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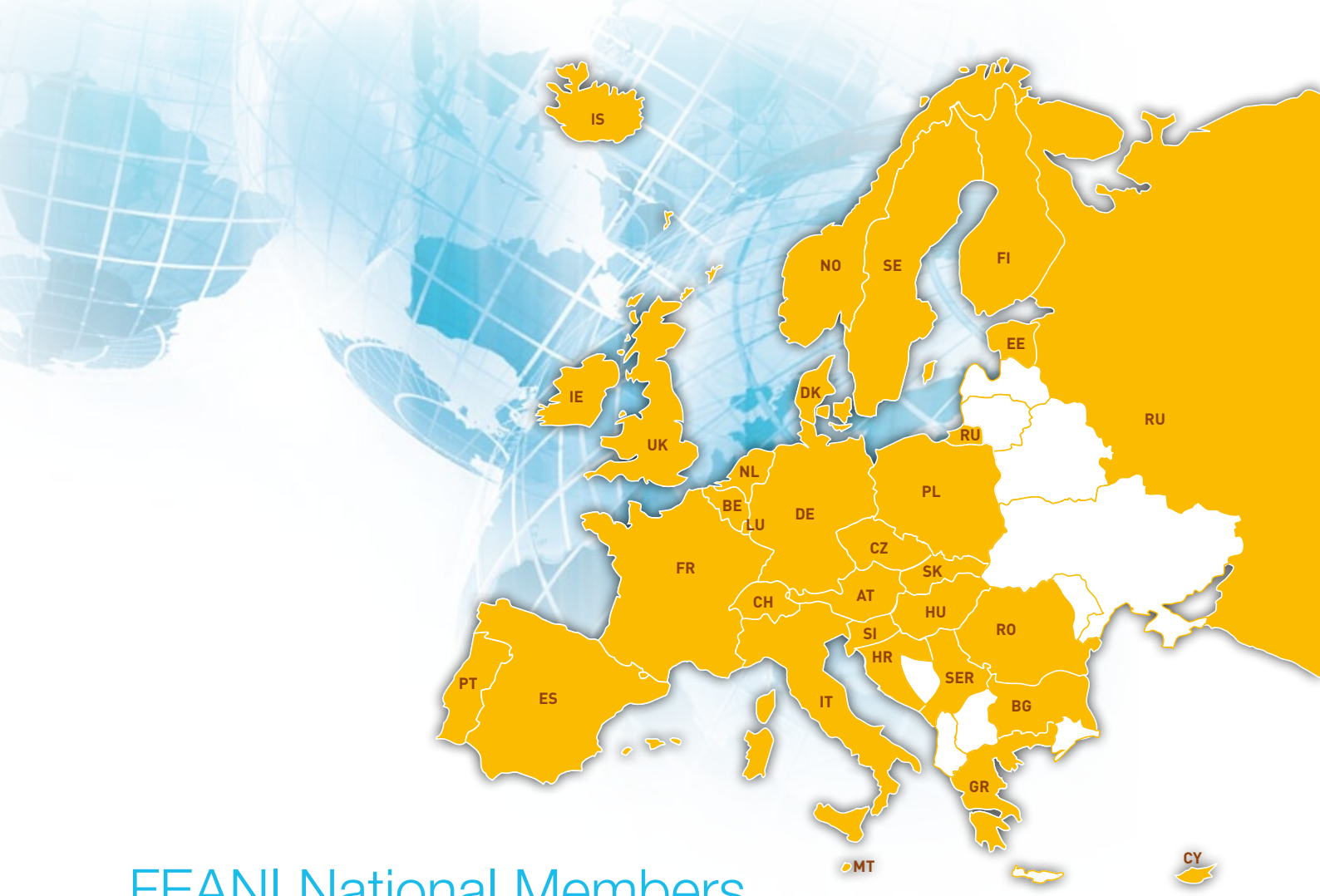

FEANI National Members

AT **ÖIAV** - Österreichischer Ingenieur-und Architekten-Verein

BE **CIBIC** - Comité des Ingénieurs Belges / Belgisch Ingenieurscomité

BG **FNTS** - Federation of Scientific Technical Unions in Bulgaria

CH **SIA** - Swiss Society of Engineers and Architects
STV/UTS - Swiss Engineering STV

CY **CPEA** - Cyprus Professional Engineers Association

CZ **CSVTS** - Czech Association of Scientific and Technical Societies
CKAIT- Czech Chamber of Chartered Engineers and Technicians

DE **DVT** - Deutscher Verband Technisch-Wissenschaftlicher Vereine

DK **IDA** - Ingeniørforeningen I Danmark

EE **EAE** - Estonian Association of Engineers

ES **IIE** - Instituto de la Ingenieriá de España
INITE - Instituto de Ingenieros Técnicos de España

FI **UIL** - The Union of Professional Engineers in Finland
TEK - The Finnish Association of Graduate Engineers TEK

FR **CNISF** - Conseil National des Ingénieurs et des Scientifiques de France

UK **EC** - The Engineering Council

GR **TCG** - Technical Chamber of Greece

HR **HIS** - Croatian Engineers Association

HU **Budapest University of Technology and Economics**

IE **Engineers Ireland**

IS **VFI** - Association of Chartered Engineers in Iceland
TFI - The Icelandic Society of Engineers

IT **CNI** - Consiglio Nazionale Ingegneri

LU **A.L.I.** - Association Luxembourgeoise des Ingénieurs

MT **COE** - Chamber of Engineers

NL **KIVI NIRIA** - Koninklijk Instituut Van Ingenieurs

NO **NITO** - The Norwegian Society of Engineers and Technologists
TEKNA – The Norwegian Society of Chartered Scientific and Academic Professionals

PL **NOT** - Polish Federation of Engineering Associations

PT **Ordem Dos Engenheiros**

RO **AGIR** - The General Association of Engineers in Romania

RU **RUSEA** – Russian Union of Scientific and Engineering Associations

SE **SVERIGES INGENJÖRER** - The Swedish Association of Graduate Engineers

RS **SITS** - Union of Engineers and Technicians of Serbia

SI **ZDIT** - Association of Societies of Engineers and Technicians

SK **ZSVTS** - Association of Slovak Scientific and Technological Societies

FEANI NEWS

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Word of the President, Mr. Lars Bytoft

From 29 September to 1 October 2010, FEANI held its Annual Business meetings (ABMs) in Sofia (Bulgaria). This annual event included the General Assembly and an Academic Session on the topic of "Energy" as well as internal Committee and Board meetings.

At the General Assembly (GA) on 1 October 2010 I could welcome FEANI National Members from 25 countries. I was also particularly pleased that the GA ratified with an overwhelming majority Mr. Dirk Bochar as our new FEANI Secretary General. Mr. Bochar, who held various international senior management positions in the past, has a background in human sciences and holds an MBA in TQM. I fully support and amplify his intentions expressed in his opening address, to bring FEANI into pole-position as the European voice of the engineers, through strengthening the co-operation with the EU and by ensuring a more active involvement of our National Members. I am confident that our NMs will be committed in their support to make his endeavours successful to the satisfaction of us all. At the same time, the GA appointed Dr Rafael Aller from Spain as Vice President and extended the mandate of Mr Peter Reichel as our Treasurer. My congratulations also go to them.

With the endorsement of our "professional card for engineers", the so called EngineerING Card, we now have an instrument at hand to ensure that the mutual acceptance of engineering competencies are carried out throughout the profession. This card will facilitate and increase the cross-country employment and the mobility of engineers throughout Europe. My appreciation goes especially to our German member VDI who has been leading this project since the beginning. Through our European Monitoring Committee (EMC), FEANI will now monitor its National Members who issue the card via their respective national register committees. The latter will consist of experts from science and industry in every country.

The GA also approved the application from IMI - the Engineering Institution of Macedonia - as new Provisional Member as of 1 January 2011. The status of Provisional Member is seen as a first step in the direction of acceptance as National Member.

We have also continued to be active in the framework of our strategic focus areas : Education and Professional Development, Mobility, Professional Standards and Ethics, Societal Engineering Issues and European Engineering Culture in Global Fora. In particular, I wish to highlight the work on our Position Papers on "Energy" and "Educational Policy". The latter – I'm proud to say - having been elaborated by a Working Group headed by the Danish National Member organization IDA. The full text is available on the FEANI website: www.feani.org (section "Statements/ Position Papers"). In addition to this, FEANI also continued working on the project "More Engineers for Europe" and continued to be involved in the "University Ranking" project, as well as on the work done in collaboration with ENAEE (European Network for Accreditation of Engineering Education), related to the EUR-ACE accreditation system. As President of FEANI, I hope to have the opportunity to welcome all our NMs and many of our readers at our next year's GA, which will take place in early September 2011 in Geneva/Switzerland in conjunction with the WEC (World Engineers" Convention) 2011.

Lars Bytoft,
FEANI President

OMNIA FAUSTA

Dirk Bochar, Secretary General

Word of the Secretary General, Mr. Dirk Bochar

Whereas I was tempted to start my first editorial for the FEANI News under the heading *nil volentibus arduum*, I felt it would surely be more appropriate to start off with wishing all of you, members, partners and stakeholders an Excellent and Successful 2011 !

When on 1 October in Sofia I was ratified as new Secretary General of FEANI, I had already spent a number of weeks in the office with my predecessor Mr Philippe Wauters. His commitment to FEANI and his achievements on behalf of it cannot be underestimated. I thank him for having handed over an Organization which has gained considerable impact in today's society.

Over the last six months FEANI engaged in many meetings and events such as at the Executive Council Meetings of the European Network for the Accreditation of the Engineering Education (ENAEE) in Brussels, but also in numerous meetings at the EU Parliament and the EU Commission on the Bologna Process and the revision of the EU Directive 2005/36 on Professional Qualifications. We participated in the closing meeting of the EUR-ACE SPREAD Project in Brussels, we were invited by the French Prime Minister at the Hotel Matignon to celebrate the 150th Anniversary of the French Engineering Association, we spoke at the Round Table of French Engineering Students in Cachan, participated at the impressive VDE Congress in Leipzig, gave a presentation to the Dean Conference of ESMU in Barcelona and took part in the panel discussion at the International Summit on the Future of Science and Technology in The Hague. We learned more of the Danish leadership in wind energy (see article further on) and attended our FEANI working group meetings on CPD at Engineers Ireland (Dublin) and on the operational management of our Professional Card (Brussels). Very valuable were also my encounters with some of our major member-shareholders: CNISF in Paris, VDI in Düsseldorf and the Engineering Council in London. I also retain good memories from taking part in the EURO-CASE Annual Conference at the Academy of Sciences in Berlin, albeit that leaving Berlin was again difficult, this time due to weather conditions. From all of the above, it can be retrieved that FEANI is widely solicited as an important partner and a valuable contributor on various international stages and that our network is extraordinary wide.

Most revealing, however, was my exposure to the machinery of the World Federation of Engineering Organisations (WFEO) in Buenos Aires. Taking part at their Executive Council Meeting and engaging in many international contacts, clarified and amplified the need for Associations such as ours. In their recent publication *"Capacity Building Guideline 2010"* an inspiring overview is provided on the activities professional engineering institutions should take responsibility for. By definition incomplete, it refers to "establishing a membership data base; regularly review the constitution, bylaws and regulations; be involved in strategic planning; develop policy documents; establish continued professional development (CPD) programmes including courses, seminars, site visits, etc.; publish magazines, a newsletter or technical journals; provide career guidance; ensure international recognition for educational and professional standards; develop best and good practice manuals, technical guidelines and codes of best practice; agree on codes of ethics; revise and monitor education and training curricula; evaluate professional remuneration and fees; get involved in ensuring mentorship and mentoring; enhance the image of the profession; be in liaison with government structures at all levels; liaise with media; network with other professions; ensure publications including the Presidential address and the Annual Report; develop an interactive Website and set up a structure for administrative support to members". These are just a few basic services whereas also reference is made to "an electronic technical paper data base, awards for technical excellence and awards for members; training

manuals; international business and technical networks; overall international legislation; accreditation of academic institutions; networking and affiliation locally, regionally and internationally; specialist technical input and working groups; funding and sponsorship initiatives; establishment of an annual calendar of events and programme of activities; maintain an events database; consider meeting facilities; organize conferences". It is very valuable to have such an overview at hand and we appreciate this inventory-exercise very much. It is also helpful for those who may have lost focus as time went by.

