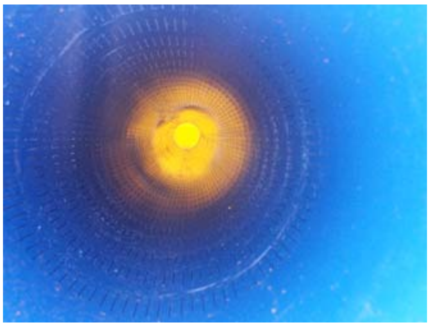
International Energy Agency

Energy Conservation through Energy Storage Programme

Annual Report 2008

Contents

Preface

ENERGY CONSERVATION THROUGH ENERGY STORAGE IMPLEMENTING AGREEMENT

The Implementing Agreement (IA) started in 1978. Its present term ends by the end of 2010. At present, Contracting Parties from the following countries have signed the Implementing Agreement: Belgium, Canada, Finland, France, Germany, Japan, Korea, Norway, Sweden, Turkey, USA and IF Technologies from The Netherlands and the Institute of Heat Engineering (ITC) of the University of Technology, Warsaw, Poland as sponsors. The Executive Committee is working intensively to attract more countries to join the activities and to sign the Implementing Agreement in particular China. New Zealand, Slovenia, Australia, Brazil, Bulgaria, India, Israel, Malaysia, South Africa and Switzerland are also interested. Experts from several countries do already participate in the Annex work as observers.

According to the new Strategy Plan (2006 – 2010) approved 2005 the strategic objectives for the IA are as follows*:*

Technology: Maintain and develop international technical RD&D collaborations that further the environmental and market objectives.

Environment: Quantify and publicise the environmental and energy efficiency benefits of integrated energy storage systems.

Market and Deployment: Develop and deliver information to support appropriate market deployment and provide effective collaboration and information to stakeholders."

The Executive Committee co-ordinates and leads the collaborative work in the Annexes and the Committee also takes an active part in various information activities such as workshops, seminars and conferences.

Introduction

We need energy – electrical or thermal – but in most cases not where or when it is available. Enjoying the sound of music while you are jogging, you can not stand beside the socket: electrical energy storages – batteries – make you mobile. The energy you need is stored for a short while and over the distance you like to run. Having a cold beer on a summers evening was possible even before cooling machines were invented. At that time people were cutting ice from the lakes in winter, transported the ice to the brewery and stored it in deep cellars. The cold was stored form the winter to the summer: An example for long term thermal energy storage and the utilization of renewable energies. In cold climates surplus solar heat from summer can be used in winter for heating of buildings by seasonal storage.

Waste heat from industrial processes, steam from solar thermal power plants or electricity from photovoltaic panels are examples for energy sources, which can not be used more extensively without energy storages. A huge potential of energy sources substituting fossil fuels can only be exploited by energy storage systems, utilizing renewables like solar thermal, PV and wind energy. Thermal and electrical energy storage systems enable greater and more efficient use of these fluctuating energy sources by matching the energy supply with the demand. This can finally lead to a substantial energy conservation and reduction of CO_2 emissions. The growing peak demand of today's energy consumption, essentially caused by electrical air conditioning, leads more often to black-outs all over the world. Such a problem – the shifting of a peak demand for only a few hours or minutes – can be solved by cold storage technologies. In this context energy storages can be the best solution not only from the technical point of view, but also for economical reasons.

The energy to be stored can be either electrical or thermal. Both energies require completely different storage technologies. However in the actual application both technologies can meet: The peak demand of electricity for example is in most cases caused by air conditioning, which is a thermal task. The cooling demand can be covered by a cold store (ice or chilled water) which is charged at off peak hours by electric chillers. Energy storages can be described by their storage capacity (stored energy per mass or volume), power (energy output per time), storage period (how long the energy should be stored) and size. All these parameters can vary over a huge scale: From latent heat storage to prevent laptops from getting too hot (stored energy in the range of a few Wh) to the heat and cold thermal underground storage system underneath the German Reichstag in Berlin (stored energy in the range of some 2 GWh).

Many governments have committed to reduce CO_2 emissions into the atmosphere. They have decided to strengthen their national efforts and the international co-operation for research and development (R&D) in the International Energy Agency (IEA) and to increase the deployment of energy conservation technologies and utilization of renewable energy sources. So far in most industrialized countries, renewable energy sources contribute only marginally to satisfy energy demand. Energy storage technologies can help to solve problems caused by the intermittent energy supply of these sources. There is a huge potential for the application of energy storage systems. The fact that energy storage systems are not as widely used as they could, is due to several reasons, in particular because most new storage systems are not yet economically competitive with fossil fuels and their long term reliability and performance is not yet proven. There are still some regulatory and market barriers which have to be overcome. Therefore, further attempts are being made to resolve these issues.

The IEA Implementing Agreement on Energy Conservation through Energy Storage provides the platform for international co-operation (www.iea.org) in R&D, D. After almost 3 decades of R&D the emphasis of the co-operative RD&D efforts has shifted towards to implementation and optimal integration of new storage technologies for an efficient use of energy and renewable energy sources. In the future more application oriented topics like thermal energy storage for cooling and industrial processes or mobile thermal storage systems for the utilization of waste heat will be investigated. The issue of implementation and deployment of new energy storage technologies has become a higher priority as the R&D phase is concluding.

