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ADVANCED ENERGY SYSTEMS DIVISION

EDITOR: Laura Schaefer

FALL 2005

CHAIR'S MESSAGE *Dr. Srinivas Garimella*

It is indeed an honor to write this message to all the dedicated members of the division and the society at large. While all of us get involved in the society to serve the profession, it is clear that what we receive in terms of professional contacts, a community of like-minded people, long-term friendships, and a sense of contributing in our small ways to our favorite causes is immeasurable. The division is in great shape due to the tireless efforts of the members, committee chairs, and numerous other volunteers. A long line of distinguished chairs, Hameed Metghalchi, Sriram Somasundaram, Sherif A. Sherif, Salvador Aceves, Jerzy Fiszdon, Karen Den Braven, Keith Herold, Mysore Ramalingam, and others before them have led this division to its current vibrant state.

There is also a new "energy" in the field of Advanced Energy Systems, as evidenced by the myriad of news stories, popular press articles, books and the like appearing everywhere on related topics. There are new initiatives to address energy related issues at major corporations, and new research laboratories and research centers on these topics are being established around the globe. Even kindergarten and first grade kids are now being taught about energy in elementary schools across the country. We find ourselves positioned at a stage in history where monumental challenges regarding energy source availability, conversion, transmission, storage and end use face us. Unlike in the past when utopian claims about the capabilities of a particular energy technology were routinely made, now the emphasis seems to be on a more objective look. In recent research and development efforts, energy efficiency is not the only criterion: it is being considered along with issues such as practical feasibility, environmental impact (for example, green house gas emissions), life-cycle costing and other issues that establish the implementation of the technology. The goal that has been embraced the world over is sustainable energy. It is up to us to seize this opportunity to deliver appropriate solutions. Might I say, it is once again cool to be engineers working in the field of Energy.

Latest records show that almost 1400 members note the Advanced Energy Systems division as their primary home within ASME, with numerous others listing this division among their top choices within ASME. This represents a welcome increasing trend in membership. Our members are contributing to much needed research and development efforts in the field of advanced energy systems. Our conference sessions at the annual IMECE and other venues routinely attract papers of excellent technical quality, with large audiences confirming their relevance and significance. Additional information about the conference sessions at the upcoming IMECE is available elsewhere in this newsletter. We are also pursuing opportunities for strategic collaborations with other divisions such as the Solar Energy Division to extend the scope and visibility of our activities. The contribution of archival papers to the ASME Journal of Energy Resources Technology from members of our division has also increased dramatically in recent years. Several of our division members are also providing invaluable service to this journal as Associate Editors.

I am pleased to welcome two new members to the Executive Committee. Abel Hernandez Guerrero and Abdolreza Zaltash have been significant contributors to the division through their service in the technical committees. They will now help lead the division through their participation in the Executive Committee. Abel is the new Secretary of the division Executive Committee, and Abdi will serve as the program representative from the division to the IMECE.

We have been reporting on the ASME-wide Continuity and Change activities during the past few years. Several members of our division including myself have participated over the past several years in these deliberations at the annual Technology Executives Conference as well as through numerous teleconferences. The reorganization of the society was approved this past June and in the

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INSIDE

PUBLICATION OPPORTUNITIES FOR AESD AUTHORS *Dr. M.J. Moran*

Several opportunities are available for AESD authors to publish their technical articles. These include symposia, the monthly Mechanical Engineering, and archival journals. AESD authors are encouraged to give a tangible expression of their ASME affiliation by considering these publication outlets.

Opportunities for publishing technical papers are provided by the symposium volumes of the IMECE AESD technical sessions. Normally one or more such volumes are prepared annually, comprised of the dozens of papers presented at the IMECE. Such papers may be eligible for consideration for the prestigious E.F. Obert Award, as well as individual technical committee awards.

Symposium volumes are available for purchase at IMECE or may be ordered directly from ASME technical publications. Abstracts are generally due in January for papers to be presented at the following IMECE. Authors wanting to participate at the IMECE should check the calls for papers in the monthly meetings calendar in Mechanical Engineering or visit http://www.asme.org/events/.

In addition to the IMECE, every summer for nearly 20 years, AESD also has participated in symposia held outside the United States at various memorable sites, as discussed in the AESD Conference Activities section below. For information concerning upcoming conferences, authors should check the meetings calendar in Mechanical Engineering or visit http://www.asmeconferences.org/.

Additional outlets for technical articles by AESD authors are provided by the archival ASME journals, Journal of Energy Resources Technology, Journal of Engineering for Gas Turbines and Power, Journal of Turbomachinery, and the new Journal of Fuel Cell Science and Technology. Owing to peer review requirements and some queuing of accepted papers before publication, a year or more can elapse between submission and publication. Still, archival journals are the appropriate forum for articles of enduring value.