WFEO Executive Council Meeting, Buenos Aires-Argentina, 17 October 2010

Dr Willi FUCHS (VDI Direktor), Mr Dirk BOCHAR (FEANI Secretary General), Mrs Maria Prieto LAFFARGUE (WFEO President), Prof Dr. Rainer HIRSCHBERG (Board Member VDI, Germany).

An even more substantial question is of course *how* to do all this, since there are often budgetary constraints and a growing need by association members to receive value from their membership. In that respect, a recent White Paper of MCI dealing with *"Strategies for tomorrow's Innovative Associations"* outlines and confirms the relevance of a number of actions which we at FEANI have already started working on. The paper emphasises that members - more rigorously than in the past - desire a return on investment and that therefore it is required to continue making the association future oriented and proactive, whilst listening to and learning from its stakeholders (members, future members and associates). In that respect, FEANI is indeed determined to continue being seen as the thought leader who guides its member communities towards future success. For that we will also engage in substantial innovative actions. These will vary from developing new projects and pursuing new revenue streams, to exploring new markets and working in partnership with other associations to achieve common goals. This will allow us to reach out to wider audiences and build a larger community, a process that necessitates mutual understanding. At its meeting of 13 December 2010, the FEANI Executive Board supported the process of strengthening our governance and enhancing trust in the systems in place to deliver the services our members rely on. At the same time, it amplified the importance to modify the way things have been traditionally done by revisiting our organisational and financial model. Performing more and better with less resources, being transparent in our financial management, having clear KPI's and working to agreed business plans are a few of the issues that will keep us busy in the year just started. We will define a working programme to cope with members' requests and generate membership value. Our focus will perhaps not necessarily be on growth, but it will be on profitability. Although "not-for-profit" we must be able to generate surpluses which can then be reinvested in new initiatives, designed to fulfil our mission. Our members require that and our reserves allow for it.

As FEANI we represent between 3,5 to 4 million European engineers who expect us to remain the authoritative voice of the engineering profession in Europe: this becomes an ever bigger challenge in a world of 24-hour news and information, social media and instant commentary. We therefore must demonstrate a kind of leadership that maintains our position as the authority in our field. Being the trusted interlocutor and a potential partner of the EU institutions, we will look on how we can collaborate on projects, programmes or policy initiatives of mutual benefit. Being a recognised partner will help us attracting and retaining members. Being a provider of policy intelligence of EU legislative proposals, our national members will benefit more. Being there first address in Brussels, they will be informed about EU funding opportunities and assisted in drafting proposals. They will be offered tools and expertise in addition to their industry knowledge. In doing so, we intend to work co-operatively and more systematically with other organizations in the engineering field, eventually to host conferences and events in common. In building these strategic alliances, often on ad hoc issues such as the revision of the Directive 2005/36, we will achieve smarter regulatory frameworks and speak with a stronger, unified voice. It will ultimately facilitate our ability to influence the rapidly evolving policy and regulatory environment.

In the next couple of weeks we will actively solicit feedback from our members on a variety of issues, because in a number of areas we need to collect more quantifiable data and reliable statistics. We are confident that by then our website can be used to directly input the requested information. Going through some reshaping at the moment, our homepage shall in future continue to deliver high quality content at low cost and become flexible and adaptable to members' needs. It will also become more attuned to the younger generations who are used to interacting digitally to share or retrieve information. Because our profession is faced today with a significant shortage, our homepage can help to redress this by attracting the younger generation whilst they are students, so that later on our members can accompany them throughout their professional career. It is an extremely effective way of reaching out to people who not only represent the future of our association, but who will also become the future leaders in our profession. We will, as such not only generate content and data, but also gain feedback and start measuring the number (and origin) of hits on our Internet-platform to see if it really reaches out to a broader audience and beyond our current members.

I am confident that for the year to come in which we will celebrate our 60th Anniversary, I can rely on the loyalty, the vision and commitment of our members to drive our agenda forward. Wherever they can, they are encouraged to market our logo to brandish our European credibility and reliability. Through them we can improve our marketing, our visibility and our press coverage. Seeking their input will be vital to set the path and to ensure FEANI's continued relevance. Let's make it so. *Omnia Fausta FEANI.*

SOLUTIONS for SUSTAINABLE ENERGY

WEC 2011 – CONTRIBUTIONS FROM YOUNG ENGINEERS

Christa Rosatzin-Strobel
Public Relations WEC 2011

The World Engineers' Convention (WEC) 2011 invites professionals from all over the world to submit papers and share their successful research, experience and knowledge. But the call for papers is just one way to contribute to the convention. WEC 2011 also invites young engineers to work on solutions for sustainable energy.

Young engineers provide answers to the big social questions of tomorrow. They will shape the future of sustainable energy significantly. The World Engineers' Convention 2011 has therefore launched a special project: members of Swiss Universities identify problem areas within the main topic of the convention and formulate questions that are in turn answered by teams of young engineers.

The aim of the project is to enable young engineers to feel that they, too, are experts capable of finding solutions to important social problems. Regardless of whether they work on their solutions alone or in teams, in Switzerland or elsewhere, the objective is for them to present their projects at WEC 2011 and thus share their ideas with an international audience.

Promising Project Ideas

The Young Engineers project was launched in September 2010 with several interesting proposals. One submitted project is entitled *"Sustainable and energy efficient urban development in informal settlements in Mozambique"*. In the past, the scarcity of resources on the island led to ingenious water management, urbanization and construction solutions. It is a particular challenge to address Mozambique's current problems with modern solutions and to demonstrate that they are equally sustainable and efficient. Another project deals with a *"Real, ecological model for everyday life in urban areas"*. The central idea of the project is the development, propagation and establishment of urban settlements in an ecological, social, economic and technological context. The goal is to design systems that are, strictly speaking,

independent from the broader environment and its resources and where societies can live, work and learn safely and promisingly. The areas that constitute everyday life today and in the future should be developed and maintained sustainably. A third example deals with the application of the Organic Rankine Cycle (ORC). The ORC is a thermodynamic cycle and can be used to produce electricity from low-temperature heat sources. The working principle is the same as that of the Rankine cycle, except that it uses an organic working fluid instead of water. Possible applications of the ORC are waste heat recovery, biomass power plants, geothermal plants or solar thermal power. In their project, the young engineers would analyze, for example, the effect on the energy efficiency of particular systems and compare the different working fluids with respect to their impact on the environment. Other goals include elaborating a cost-benefit analysis of various applications and evaluating the market potential.

International teams develop solutions

All Swiss technical universities active in the field of engineering can take part in the project. A member of the university, such as a professor, acts as a coach and identifies problem areas within the main topic of the convention. The problems in question may be covered within projects that are either planned or already under way in partnership with a region, municipal authority or economic partner. By the end of November 2010, the coaches choose a young engineer, such as an academic assistant at an institute, a Master's student, or a recently graduated young engineer now working in the private sector. He or she will spearhead the work and build up an international team of up to five people.

Young engineers who would like to participate in solving a problem should express their interest at the international level by the February 2011 deadline. Definitive teams will be formed in cooperation with the team coaches by the end of that month. Afterwards, teams will work on solving their assigned problems together through an internet platform and regular telephone conferences.

In the beginning of September 2011, all teams will meet with their coaches on the campus of the coach's home university to finalize the project and its presentation. The projects will be presented to small regional panels and each panel will select one or two projects that will be presented orally at WEC 2011. The other projects can be presented via poster or video at WEC 2011.

World Engineers' Convention (WEC) 2011
Contact person for young engineers:
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www.wec2011.org

WEC 2011 is asking young engineers to contribute their knowledge. They will elaborate solutions for sustainable energy use in international teams and present their results in Geneva in September 2011.

Answers to Burning Questions

WEC 2011 will consider the burning energy questions through a process of international discussion, involving national engineering associations, universities and other organizations.

Neil Bailey from the Commonwealth Engineers' Council answers the question: How can we satisfy the energy needs of the world population in an equitable way?

" Equitable energy access remains fundamental for effective socio-economic development and poverty alleviation targets to be realized. However, with the UN estimation that 20% of the global population currently has no access to electricity, it is clear that wide disparities in energy access still remain.

To expand basic energy supplies to the global population using the centralized approach adopted by many industrialized nations requires intensive infrastructure investments. The necessary investment scale may, however, lie beyond the scope of many developing countries.

Furthermore, for much of the global poor residing in rural areas, large-scale infrastructure investments are not the most cost-effective approach and parallel strategies will be required to ensure equitable energy access. Engineers must focus on innovation and technological development, taking into consideration local knowledge, regional topography and resource availability, in order to develop and adapt local energy generation and supply solutions. A sustainable energy mix, prioritizing the use of renewable energy solutions tailored to the local environment in accordance with MDG 7, and reducing demand for high-cost fossil fuels, is critical in bringing affordable energy to the global poor.

Conversely, while such solutions allow for the expansion of energy supplies, and hence consumption, to the developing world, within the industrialized economies there is a clear need to reduce energy consumption. Modern engineering strategies, including innovative design and technological adaptation, have a significant role to play in increasing energy efficiency and reducing energy waste within the built environment. However, on a wider social level, there remains a clear and pressing need to influence society to reduce consumption patterns, focusing on sustainability in tandem with the development of efficient technological innovations."

U-Multirank

A New Approach to **International University Ranking**

GERO FEDERKEIL,
CHE- Centre for Higher Education Development

Following the discussions about methodological flaws of existing international rankings and the need for transparency about the emerging European higher education area, the European Commission launched a call for tender to develop a new, multi-dimensional global university ranking. The tender was won by the CHERPA network, a consortium of CHE (Centre for Higher Education Development, Germany), CHEPS (Center for Higher Education Policy Studies, University Twente, the Netherlands), CWTS (Center for Science and Technology Studies, Leiden University, the Netherlands), the research group INCENTIM at the Catholic University Leuven (Belgium) and OST (Observatoire de Science et Technique, Paris). FEANI as well as EFMD (European Foundation for Management Development are also associated with the project.

U-Multirank will develop a concept and make a feasibility study both for institutional rankings of whole institutions and for field-based rankings. Here the pilot fields will be business and engineering (mechanical and electrical). The basic purpose and approach of U-Multirank was described in an earlier issue of this journal. After a thorough analysis of existing national and international rankings, other international data bases on performance indicators, the U-Multirank project developed a set of indicators for a multi-dimensional international ranking, both on the institutional and the field level. U-Multirank is a feasibility study: it will produce a published ranking; instead the result will be a concept for a new ranking which will have been tested in a currently running pilot study. U-Multirank is applying a stakeholder centered approach. This means the ranking is designed to deliver relevant information for a multitude of stakeholders, students, academic teachers and researchers, university management, employers and policy makers. At the same time the process of selecting and defining the set of indicators was heavily relying on stakeholder consultation. Starting with a first model of indicators on the five dimensions: teaching & learning, research, knowledge transfer, international orientation and regional engagement, the CHERPA network included stakeholders' views in the relevance of indicators in several ways. A workshop was first organized with stakeholders representing various organizations and groups, then an open online survey was conducted in which respondents could share their views on the relevance of indicators. Together with our own experts views on the validity and reliability of indicators, this allowed to determine of indicators which went into a pretest of instruments to collect data in which ten higher education institutions from different countries, European as well as Non-European, participated. This pretest provided a clearer view on the availability of data and the clarity of concepts which lead to a further fine-tuning of indicators and instruments of data collection. In November, a pilot study was started to collect data for a sample of about 150 higher education institutions from all over the world.

Data collection includes data on the whole institutions as well as field-based data for three fields: business administration / management, mechanical / industrial engineering and electrical engineering. Up to now, about 140 institutions confirmed their participation; the process of recruiting volunteering institutions is still going on. Whereas we gained a high participation from European countries the interest in participation seems to be lower in countries, like China and the US. The aim is to have a sample of institutions that is representing the diversity of higher education institutions, in terms of geographical spread, as well as with regard to institutional profiles.

A second interim report on both the selection of indicators and the recruiting of pilot institutions has recently been published on the U-Multirank website. It includes a detailed description of indicators for institutional and field-based rankings. The following table shows – as an example – the table of indicators on the dimension "Knowledge transfer" for the field-based rankings. The same tables can be found in the report for each of the five dimensions included and both for institutional and field-based rankings. Starting with relevance (based on stakeholder consultation), the validity, reliability and availability of indicators are assessed, resulting in a Rating of indicators made by the CHERPA Network.