Chairman´s Report

The world is not on course for a sustainable energy future. Improved energy efficiency is one of the cheapest, fastest and most sustainable ways to safe the world's environment. Energy storage is a key component in many energy efficient systems.

Even if the technologies for thermal and electrical energy storages are completely different, the reasons for their use are quite similar: Increasing the total energy efficiency of a system consisting of one or more energy sources and users.

Which storage system fits the demand best strongly depends on the boundary conditions.

ECES made in 2008 a meaningful decision: In future we are going to take both technologies into account: thermal and electrical storage systems for stressing the general meaning of energy storage.

In many countries a lot of research and development is carried out concerning energy storage technologies itself and their system integration, too. But beyond the partly remarkable competitiveness, there is still a great potential of increasing the energy efficiency in the different sectors. There is still a high demand for further Research and Development activities. Improving thermal and electrical storages is one very important topic and ECES is going to continue on this in future.

Achievements in 2008

Within 2008 three new annexes have been approved, strengthen both: The basic R&D activities concerning storage materials and the system development in general and the need for Research with regard to applications.

According to the last topic, the newly-approved Annex 22 is dealing with Storage integration in greenhouses, whereas Annex 23 examines the role of Energy Storage in low-energy Buildings of the Future.

The third new annex stresses the meaning of Energy Storage as a cross-cutting issue, I am very glad that we have been able to start this Annex as together with the Implementing Agreement “Solar Heating and Cooling”: Annex 24 focuses on compact thermal storage materials and their system Integration.

In 2008 we have two very interesting ExCo Meetings: The first took place in France in Spring, the fall meeting was in South Korea.

So we got to know fantastic impressions from quite different countries and we were pleased from their hostility.

To conclude, 2008 was a very successful year for our Implementing Agreement, we have been able to extend our activities on Annex-level and made a very important decision concerning the role of Energy Storage in future by taking into account both thermal and electrical energy storages.

Support by the IEA-Secretariat

I would like to take the opportunity to thank all colleagues for their continuous efforts and engagement, in particular Jeppe Bjerg (IEA-desk officer) and Dr. Andreas Hauer (ECES scientific secretary).

Ongoing Activities

In 2008 4 Annexes were performed by the "Energy Conservation through Energy Storage" Implementing Agreement.

Annex-No.	Title	Tim Schedule	Operating Agent
1	Transportation of Thermal Energy Utilizing Thermal Energy Storage Technology	2006 -	KTH / Sweden
1	Optimised Industrial Process Heat and Power Generation with Thermal Energy Storage	2006 -	DLR / Germany
2	Sustainable Cooling with Thermal Energy Storage	2006 -	Nagoya University
2	Thermal Response Test	2007 -	ZAE Bayern / Germany

Annex 18: Transportation of Thermal Energy Utilizing Thermal Energy Storage Technology

A key component in a sustainable energy system is to be able to use thermal energy from various sources at a consumer located at a distance from theses sources. For this purpose, the thermal energy has to be transported from one place to another. This could be achieved by using thermal energy storage technology. Depending on the distance, the storage medium could either be pumped through pipelines or for longer distances the TES itself could be transported on a truck or a train. The crucial properties of the TES for the technical and economical feasibility are the storage capacity per volume and weight and the possible charging and discharging power, which affects the possible number of storage cycles per time.

Annex 18 was approved by the Executive Committee at the meeting in June 2006 and will proceed until December 2009. Operating Agent is Royal Institute of Technology KTH / Sweden.
Participating Countries: Germany, Japan, Sweden

Activities 2008
The work in the annex is organized into three subtasks:

1. Pumpable thermal energy storage technologies (slurries, emulsions, etc)
2. Thermal energy storage transportation using truck, train or boat.
3. Thermal energy storage in vehicles – vehicle waste heat recovery and transportation of temperature sensitive goods.

R&D activities within the annex has during the period of 2008 included:

- State-of-the-art developments in the area of multifunctional fluids such as phase change slurries based on micro-encapsulation or emulsion technology..
- Techno-economical case studies on the transportation of industrial waste heat to heating demands using truck, train or boat.

The fourth Workshop and Experts' Meeting was held in Lleida, Spain, in April 2008. This workshop was held jointly with the IEA/ECES Annex 19 on Optimised Steam and Power Generation through TES. The common aspect between the two annexes was high-lighted – the need for development of functional and cost-effective thermal storage technologies for high-temperature storage. Approximately 10 technical notes/presentations are published on the Annex 18 website – www.webforum.com/annex18 .

The fifth Workshop and Expert's Meeting was held at the ISE Fraunhofer, Freiburg, November 2008. High-lights were:

- an updated networking with the IIR working party on ice slurries;

- a presentation of the Japanese Eco-Run-Cool project using a dynamic cold storage for temperature regulation of goods during transportation (see picture below);
- as well as a comprehensive presentation of key factors influencing the economy of transportation of heat by truck, train and boat.

Elements of the Eco-run-cool refrigeration container: (1) dynamic ice storage tank; (2) forced convection air cooler; (3) ice slurry circulation pump (Courtesy of Professor Yukitaka Kato, Tokyo Institute of Technology, Japan). Saving up to 30% CO2 emissions as compared to conventional on-board cooling.

