PSCC 2005, Liège (Belgium)

Full day Tutorial

Future energy sources and technologies for electricity systems

Monday 22 August 2005
9h00 to 18h00 – Palais des Congrès – Salle Rogier

9h00:

- Introduction of the tutorial

Bruno Meyer (EDF R&D), **Albert Germain** (University of Liège)

9h15:

- The development of the energy supply in the next 20 years with a perspective up to 2050. Focus on Europe, with a worldwide outlook.

How will the electrical energy supply develop over the next decades?

- Probable development of the power consumption over the next 20 to 30 years
- Consumption of coal, oil, gas and uranium today
- Known reserves and resources in coal, oil, gas and uranium today
- The fight for the resources
- Role of the renewable energies in the future energy mix
- Energy policy and concepts in Europe, USA, China and Japan
- Development of future technologies
- Electrical energy supply scenarios for 2020 and beyond

Prof Dr-Ing Wolfgang Schröppel (wolfgang.schroeppel@siemens.com), Siemens – Germany

Curriculum vitae of Prof. Dr.-Ing. Wolfgang Schröppel

1965-1970	Study of Power Engineering at the Technical University of Munich
1970-1975	Research in Network Theory at the Technical University of Munich
1975-	Siemens AG, Erlangen/ Nürnberg, D
1990-1995	Vice President Technology, Power Systems Control, Nürnberg, D
1995-1996	Global Development Manager, Siemens, Minneapolis /USA,
1996-2002	President, Energy Management and Information System, USA/D
2000-	Professor at the University Karlsruhe.
1989-1996	Secretary of the IEC TC 57 „Power Systems Control”
2002	Chairman of Power Engineering Society of VDE
Member	VDE, IEEE

10h30: Coffee Break

11h00:

- Fusion: a sustainable energy source

Fusion is one of the few large scale energy source for the future. Progress achieved worldwide made possible the construction of ITER, a first device where significant amount of energy (500 MW) will be produced. The course will review the physical basis of magnetically confined fusion plasma, plasma heating methods. The realisation of a fusion reactor will also involve the development of novel technology in field as diversified as remote handling, material science, superconductivity. The role of fusion in a future energy mix will be outlined. ITER physics and technology will be discussed in details. Finally the road map and the different components of a programme towards fusion reactor will be outlined.

Prof. Dr. Minh Quang TRAN (minhquang.tran@epfl.ch)
Director - Centre de Recherches en Physique des Plasmas, Association Euratom- Confédération Suisse
Ecole Polytechnique Fédérale de Lausanne, PPB-EPFL 1015 Lausanne - Switzerland

M. Q. Tran is born on May 30 1951 in Saigon (Viet-Nam). He graduated in 1973 from the Swiss Federal institute of Technology (EPFL) with the degree of "Ingénieur Physicien" and completed his Ph.D. at the Centre for Research in Plasma Physics (CRPP-EPFL) in 1977. He was Adjunct Assistant Professor at the Plasma Physics Laboratory of the University of California at Los Angeles (1977-1979) and then returned to the CRPP. He is Professor of Plasma Physics at the EPFL since 1997 and Director of the CRPP since 1999. In 2003 he was appointed EFDA Leader, in charge of the joint European development in the field of fusion. In 2005 he was nominated Member of the Swiss Academy of Technical Sciences.

12h30: Lunch

14h00:

- Hydrogen: the future energy carrier?

Renewable energy converters always deliver the power as electricity e.g. hydropower stations, photovoltaic cells or heat. Electricity can be stored in electrochemical cells or capacitors with a limited energy storage density. Hydrogen as a synthetic fuel produced from electricity and water is stored as a gas, a liquid or a solid with an energy density close to the energy density of fossil fuels. Finally hydrogen is combust in an internal combustion engine or better in a fuel cell and releases work or electricity, respectively. In the three sections of the hydrogen cycle the production, storage and combustion several material problems have to be solved. Electrolysers require corrosion resistive electrodes, which exhibit a small over-potential for hydrogen evolution and a gas tight membrane with a high electrical resistance and a high ion conductivity. Hydrogen storage is based on materials, which intercalate hydrogen atoms on interstitial sites and bind the hydrogen with a binding energy of 19 kJ mol-1 H. The ideal storage materials have a small molecular mass and a high gravimetric density. The conversion of the chemical energy in hydrogen to electricity in a fuel cell is the inverse process of the electrolysis. The challenge is to develop materials which allow an efficient conversion and a high volumetric power density in the fuel cell.

