BOOK REVIEWS

Energy Storage for Energy Management

This book is the Proceedings of the 2nd BHRA Fluid Engineering Centre's international conference on energy storage, energy storage for energy management, held in Stratford-upon-Avon, UK, on 24–26 May 1983.

Twenty-three papers were presented by authors from the UK, Sweden, Germany, Belgium, Italy, the United States, and Canada. Fifteen of these papers were submitted by people representing industry or consulting firms and this had a definite impact on the conference. Practical aspects of energy storage problems and questions of economic feasibility were strongly emphasised. This does sound optimistic for it indicates that energy storage has reached a more mature stage of its development.

The discussions were held in eight sessions. Five papers given in two introductory sessions presented an overview of the present situation and the potential for future industrial energy storage in the European Communities, which have been conducting extensive research and development programmes in the area of energy storage and waste heat recovery in recent years. Thermal, electrical and mechanical energy storage applications were surveyed. Hot water storage is considered to offer the most opportunities and high economic effectiveness, and is superior to steam storage in thermal systems. In the area of electrical systems, availability of cheap off-peak power is very attractive, stimulating development of purely electrical as well as combined fossil fuel–solar–electric energy storage systems for space heating. Application of flywheels in mechanical energy storage is usually found to be too expensive or technically not feasible. An obvious, but often overlooked point, was raised in discussions of process waste heat recovery: 'You do not recover heat if you don't know how you can possibly use it!'. Over 50% of the industrial potential for heat recovery cannot be used because no applications have been identified for the recovered heat.

The first two technical sessions of the conference were devoted to energy storage applications in home space heating. Heat storage in fossil-fuel fired systems, electric boilers, solar systems and phase change systems were discussed with emphasis on experimental performance evaluations.

Three large-scale energy storage systems were presented in session E. Heating and refrigeration systems were both discussed. All reported applications were claimed to be successful, even if only by allowing for appreciation of complexity of the problems.

Two systems with heat pumps were described in session F. A system comprising a sorption heat pump with a zeolite absorber was presented in one paper, whereas a general concept and some results of laboratory experiments with a self-driven chemical heat pipe were discussed in the other of the two papers given in this session. Significant improvements in thermal efficiency compared with conventional devices are claimed in both papers.

The problem of evaluating the thermal performance of heat storage systems in various applications was discussed in session G. A comparative study of a phase change system against a water storage system revealed that certain advantages of the former system (reduced storage volume) are offset by a significantly higher cost. The importance of collector area as an optimisation criterion in designing solar systems was indicated. An area of the solar collector has a far greater effect on system performance than, for example, storage volume. Solar system performance is indeed most sensitive to the collector area, but one should not carelessly size the storage unit.

Problems associated with energy storage in electric utilities were discussed in session J. One of the interesting problems addressed here was the use of excavated caverns for large capacity energy storage.

In session K, entitled 'Latest technology', only one paper giving an overview of the Solar Energy Storage Program at the Solar Energy Research Institute in Golden, Colorado, USA, was presented. The main objective of the programme is to develop thermal energy storage systems for solar thermal power and process heat application which would become competitive with fossil-fuel powered systems between the years 1990 and 2010.

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