At the end of the year, two demonstration projects for the external utilization of industrial waste heat by means of advanced energy transportation was under way within the annex 18 partners. Also, an extensive R&D project on pumpable solutions like Phase Change Slurries using micro-encapsulated PCM or emulsions is in progress. Several projects for using thermal energy storage in vehicles are being monitored.

Future Activities

- Fall 2009: results analysis, and the production of a final report including conclusions from the Annex 18.
- Experts' teleconference, October 2009.
- Presentation of draft final report at the ExCo meeting in Japan, November 2009.
- Finalization of final report and dissemination of results (web-based, and digital publication).

Annex 18 -- Mastering Challenges in Thermal Energy Transportation with Advanced Thermal Energy Storage Technology for Sustainable Energy Systems

Annex 19: Optimised Industrial Process Heat and Power Generation with Thermal Energy Storage

The potential for thermal energy storage and regenerative heat transfer for the industrial process heat sector for efficient energy utilisation, heat recovery and storage of high temperature waste heat as well as the need for energy storage for power generation based on new conversion techniques and renewable energy resources (RES) is a concern of several national and international research strategies. Both areas are directed to applications and processes at high temperature. In this context “High Temperature” is defined to be higher than 120 °C as required for comfort heating and where water cannot be applied as heat transfer fluid.

Annex 19 was approved by the Executive Committee at the meeting in November 2006 and will continue until December 2009. Operating Agent is German Space Agency DLR /Germany.
Participating Countries: Germany, France, University of Lleida, Spain

Activities 2008
The work in the annex was focussed on three major subjects:

- to provide an overview and assessment of the available high temperature thermal energy storage (HTTES) technology
- to compile previous and current activities and research projects in the HTTES field
- information exchange of current R&D activities which are directed to material development as well as to designing and testing of storage components in technical scale.

While the focus in France is directed to the development of improved composite phase change storage materials, the contribution from Germany covers the development and testing of PCM storage for industrial process steam applications. Activities in Spain are directed to storing high temperature heat for solar thermal power generation

The third Workshop and Expert’s Meeting was held in Lleida, Spain, in April 2008. This event was organized as a joint workshop between the Annexes 18 and 19 in order to high-light the common aim of the two annexes summarized as efficient thermal energy management in industrial applications. The presentations covered current R&D projects dealing with sensible and PCM storage, material testing and modelling.

The forth Annex 19 Expert´s Meeting and “Advanced Thermal Energy Storage” Workshop took place in September 2008 at PROMES CNRS Perpignan. Nearly

30 participants from France, Germany and Spain were present. Although participants from universities and research institutes were dominating, there was relevant industrial participation.

The "state of the art" report on HTTES was competed. The report comprises a review on high temperature TES for industrial waste heat storage and solar thermal power applications. The focus is laid on commercially available technologies - steam accumulator, liquid salt storage, and regenerators - as well as on pre-commercial approaches - concrete storage and latent heat storage. In addition, a HTTES patent research is included considering the main evolution trends within patented latent heat thermal energy storage system concepts. All relevant concepts found are categorised according to "Bulk storage systems, macro-encapsulation, and micro-encapsulation storage".

The "state of the art" report is a sound basis for further development of existing as well as the development of new advanced storage systems, and indicates that there is still a strong demand for further improvements to reduce investment cost, performance and reliability of storage systems.

400 kWh sensible concrete storage module for heat storage in the 100-400 °C range (source DLR)

700 kWh (13000 kg) sodium nitrate PCM storage for 300 °C applications (source DLR)

Future Activities

- Expert´s meeting and presentations at the Effstock 2009 conference in Stockholm
- Additional workshop and Expert´s meetings in fall 2009.
- Analyse the potential for implementation of HTTES technology in the different countries
- Development of subsequent projects in Germany, France and Spain

Annex 20: Sustainable Cooling with Thermal Energy Storage

Renewable and natural energy sources, main components of sustainable energy systems, can only be made continuously available to users through thermal energy storage (TES). In addition to heating, TES provides several flexible alternatives for cooling systems. Recent discussions on topics like global warming and heat waves have brought attention once again to energy efficient cooling systems utilizing renewable energy sources. Cooling demand has already been increasing due to the evolving comfort expectations and technological development around the world. Climate change has brought additional challenges for cooling systems designers. New cooling systems must use less and less electricity generated by fossil fuel based systems and still be able to meet the ever increasing and varying demand.

Annex 20 was approved by the Executive Committee at the meeting in May 2005 and will end in December 2009. Annex 20 “Sustainable Cooling with Thermal Energy Storage” has been operated from January 2006 to December 2007. An extension of Annex 20 through December, 2009 was approved at the 63rd meeting of the Executive Committee of the Implementing Agreement on Energy Conservation through Energy Storage.

Operating Agent is Nagoya University / Japan.
Participating Countries: Japan, Canada, Germany, Turkey, Netherlands, Spain, Sweden, USA and since 2008 Korea and China.

Activities 2008
The work in the Annex was conducted at following three subtasks:

- Subtask A: Demonstration projects/System performance evaluation for an actual project
- Subtask B: Design Procedure and System Performance Evaluation Tools
- Subtask C: Information Dissemination and Technology Transfer

The fifth experts meeting and sixth workshop was held in Seville, Spain in May 2008. There were six presentations given at the workshop, which are related to the works of Subtask A and B. To Subtask A, the progress of work was reported and an index for system performance evaluation was discussed, especially on the sustainability evaluation table by Dr. Momota and the worksheet by Prof. Stiles. In Subtask B was the progress report introduced. Dr. Tanaka explained the report from Japan.