KNOWLEDGE TRANSFER FIELD-BASED RANKING	RELEVANCE	CONCEPT/ CON-STRUCT VALIDITY	FACE VALIDITY	ROBUSTNESS / RELIABILITY	AVAILABILITY	CHERPA RATING
University-industry joint publications	▲	▲	▼	▲	▲	A
Academic staff with work experience outside HE	▲	▲	▼	■	■	A
Joint research contracts with private sector	▲	▲	▼	■	■	A
Co-patenting	▼	▲	▼	▲	▲	B
Annual income from licensing	▼	▲	▼	■	▼	B
Number of license agreements	▲	▲	▼	■	▼	B
Number of spin-offs	▲	■	■	■	■	B
Patents awarded	▼	▲	▲	▲	▼	C

Selection of indicators – Knowledge transfer, field-based ranking

Each indicator is assessed as: ▲ not a problem/high score; ■ there may be challenges ahead; ▼ definitively a challenge/low score, with respect to each criteria. In addition the tables report the assessment of revelance and importance as perceived by stakeholders.

Indicators rated "A" which are expected to work without major problems and indicators rated "B", for which we expect some problems in collecting data and calculating indicators, are included in the pilot data collection. The third category of indicators, rated "C" were finally omitted from data collection due to severe doubts concerning either the relevance, validity, reliability or availability of data. One of the major results of the project will be an evidence-based, tested set of indicators which can be used in future international rankings.

The Second Interim Report of the U-Multirank Project is available at: http://www.u-multirank.eu/news/. For more information on the project see: www.u-multirank.eu or contact Gero Federkeil: gero.federkeil@che-ranking.de or Frans Kaiser f.kaiser@utwente.nl

EUR-ACE SPREAD Project: a Very Positive End

Prof. G. Augusti,
CHE Centre for Higher Education Development, Guetersloh, Germany

The EC-supported EUR-ACE SPREAD project, aimed at spreading the system into further EHEA countries, and in particular Romania, Lithuania, Italy and Switzerland, ended its two-year lifespan in Brussels with a Final Conference on 25 October 2010 and with the approval of the project outcomes by the Project Board the following day.

A numerous and qualified audience attended the Final Conference, that was held in the premises of the Permanent Representation to the EU of Baden-Württemberg.

Two lectures were presented by representatives of the European Network for Quality Assurance in Higher Education (ENQA) and the European Universities Association (EUA), respectively the Vice-President Prof. Helka Kekäläinen and the Senior Adviser Prof. Howard Davies. They illustrated in particular the position of their organizations in the debate about institutional vs. programme accreditation. It came out that the two procedures are not in contrast but on the contrary can usefully complement each other. In Prof. Davies' words, there is *"no discontinuity between institutional and programmes levels, where both are consistent with [the European Standards and Guidelines for Quality Assessment in Higher Education] ESG"*; programme accreditation is *"particularly relevant for disciplines relevant to public health and safety"*.

Mr. Dirk Bochar, the new Secretary General of FEANI, illustrated the "engineerING card" project, approved in Sofia by the General Assembly of FEANI on 1 October 2010. This project, that accepts EUR-ACE as the basic educational qualification, should greatly facilitate the mobility of engineers throughout Europe.

Prof. Hu Hanrahan, Special Consultant of the Engineers' Council of South Africa and Vice-Chairman of the Washington Accord, described the global context in which EUR-ACE acts. He presented the "International Engineering Alliance" (IEA), consisting of three "educational accords", i.e. agreements for recognition of education (Washington for professional engineers, Sydney for engineering "technologists", and Dublin for technicians) and four "Mobility Fora", for recognition of professional qualifications. ENAEE, which is permanently invited to IEA meetings and initiatives, intends to strengthen these ties and in particular foster discussions and confrontations between engineering degrees and qualifications on the world scale. For the time being, a *"Glossary of terms in engineering education"* is being elaborated by a Working Group of ENAEE and IEA on the basis of the Glossary published by the TREE Thematic Network a few years ago. This Glossary, of which a first version is planned to be ready in 2011, should facilitate exchanges and avoid misunderstandings.

The Project Coordinator, Prof. G. Augusti, reported on EUR-ACE achievements, present status and future developments. He referred to an abstract from an article published in the October 2010 issue of the Engineers Australia magazine, describing EUR-ACE under the title *"Accreditation reaches milestone in Europe"*. This article, that summarizes a presentation at the WFEO Congress held the previous week in Buenos Aires, confirms that EUR-ACE is known and esteemed throughout the world.

The progress achieved by EUR-ACE SPREAD in the different countries were illustrated by representatives of Agencies and Organizations that have actively collaborated in the EUR-ACE SPREAD project: MÜDEK – Turkey; SKVC – Lithuania; ARACIS – Romania; Agenzia EUR-ACE – Italy; OAQ – Switzerland.

The Conference ended with a Round Table on the future of EUR-ACE, chaired by Philippe Wauters, member of the ENAEE Administrative Council. Several speakers participated: among others, Guy Haug, a well-known Bologna expert, member of the EUR-ACE SPREAD International Advisory Board, T. Bach, representative of the German association of engineering students and Prof. G. Langouche, Vice-President of the Netherlands & Flanders Accreditation Organization NVAO.

It was also reported that EUR-ACE SPREAD has been active in other countries too:

- The Polish Committee for Accreditation of Technical Universities, KAUT, has just applied to be EUR-ACE accredited;
- The French CTI has been asked to accredit engineering programmes in French-language Belgian Universities jointly with AEQES, the French-Belgian Evaluation/ Accreditation Agency for HE. CTI will award to these programmes also the EUR-ACE label (that they have already granted to a programme of the bilingual Belgian Royal Military Academy in Brussels).
- Contacts are also on the way in Finland, Denmark and other countries.

The EUR-ACE SPREAD Project Board met on the following day, 26 October, in the premises of EUROCADRES and approved the output documents of the project. These will be transmitted in due time to the European Commission together with the financial report and also to ENAEE that has to evaluate the applications of SKVC, ARACIS, OAQ (plus other applications that may be submitted in the future) which ENAEE will implement for the revision of the EUR-ACE Framework Standards. A EUR-ACE SPREAD Working Group has checked the complete compatibility of the EUR-ACE Framework Standards and the *"European Standards and Guidelines for Quality Assessment in Higher Education"* (ESG).

News on the **engineerING card**

Lars Funk, VDI

The engineerING card project has progressed considerably. The FEANI News n°7 has informed already about past steps and highlighted the advantages associated with the engineering card.

FEANI's General Assembly voted in favour of the new engineerING card

At the FEANI General Assembly of 1 October (Sofia), all participants agreed on the big advantages of this concept: the engineerING card will not only foster the mobility of engineers in Europe (see FEANI news 07/2010). FEANI will also get the opportunity to support the drafting process for the revision of the EU Directive 2005/36/EC. The engineerING card is a good instrument to shape the profile of the engineering profession.

In Germany, the engineerING card was launched in spring 2010. The Netherlands will follow probably on March 1, 2011. Furthermore Slovakia, Slovenia, Czech Republic and Portugal have indicated their interest in implementing the card. VDI offers full support to all organizations that are interested in launching the engineerING card in their country.

Political support for the engineerING card

On 26 October, VDI Director Willi Fuchs was invited to speak about the engineerING card at the EU Parliament. It was an Interparliamentary Meeting with members from the EU Parliament as well as members of national Parliaments organised by the European Parliament's Committee on Internal Market and Consumer Protection (IMCO). The aim of this meeting was to discuss the current framework for the recognition of professional qualifications within the EU Member States and to identify areas for better regulation.

Fuchs requested political support for the engineerING card project and urged the Parliament to use the upcoming revision of the mobility Directive 2005/36/EC to include a reference to the engineerING card as the adequate instrument for fostering intra-EU mobility for engineers by facilitating the recognition process for engineers' professional qualifications.

The Committee was very positive about the request. Several comments made during the discussion that followed Dr. Fuchs' presentation, suggested that a number of the Parliamentarians recognise and appreciate the advantages such a professional card can offer. The spokeswoman of the S&D groups of the IMCO-Committee, Evelyne Gebhardt and the delegate of the EVP Group, Kurt Lechner assured their support. EU Commissioner Barnier announced a new draft of the directive 2005/36/EG to be completed by the end of 2011. He clearly argued in favour of anchoring professional cards in this redraft of the directive and collaborating with the professional associations. FEANI offered the EU-Commission its support on this matter.

The FEANI European Monitoring Committee has started its work to monitor the operational implementation of the engineerING card within the respective FEANI member associations.

For more information please check:
www.engineering-card.de

FEDERATION OF SCIENTIFIC ENGINEERING UNIONS in BULGARIA

Prof. Vassil Sgurev

Some History

In January 1885, the permission of the War Minister of the Principality of Bulgaria was received in the town of Rousse, the largest and most European town in the recently liberated Bulgaria. A number of initiatives could be set in practice, one of which was the foundation of the Technical Society. In less than a month, the Statutes and the Programme of the Society were drafted, for which considerable credit should be given to the renowned Russian scientist, mechanical engineer and inventor Pavel Kouzminski and to captain-lieutenant Zinovij Rozhdenstvenskij, commander of the Rousse garrison.

From today's point of view this is a Europe an orientated statute of a Non-Governmental Organization, the first creation of the kind in the newly established Principality of Bulgaria. The goal of the Society is to *"contribute to the advancement of engineering and technical occupations in Bulgaria"*, which converts it into a professional organization of national importance. The activities of the Society are defined as the application of a scientific set on practical lines. The forms of work are: readings, public discussions about technical subjects, assistance in spreading technical education and development of industry, factory materials and technologies.

The program for the future concentrates on chemical productions and metallurgy, mechanical technology, dynamo electric and magnetic field machinery. The people who were enlisted as the 42 founding members, were quite remarkable personalities. The chairman Simeon Vankov was the future general and professor in cold working of metals. A few generals and an admiral in two different states were among the members of this first Technical Society.
The first official general meeting of the Technical Society took place on 26 March 1885. Today, this date is celebrated at the Federation as Thanksgiving Day to the veterans and our forerunners.

Despite the war, and other internal cataclysms wich interrupted the regular organizational life of the Bulgarian Technical Society, its exceedingly great role and significance in history as the first non-governmental organization of the Bulgarian engineers and technicians was not in the least diminished.

In 1893, the already high number of Bulgarian engineers and architects set up the Bulgarian Engineering Architectural Society (BEAS) in Sofia with chairman Eng. Michail Momchilov and 35 founding members. The Statutes were worked out on the basis of the best European examples of professional organizations of that type. The society is a deed of the first generation of Bulgarian technical intelligentsia, which at the beginning of the 19th century was run by no more than 50 persons. It can be definitely claimed that for the restoration of Bulgaria and for its uplift after the heavy wars the contribution made by the society members is truly outstanding. Their commitment excites admiration. By their voluntary contributions and loans, covered even with their private property, the engineers bought the area at the Rakovski and Gourko streets corner, worked out the project and built up the home of the society with their own efforts.

For over four decades since the beginning of last century there have been no more consistent upholders and fighters for the establishment of a higher engineering educational institution than the members of the engineering architectural society. And so the opening of the Sofia polytechnic school was ultimately reached in 1942.

In 1949, several organizations of engineers and technicians united under the name of “scientific-technical unions”, out of which our Federation of the Scientific-Engineering Unions in Bulgaria (FNTS) grew up to its present form. The Union participation in the industrialization of the country, in the setting up of heavy chemistry and metallurgy, mining and modern transport, machine-and shipbuilding is remarkable. And of course, that of the most creative engineering activity in high-tech productions – computing equipment, personal computers, communication systems, electronics, pharmacy, military equipment and systems, etc.

Our organization is proud of its Homes of Science and Engineering network spread over the whole country. Presently, they represent true temples of activities to the service of community.

The transition to democratic development and market economy was accompanied with some few difficulties both for the country as a whole and our organization in particular. The Federation of Scientific-Engineering Unions managed to successfully adapt itself to the new requirements. A great help was the membership in the European Federation of National Engineering Associations (FEANI) and the World Federation of Engineering Organizations (WFEO), as well as the participation in prestigious international professional organizations like IEEE, CEPIS, IFAC, EYE and others. Our Federation holds the largest number of high-status international, national and regional events – scientific, scientific-application and practice orientated ones as compared to any other non-governmental organization in this country.

Vocational training problems have been in the focus of our subsidiaries attention for quite a long time. At present, the FNTS and its associations are the best professional training center in this country, integrating a network of regional centers. It is the sole organization in this country having the right to award the EUR ING title through FEANI, as well as to issue the respective diplomas for computer skills under the CEPIS’s - ECDL certificate.