For answers concerning your questions about AESD publishing opportunities contact M.J. Moran (contact information is provided in the roster at the end of the newsletter). This newsletter also welcomes articles of general interest to the Division membership. Interested authors should contact Laura Schaefer, the Newsletter Editor, at the address given in the roster at the end of this publication. ❖

AESD CONFERENCE ACTIVITIES

In addition to organizing sessions for the annual IMECE, AESD members are active in a number of additional national and international conferences.

In 1985, the Systems Analysis Technical Committee of the AESD, led by Richard Gaggioli, decided to not only present sessions at the IMECE (which was then called the ASME Winter Annual Meeting), but to also strive to broaden the participation of non-U.S. scientists and engineers. To that end, the SATC's first overseas conference occurred in Rome, Italy, in 1987, and was chaired by Enrico Sciubba and Michael Moran. In 1992, the conference was renamed ECOS, an acronym for the Efficiency, Costs, Optimization, and Simulation of Energy Systems. ECOS conferences have been held in China, Greece, Spain, Poland, Turkey, Japan, and numerous other countries. ECOS 2005 was held in Trondheim, Norway from June 20-23. Over the course of three days, 122 papers and 28 posters were presented in 30 sessions. ECOS 2006 is set for the Greek island of Crete for July 12-14. In 2007, ECOS will return to Italy for its 20th anniversary, and will be held in Padova from June 25-27.

The AESD has also been active in fuel cell conferences. The Third International Conference on Fuel Cell Science, Engineering and Technology was held May 23-25 in Ypsilanti, Michigan. The Fourth International Conference on Fuel Cell Science, Engineering and Technology will be held June 19-21, 2006, in Irvine, California. Additionally, ASME is participating in the first European Fuel Cell Technology and Applications Conference, to be held December 14-16, 2005, in Rome, Italy. Papers submitted to each of these conferences will be considered for publication by the ASME Journal of Fuel Cell Science and Technology. ❖

CHAIR'S MESSAGE – *Continued From Page One*

words of ASME president Gene Feigel, is expected "to improve ASME's viability and allow it to concentrate on its core assets: providing knowledge, community and advocacy to mechanical engineers." With this reorganization, I expect that further progress will also be made in the near future on the formation of the Energy Institute that we have been developing over the past few years in collaboration with other divisions across the society. Among the new society wide initiatives are the VOLT Academy, which has been established as the resource center for all volunteer orientation and leadership training needs to enable a new volunteer leader to progress to the highest leadership levels at ASME. In addition, the ASME Leadership Training Conference in March 2006 will replace the old TEC (technical units) and the MTS (global units) and will now be available for all units of the Society.

I would welcome input from you on our activities and particularly your suggestions on how we can serve you better. Please don't hesitate to call or send me an e-mail. It is your involvement and participation that matters the most. I look forward to meeting each one of you at our conference sessions and in other forums as we address these exciting challenges in Advanced Energy Systems. ❖

THERMALLY ACTIVATED DESICCANT TECHNOLOGY FOR HEAT RECOVERY AND CONTROL

Dr. Ali A. Jalalzadeh-Azar

Desiccant cooling is an important part of the diverse portfolio of Thermally Activated Technologies (TAT) designed for conversion of heat for the purpose of indoor air quality control. Thermally activated desiccant cooling incorporates a desiccant material that undergoes a cyclic process involving direct dehumidification of moist air and thermal regeneration. Desiccants fall into two categories: liquid and solid desiccants. Regardless of the type, solid or liquid, the governing principles of desiccant dehumidification systems are the same. In the dehumidification process, the vapor pressure of the moist air is higher than that of the desiccant, leading to transfer of moisture from the air to the desiccant material. By heating the desiccant, the vapor pressure differential is reversed in the regeneration process that drives the moisture from the desiccant. Figure 1 illustrates a rotary solid-desiccant dehumidifier. A burner or a thermally compatible source of waste heat can provide the required heat for regeneration.

A desiccant device can operate in concert with an indirect and/or direct evaporative cooling unit to efficiently meet the sensible and latent cooling loads of a building. Studies have demonstrated the applicability of such cooling equipment to a wide range of climatic conditions. Desiccants can also be integrated with conventional (vapor compression) air-conditioning systems to independently meet the dehumidification loads and eliminate the need for an inefficient process of overcooling and reheating, which is inherent with conventional systems. Implementation of desiccant technologies are particularly attractive to health-care facilities, highly ventilated buildings in humid climates,

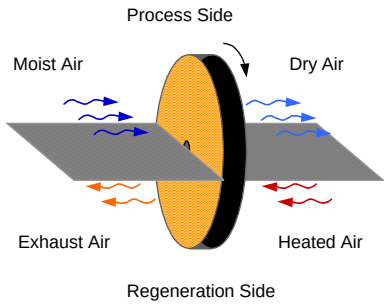

Figure 1. Rotary Solid-Desiccant System

and industrial facilities with strict humidity control requirements. Together, desiccants and other TAT for heating and cooling can meet a significant portion of the national space heating/cooling demand, which represents about one-third of the U.S. primary energy consumption for residential and commercial buildings.