The sixth experts meeting and seventh workshop was held in Soul, Korea in November 2008. There were ten presentations given at the workshop.

For Subtask A, there were 26 projects to be demonstrated and evaluated (6 ATES, 5 BTES, 2 Ice, 3 Water, 5 Foundation, 1 BTES+Ice, 4 PCM). Projects from Korea and China are expected to be included.
Information on demonstration projects will be collected with project templates by Prof. Paksoy. Including questions about storage technology, current progress, system description and sustainability performance. A system performance evaluation will be completed by excel worksheets by Dr. Momota. The work-sheets should collect information about COP, storage efficiency, capacity, tem-perature, etc. of the heat source section, the thermal storage section and the entire heat source system.

For subtask B, characteristics of the tools which can be used to simulate the system with TES were discussed. Many simulation programs work with data re-cords, in order to read in the boundary conditions. That concerns in particular the weather and the cooling loads. Further these data are important for the general evaluation of the projects. And so questions about weather and cooling loads were worked out, for example sizes are measured, technology / software, data process, data formats, etc.

Future Activities

- Experts meeting and presentations at the Effstock 2009 conference in Stockholm, Sweden
- Workshop and experts meeting in fall 2009.
- Template for evaluation of TES system will be completed and analysed
- Evaluation of actual system will complete
- Comparison of simulation tools will be done
- Usability of tools will be discussed

Annex 21: Thermal Response Test

Thermal Response Test (TRT) is a measurement method to determine in situ ground thermal properties i.e. effective thermal conductivity of ground thermal resistance in boreholes. This is important for the design of Underground Thermal Energy Storages (UTES). The TRT equipment is usually set up on a trailer for easy transportation between test sites. This method has been very important in the rapid spreading of BTES systems. It has been a door opener for introducing the technology in “new” countries.

The overall objectives of Annex 21 are to compile TRT experiences worldwide in order to identify problems, carry out further development, disseminate gained knowledge, and promote the technology. Based on the overview, a TRT State of the art, new developments and further work are studied.

Annex 21 was approved by the Executive Committee in April 2007 and will run until April 2011. Operating Agent is the Bavarian Center for Applied Energy Research ZAE Bayern / Germany. Participating Countries: Germany, Sweden, Canada, Finland, Japan, Korea, Norway, Spain, Turkey and The Netherlands. Several other countries like Austria, Bulgaria, China, Italy and others have shown interest to join.

Activities 2008

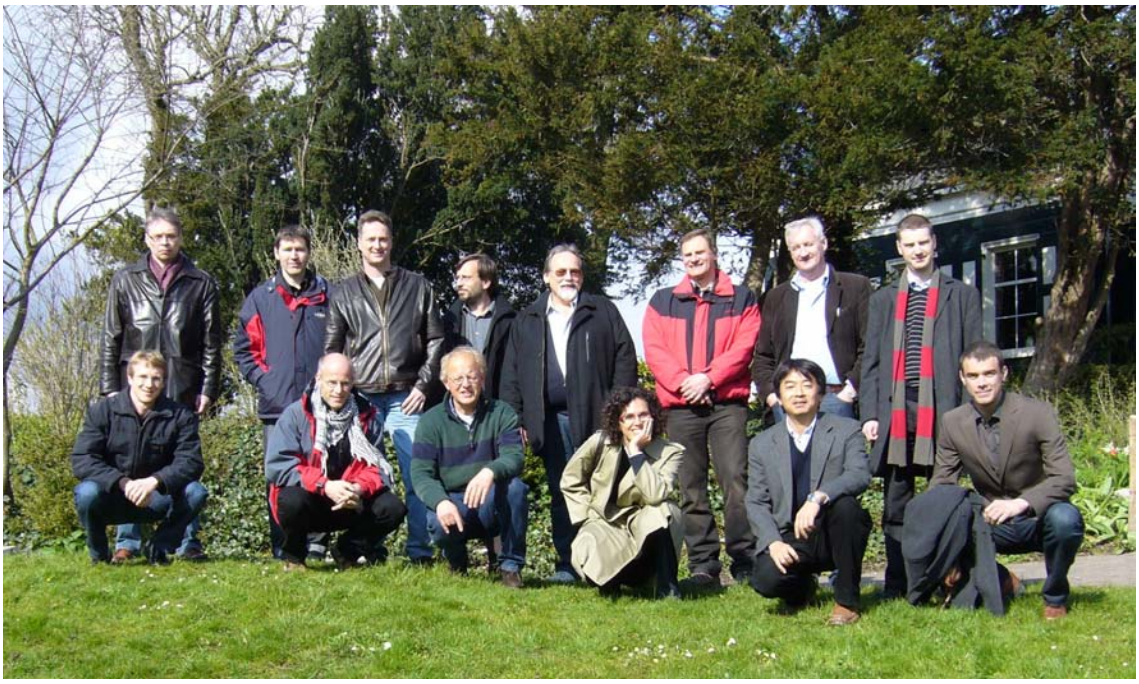
Two meetings were held in 2008, one in Amsterdam (The Netherlands) hosted by Groenholland and one in Vienna (Austria) hosted by Arsenal Research. At these meetings the current status and the further steps of the five subtasks were discussed in detail.