The need for engineers has been discussed for some time now in Europe and a European programme for solving the problem is being implemented. We, at FNTS, are confident that a true renaissance of the engineering profession will our in country too, lead to a new and even higher technological level.

In conclusion it is worth noting that the now swaying financial and economic crisis will die down one way or the other. It should not be forgotten however, that the world and Europe are in a global embrace where competitiveness decides which countries and regions will reach the summit and which ones will vegetate. From that point of view challenges to Bulgaria are even higher. If the necessary conditions are established, Bulgarian engineers, backed up firmly by their historic roots and traditions, will be able, in conjunction with their other colleagues, to make a “jump into the heights” as they did in the past. Let us be optimistic that this will come true.

150 ANS D'UTILITÉ PUBLIQUE

by Daniel Ameline

On 3 November, France Prime Minister Francois FILLON received Engineers and Scientists of France at Hotel Matignon on the occasion of their 150 years of Public Interest recognition: it was on December 22nd, 1860 that Napoleon III signed a decree declaring the Society of Civil Engineers as an organization of Public Interest.

Mr Francois FILLON was accompanied by Mrs Valerie PECRESSE, Minister of Higher Education and Research, Mr. Christian ESTROSI, Minister of Industry, and Marc-Philippe DAUBRESSE, Minister of Youth and Active Solidarities. They were present to honour the vocation of engineer and researcher, in the center of our History and of the present ambitions of France.

Extracts from the speech of Mr Julien Roitman, President, Engineers and Scientists of France.

Mr Prime Minister, thank you for honouring us in receiving Engineers and Scientists of France in the Hotel Matignon on the occasion of the 150th anniversary of their public interest recognition by an imperial decree of Napoleon III. This testimony of interest from the Republic is precious to us, and the 400 people present this evening will relay it to the 850,000 engineers and scientists we federate through more than 140 associations.

When the Society of Civil Engineers was recognised to be of public interest in 1860, France was beginning its second industrial and technological period. The key points were then the steel industry, railroads and the banking system. Today the world started a new cycle, which sees an explosion of the number and variety of scientific and technical domains, because it is only technology and science which can allow us to meet the challenges of the 21st century : energy, information, communication, mobility, transport, food, management of natural resources, climate, sustainable development, etc.

Engineers and scientists can help France to adapt the country to this new wave, because they hold the keys of innovation and competitiveness. We consider that it is our responsibility to defend and help to restore the growth of French industry, of which engineers and researchers are the kingpin. Without industry there is no research, no innovation, no growth, no economic future nor any future at all. So do not hesitate to rely on your engineers and scientists, because they are a national wealth.

Our country needs a commitment of youth to sciences. Nowadays the French educational system does not train enough engineers for the needs of innovation, and research is too seldom an objective for the best elements

of our high schools. The pipeline which feeds the high-level scientific and technological sectors risks to dry up, so we are convinced that it is necessary to restore as quickly as possible the growth of scientific studies by draining more pupils from high schools towards sciences and engineering.

To interest young people and motivate them, it is necessary to make them dream. It is necessary to promote the professions of engineer and researcher in France. We have to value their skills and their diplomas, to build and keep the image of highly qualified men and women. The meeting of this evening, Mr Prime Minister, is certainly going to contribute to that, thanks to you.

Extracts of the speech of Mr Francois FILLON, Prime Minister.

By receiving in Hotel Matignon the National Council of Engineers and Scientists of France, I wanted, together with Christian ESTROSI, Valerie PECRESSE and Marc DAUBRESSE, to honour a vocation which is in the center of our History and of our present ambition. It is an anniversary which gave us the opportunity of this meeting, because Napoleon III signed 150 years ago a decree declaring the Society of Civil Engineers as an "Establishment of Public Interest". Your National Council is a direct successor of this Society, created in 1848 and already drawing an important stage in the recognition of a profession in full development. Truly, the Ecole des Ponts et Chaussees, the Ecole des Mines, the Ecole des Arts et Metiers, were already created at the end of the Ancien Regime, but we can say that it is during the 19th century that engineers began to take power within the French society. Both political and industrial revolutions contributed to their emergence. Engineers carry on national economic ambitions. They also embody philosophic ideals, those of Saint-Simonism which associates technical and social progress.

Even the United States start to worry about the fact, studied by the National Science Foundation in its last report, that to dispossess skills and realizations connected to technical production, means in reality to run a terrible strategic risk. The major stake which we face is the control of the industry worldwide. Once there was the myth of the "company without factory". Then there was the myth of the "country without industry". For some years we have begun to talk about "post-industrial economy for developed countries", a term which describes obvious transformations we cannot deny. But does it really mean abandoning any industrial initiative? Can we accept to design without producing? Can we accept to discover without developing? Truth is that if we do not produce anymore, we will not design, and if we do not develop anymore we will not discover.

You know the conviction of the President of France, which is also mine: our country must stay a great industrial nation if it wants to be still a great power. Energy, communication, transport, management of natural resources, sustainable development: in front of all these current challenges that our modern societies have to face, the industrial dimension is always dominant.

In this country which we want to be effective, the role of engineers remains absolutely essential. The control functions, that Public Authority is brought to exercise in domains of high technicality, cannot come true without relying on the expertise of our engineers. It is both in innovative SMEs and in our large companies that the contribution of engineers and scientists to the national wealth is fundamental. Your jobs are therefore at the very heart of our success worldwide: all around the planet French engineers are called to build dams, subways, oil platforms, energy power plants.

The excellence of our educational system is recognized. But we have to enable it to meet the new challenges. We have to boost social promotion by school and higher education, while maintaining the high level of acquired knowledge. We have to encourage the scientific vocations and diversify the recruitment by fighting against former prejudices - I think in particular to the place of women in engineering positions which still remains too low. We have to reform our education and our research model in a global environment, having its own rules, which we cannot ignore without taking risk.

The Prime Minister concluded:
The President of the Republic began to modernize France. This policy must be pursued. Our country must not lag behind. To go along this modernization, to win the battle of competitiveness, our country needs its engineers. Thanks to you all who believe in the capacity of realization and invention of our country, I believe we are on the right track.

175th Anniversary at **the Convention Centre Dublin**

16th July 2010

Author: Jimmy Kinahan

To celebrate Engineers Ireland's 175th anniversary this year we marked this historic event by hosting the first-ever live performance in The Convention Centre Dublin (CCD) – one of Ireland's newest and most iconic buildings, which is situated further along the Quays from the Custom House. The first meeting of the Institution of Engineers of Ireland (formally The Institution of Civil Engineers of Ireland) took place on Thursday 6th August 1835 at the Offices of Public Works (OPW), known as the Board of Public Works. It was presided over by John Fox Burgoyne then Chairman of the Board. The founding members were mainly engineers working for the Board along with engineers from the armed forces. Today both organisations continue their support.

This is the latest iconic building to grace the skylines of our capital city and is truly a centre of excellence also has a first in many engineering accomplishments, e.g. the first Carbon Free Public Access building in Europe recognised as the first carbon neutral convention centre, this contemporary design meets the highest standards of environmental sustainability It is committed to long-term sustainability in accordance with the International Standards Organisation (ISO) 14001 and will be seeking accreditation following our opening.

Designed by Pritzker award-winning Irish-born architect Kevin Roche The CCD has quickly become a landmark building. Its stunning design includes a unique glass-fronted atrium running the full height of the building, which gives visitors panoramic views of the River Liffey, Dublin city centre and the Wicklow mountains.

The use of carbon neutral building materials has made the CCD one of the most sustainable buildings in the world.

The Concert programme consisted of a limited tour of the building with a concert with The Army No 1 Band and the National Harp Orchestra whose founder and director is Dr. Janet Harbison the daughter of our second president of the then 1969 newly merged Institution of Engineers of Ireland, later rebranded as Engineers Ireland, formerly The Institution of Civil Engineers and Cumann na nInnealtóirí.

The National Harp Orchestra gave a spectacular performance of Ireland's music, song and dance and they were followed by the Army No 1 Band. Both of these acts are well known outside Ireland where they achieve sell out tours both in America and Europe.

The **OFFSHORE EXPERIENCE** in 2011 in the Netherlands!

The 30th International Conference on Ocean, Offshore and Arctic Engineering (OMAE 2011) will be held in Rotterdam (The Netherlands), Europe's largest port and the base of a large number of world renowned offshore companies. OMAE 2011 is the ideal forum for researchers, engineers, managers, technicians and students from the scientific and industrial communities from around the world to meet and present their progress in technology and its scientific support. More than 600 technical papers shall be presented at the conference from June 19-24. The opportunity to see real offshore structures during the Rotterdam Offshore Boat Tour makes it a unique event. ASME, the OOAE Division of the International Petroleum Technology Institute (IPTI) and the Royal Institute of Engineers KIVI NIRIA are organizing this conference. Information can be found on www.OMAE2011.com. Registration will be possible by the end of January 2011.

Portuguese Association of Engineers criticizes **the Bologna Process**

José Manuel Pereira Vieira
President ordem dos engenheiros

The political decision to give the title of licenciatura to the first three years degree in Portugal is a very grave matter, as it corresponds to the same title for a five years long degree before the implementation of the Bologna Process. These criticisms come from José Vieira, Vice-president of the Portuguese Association of Engineers ("Ordem dos Engenheiros"), in an interview for "Ingenium", the Association's magazine.

According to José Vieira, *"this confusion becomes even more serious by the unacceptable regulations of the National Qualifications Board, which attributes the same professional level (level six) to both bachelor (with a graduation of three years) and licenciado (with a five years graduation) without considering if the graduation was finished before or after the implementation of the Bologna Process at the universities*".

This situation, which is strongly criticizin by the Portuguese Association of Engineers, originated a public petition to the Portuguese Parliament in order to attribute the title of master to those who completed the five year degree course before Bologna started. This petition was an initiative of the National Council of the Professional Associations in Portugal.

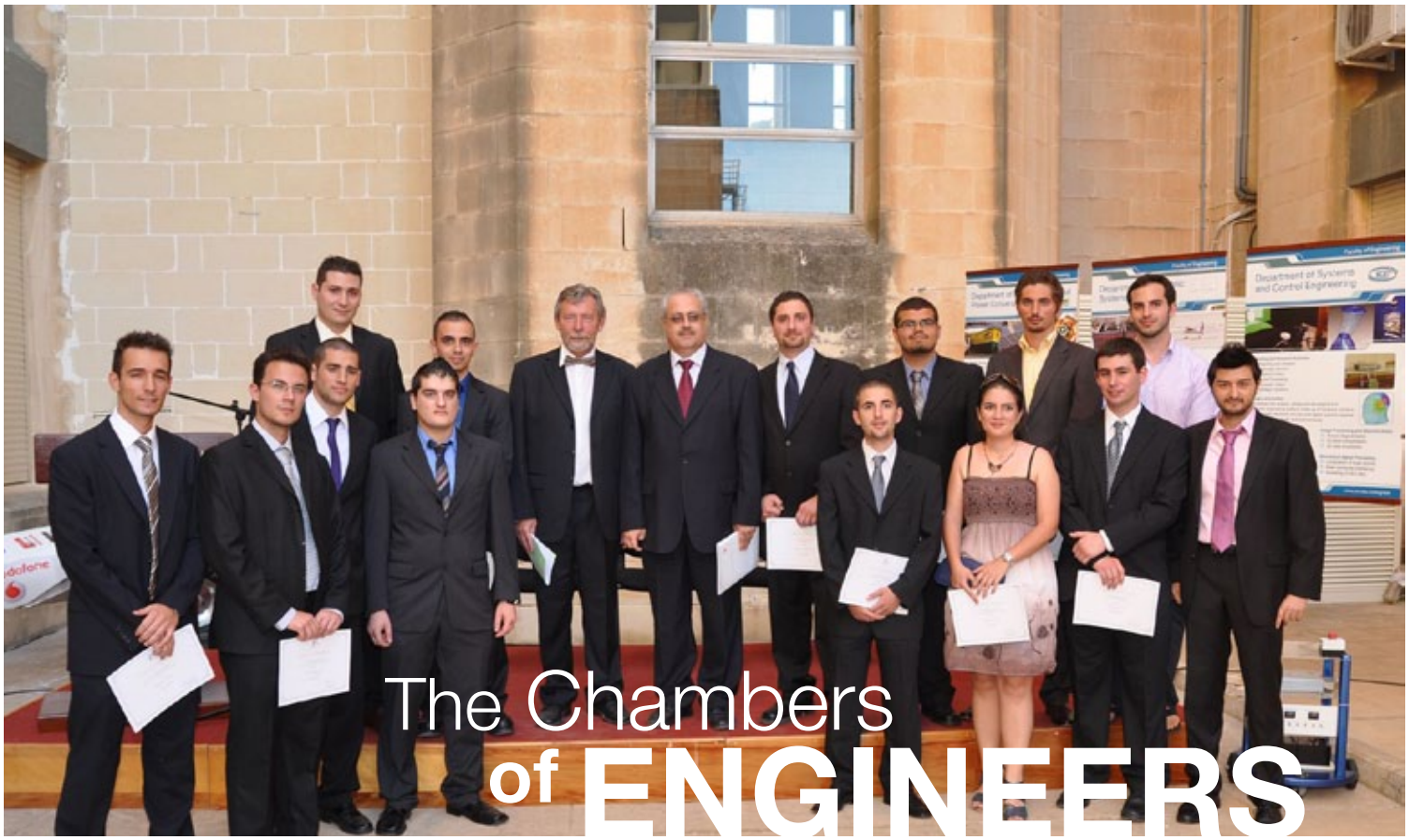
Before adoption of the Bologna Process in high education, the situation of degrees in Engineering was perfectly clear in Portugal. Consisting of two different levels: licenciatura to which corresponds a direct title of engineer, given by the Portuguese Association of Engineers to those who have taken a five year course to graduate; and bachelor, with a three years degree, to those who corresponded to the title of technical engineer, attributed by the National Association of Technical Engineers.

