

HK 20: Energy for the future

Time: Monday 16:30–19:00

Location: H-ZO 50

Invited Group Report HK 20.1 Mo 16:30 H-ZO 50
Energy Initiatives of the European Physical Society —
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We are all aware that energy is gradually getting a rare commodity on one side and that the consequences of burning fossil fuels lead to major changes of our climate. Physics plays a crucial role in the improvement of established energy technologies but also in the development of new energy sources. Electricity is the highest form of energy in a technical context and plays a specific role for societies and their economies. In my report, I will try to elucidate the role physics can play in photo voltaic systems, in nuclear fission and in nuclear fusion. These are areas where the European Physical Society and its Member Societies play an important role in the dissemination of scientific results. Based on its analyses the EPS tries to influence the development of a European energy policy with position papers. In addition, EPS and many of its Member Societies have active Energy Working Groups. Some of the findings and recommendations resulting of the work of these groups will be summarized.

Invited Group Report HK 20.2 Mo 17:00 H-ZO 50
European energy options — ●SVEN KULLANDER — Royal Swedish
 Academy of Sciences, Box 50005, S-10405 Stockholm, Sweden

Energy produced inside the EU27 provides 46% of gross inland consumption. Nearly half of the production comes from nuclear and renewable sources. The EU27 fossil-fuel share of the consumption is 80% since the import consists of fossil fuels. The main target for the EU energy policy is to reduce the CO₂ emissions and secure the supply; the dependence on imported fossil fuels must decrease.

The most promising energy sources in a long-term perspective appear to be concentrating solar power, suitable for South Europe, and nuclear energy. Intermittent energy sources such as wind and waves require matching energy, for example hydropower. Bioenergy, particularly motor biofuel, is often considered to be a powerful alternative to fossil fuels. However, competition with food production, biodiversity considerations and greenhouse gas emissions are factors against extensive use of biomass for energy production.

Increased use of electricity for example in the transport sector can be foreseen. Since electricity converts energy to movement essentially without heat losses, important savings can be made when fossil-fuel combustion is replaced by electricity. Since Europe is a rather small continent, a European electric power grid should be a major option for securing electricity supply.

Invited Group Report HK 20.3 Mo 17:45 H-ZO 50

Technology for Society's Energy and Climate Needs - Economic Analysis of Policy Options — ●GUNNAR ESKELAND — Norwegian School of Economics and Business, Bergen, Norway

Taxes levied on energy and emissions (or alternatively tradable quotas, as in the Kyoto protocol or Europe's Emission trading system) can do a lot for problems associated with emissions or energy security. Policy instruments such as support for renewables, feed-in-tariffs and energy efficiency support are not that easily understood or justified in basic economics textbooks. But issues of distribution - political feasibility - indicates that these supplementary policies will be prevalent. A consequence is that emission reduction initiatives will be rather short-sighted: since energy prices and emission prices will be lower than optimal, far-sighted research and development will be below what is socially optimal. We argue that public expenditures on energy research and technology is justified and unavoidable. Without it, Europe meets its goals for the short to intermediate term (2020), but fails to address longer term objectives.

Invited Group Report HK 20.4 Mo 18:30 H-ZO 50
Nuclear Energy of the Future — ●ADRIEN BIDAUD, S. DAVID,
 and O. MÉPLAN — LPSC, Université Joseph Fourier Grenoble 1,
 CNRS/IN2P3, INPG, France

The coming century may see the end of standard fossil fuels, which represent today 75% of the world energy production and the climate change induced by their greenhouse gas releases. In this context, nuclear power appears as the only energy source available today, able to respond significantly to the growing world energy demand.

Present reactors are based on the fission of U-235 which represents only 0,7% of natural uranium. In a scenario of significant growing of nuclear energy, uranium reserves would be consumed in a few decades. Moreover, the waste production associated with these standards technologies should limit their deployment. It appears clearly today, that innovative technologies such as: GEN IV, thorium fuelled and accelerator-driven reactors have to be explored, in order to reduce considerably the ore consumption and the associated waste production.

We will present the links between the management of minor actinides, the need for electricity at the global scale and the start up of GEN IV reactors. Innovative reactors and fuel management facilities can only be built within a very clear legal frame defining the policy regarding safety, dismantlement, waste management, and proliferation. Thus, not only the contributions of nuclear physicists to the efforts of innovative reactor design, but also the importance of public acceptance and the weight of political choices will be pointed out.