It is planned to have the ‘State-of-the-Art-Study’ available at the end of 2009. A major focus of the work of subtask 2 and 3 ‘New Developments’ and ‘Evaluation Methods and Developments’ was put on ground water influence on the TRT measurement method as well as the evaluation related to geological layers which turned out to be of significant importance in many cases. Initiatives in several countries for development of standards for shallow geothermal systems point out the importance of subtask 4 ‘Standard TRT Procedures’.

The dissemination activities started with a first draft of a common website for presentation of Annex 21.

Future Activities

- Two expert’s meetings are planned in 2009, one in June along with the Effstock 2009 Conference and one in fall in Canada
- It is planned to work out a course for TRT which can be used by interested countries to train people



Annex 21 Team

Planned Activities

„Applying Energy Storage in Buildings of the Future“

Sustainable buildings will need to be energy efficient well beyond current levels of energy use. They will need to take advantage of renewable and waste energy to approach ultra-low energy buildings1. Such buildings will need to apply thermal and electrical energy storage techniques customized for smaller loads, more distributed electrical sources and community based thermal sources. Lower exergy heating and cooling sources will be more common. This will require that energy storage be intimately integrated into sustainable building design. Many past applications simply responded to conventional heating and cooling loads. Recent results from low energy demonstrations, distributed generation trials and results from other Annexes and IAs such as Annex 37 of the ECBCS IA, Low Exergy Systems for Heating and Cooling need to be evaluated. Although the ECES IA has treated energy storage in the earth, in groundwater, with and without heat pumps and storing waste and naturally occurring energy sources, it is still not clear how these can best be integrated into ultra-low energy buildings capable of being replicated generally in a variety of climates and technical capabilities.

Energy storage has often been applied in standard buildings that happened to be available. The objective was to demonstrate that the energy storage techniques could be successfully applied rather than to optimize the building performance. Indeed the design of the building and the design of the energy storage were often not coordinated and energy storage simply supplied the building demand whatever it might be.

Responsible for this proposal of a new Annex is Ed Morofsky (MOROFSKE@PWGSC.GC.CA).

“Thermal Energy Storage in Horticultural Greenhouses”

Increasing attention is being paid to thermal energy storage (TES) in greenhouse systems as a means of enhancing crop production while reducing primary energy (fossil fuel) use and operational impacts to soil, water and air. TES leads to the ‘closed or nearly closed’ greenhouse concept, which subsequently allows for active environmental control, avoiding the need to control of environmental variables by opening and closing windows – an act which also unintentionally releases CO_2.

Thermal energy storage has an important contribution to make to the viability and sustainability of horticultural greenhouse systems because it allows for a renewable, continuous, and adaptable supply of heating, cooling, and dehumidification. The nature of this contribution is cardinal in light of concerns of increasing fossil fuel expenses and climate change.

The industries which provide us with food and plants (i.e. potted plants, flowers, sod, trees) strive to maximize the outputs of their greenhouse system while simultaneously minimizing their inputs. They do this to meet ever-increasing demands for competitive pricing as well as product quality and security assurances. There are three key ways in which the integration of TES simultaneously addresses the system’s outputs and inputs:

- Energy savings
- Controlled CO_2 and humidity
- Fewer chemicals

If you are interested in this new Annex activity please contact Frank Cruickshanks (Frank.Cruickhanks@ec.gc.ca).

“Compact Thermal Energy Storage – Material Development and System Integration”

For the performance of thermal energy storage systems their thermal energy and power density are crucial. Both criteria are strongly depending on the materials used in the systems. After a number of thermal energy storage technologies have reached the state of prototypes or demonstration systems a further improvement is necessary to bring theses systems into the market. The development of improved materials for TES systems is an appropriate way to achieve this. The material solutions have to be cost effective at the same time. Otherwise the state of the existing technologies can not be brought closer to the market.

In Addition to that the more precise knowledge from pilot and demonstration projects concerning the real boundary conditions of the TES systems is necessary to put up a profile of requirements for the material properties. In a lot of cases these conditions are quiet different from the assumptions made in the beginning of the development.

Very important for many applications is a high number of charging and discharging cycles of the TES system. Therefore the stability of all materials in the systems is a very important property.

The world wide R&D activities on novel materials for TES applications could be better coordinated. A lot of projects are focusing on the material problems related to their special application and not towards a wider approach for TES in general. The proposed Annex should help to bundle the ongoing R&D activities in the different TES technologies.

The proposed Annex should be operated as a joint activity with the Solar Heating and Cooling Implementing Agreement (SHC)

In 2008 a symposium was organised on “Material Develoment for Thermal Energy Storage – Phase Change Materials and Chemical Reactions”. This event brought together about 80 participants from 11 countries. It was an excellent starting point for this new proposed Annex.

This new Annex activity was proposed by Andreas Hauer (hauer@muc.zae-bayern.de).

"Surplus Heat Management using advanced Thermal Energy Storage Technology"

Approximately 1/3 to 1/2 of the energy supplied is "wasted" in energy conversion to the desired services power, heat and cold. From a sustainability perspective, increasing the efficiency in many energy conversion processes is crucial. As the demand for energy increases in all sectors, and all over the world, improved management of such surplus heat will be a cost-effective way of securing the supply of energy and power while mitigating the emissions of CO_2. Such management is most effectively done in cases where the heat flows are large, like industrial processes, or in cases where the value of increased waste heat utilization is large, like in the vehicles and transporting goods sector.

