flaring emissions accounting for up to 20% of the world's volume. The project evaluates the role of CDM in curbing gas flaring.
*Challenges:*
- Absence of organized/structured information and data resources
- Ensuring that only valid information and data are utilized
- Analysis of large related information and data from various sources
*Tasks:*
- Sourcing and evaluating relevant data and policy information
- Developing Project Identification Note/(PIN) and Project Design Document/(PDD)
- Inventorisation of emission sources from the national communication of Nigeria to United Nations Framework Convention on Climate Change; inputs to post-Kyoto-(2012) petroleum sector climate policy.

Meghan IRVING
Groupe URD (Plaisians, 26, France)

## Ecological Solutions to Reduce the Environmental Impacts of Humanitarian Aid Programs.

Groupe URD (Emergency, Rehabilitation, Development) is a non-profit organization dedicated to improving practices in the humanitarian sector to enhance the value of aid programs to the benefit of crisis-affected populations. One area presently being investigated is the environmental impact of humanitarian action.

At the onset of humanitarian crises (natural disasters, conflicts, war) the priority is given to addressing critical needs. However, integrating the environment into assistance efforts from the beginning can greatly increase the quality of the aid given as it facilitates the exit from crisis situations, prevents future conflicts over limited or degraded natural resources and promotes a sustainable environment management system where one may not have existed before. This is especially important considering that human or natural disasters weaken local environments and further mismanagement can perpetuate crisis situations.

This study will produce a best-practice manual for use by humanitarian aid workers, with a focus given to investigating technical solutions that minimize environmental impacts, adaptable to different regions or contexts. It should help humanitarian actors to identify environmental problems, determine the causes and adapt a solution that eliminates, reduces or compensates for an environmental impact, taking into account social, economic and technical considerations.