With Bologna, there were introduced three different levels for studying Engineering: licenciatura, masters and doctor. This change created an enormous difference in terms of the degrees taught at universities and the skills profiles achieved in the two first levels.

José Vieira confronts the possibility of getting a Masters in a course composed of two cycles as worrying, as it allows the coexistence with an integrated masters (a long cycle with five years graduation), without the certainty about the equivalence of skills between both, a situation that can affect the professional qualification of engineers.

The European Federation of the National Engineering Associations (FEANI) recognizes two main levels for the two first graduation cycles, which can make it easier to associate the proper professional skills with education in Engineering towards the mobility of professionals throughout Europe.

For the Portuguese Association of Engineers, this situation demands an intense reflection about future engineers who can enroll in the Association, since its statutes allow the admission of people with a licenciatura pre Bologna, meaning at least a five year graduation. The adoption of the same designation for a different graduation creates a controversy between what is written, even nowadays, in the statutes and the spirit at the time that created them.



The Chambers of ENGINEERS in RENOVATION PROCESS

Paul Refalo, PRO, Chamber of Engineers

The Chamber of Engineers is in a renovation process which is ultimately aimed at bringing more value to members and interact better with its European counterparts. The Executive Council of the CoE has embarked on improving its public relations, to restructure its priorities and to address issues in line with the new realities surrounding it. This change in substance is going to be accompanied by other initiatives which already included the modernization of the Chamber's logo. The Chamber has officially launched its new logo on 10 September 2010 during a social event for Chamber members and friends. The Chamber has implemented 'Networking Engineering' which is the new motto that complements the logo.

Building on the solid foundations laid by the Chamber's predecessors, to whom the Chamber is most grateful, the President, Ing. Saviour Baldacchino and the Council continue to organize the annual events that are landmarks in the Chamber's calendar of events. The forthcoming annual event, which will be held towards the beginning of December, is the 9th edition of the Malta Engineering Excellence Awards which recognizes engineers and/or organizations that have achieved outstanding engineering accomplishments, impacting significantly on engineering in Maltese society.

The Chamber of Engineers in collaboration with the Faculty of Engineering at the University of Malta, recently presented awards to final year engineering students in recognition of the effort made in their final year research projects. The engineering student projects awards are aimed to encourage more students to pursue the profession. The presentation ceremony coincided with the opening of the Engineering Projects Exhibition 2010 held at the University of Malta.

Another initiative taken by the Executive Council was to meet up with the retired members' engineers, who through the Chamber, also participated in the national consultation on the Pensions reform.

Networking Engineering

www.coe.org.mt

TESTIMONIAL OF AN ENGINEER

Guy Dreessen Corporate Innovation Manager at GDF SUEZ, Brussels

As Secretary General of FEANI, I shall with every new Issue of the FEANI News try to introduce its readers to engineering people from within my personal network. In this Edition, we offered the floor to Guy Dreessen (42). He joined GDF SUEZ in 1992 and holds a Master Degree in Nuclear Engineering and International Management from the Flemish Vlerick Business School. He gained his first experience in the nuclear industry and later on as a Product Line Manager for Electrabel in charge of Sales and Support of Technical Services for B2B customers. Since 2008 he is responsible for building up the innovation capacity (R&D) within GDF SUEZ. He is involved in CEN/TC 389 on the standardization of innovation management and a member of the European Industrial Research Management Association (EIRMA).

How does one become an ENGINEER?

A first trigger to become an engineer already occurred to me in primary school at the age of ten. I had to prepare a presentation about the "functioning of a transistor radio". It was quite a challenge to retrieve sufficient information about this subject, without having Internet or any engineers in the family around. This exercise was certainly an unconscious milestone on my way to becoming an engineer later on. I was also a fan of mathematics and science, so ultimately it was obvious that I would pursue my studies in either chemistry, physics or engineering. The final choice for Nuclear Engineering originated from a personal curiosity in the field and was influenced by some classmates, but certainly not driven by market demand (it was the time of the Chernobyl disaster). I am convinced though that education is the backbone of your profession. The hands-on use of educational content in your later professional life of course largely depends from the type of professional position you will ultimately have, but I am convinced that whether you are a specialist, an operational engineer or a general manager, continuous professional development is always the key to success. For engineers in particular, I think that more emphasis on modern language skills, management skills (including creativity) and project management (venturing, finance) could be additional valuable assets in their education. For me personally, a topic such as human resource management would have surely enhanced my competencies and skills.

What does INNOVATION mean for your field of activity ?

The combination of smart grids, electrical storage and environmentally friendly generation capacity will surely become important elements in the future energy sector. New materials will drive other sectors to innovate. *"Cities of tomorrow"* are our top priority. The transport sector is already evolving towards natural gas and electrical cars. But also, every day life will change because of new ways to communicate, such as Web 3.0. New healthcare innovations, such as surgery without scars, will emerge. Some futurologists even predict the possibility to read the background and experience of other people by using interactive eye lenses. Open crowdsourcing will also become more important in the globalized market. The time that "knowledge was power" is changing. Intelligent use of open crowd knowledge will become part of daily business.

How would you assess the INNOVATION issue in Europe as compared to the US, Japan and emerging economies such as Brazil or Russia?

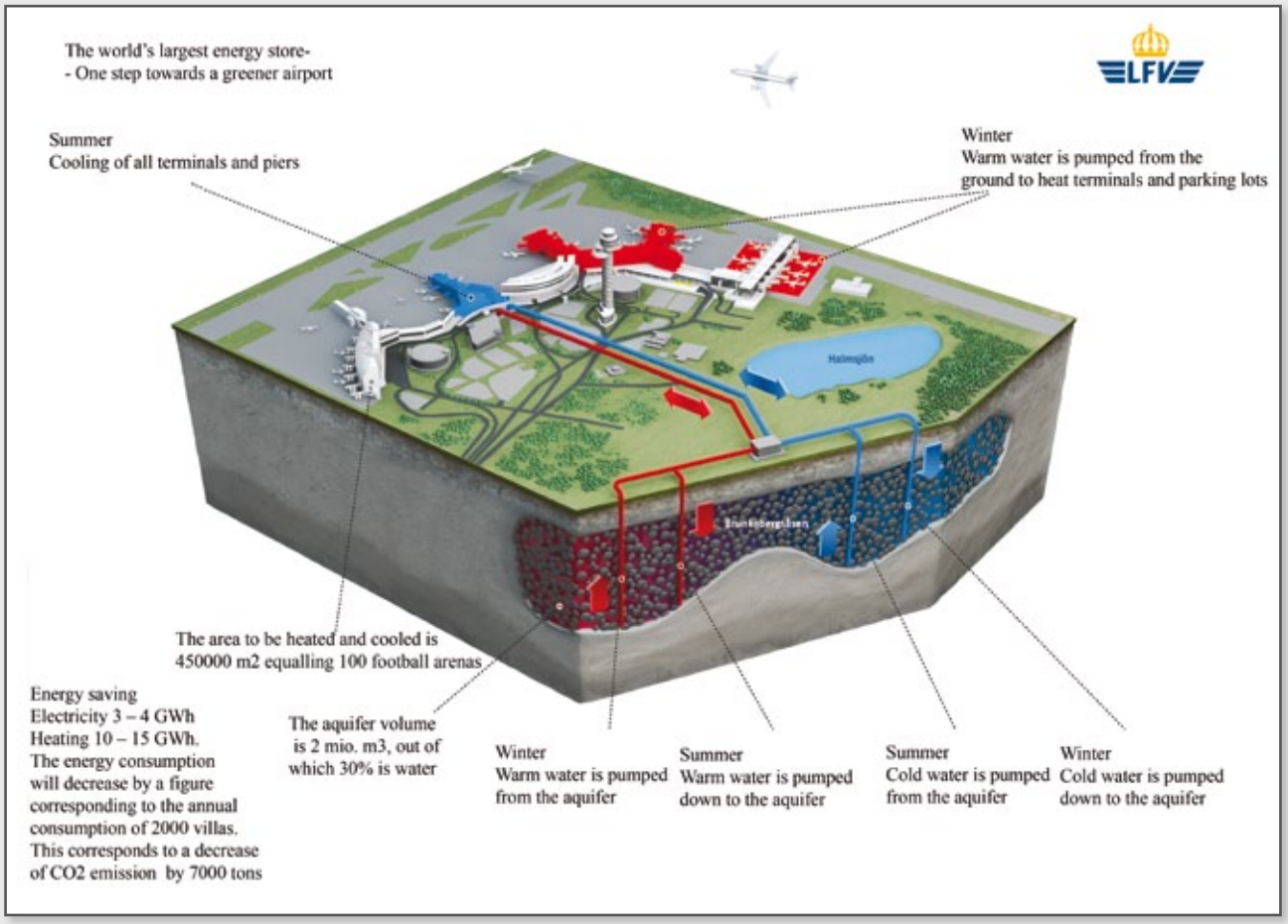
Setting objectives and goals for innovation – which are often focused on economic growth – is important. A comparison is very difficult to make, but we can see different approaches. The US have launched *"New Innovation Partnerships"* to drive domestic growth, employment, global health and a green economy. They use a results driven business approach. Japan and South Corea are working on the *"East Asian Science and Innovation Cooperation"*. These countries are more focused on structuring the innovation capabilities. Russia has still a critical mass of researchers and this capacity is a starting point of innovation. Brazil provides loans for companies as an innovation driver and with great success. The EU Commission in its Europe 2020 Strategy, announced that it will launch, as part of the Innovation Union flagship initiative, European Innovation Partnerships. These Partnerships will test a new approach to EU research and innovation aiming to bring together all Europe's major players. It is proposed to launch the first European Partnership on active and healthy ageing. Smart cities, water-efficient Europe, sustainable supply of non-energy raw materials for a modern society and smart mobility for Europe's citizens and businesses, are potential future topics.

What do you think about the international mobility of engineers and the recognition of their professional qualifications ? How can we ensure more engineers for Europe ?

Despite having worked for two employers only over the last 18 years, I have had the opportunity to develop diversity in my professional expertise. I started in the nuclear industry to become later a product line manager co-generation and renewable energy. Currently, I am working on a large spectrum of technologies, business models and new markets within the research and innovation division of GDF SUEZ. On the basis of my experience, I do not see any problem at all to work in another country, even if that would be another company. Because of the growth and spread of multinationals, an international track record in combination with CPD is for sure an added value for an engineer. For the entrepreneurially-minded engineers, the climate for innovation generally, and for business start-ups and self-employment in particular, are changing and this will have an important influence in the decision of an engineer to move abroad. As to attract young people for the engineering profession, I think the older generations need to focus their educational framework more around creativity, innovation and entrepreneurship too. Co-operation amongst and between alumni networks, presentations or open days, scholarships, trainings or specific sessions for students organized by successful freshly established new companies, etc. will surely attract youngsters to the profession.