The presently on-going Annex 18 has taken a creative approach in examining the possibilities of utilizing advanced thermal energy storage technologies in order to more effectively distribute thermal energy to end users. Key findings point towards the path to technically robust solutions and cost-effectiveness. However, for the future a more holistic approach to surplus heat management is proposed where it is better high-lighted that in addition to e.g. external use of industrial surplus heat, enhanced process integration and thermally driven power generation may be better options. Still, advanced thermal energy storage technology will likely have a key role in improving the surplus heat management. A continuation project on advanced TES for effective surplus heat management is therefore proposed as containing the following sub-tasks:

A. The potential for advanced TES to minimize process surplus heat through better process integration, enabling the use of waste heat for internal heating demands or cooling demands (via heat driven cooling).
B. The potential for advanced TES to cost-effectively increase surplus heat driven power generation in industrial applications.
C. The potential for advanced TES to enable external use of heat from industrial-scale processes through effective thermal energy distribution.
D. The potential for advanced TES to increase the utilization of waste heat in vehicles like on-board cooling and minimization of cold-start.

This new Annex activity was proposed by the Annex 18 Expert's along with Prof Luisa Cabeza, Lleida, Spain
(contact: viktoria.martin@energy.kth.se).

Further Activities

Executive Committee Meetings

The Executive Committee had two meetings during the year 2008. The 65th Executive Committee Meeting in Bordeaux, France on May 28 – 29 and the 66th XC meeting in Seoul, Korea on November 26 – 27 2008.

The most important items and decisions of the XC meetings in 2008 are outlined below.

The Bordeaux Meeting, May 28 – 29, 2008

- Approval of the minutes of the 64th XC meeting
- Kirsti Midtomme (Norway) was unanimously elected as the Chairman, Tadahiko Ibamoto (Japan) and Lynn Stiles (USA) were elected as Vice Chairs.
- New Lay-out for the Annual Report 2007 was approved
- Financial statement about the common fund of the secretariat was approved
- XC closed Annex 13.
- Approval of the progress reports of the ongoing Annexes 18, 19, 20 and 21.
- Discussion on the structure of the proposed joint Annex with the Solar and Heating Implementing Agreement "Compact Thermal Energy Storage – Material Development and System Integration".
- Discussion on the Integration of Electrical Energy Storage within the ECES.
- The progress of the organization of the Symposium on "Material Development for Thermal Energy Storage – Phase Change Materials and Chemical Reactions" and the "Effstock"-conference 2009 in Stockholm were presented

The Seoul Meeting, November 26 – 27, 2008

- Minutes of the 65th XC meeting were adopted
- Financial statement about the common fund of the secretariat was approved
- Andreas Hauer was unanimously elected as the secretary for the next two years.
- The XC approved to remove the “dormant” countries EC, Italy, Spain and the UK from the list of participating countries.
- The XC approved to integrate “Electrical Energy Storage” and organize a “Forum on Storage” in order to discuss collaboration with other Implementing Agreements on Thermal and Electrical Energy Storage.
- Approval of progress reports of the ongoing Annexes 18, 19, 20 and 21.
- Approval of new Annex 22 “Thermal Energy Storage in Horticultural Greenhouses” (Operating Agent Canada)
- Approval of new Annex proposals on “Applying Energy Storage in Buildings of the Future” (Operating Agent Canada)
- Approval of the new Annex “Compact Thermal Energy Storage – Material Development and System Integration” (Operating Agent Germany) in collaboration with the SHC IA.
- The progress of the organization of the “Effstock”-conference 2009 in Stockholm was presented

Other Activities

BCG Meeting in Paris

Andreas Hauer attended the last BCG Building Coordination Group meeting January 31st in Paris. Most of the Building Related Implementing Agreements BRIAS were present (DHC, SHC, HP, PV, DSM, ECBCS and Efficient Electrical End-use Equipment), as well as representatives of the End-Use Working Party EUWP. Interesting points on the agenda were presentations by the IEA secretariat on the "Energy Technologies Perspectives 2008", where energy storage is mentioned in some of the technologies roadmaps, "Building Indicators Analysis" and Building Codes". An Update on the NEET initiative was given by the IEA. The next meeting will be January 29th and 30th 2009 in Paris.

AHGSET Meeting in Paris

The IEA's Ad-Hoc Group on Science and Energy Technologies (AHGSET), which is part of the IEA's Committee on Energy Research and Technology (CERT), has been working to bridge the gap between the basic science and applied energy communities since 2005 through information exchange and outreach.
With the aim of addressing energy breakthroughs for the future by engaging the IEA's Implementing Agreements, AHGSET hosted a meeting on 6-7 May that included over 45 experts from government, industry and academia, as well as a number of Implementing Agreement representatives. ECES attended that meeting and presented its activities, especially on the Symposium on "Material Development for Thermal Energy Storage", where basic scientists and applied researchers should meet. Participants discussed the need for increased collaboration and information exchange in the area in order to reach the goals of an "Energy Revolution" given out by IEA's Executive Director Mr. Nobuo Tanaka.

