ISCN – GULF Conference

Sustainable academic & corporate campuses:

Time to implement

Track B: University & Sr. corporate leaders

Lausanne – EPFL

June 11 & 12, 2009
Agenda – June 11

13:30 Welcome and opening remarks  P. Aebischer
     H. B. Püttgen
13:50 Setting the stage presentations  R. Stulz
     Y. Loerincik
     S. Dimolitsas
     R. Eichler
15:30 Break
16:00 Briefing by ISCN Working Group leaders
16:30 Open discussion
17:30 Plenary panel discussion
18:15 Transfer to evening reception and dinner
Agenda – June 12

9:00 Setting the stage presentations
   J. Newman
   M. Lehni
   J. Mullinix

10:00 EPFL campus visit

11:40 Closing discussion: where do we go from here?

12:45 Buffet lunch
Main R & D Challenges of the 21st Century

- Availability and broad access of reliable and affordable preventative and clinical health services world-wide

- Production and distribution of food world-wide; conflicts with energy production

- Production, storage, transport, delivery and end-use of energy

Water resources and cycle
Major players in the Swiss energy R & D arena

ETH (Swiss Federal Institutes of Technology) Domain

- Federal Department of Internal Affairs (DHA)
- Board of the Swiss Federal Institutes of Technology
- ETH Board

ETH Domain

- ETH Zürich
- EPF Lausanne

Group of research institutions

- PSI
- EMPA
- WSL
- EAWAG

Competence Center Energy & Mobility

Universities - Cantons

Universities of Applied Sciences

Energy Center

ISCN – GULF; Lausanne – EPFL; Track B; June 11 & 12, 2009
Background: demographic explosion

By 2050, the world population will consist of:

- 3 billion people who will be « energy affluent »
- 3 billion people who will be « energy poor »
- 3 billion new inhabitants of the our planet, primarily living in « energy poor » regions of the world.
Primary energy world wide

The energy growth primarily takes place outside of the OECD

Source: IEA 2008

<table>
<thead>
<tr>
<th></th>
<th>1973</th>
<th>%</th>
<th>2006</th>
<th>%</th>
<th>croiss.</th>
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</thead>
<tbody>
<tr>
<td>OECD</td>
<td>3'747</td>
<td>61%</td>
<td>5'590</td>
<td>48%</td>
<td>149%</td>
</tr>
<tr>
<td>Non OECD</td>
<td>2'368</td>
<td>39%</td>
<td>6'151</td>
<td>52%</td>
<td>260%</td>
</tr>
<tr>
<td></td>
<td>6'115</td>
<td>11'741</td>
<td>192%</td>
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*Exclude electricity trade
**Other includes geothermal, solar, wind, heat, etc.
Electricity production world wide

Primary energy growth: 192 %
Electricity growth: 310 %

The electrification of the world increases quickly

Source: IEA 2008
<table>
<thead>
<tr>
<th>Country</th>
<th>CO₂ emissions per capita</th>
<th>CO₂ emissions per GDP</th>
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<tbody>
<tr>
<td>Switzerland</td>
<td>5.95 tons</td>
<td>0.18 kg/US$</td>
</tr>
<tr>
<td>Austria</td>
<td>9.19 tons</td>
<td>0.37 kg/US$</td>
</tr>
<tr>
<td>France</td>
<td>6.22 tons</td>
<td>0.27 kg/US$</td>
</tr>
<tr>
<td>Germany</td>
<td>10.29 tons</td>
<td>0.43 kg/US$</td>
</tr>
<tr>
<td>World</td>
<td>4.18 tons</td>
<td>0.76 kg/US$</td>
</tr>
<tr>
<td>Europe 25</td>
<td>8.46 tons</td>
<td>0.44 kg/US$</td>
</tr>
<tr>
<td>North America</td>
<td>19.49 tons</td>
<td>0.55 kg/US$</td>
</tr>
<tr>
<td>China</td>
<td>3.65 tons</td>
<td>2.76 kg/US$</td>
</tr>
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Two types of challenges

From the data given above, one should come to the conclusion that there are two types of challenges:

- In industrialized countries, the challenge is the rational – sober - utilization of energy.
  - Energy efficiency

- In emerging countries, the challenge is a massive increase in energy production while avoiding a catastrophic impact on the environment.
  - Environmental impact
**EPFL Energy Center vision**

- Development of sustainable energy production, storage, transportation, distribution, and end-use systems and technologies.

- Proactive engagement in the formulation and implementation of the private and public sector policies and strategies required to achieve such development.

- Position EPFL as the indispensable partner for the private and public sectors in these activities
Energy Center activities

- Exploratory - disruptive research
- Design, implementation and operation of innovative energy systems and technologies
- Public policy and regulatory processes in support of energy solutions
- Professional development and executive education
EPFL energy research focus areas

Renewables

- **Hydro**
  - Turbines
  - Civil engineering
  - Electrical machines
  - Power electronics

- **Wind**
  - Environmental simulations
  - Environmental monitoring

- **Solar**
  - Thin-film
  - Dye cell

- **H₂**
  - PEC technologies
  - Materials for storage
EPFL energy research focus areas

**Energy processes**

- Electric power systems – distributed electric systems
- Buildings Energy management
  - PV integration
  - Renovation technologies and processes
  - Heat pump technologies & integration
- Industry Multi-energy systems and networks
  - Heat pump systems development
  - Energy balance studies
- Clean transportation systems
- Urban energy systems
EPFL energy research focus areas

Nuclear
- Controlled fusion
- Nuclear reactor safety

Regulatory and Public policy issues

Behavioral modification & energy conservation
The Roundtable on Sustainable Biofuels
An EPFL Energy Center initiative

Ensuring that biofuels deliver on their promise of sustainability
Energy Center RSB Sponsors
In the context of a post-petroleum economy:

- Reduce the CO₂ emission by a factor 4 by 2050
- Reduce the hydrocarbon dependency

Two world-leading academic partners with EDF:

- Ecole Polytechnique Fédérale de Lausanne
- Ecole des Mines de Paris

ECLEER: European Centre and Laboratories for Energy Efficiency Research

Objectives:

- Accelerate the research and innovation pace
- Federate the efforts of leading institutions
Federating projects
ECLEER – EDF & Ecole des Mines & EPFL

- Four main subjects
  - Heat pumps
  - Industrial processes energy efficiency
  - Buildings and solar systems integrations
  - Socio-economic aspects
Topics for discussion

- How important is it to include sustainability within the « corporate image » of academic or corporate organizations?
  - Marking & sales
  - Recruitment of best talents

- What are the key elements when implementing a sustainability « état d’esprit » on campus?
  - Positive drivers
  - Obstacles

- Is there a need to propose and establish broadly-agreed upon indicators to « rank » academic institutions as to how « green » they are? If so, how?

- Can joint ISCN – GULF activities, such as this conference, be a « win-win » situation?