Ways to get the Energy budget in balance

Claes & Sten Trolle



While the debate continues about which of our energy sources should be invested in for being the most reliable, efficient and environmental friendly, it is easy to forget or push aside other aspects of our energy consumption. Measuring our energy situation in financial terms we can look at the energy situation as a balance sheet. A company with its finances in order should show a sound balance sheet where the assets are balanced by equities and liabilities. The solidity of a company is based on equity in relation to the sum of equity and liabilities. A low key figure for solidity is a warning sign – there is likely to be problems sooner or later. In the energy balance sheet we could put consumption on the asset side while production and import is put on the equity and liabilities side. Looking at the energy situation like this, it is easy to see that something has to be done about either production or consumption of energy (or both) to achieve a sustainable situation. From many aspects, only increasing our production is not a viable solution on a long term basis, so we need to consider ways to reduce our energy consumption in order to minimize the imports of mainly fossil fuels. This would be beneficial not only for the environment, but also for political, economic and energy safety reasons. We need to continue asking ourselves how we can make our energy systems more efficient, how we can minimize our energy losses and how we can start using less energy – we need to find ways to get our energy budget in a sound balance.

EU is to a large extent dependent on energy imports from other countries for our energy supply. In 2008 the gross energy consumption was 1825,2 mtoe , of which 1010 mtoe was imported. This corresponds to approximately 21,2 PWh (21,2*1012 kWh) and 11,7 PWh, respectively. Our energy dependency was at 53,8 %,which means that more than half of our energy supply is from sources we cannot control. In 2001, the energy dependency was approximately 51 % so there has been a significant increase. The transport sector and use of electricity has had an increasing share of the gross energy consumption since 1991 (figures from 2006) .

The implication of these numbers is obvious. While the energy- and climate debate mainly focuses on renewable ways to generate electricity, concentrating on for instance water-, wind-, wave- and solar power, the fossil fuels do represent the largest share of our net import. This can easily be seen, as our energy dependency for nature gas was 60,3 % in 2007, and oil was up to a massive 82,7 %. It is essential that we decrease our energy dependency, not only for political and economic reasons, but also from an energy safety point of view.

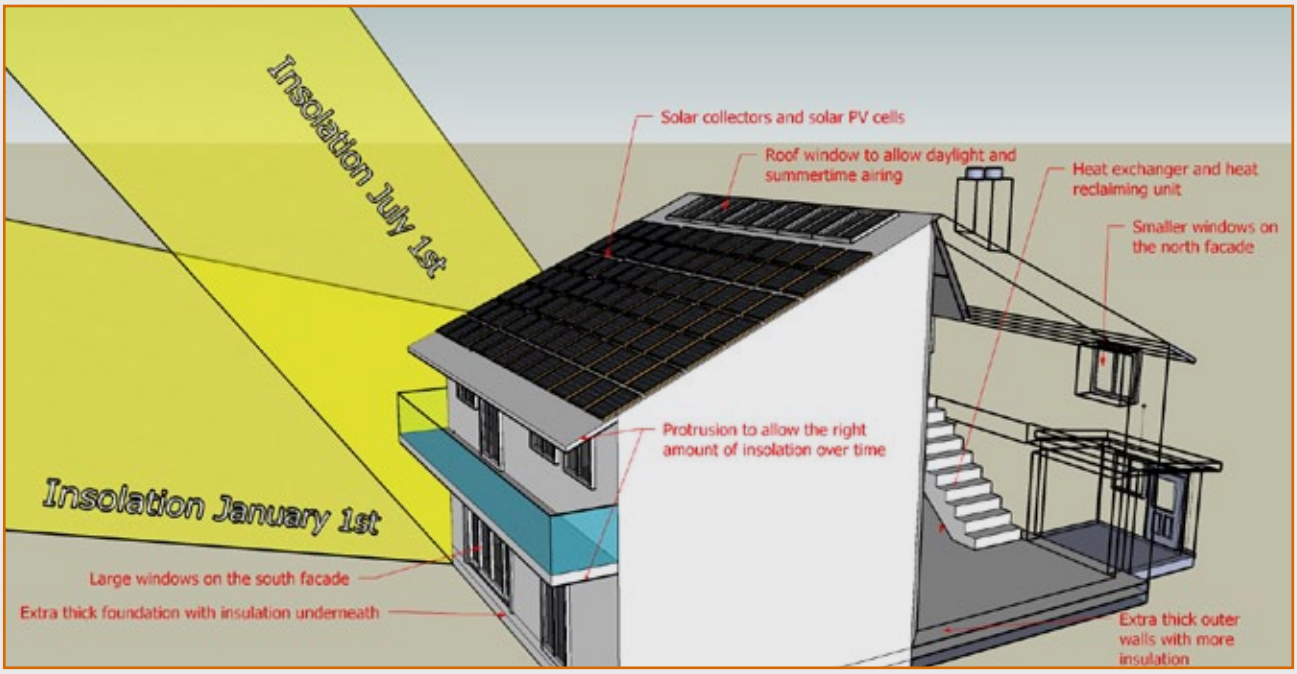
While renewable energy is advancing in many areas, because there is a political will to reduce CO2-emissions and introduce more sustainable energy alternatives, the transport sector makes up for the largest part of the fossil-fuel consumption and therefore makes us more energy dependent. At the 2008 G8 summit in Hokkaido, IEA proposed policies that would increase our energy efficiency in several areas. To some extent, these policies have been implemented, but in their report ”Progress with implementing energy efficiency policies in the G8” (2009) IEA claims that more can and needs to be done – particularly regarding the transport sector.

Let us return, for a while, to getting an overview of our energy production versus our energy consumption. Presently, we have access to several different renewable energy sources. Most of these are very suitable for producing electricity or heating houses and buildings – for example wind power, water power, solar energy, geothermal energy, wave power and of course bioenergy. If we take a look at the non-renewables, fossil fuels are dominating, apart of course from nuclear power which at present, however, can be used for electricity production only.

So, if we are to make a simplified ”energy budget”: Among the incomes in our energy budget are a number of renewable energies and nuclear power, and among the expenses are electricity, heating (and cooling) of buildings and transportation. It hardly needs to be said that our own incomes could eventually cover our expenses in the electricity and heating areas. But when it comes to transportation, we instead take ”loans” to cover our expenses. So, how do we balance the energy budget?

Apart from a large-scale transition to biofuels for environmental reasons (which we at present do not really have the resources for), there is also the possibility of implementing new methods for energy storage.

Flywheels are a great example of an energy storing method. Even though the flywheel is a very old invention, it has great opportunities within the vehicle industry today and thus in the transportation sector as well. Because they store energy like an electrochemical battery, but aren’t as affected by high temperatures, have high efficiency and charge very quickly they can prove to be an important instrument in saving energy where it is needed.



The Passive House

An illustrating image of how the Passive house works: thicker outside walls with more insulation than a normal house, solar cells on the roof, heat exchangers and heat reclaiming units, smaller windows to the north and larger windows to the south. Also, it has protrusions on the southern wall to ensure the right amount of insolation over time, adapted to the different insolation angles during winter and summer.

Other newer ways of storing energy, and not only in the transport sector, are of course also interesting. Because one of the major problems with energy is that it is so difficult to store with high efficiency and few losses, different kinds of for example TES (Thermal Energy Storage) can provide us with efficient methods of storing energy such as solar power which we all know has enormous potential, otherwise causing problems because of its intermittent production. Also, we cannot neglect the potential of energy storing methods such as aquifers, hydrogen, CAES (Compressed Air Energy Storage), super capacitors and pumped hydropower which all can and will need to be developed further even though they are being used already.

The aquifer in real life: Arlanda airport installation *(Courtesy Luftfartsverket*

During summer, the colder water is used for cooling the buildings at the airport. The warmer water that is pumped back to the aquifer is then used for heating the buildings during winter.

Let us have a look at another difficulty regarding our energy supply. Energy transition uses about one third of the primary energy – and the efficiency is only about 40%! Apart from storing energy, the transmission of energy from generation to distribution inevitably causes energy losses because of the electrical resistance in the power lines - traditional power lines as well as the HVDC-cables although the latter have much smaller energy losses. To produce energy at one place and then transfer it to another place with no losses at all would naturally save us countless amounts of energy and create an opportunity to produce energy where it is suitable and then transfer it to where it is needed. Considering the principles and theories of quantum mechanics, which have been proven to work, and using superconducting transmission lines for energy transmission in large scale would actually make this possible, because of the lack of electrical resistance in these materials. For example, if a high-temperature superconductor (an iron-based one for example) would be used, the temperature could be lowered using just liquid nitrogen to reach the temperature where the resistance drops to zero and allow loss-free energy transmission. Today, there also exist superconducting transmission lines working at temperatures close to room temperature allowing loss-free energy transmission. So far this has been achieved only in a laboratory scale, but the results are very promising. Superconductor ring batteries also have to be mentioned, as they can store large amounts of energy for very long periods of time. All this does of course require large investments in R&D to enable their use in a large scale. As for power transmission, it is difficult to find a more efficient method apart from producing power where it is actually used – for example by having solar cells on the roofs of houses. By funding research that is not rewarding in a short perspective only, we could see a faster development in many areas of energy research.

Consider, for a moment, that some of the extensive funding for research in the “traditional” areas of energy, such as wind power or nuclear power, would be invested in new and different ways of saving and producing energy, for example superconductors , new energy storing methods or something as well-known and often discussed as solar energy and solar cells. Naturally, we would see a slower short-term development in energy research, but over a period of time we could see much better results and a more sustainable energy solution.

Salt – Solar nergy storage

By using reflectors that heat salt to over 1000 degrees Celsius, solar energy is “stored” in the melted salt. The heat in the salt can later be used to power a steam generator, thus generating electricity.

If you were to make a budget of your own, you would start by looking at your income and not your expenses. In most cases you will find it difficult to increase your income to match how much you will spend in the future, and you would definitely not like to find that more than half of your spending has to be borrowed each month. To be able to increase your spending in a longer perspective you will have to temporarily shift some of your expenses to investments. In a way you have to tighten your belt to prepare for a better life in a longer perspective. Until these investments turn into profit, you will have to cut down on other expenses to suit your budget.

Of course, this comparison cannot be applied directly to our energy system. But what is important is to try to lower our expenses to reduce our energy dependency. Much because we rely on fossil fuels, we are “below our budget”, and because many technological solutions are some years away we need other ways to decrease the gap between what we produce and what we use. We do not just have to increase our production; we have to decrease our consumption. Of course, this is nothing new, but it is just as important as anything else you could think of when it comes to our energy situation.

For example, we can look at the warming and cooling of buildings. By reducing the temperature indoors by one degree in heated houses, we lower our costs of heating by 5 %. Using meteorology via forecast targeting is a rather simple and very efficient way of saving energy. Sensors on a building receive weather information via a GPRS-system, not only about temperature but also for example winds and sun radiation and adjust the indoor temperature accordingly. According to a company that works with forecast targeting, it could save 10-15 % of the energy used to heat a building. For buildings in warmer climates, there are systems that use electricity to produce ice at night, when the electricity is cheaper. When the heat from the house melts the ice during the day, the cold water is used for cooling and in that way reduces air conditioning costs.