Symposium "Material Develoment for Thermal Energy Storage – Phase Change Materials and Chemical Reactions"

On June 4-6 2008 the Implementing Agreement "Energy Conservation through Energy Storage", ECES together with the Bavarian Centre for Applied Energy Research, ZAE Bayern, organized a Symposium on "Material development for thermal energy storage" in Bad Tölz.

The goal of this Symposium was to define needs for research and to establish teams for further activities, which include material science and Thermal Energy Storage application expertise. The scattered international activities in material research and development for thermal energy storage should become more structured and better coordinated.

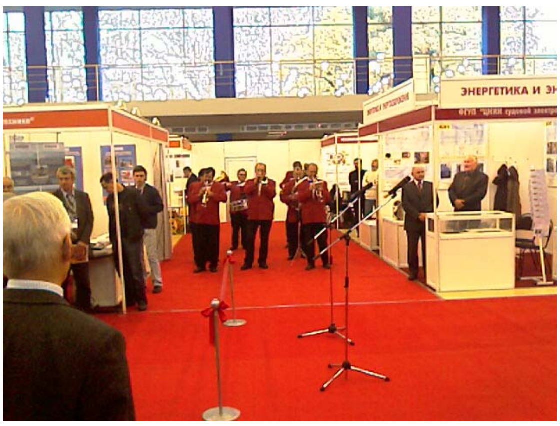
About 80 participants from 11 countries attended the Symposium. Experts from basic material science, from applied science and from industry, almost one third each were participating.

The symposium was focused on Phase Change materials and Chemical reactions. Its major outcome was that the participants saw the gap between fundamental material science, applied research and industrial interests and that the different parties talked to each other. By doing that, they started to learn each others “languages” and to overcome obstacles in the development of these technologies. The event was an excellent start for joint Annex/Task activities with other Implementing Agreements.

NEET workshop in Russia

NEET - Networks of Expertise in Energy Technology - is part of the IEA's programme supporting the G8 Gleneagles Plan of Action. It works to foster broader, more effective international co-operation, in particular with non-IEA countries. Building on its existing "Implementing Agreement" programmes, the IEA is linking with the international business community, with policy makers, researchers and other stakeholders.

The Federal Agency for Science and Innovation, FASI, and the IEA jointly held a very successful workshop on energy technology collaboration in Moscow on 30 September – 1 October 2008. Mr. Sergey Mazurenko, Head of the FASI, along side Ambassador Richard H. Jones, Deputy Executive Director of the IEA, opened the event on Tuesday 30 September. More than 200 key Russian stakeholders and 18 international experts spent two days exchanging information about their various programmes. Cleaner fossil fuel power production, renewable energies, improving energy efficiency, demand side management, and energy modelling were addressed, and possible areas for future joint action were explored.



The event allowed Russia and the IEA

to explore areas of future collaboration, identify key partners and strengthen international ties. It was recognised that in many areas goals and challenges have remarkable similarities.

The ECES activities were presented and discussed. The next step would be to discuss Russian participation in the Implementing Agreement.

End-Use Working Party Workshop in Berlin

The End-Use Working Party organized a workshop on “Long-term Technology Perspectives in the End-Use Sector” October 16 2008 in Berlin. The Workshop was intended to foster the discussion on future end-use technologies for energy efficiency, energy security and greenhouse-gas reduction, on consequences for future R&D strategies and on the role of international cooperation in the IEA´s End-Use Working Party.

In the final panel discussion 6 Implementing Agreements were participating (ENARD, Superconductivity, ECBCS, DSM, ETSAP and ECES). Outcome of the discussion was an agreement on the importance of deployment of renewable energies and a better recognition of the “technologies in-between” (not energy supply and not yet end-use) like demand side management, electricity grids and energy storage.

Executive Committee Members

Belgium

Delegate

Stéphane Marchand,
Ministry of Economic Affairs, Department of Energy, Koning Albert II-laan 16, 1000 Brussel, Belgium
Tel: 0032 (0) 2 206 45 41, Fax: 0032 (0) 2 206 57 32, Sté-phane.marchand@mineco.fgov.be

Alt. Delegate

Bert Gysen alt. Delegate
Vlaamse Instelling voor Technologisch
Onderzoek, VITO
Boeretang 200
B-2400 Mol, BELGIUM
Tel:+32-14-335-914 (5511), Fax:+32-14-321-185
bert.gysen@vito.be

Canada

Delegate

Edward Morofsky
A/Manager, Energy & Sustainability Innovation and Solutions Directorate, Strategic Program Development, Public Works and Government Services Canada, Real Property Program Branch, Place du Portage, Phase III, 8B1, Hull, Quebec K1A 0S5 Canada
tel: +1-613-941-5572, fax: +1-613-941-5595
MOROFSKE@PWGSC.GC.CA

Alt. Delegate

Frank Cruickshanks
Environment Canada, Environmental Conservation Branch, 45 Alderney Drive Dartmouth, Nova Scotia B2Y 2N6, CANADA
tel:+1-902-426-6885, fax:+1-902-426-4457
Frank.Cruickhanks@ec.gc.ca

Finland

Delegate

Juha Linden
Energy and Environment National Technology Agency of Finland (TEKES), Kyllikinportti 2, P.O. Box 69, FIN-00101 Helsinki, Finland
Tel. +358 50 874, Mobile Phone +358-10 521 5905
juha.linden@tekes.fi