Prof. Dr. Andreas Züttel (andreas.zuettel@unifr.ch)
University of Fribourg, Physics Department, Condensed Matter Physics (http://www.ifres.ch)
Pérolles, CH-1700 Fribourg, Switzerland

Dr Andreas Züttel was born 1963 in Bern, Switzerland. In 1985, he earned an Engineering Degree in Chemistry, Burgdorf, Switzerland. He was exchange student in the Netherlands "Polyurethan network formation" with Dow Chemical in Terneuzen, The Netherlands. In 1990 he got his Diploma in Physics from the Unversity of Fribourg, Switzerland and in 1993 the Dr. rer. nat. from the science faculty at the University of Fribourg. 1994 he was Post-doc "Amorphous hydrides and optical films" with AT&T Bell Labs in Murray-Hill, New Jersey, USA. In 1996 Head of the Metalhydride and Energy Storage Group in the Physics Department of the University of Fribourg, 1997 Lecturer at the Physics Department University of Frbourg, 2001 Vice president of the Swiss hydrogen association "Hydropole", 2003 External professor at the Vrije Universiteit Amsterdam, The Netherlands. In 2004 he got the Habilitation in experimental physics at the science faculty at the University of Fribourg. He is Vice-President of the Swiss Physical Society (SPS) and President of the Swiss Hydrogen Association "Hydropole".

15h00:

- The future of solar energy

The tutorial will address the future of solar energy and will cover the photovoltaics conversion, concentrated solar power and solar thermal for water heating. The main topics will be:

1. The solar resource
2. Technology:
    - Principles
    - Performances
    - Costs
    - Environmental impact
    - Medium and Long Term Perspectives
3. Market
    - The market at the beginning of 2005
    - The incentive mechanism
    - Medium and long term perspective
    - The main players

Robert SOLER (robert.soler@edf.fr)
Senior Resarcher, EDF R&D

Robert SOLER, 41 years old, began to work for EDF in 1988 and joined the R&D Division one year later. He is senior expert in the field of solar energy and is currently in charge of coordinating a technical watch on the different uses of this energy. He has been involved for the last 10 years in the fields of renewables and electrification of developing countries.

16h00: Coffee Break

16h30:

- The destination of integrated energy delivery system - From the view point of Japanese experience

- How future of application of renewables is expected in Japan. What are problem for increasing those penetration
- How technologies such as Micro-grids, Energy Storage, superconductivity and H2 applications will be developed.
- Discussion based on Japanese experience through several projects.
- Electricity? H2? or integration of both technologies?
- Relation between "penetration of DGs or new technologies" and “liberalization of utility business"

Dr. Satoshi Morozumi (moro@mri.co.jp)
Mitsubishi Research Institute, Head of promotion office of new electric power supply system, Japan

Satoshi MOROZUMI is Research Director, Energy Policy and Technology Research Division, Mitsubishi Research Institute, Inc. He holds a Ph. D in Engineering from Hokkaido University, Japan in 1986 – At Mitsubishi Research Institute, he has over the 18-years of working experience in consulting projects in the energy sector assigned by the Japanese government and private companies.

17h30: Discussion

18h00: Adjourn

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❑ I register for the Tutorial Eur 150.00 .....

The registration fees include the coffee breaks, lunch and handouts.

TOTAL	**€**

PAYMENT DETAILS (attendance at the Tutorial will only be confirmed on receipt of the full payment)

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