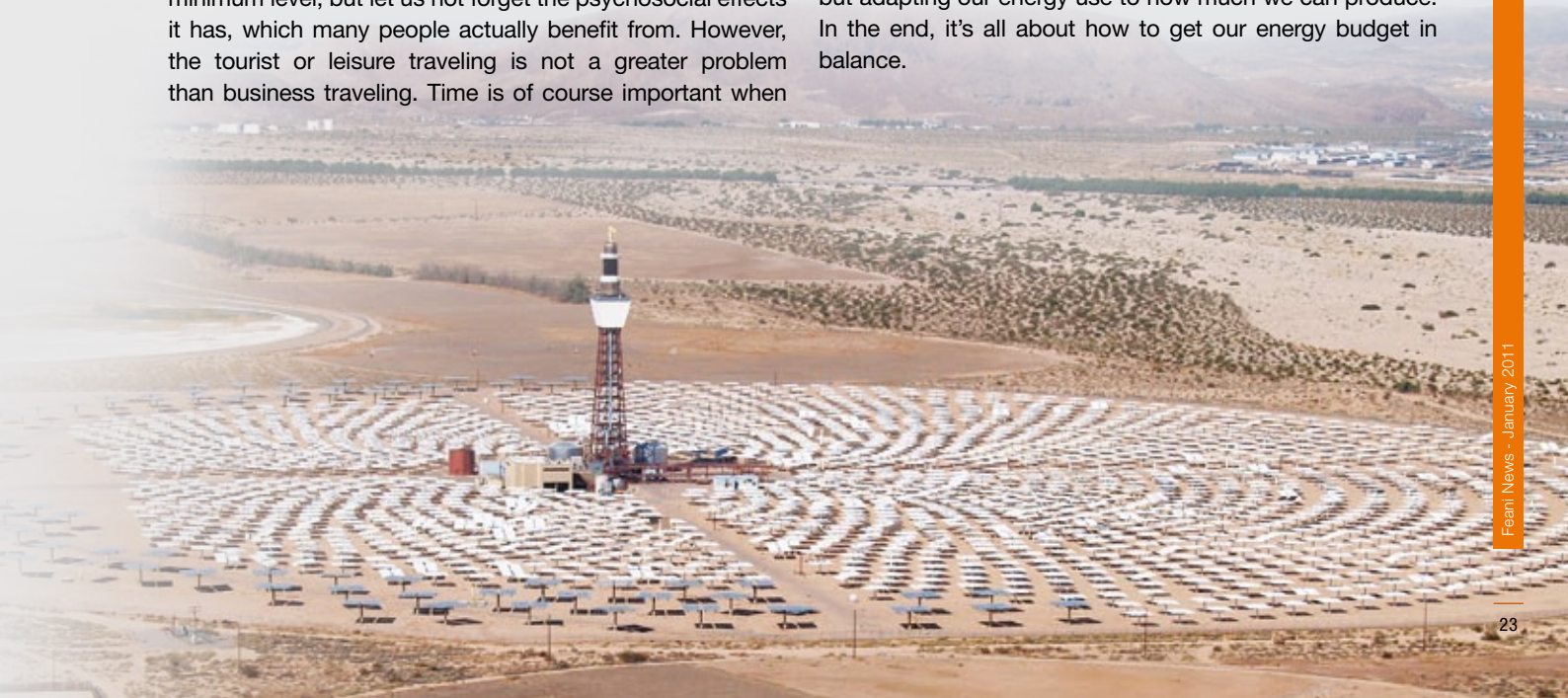
The EU Action Plan for Energy Efficiency brings forward a number of actions to reduce energy consumption. The Commission points to the fact that 40 % of the primary energy consumption (within EU) is used up by houses and has set the target in the Directive EPBD2 that all new production should be self-supporting from 2020 – for official buildings the year is set to 2018. There are examples of villas, called Passive houses, built already in in Germany and Sweden, which are net providers of energy, implying that they are actually energy producers – not consumers. This has been achieved by means of solar cells, improved insulation and conserving energy from all sources of heat within the building (not least heat emission from the inhabitants). However, we must remember that these buildings require a lot of knowledge of energy and construction, and also time and exactness when built, in order to function properly. If for example the insulation gets just a little damp in the building process and everything is not built with care, the Passive house will not work as intended and could be completely useless. Mass-production of these buildings has to include making sure that the building companies do their work properly and without carelessness. In this particular case, production time shouldn't be an issue but as we all know, in a competitive business, it usually becomes one anyway.

Another frequently discussed problem is that of traveling. Tourist traveling is of course something we could keep at a minimum level, but let us not forget the psychosocial effects it has, which many people actually benefit from. However, the tourist or leisure traveling is not a greater problem than business traveling. Time is of course important when it comes to doing business, but then why is so much time spent on traveling back and forth for meetings in different countries and different cities? There are many other ways of communication that work just as well and are more efficient, so decreasing business traveling should be seriously considered. Ever heard of Facebook or Twitter?

Many companies have large office buildings that are empty nearly two thirds of the day, or in use only 22% on a yearly basis. If employees were to work at home, costs both for building, rent and also for energy would drop and it would save both energy and money. This would of course not work everywhere, but still in many places, the only problems being perhaps of logistic and also psychosocial nature. Many people enjoy going to their workplace to meet their colleagues, and also taking that away could cause less efficiency in the company. Still, there is no doubt that it is a way of saving a lot of energy that should be considered.

Also, transportation of goods between different places could easily be done by other means than trucks, air craft and trains. To a physicist, marine transportation is beautiful: Lots of cargo, minimum of friction, no change in potential energy. A drawback is its contrary to the "just-in-time"-concept, which was developed to decrease the costs for storing goods and material and increase competitiveness. If, however, the transportation costs were based on the time saved by using fast transportation means there would be a competitive edge to those producing merchandise close to the user and at the same time investing in storage facilities instead of fast transportation means.

These "solutions" and many more are examples of measures to reduce our energy dependency. The less we spend, the less we need to import and to produce. Finding ways for the transportation sector to reduce the need of fossil fuels is essential, starting with spending less and developing methods of making the most of the resources we have available. Making sure science is funded in a long-term perspective will also help stabilize our energy systems. This involves making many new ideas open to the public, to create an understanding that the solution is not just in finding new ways of adapting to the way we use our energy, but adapting our energy use to how much we can produce. In the end, it's all about how to get our energy budget in balance.



VESTAS

THE GRAND OLD MAN of the INDUSTRY

Vestas might be the world's leading wind turbine manufacturer. But its native soil, Central Denmark, still plays an important role in its global strategy.

- The world's largest wind turbine manufacturer, Vestas, is in the process of moving its headquarters to Aarhus
- The roller coaster history of the company is representative of the development of the Danish wind turbine industry

Source: "AARHUS - Capital of wind energy" by Monday Morning

Over the last 30 years, the wind giant Vestas has slowly migrated from its home town of Lem on the western coast of Denmark, through Ringkøbing and Randers to Aarhus, where its new corporate headquarters is scheduled to open in 2011. In the course of this 114 kilometres journey, the company has undergone a exceptional transformation, from a small forge to a global wind energy market leader. It has kept facilities on its native soil in the Ringkøbing-Skjern area. But by and large, it is a global operator with around 22,000 employees around the world, a market share of 12.5 percent and a turnover of 49.4 billion kroner in 2009. Since Vestas produced its first turbine in 1979, the company has installed over 40,000 turbines around the world. Today, it erects a new turbine every three hours. Vestas can claim the credit for almost a third of the world's combined wind power capacity over the last thirty years.

The Beginning: Lem

The story of Vestas begins in 1898, when 22-year-old Hans Søren Hansen bought his local forge and founded his company. Right from the beginning, the enterprise was engaged to windmills, servicing the numerous Danish farms where small mills powered threshers and similar machinery. But its main product was steel window frames for industry.

During WWII, the company went bankrupt due to a lack of raw materials, but already in 1945, the founder's son, Peter Hansen, founded VEstjyske STaalvarefabrik A/S (West Jutland Steel Factory Inc.), shortened "Vestas". Initially, it produced household machines, but slowly turned to farm vehicles and small cranes for trucks.

The oil crisis of the 1970s brought political attention to energy security. Concording with the spirit of the times, Vestas commenced its first wind turbine experiments. In 1979, Vestas developed its tall, three-bladed trademark turbine, simply known as the "Danish Concept" in the industry. The design which conquered the world and is the industry standard even today.

Interest in wind turbines was modest in the beginning, mainly stemming from communes and small, alternative farmers. In 1980, Vestas had 36 orders for wind turbines.

The introduction of highly advantageous American tax schemes which contributed up to 50 percent of the price of the turbines, changed this and created what has since been referred to as the "Great Californian wind rush". In 1983, Vestas' orders rocketed from around 30-40 per year to 155. Within a year they, had 550 orders, and in 1985s, they sent 1,200 turbines across the Atlantic.

In 1986. the American market suddenly collapsed as a new political agenda put a stop to the tax rebates. This spelled disaster for Vestas, which applied for an administration order. On January 7th 1987, Vestas was declared technically bankrupt. The wind turbine adventure of the 1980s was over.

The Recovery: Ringkøbing

On the same day, Vestas rose from the ashes for a second time with the founding of Vestas Wind Systems A/S. With just 60 employees, it set out on a remarkable recovery.

The bankruptcy had taught the company a valuable lesson, and Vestas began to forge new markets so that it would never be dependent on one clientele again. A joint venture with India was established, and Vestas opened sales offices in Germany, Sweden, the US and Italy. Slowly, turnover began to grow from 100 million kroner in 1987 to 500 million kroner in 1990.

At the same time, technological development began to pick up speed. In the 1980s, Vestas had been producing 100 kilowatt turbines. In 1995, it launched a 1.5 megawatts turbine. The same year, the company embarked on its first off-shore project, featuring 10 sea turbines in Tunø Knob in the Kattegat Straights south-east of Aarhus.

In 1998, Vestas was once again back on top as the world's largest wind turbine manufacturer with a turnover of 2.6 billion kroner. The same year, the company moved its headquarters to an old shipbuilding yard in Ringkøbing. Turnover increased to 6.5 billion kroner in 2000, and the year after, it grew by almost 50 percent to 9.52 billion kroner.

The Merger: Randers

In 2003 Vestas merged with its competitor, Central Jutland's other big wind turbine manufacturer, NEG MICON. In one stroke this created a wind giant with a global market share of 35 percent. The new company was called Vestas, but moved into NEG MICON's offices in Randers.

By 2005, Vestas was undisputedly the world's dominant wind turbine manufacturer. But it had also faced a number of challenges which put the colossal growth of the company of 30-40 percent per annum between 1987-2005, into perspective. Following the merger of two very different organisational cultures, a number of technical problems arose. In 2003 Vestas was forced to take down and repair 80 off-shore turbines which had been erected at Horns Rev.

The answer to many of these problems went by the name of Ditlev Engel, who took the stage as new CEO in 2005. One of Engel's first decisions was to establish a new development centre in Aarhus. He also launched the "Will to Win" strategy, aimed at increasing earnings and improving the quality of Vestas' products. Among other things, this was achieved by improved monitoring of wind turbines, which means that Vestas can now follow over 15,000 turbines from its development centre in Aarhus, and adjust each individual turbine to optimise performance in accordance with wind conditions. He also established an all-new organisation with 14 business regions, each controlled by its own president, who report to the general management: Engel and CFO Henrik Nørremark.

"In order to attract and keep the workforce we need, both domestic and foreign, we have chosen to locate our new base in Aarhus. We think it has the right facilities – also outside office hours."

Ditlev Engel,, CEO, Vestas

The Future: Aarhus

"Will to win" worked. In just three years, Ditlev Engel managed to change a loss of 1.45 billion kroner into a record profit of 3.8 billion kroner in 2008. That year, Ditlev Engel announced Vestas will move its headquarters to Aarhus in 2011, neighbouring the research and development centre. For now, Vestas' long journey has reached its final destination.

In reality, the journey has been far longer than the 114 kilometers between Ringkøbing and Aarhus. More than anything, Vestas is now a global company with 99 percent of its business outside of Denmark. The headquarters in Aarhus will function as a strategic junction, where Ditlev Engel can keep abreast of his presidents and their business regions which are spread out over the globe. Ditlev Engel emphasizes that one of the advantages in having their headquarters in Denmark is that, "it is possible to talk to Asia in the morning and the USA in the evening".

But why Aarhus?

"Central Denmark and Aarhus play an important role for Vestas for many reasons. This is where a large part of our company was founded. There is a special know-how, knowledge and understanding of our products and the wind industry in general among employees, local residents, politicians and educational institutions," says Ditlev Engel. "Aarhus is the largest and most international city in the region. In order to attract and keep the workforce we need, both domestic and foreign, we have chosen to locate our new base in Aarhus. We think it has the right facilities – also outside office hours. When the world is getting smaller and smaller, it will be more and more crucial to have a "one stop shop" concept in place for overseas employees. For this reason, Vestas has engaged in the International Community as well as the international school in Aarhus. We have high hopes that an international high school will soon be established," he says.

There is no doubt that attracting and holding on to global companies is a major challenge for Denmark. Looking forward, what does it take for Denmark and Aarhus to remain attractive to companies like Vestas? "Denmark has a great deal of experience and knowledge of wind energy. But we have got to pool our resources to really make a difference and take on countries such as China and the US. We hope that the different educational institutions in the Greater Aarhus area and the rest of the country will work strategically together to support the wind energy industry and its suppliers. The concept of creating clusters of special knowledge within energy in Central Denmark is the right one. We have got to work together to make it internationally."

A WITNESS FROM INDUSTRY: THE RUSSIAN CONSUL

Ute Philipp - Business Development Manager Rhode & Schwarz

Looking back at the winding path that got her there, Ute Philipp may have been destined for her role at Rohde & Schwarz as T&M Business Development Manager for the Russian market.