Alt. Delegate

Raili Alanen
VTT PROCESSES, Nuclear Energy, Lämpömiehenkuja 3, P.O.Box 1606, FIN-02044 VTT, Finland
Tel. +358 9 456 5808, Fax: +358 9 456 6538
Raili.Alanen@vtt.fi

France

Delegate

Elena Paloma del Barrio
Professeur des Universités, Laboratoire TREFLE/CNRS, UMR 8508
Esplanade des Arts et Métiers, 33405 TALENCE cedex, FRANCE
Tel: ++33 05 56 84 54 04
elena.palomo@bordeaux.ensam.fr

Alt. Delegate

Stéphane BISCAGLIA, alt. Delegate
Direction des Energies renouvelables, des Réseaux et des Marchés énergétique (DERRME), ADEME
500 route des Lucioles
06560 VALBONNE, FRANCE
Tel: + 33 04 93 95 79 00
stephane.biscaglia@ademe.fr

Germany

Delegate

Astrid Wille
Projektträger Jülich, PTJ-ERG1, D-52425 Jülich, GERMANY
tel: +49 2461-61-2712, fax: +49 2461-61-3131
a.wille@FZ-juelich.de

Alt. Delegate

Rolf Stricker
Projektträger Jülich, PTJ-ERG1, D-52425 Jülich, GERMANY
tel. +49-2461-61-1575, fax. +49-2461-61-3131
r.stricker@FZ-juelich.de

Japan

Delegate

Tadahiko Ibamoto,
Tokyo Denki University, 2-2, Kanda-Nishiki-cho, Chiyodaku, Tokyo 101-8457, Japan
tel: +81-3-5280-3429, fax: +81-3-3429-3264
ibamoto@cck.dendai.ac.jp

Alt. Delegate

Dr. Xiaomei Li
Heat Pump & Thermal Storage Techn. Center of Japan, 28-5, Nihon-bashi, Kakigara-cho, 1 chome, Chuo-ku, Tokyo, JAPAN
tel +03-5643-2404, fax +03-5641-4501
li@hptcj.or.jp

Korea

Delegate

In-Hwan Oh
Energy and Environment Research Division, Korea Institute of Science and Technology, #39-1 Hawolgok-dong, Seongbuk-gu, Seoul, Republic of Korea 136-791
Tel: +82-2-958-5272, Fax: +82-2-958-5199
oih@kist.re.kr

Norway

Delegate

Kirsti Midttomme
NGI, PO Box 1230, Havnegata 9, NO-7462 Trondheim, Norway
Tel: +47 22021990
KMi@ngi.no

Sweden

Delegate

Conny Ryytty
The Energy Technology Departmen, Swedish Energy Agency, Kungsgatan 43, PO Box 310, S-631 04 Eskilstuna, SWEDEN
Tel: + 46-16-544 2096, Fax: + 46-16-544 2261
conny.ryytty@energimyndigheten.se

Alt. Delegate

Peter Rohlin
The Energy Technology Departmen, Swedish Energy Agency, Kungsgatan 43, PO Box 310, S-631 04 Eskilstuna, SWEDEN
Tel.: +46 16 544 2112, Fax: +46 16 544 2261
peter.rohlin@stem.se

Turkey

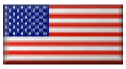
Delegate

Halime Paksoy
Çukurova University, Faculty of Arts and Sciences, Chemistry Department, 01330 Adana, TURKEY
tel: +90-322-338-6081, fax: +90-322-338-6070
hopaksoy@cu.edu.tr

Alt. Delegate

Hunay Evliya
Çukurova University, Centre for Environmental Research, Chemistry Department, 01330 Adana, TURKEY
tel: +90-322-338-6361, fax: +90-322-338-6361
cesam@cevre.cu.edu.tr

USA



Delegate

Imre Gyuk
U.S Department of Energy, 1000 Independence Ave, Washington, DC 20585, USA
Tel: +1 202-586-1482, Fax: +1 202-586-0784
IMRE.GYUK@ee.doe.gov

Alt. Delegate

Lynn Stiles
Richard Stockton College, NAMS PO Box 195 , Pomona , NJ 08240-0195 USA
Tel.+1 609 652 4299, Fax: +1 609 652 4972
lynn.stiles@stockton.edu

Sponsors:

IF Technology

Delegate

Aart Snijders
IF Technology b.v., Frombergstraat 1, P.O. Box 605, 6800 EA Arnhem, The Netherlands
fax:+31-26-4460-153
office@IF-tech.nl

Institute of Heat Engineering

Delegate

Roman W. Domanski
The Institute of Heat Engineering (ITC) of the University of Technology of Warsaw, Nowowiejska 2500-665, Warszawa, POLAND
Tel: +48-22-825 52 70, Fax: +48-22-825 05 65
rdoma@itc.pw.edu.pl

Secretary:

Andreas Hauer
Bavarian Center for Applied Energy Research, Division 1: Technology for Energy Systems and Renewable Energy, Walther-Meißner-Str. 6, 85748 Garching, Germany
Tel: +49 89 / 329442-16, Fax: +49 89 / 329442-23
hauer@muc.zae-bayern.de

The secretary enjoying the hot and spicy Korean food at the Fall meeting in Seoul

International Energy Agency Energy Conservation through Energy Storage Programme ECES

www.iea-eces.org