Panel discussions

Panel 1: Modelling and Simulation in Cleantech

Chairs:
Bernt Lie, University College of Southeast Norway, Norway
Jesús Zambrano, Mälardalen University, Sweden

Panelists:
Luis J. Yebra, CIEMAT-Plataforma Solar de Almería, Spain
Erik Dahlquist, Mälardalen University, Sweden

What is cleantech? Cleantech consists of products and services which are focused on the use of renewable natural resources and recycled materials in an energy-efficient way. Cleantech utilizes biological natural resources and turns them into food, energy, and other products and services. Cleantech uses clean technologies, which saves the environment by efficient recycling of materials. How? We have a broad range of technologies related to recycling, renewable energy, information technology, green transportation, electric motors, green chemistry, lighting, grey water, and more. Does this mean that cleantech is gradually introduced in all areas?

The environment is restored with pollution removal and avoidance. What can we do in practise? Air has been a focus area in industry, energy and traffic. Water treatment has been developed to remove undesirable chemicals, biological contaminants, suspended solids and gases from contaminated water. Where do we have the main risks? Availability of usable water may set constraints on operation. In industrial processes, closed water circulation is a goal which is beneficial for the environment. Wastewater treatment is needed for purifying contaminated water before returning it to the nature. Why are there difficulties in combining industrial and domestic wastewater treatment? Mining introduces many challenges for the environment. Renewable energy, including wind power, solar power, biomass, hydropower, biofuels etc., is an essential part in integrating cleantech with the energy production. Waste can be used as raw material or fuel in many ways. Power plants can use waste in energy production. What are the main challenges?

A circular economy aims to close the loop to make economy more sustainable and competitive. This should be more than just recycling. What does this mean? Water and wastewater treatment are good examples. There are challenging tasks for Information technology, modelling, control and optimisation. How can we proceed? What kind of Modelling and Simulation is important in cleantech? How can we compare alternative solutions and build situation awareness? The problem solving in cleantech includes the smart integration of all the historical elements, earth, fire, water and air, with data.

Panel 2: Future Energy Systems

Chairs:
Erik Dahlquist, Mälardalen University, Sweden,
Cristian Nichita. University of Le Havre, France

Panelists:
Rebei Bel Fdhila, ABB Corporate Research, Sweden
Luis J. Yebra, CIEMAT-Plataforma Solar de Almería, Spain Panelists:

A thermal power station or a coal fired thermal power plant is by far, the most conventional method of generating electric power with reasonably high efficiency. Technology has reached very high levels and environment is in focus in many ways. Bioenergy takes an increasing portion of the production: a wide variety of materials are used as fuels. Oil and gas hold a very strong position in overall energy usage. Biofuels provide new competing alternatives. CO_2 capture has taken a high role in research. Is it important also in practise? Are we going to bioeconomy? Is the thermal power a necessity in our energy balance?

Sustainable or renewable energy is considered as a future source of energy, but it is already strong in many forms: water power is well integrated in the energy system; solar and wind are getting more popular; geothermal, wave and tide energy can be locally very important. Electricity is increasingly popular both in solar and wind power. To what level it is sufficient? Efficiency is not very high in solar panels. Wind power cannot reach sufficient operating hours. We need storages but can we find practical solutions? Solar thermal power plants, especially concentrating technology, provide higher efficiency. There are many feasible solutions to thermal storage. What to use? How to design a system? What is needed in control? There are unavoidable disturbances.

Where do we use energy? Industry needs high reliable levels. Is the nuclear power a solution? Adaptation is easier in domestic use, but how to do it? Heating and cooling take the highest part. Solar energy can help but needs storage. Geothermal can be used as storage. What is the potential of buildings as storages? Do we need small scale Combined Heat and Power (CHP)? District heating systems are good solutions to bring the thermal energy to buildings. Smart grids have studied mainly for electricity. What do we need for smart thermal grids? In northern areas, we have consumption peaks. Can we cut them with smart adaptation? Traffic is under change: electricity is gaining popularity; interesting biofuels have been introduced; fuel cells are considered as a future option in the way to the hydrogen economy. How to integrate these with sustainable energy? How to choose an operable portfolio from the increasing alternatives of energy production?

Panel 3: Intelligent Systems and IoT in Future Automation

Chairs:
Esko K. Juuso, University of Oulu, Finland
Lars Eriksson, Linköping University, Sweden

Panelists:
Roy Calder, Schneider Electric, United Kingdom
Yukinori Suzuki, Muroran Institute of Technology, Japan
Galia Weidl, Daimler AG, Germany

In industry, intelligent systems have been developed for integrating data and expertise to develop smart adaptive applications. Recently, big data, cloud computing and data analysis has been presented as a solution for all kinds of problems. This provides feasible new things in global business and digitalisation in new applications. Can we take this as a general solution for automation? Are sensors only for collecting data to clouds? However, e.g. condition monitoring introduces huge volumes of data. Wireless solutions are improving fast: 3G, 4G, 5G. But can we transfer signals to clouds and store the data? Is this too much? Where is the expertise? Obviously, local calculations are needed. Are they based on intelligent systems? Also the security of the automation becomes increasingly important in distributed systems.

Transport systems are analysed as discrete event systems to find bottlenecks and avoid risks. Urban traffic is becoming an important area. Autonomous driving is a hot topic. What is needed to embed this in the urban traffic? Are there analogies with industrial systems? Mechatronics is an essential part in machines and many process devices. IoT with sensor development and access to traffic information opens up many opportunities for planning and control of transport through optimization.

What are the main differences between industrial systems and transport systems? Can we use similar control solutions? What can we learn from other areas? Can we find analogies? What is common? Where do we have differences? What kind of models do we need? What should the control