IEA Experts' Group on R&D Priority Setting and Evaluation (EGRD)

Workshop on Space Cooling

17-18 May 2016
IEA, Paris

Research, development, and deployment of innovative technologies are crucial to meeting future energy challenges. The capacity of countries to apply sound tools in developing effective national research and development (R&D) strategies and programs is becoming increasingly important. The Experts' Group on R&D Priority Setting and Evaluation (EGRD) was established by the IEA Committee on Energy Research and Technology (CERT) to promote development and refinement of analytical approaches to energy technology analysis, R&D priority setting, and assessment of benefits from R&D activities.

Senior experts engaged in national and international R&D efforts collaborate on topical issues through international workshops, information exchange, networking, and outreach. Nineteen countries and the European Commission participate in the current program of work. Results provide a global perspective on national R&D efforts that aim to support the CERT and feed into the IEA Secretariat's analysis.

For further information about EGRD activities, see:
http://www.iea.org/aboutus/standinggroupsandcommittees/cert/egrd/

To view the agenda and presentations for this workshop, see:
https://www.iea.org/workshops/egrd-space-cooling.html

This Executive Summary reflects key points that emerged from the discussions held at this workshop. The views expressed in this report do not represent those of the IEA or IEA policy nor do they represent consensus among the discussants.

The full workshop report, including detailed information on individual sessions and presentations, has been prepared by the organisers and may be consulted at http://www/ieadsm.org/egrd.

EXECUTIVE SUMMARY

The IEA's Experts Group on Energy R&D and Priority Setting organised a workshop on 17-18 May 2016 in Paris, France. The workshop focussed on space cooling and addressed the reason for the increase in energy demand for space cooling as well as available and future technologies and policies to meet the demand in various countries. With input from speakers representing public authorities, research and the private sector, the participants discussed key technologies, innovation, target-oriented RD&D programs and reasonable incentives to reduce the energy demand responsible for CO_2-emissions from space cooling.

Experts agree that energy demand for cooling is growing fast. Sales of simple air-conditioning units are growing exponentially, partly because they have become affordable for many citizens in countries like India, China and parts of Latin America. This process is stimulated by increasing welfare as cooling is considered a luxury good and more importantly as people can afford more comfort!

Further, demand is growing because of climate change. The latter is not just caused by general rise in temperature, but by the development of so-called hotspots. Especially in dense urban areas these "heat islands" are responsible for an increased local energy demand.

Although it is generally acknowledged that the energy use for space cooling is increasing, existing statistics on global and regional demand are proprietary and limited which might not be well suited for public dissemination and public decision makers.

A portfolio of technologies and mechanisms aim at reducing overall energy use for space cooling, but cooling is also used to reduce peak load (especially in warehouses and supermarkets). The RD&D aim at developing alternative lower global warming potential (GWP) refrigerants, the improvement of technology like vapour compression, adsorption heat pumps, thermos-elastic or membrane cooling systems and the combination of mechanical cooling and renewable (solar) energy. The last combination is interesting because the cooling and energy production peaks are similar.

The efficiency of cooling is strongly climate dependent. Cooling in humid climates is far less effective than in dry areas, something which technologies manage. RD&D focus on how to reduce or avoid the use of energy for cooling, including better insulation and passive cooling. Design is also a prioritised RD&D area, ranging from optimised passive use and insulation to the development of efficient and effective district cooling. Experts discussed the tipping point to go from individual (or even personal) cooling to central and distributed systems and found that this trade off was very context specific and needed more research.

On the policy side there are a couple of topics. Relatively high global warming potential (GWP) refrigerants like the hydrofluorocarbons (HFC) R134a and R410A are used in increasing measure in the developed world as substitutes for phased-out ozone depleting refrigerants for space cooling and other applications. Concerns about global climate change are driving increasing pressure to reduce, and finally ban their use in favour of lower GWP alternatives. Labelling on the other hand is driving technology to be more energy-efficient especially if supporting a development towards (near) zero buildings. Efforts also include integrated energy policy approach combining buildings, cooling and

behavioural mechanisms. With the launch of the Mission Innovation in December 2015 and the pledge by member states to double their energy R&D funding by 2020, it is expected that technological and systemic advances in cooling space will be prioritised.