

Solar panels and the future—Simon Norcross assesses the prospects

Twelve members of the EFG gathered at Oetrange on 29 September to hear Simon review the prospects for climate change of innovations in photovoltaic (PV) technology.

Simon began by pointing out that PV was not a ‘silver bullet’ to solve the climate change problem: there would continue to be a need for improvements in energy efficiency (especially for domestic heating), transport and agriculture, and solutions to the problems of deforestation and methane released from the permafrost.

In the case of renewable energy from PV, research on which is also being conducted at the prize-winning Laboratory for Photovoltaics at Luxembourg University, there were three technical challenges: how to generate it more efficiently and cheaply; how to store it; and how to redesign the supply network to incorporate the decentralised sources of power generation, a very expensive task.

Electricity in Luxembourg comes from a variety of power sources: in 2013 the mix was 51% hydro, 12% natural gas and 9% nuclear, with small contributions from other green and less clean resources (wind: 4%, coal and lignite: 9%). PV contributed only 1.2%. Research since 1975 had improved PV cell efficiency, which was potentially capable of reaching 86%; the current optimum was 44%. But it was important not to confuse installed capacity with actual power output, which depends on the presence of sunshine.

Future developments included ‘thin film’ PV, which was bendable and thus more adaptable; building-integrated PV, incorporated in building materials; large-scale PV, potentially using areas such as road surfaces; and concentrated PV, in which energy is condensed to increase capacity. Excess heat in solar cells could be redirected, for instance to heat water.

Worldwide, capacity was increasing fast: it grew 49 times between 2000 and 2014. Though costs were falling, PV remained about twice as expensive as wind power or fossil fuels. Where, as in Germany, government subsidies to the private citizen are phased out and the end-user price rises, public support for PV could melt away. If the temporary storage problem can be fixed, PV module production costs continue to fall and energy efficiency in transport and heating continues, its contribution could be very significant.

Questioners raised the practicality of monitoring the efficiency of individual PV arrays (digital displays); the feasibility in Luxembourg of zero-energy buildings; and the comparative efficiency of solar water heating, which recovers its cost sooner than PV.