Growing up in the GDR, Ute Philipp decided to study nuclear engineering. Her motivation was the pollution caused by brown coal. "The people were yellow, the laundry was yellow, the trees were yellow – everything was yellow," she recalls. "Back then I saw my studies as the solution because I wanted things to change." This led to five and a half years spent studying the automation technology of nuclear power stations in Moscow – a difficult time. Despite having taken Russian at school, the language proved to be as big a challenge as the people's mentality. "You really had to stick with it," says Ute Philipp, describing her student years. After graduating with honors in 1989, she returned to the GDR with one clear objective in mind: "I was happy to have gotten through those years, and I swore never to go back." Her first job, at the nuclear power station in Greifswald, did not last long. Her function in T&M surveillance was exactly what she had hoped for. However, the fall of the Berlin Wall and the resulting shutdown of the power station temporarily put her career plans on ice.

A fresh start

After employment opportunities for engineers in East Germany dried up, Ute Philipp made a fresh start by joining Rohde & Schwarz in Munich in 1996 as a team assistant in the development laboratory. Alongside her role as an assistant, she frequently carried out measurement tasks in the laboratory. "I simply enjoyed it and my engineering background made it easy for me," she explains. Finally Ute Philipp had the chance to work with technology again and show what she could do. The T&M knowledge she accrued qualified her for the position of product manager for network analysis test equipment in 2000. In this role she supported the European sales units as an interface between development and customers. In her seventh year as a product manager, she traveled to Russia to make a presentation. With her language skills, the event was a resounding success. Before long the management came knocking, asking her to take on a fulltime role working on the Russian market.

Since then Ute Philipp has been visiting Russia once or twice a month to open up new business segments and territories and find new cooperation partners. Obviously it is not only her language skills that help her here, but also her knowledge of Russia and its people. Her colleagues are fond of calling her the "Russian Consul". Her responsibilities are wide-ranging. Ms. Philipp has to track the Russian market from an economic and political standpoint – while keeping tabs on the complexities of Russian laws and regulations.

At a gut level

The Russian and German markets contrast sharply. The competitive environment is completely unlike that in Germany, explains Ms. Philipp, "and the wage and development costs are also completely different." In addition, there are the state subsidies for Russian companies. Consequently, it is important for a German company to be close to the customer. "In Russia, a lot happens at a gut level," says Ute Philipp, describing the Russian mentality. "You have to work with the customer on a regular basis, and that is the focus of my activities. Of course, one issue that keeps coming up is the identification of market potential: What products does the market need and what functionality are customers looking for that we may not yet have in our portfolio? It is vital to develop a good sense of what a business partner feels and expects. "Russians don't like it when we don’t have time for them," says Ms. Philipp.

A small drawback to her job: "These issues take me away from technology a little. I'm an engineer, and the combination of Russia and business development sometimes puts me at a distance from the actual technology."But technological know-how is a necessary ingredient for success in business development, although at a different level.

However, Ute Philipp's tasks are far more varied, and there is much more involved than just her engineering background. She is now working on a concept to simplify the approval process for introducing T&M equipment on the Russian market. In addition to the Russian certification required by law, all foreign measurement devices have to be retested by the Russian authorities – a time-consuming and expensive process. Her efforts to bring about modifications in production process will one day yield substantial savings

Key contacts

From Ute Philipp's standpoint, personal contacts are the key factor in sales and business development. Naturally, with an employer like Rohde & Schwarz, a degree in engineering is also essential: "You need to understand technology to gain acceptance – and to understand the customer, " she explains. It is also vital to be able to put yourself in the customer's position and understand their problems. "The ability to step back and listen is very important," says Ms. Philipp. And finally, you need take unconventional routes and be creative. "I have developed a concept for this task and this job, and the feedback from our customers and the Moscow sales staff tells me that I'm doing a good job". With a substantial rise in sales over the past three years, the figures speak clearly in her favor.

INNOVATION in SMES:

ALWAYS ROOM for IMPROVEMENT

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Innovation supported in large-scale policy programmes

Innovation is one of the key ingredients leading towards success and survival. In the context of three large-scale policy programmes in the Netherlands and Belgium more than 800 Small and Medium-sized Enterprises (SMEs) are assisted with a standard intervention methodology in the period 2004-2012 (see box 1). The main aim of these programmes is to strengthen the SMEs' innovation capacity. The participating SMEs represent a wide range of sectors of which numerous SMEs have engineers and engineering activities in a central position. In this article we zoom in on the current results of the participating high-tech SMEs that lean on engineering skills. This focus follows the widely held assumption that innovation comes natural in these companies. However, the mere presence of these companies among the participants of these large-scale programmes and furthermore the in-depth analyses of their particular cases show that the need for support in these SMEs is not so different from the overall group.

This article discusses the conclusions from the preliminary comparisons between the high-techs (N= 65) and overall group (N=816). Three issues are specifically highlighted:

1. What can we say about the innovation capabilities of the participating high-techs?
2. Which kind of innovations do the participating high-techs plan?
3. What does the "green trend" mean for the participating high-techs?

Participating high-techs report better innovation capabilities

First of all, in the programmes each participant SME is assessed with respect to its degree of innovativeness. Participating SMEs are evaluated with respect to their capabilities related to innovation (e.g. skills and expertise to develop new products), the innovativeness of their organizational climate (e.g. openness to change) and their overall innovation performance (how the company perceives its innovation performance in comparison to its competitors). In comparison to the overall group of participating SMEs, high-tech engineering firms.

1. value their capabilities to innovate notably higher as they rate their technical skills higher;
2. report to have a better organizational climate as they invest significantly more in the education and training of employees;
3. do not assign higher rates to their innovation performance in comparison with their competitors.

Overall, the high-techs in the sample tend to be rather modest about their innovation performance because they feel that more can be reached. Their motivation to participate in the policy programme underlines that they experience a high sense of urgency to improve upon their innovation capacity especially in the way they manage and market innovations. The intervention is expected to assist them in selecting specific areas of enhancement and plan particular actions to realize these improvements.

Innovation ambitions in high-tech engineering firms go beyond new products

Secondly, in line with the European definition for innovation (see box 2), innovation in engineering firms is more than new products only. In the programme, SMEs are supported to select and set up at maximum five SMART actions to improve their innovation capacity.

These actions also encompass the innovations these companies aim for. In the analysis process, the actions are coded and classified in nine categories as Figure 1 shows. Moreover, Figure 1 depicts the comparison between the high-tech SMEs and the other SMEs in the sample.

As expected, the comparison reveals similarities and differences. To start with the similarities, the top three of the innovations in both the overall group and high-techs is the same. Participant SMEs primarily aim for improvements in:

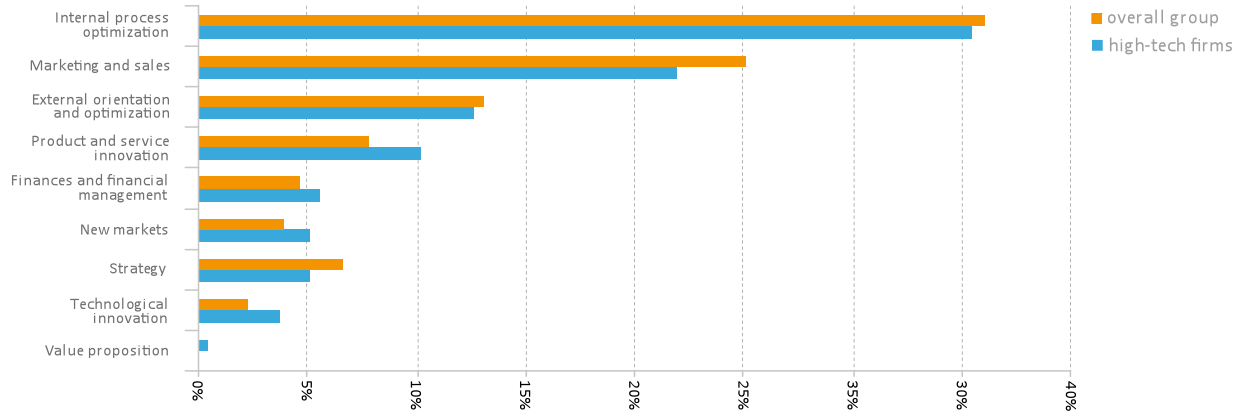
1. the company's internal organization (e.g. communication, organizational structure);
2. their marketing and sales organization (e.g. installing account managers, training engineers in sales negotiation);
3. their external orientation (e.g. cooperation with suppliers, getting to know the competitors, co-creation with customers).

However, the main differences are found in the other categories. Compared to overall group of SMEs, the high-tech participants:

1. aim for more and other product innovations. In the overall group of SMEs product innovation is less prominent and often related to product range renewal, whereas high-tech participants invest in and develop (radical) new products starting for new technologies or applications.
2. are more eager to implement actions that lead to technological innovations in the production processes (e.g. introduction of different quality measurements). This touches upon the core of what they know and like best and this is reflected in the selection of actions.
3. are challenged more by the programme to explore new markets starting from the solution that their products/services can provide. The high-techs are challenged to go beyond the most-evident and well-known markets and expand towards new target groups
4. take more action in strengthening their financial management.

Overall, the lesson confirmed is that to innovate various conditions need to be fulfilled. Participants underline that being competitive in a high-technology environment does not only require R&D and technological skills. The high-tech engineering companies participate in this support programme because despite the strong technical and

Figure 1: Innovations aimed for



functional innovation knowledge and skills, they do not succeed to fully grasp the opportunities in the market. The cases show that what these companies lack to fully benefit from their engineering skills, are skills to manage and market the resulting products/services.

Opportunities for high-tech SMEs following "the inconvenient truth"

Thirdly, nowadays awareness and concern about issues such as sustainability, green product development, corporate social responsibility grow tremendously. In this context, opportunities for high-tech engineering firms rise. Their experimental ways of working allows them to engage in the development of environmentally friendly production processes and products. The question is whether sustainability is indeed an issue in the innovation strategies of the participating high-tech engineering companies. Results are that engineering firms indeed mention sustainability or CSR as one of their strengths. Furthermore, the subject is often mentioned as being an opportunity as 12.3% of perceived opportunities in engineering firms relates to the issue, whereas it is never indicated as a threat. To compare, the overall group of participating SMEs is less optimistic. In the overall group environmental issues are only mentioned in 3.9% of all opportunities, and also appear in the categories where threats are listed (0.7% of all threats) which is not the case for the high-techs.

EUROPEAN FEDERATION OF NATIONAL ENGINEERING ASSOCIATIONS

SCHEDULED INTERNAL MEETINGS 2011

> 3 - 4 February, 2011 - Brussels, Belgium
European Monitoring Committee (EMC)

> 17 February 2011 - Helsinki, Finland
Executive Board Meeting

> 25 February 2011 - Bratislava, Slovakia
Continuing Professional Development Committee (CPDC)

> 19 April 2011 - Berlin, Germany
Executive Board Meeting

> 2 - 3 May 2011 - Coimbra, Portugal
European Monitoring Committee (EMC)

> 23 May 2011 - Brussels, Belgium
Continuing Professional Development Committee (CPDC)

> 16 June 2011 - Brussels, Belgium
Executive Board Meeting

> 7 - 8 July 2011 - Helsinki, Finland
European Monitoring Committee (EMC)

> 7 - 9 September 2011 - Geneva, Switzerland
FEANI Annual Business Meetings (ABMs)

WORLD FEDERATION OF ENGINEERING ORGANISATIONS

CONFERENCES - SYMPOSIA - WORKSHOPS

> 4 - 6 April 2011- Paris, France
WFEO Executive Board (Selected delegates)

> 29 May - 3 June 2011 - Lucerne, Switzerland
Dams and Reservoirs under Changing Challenges
Swiss Committee on Dams

> 10 - 13 July 2011 - Adelaide, Australia
The 8th Asia Pacific Conference on Sustainable Energy & Environmental Technologies (APCSEET 2011)
Centre for Energy Technology at University of Adelaide

> 19 - 22 July 2011 - Adelaide, South Australia
ICWES 15
Engineers Australia, Women in Engineering Committee

> 4 - 9 September 2011 - Geneva, Switzerland
WEC 2011

> 19 - 25 September 2011 - Rome, Italy
The Second World Landslide Forum
The Global Promotion Committee of the International Program on Landslides

> 12 - 14 October 2011 - Hyderabad, India
International Conclave on Climate Change (ICCC-1)
Centre for Climate Change, Engineering Staff College of India

> 24 - 26 October 2011 - Brisbane, Australia
Escaping Silos
Society for Sustainability and Environmental Engineering (SSEE)

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