presentation in this important area. The situation may also account for comments by other German groups that development and engineering skills have been "wasted" owing to the absence of a long-term commitment to energy conservation.

Sophisticated Systems Analysis

J. Gretz (JRC, Ispra) who manages the European Community's (EC) hydrogen in transport programme on behalf of the EC Parliament (hydrolytically produced H_2 is shipped from Canada for a fleet of buses which are are already operating and for a H_2-powered passenger aircraft due to fly next year) analysed the limiting performance of specific systems. Solar energy conversion is limited to about 70% efficiency, while the global efficiency of photosynthesis, in spite of a 33% quantum efficiency, is below 1%; the influence on the climate of a solar power plant is proportional to the difference between its conversion efficiency and that of the terrain it replaces (currently fairly small, but likely to increase); electrolysis is more efficient overall than thermochemical cycles for producing H_2 (belief in the opposite misdirected research for many years — a potent reminder of the importance of careful analysis). Atmospheric CO_2 can be managed using forestry (foresting 6% of the Earth's surface will absorb all of the CO_2 produced today) so it was fitting that J.T. McMullan, who heads the the University of Ulster's Centre for Energy Research, described a detailed analysis of power generation from wood combustion. A 1000 t/day plant is optimum, and the UK has enough productive woodland to support 60 plants generating 3000 MW in a neutral way with respect to greenhouse gas emissions.

According to W. Eichhammer and E. Jochem (Fraunhofer Institute, Karlsruhe) the potential for energy (and entropy) savings in large-scale, regional energy supply systems will be more important in the domestic sector than in industry. Experience with gas-driven heat pumps for air-conditioning in Japan and with co-generation units in Denmark has shown the value of consistent, long-term planning in the domestic sector. Potential savings in transport are also large, and R.D. Kühne (Steierwald Schönharting GmbH, Stuttgart) described how government policies are being used to reverse the trend towards modes involving high energy consumption.

C.D. Andriesse (University of Utrecht) took the case of co-generation to demonstrate the utility of fairly simple analyses for "braking entropy production". A device producing slightly more kinetic energy than heat is optimum, and given the relative cost of transporting electricity and heat, it should be rated at about 10 MW. A more sophisticated stochastic optimization model described by R. Kümmel predicted roughly 20% reductions in CO_2 production and energy consumption for a German city using local co-generation. But the 40-50% increase in costs are only economic in the entrepreneurial sense if energy prices double, or even triple. Extending models requires much more detailed information on energy demand along the lines being addressed by a new 50 MDM German project called IKARUS, probably the largest study of its type in Europe.

Although technology will be a necessary but not a sufficient condition for energy conservation, this is not the reason why contributions on energy conversion and saving technologies and materials will not be summarised. It is simply too difficult to do justice to the many physics concepts involved in the topics presented (convective thermal rectification, thermoionics, photovoltaics, combustion diagnosis, light concentration, spectrally selective materials). Readers are referred instead to the report of the meeting. Little was said about monitoring and datataking, aspects of entropy braking in the widest sense to which physics increasingly contributes.

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P.G. Boswell

1993 EPS High-Energy and Particle Physics Prize

The High-Energy and Particle Physics Prize of EPS, awarded every two years through the High-Energy and Particle Physics Division, has been won this year by Martinus J.G. ("Tini") Veltman of The University of Michigan, Ann Arbor, USA, for pioneering work on the rôle of massive Yang-Mills theories for weak interactions. The prize will presented at the International Europhysics High-Energy Physics Conference, Marseilles, 22-28 July 1993. Previous winners are G. Charpak (1989) and N. Cabibbo (1991).

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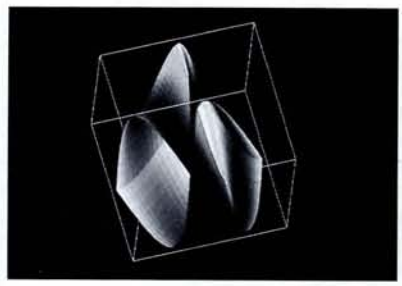
Visualization of a parametric surface



A figure produced with the statement: View[{Cos[u],Sin[v], u*v/10},{u,-Pi,Pi},{v,-Pi,Pi}]. *Descartes Visualization* acts as the link between *Mathematica* and the AVS™ visualization program. The rigorously defined object could, for example, represent stream flow.