When implemented in the context of combined heat and power (CHP), also known as cogeneration, TAT can significantly improve fuel efficiency/utilization through heat recovery from the on-site power generators. This thermal recovery leads to a significant reduction in emissions as well. The recent initiatives for developing output-based emission standards recognize the environmental implications of such energy efficient systems. The availability of desiccant materials with regeneration source temperatures typically ranging from about 160°F (70°C) to 300°F (150°C) reflects the compatibility of desiccant technologies with various types of on-site generators, including reciprocating IC engines, micro-turbines, and certain types of fuel cells. Cascading desiccant cooling with another compatible technology, such as absorption cooling, further enhances the overall system fuel efficiency and utilization. In general, cascading allows sequential heat recovery from a single heat source for driving two or more thermally activated systems with different operating temperatures to achieve higher first- and second-law efficiencies.

An interesting implication of CHP/TAT formation has to do with cost-effective improvement of indoor air quality. CHP systems that are primarily designed and sized to meet the entire or a significant portion of the electric demand often generate thermal output in excess of the minimum amount required to provide space air conditioning via TAT. In these circumstances, the indoor air quality and, hence, the comfort level can be enhanced in an energy efficient manner, which may not be economical otherwise.

Figure 2 depicts a CHP system installed at a Waldbaums supermarket in New York. The system incorporates a 60-kW micro-turbine for onsite power generation and a gas-to-liquid heat exchanger for heat recovery from the exhaust gas for space heating and desiccant dehumidification, depending on the season. A gas compressor is used to boost the natural gas pressure to the operating pressure of the microturbine combustor. Figure 3 illustrates the air-handling unit (AHU) incorporating a desiccant wheel, a DX cooling coil, and a heating coil. A glycol solution leaving the heat exchanger at about 180°F (82°C) preheats the regeneration air, which is further heated by a gas burner to about 275°F (135°C) for regeneration of the desiccant as needed. In the heating season, the hot liquid is circulated through the space-heating coil instead (Figure 3).

The performance of the CHP system (Figure 2) was monitored for more than 1 year. Based on the higher heating value of natural gas, the overall efficiency of the CHP system could exceed 50% on humid summer days, compared to the corresponding net electrical efficiency of about 21% to 23%. Higher efficiencies were reported for the heating season. (The efficiencies accounted for the parasitic energy use

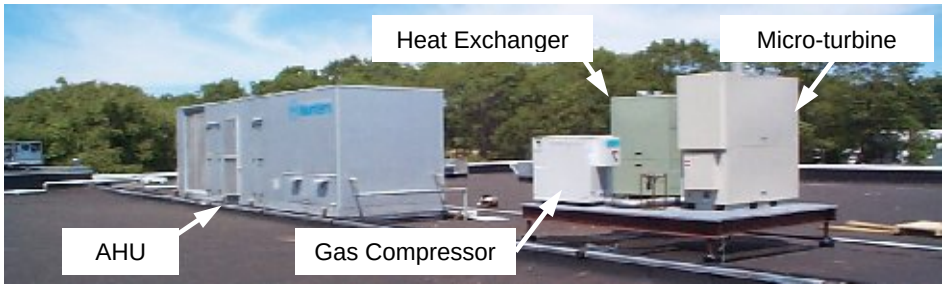

Figure 2. CHP system in Waldbaums supermarket (photograph courtesy of CDH Energy Corp.)

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of the gas compressor and the glycol-solution circulating pump, as appropriate.) These results are reflective of the importance of TAT, without which the CHP systems reduce to power generators. (More information on CHP and related initiatives are available at *http://www.uschpa.org* and *http://www.eere.energy.gov/de/*.)

The importance of TAT extends well beyond the realms of energy conservation and environmental attributes – it also precipitates viable solutions with respect to other issues. A large-scale implementation of TAT can displace a significant portion of the electrical load induced by conventional air conditioning and refrigeration systems. This, in turn, alleviates electric grid congestion and helps end-users realize savings on electricity without having to shift the loads to off-peak periods. Whether in stand-alone or CHP installations, these technologies also provide an opportunity to utilize renewable energy, bio-fuels, and other alternative energy resources. Therefore, these technologies not only can enhance the ability of energy consumers in responding to energy pricing dynamics but can also enable them to proactively participate in the implementation of energy and environmental policies. These are the important attributes that constitute the market drivers for TAT.

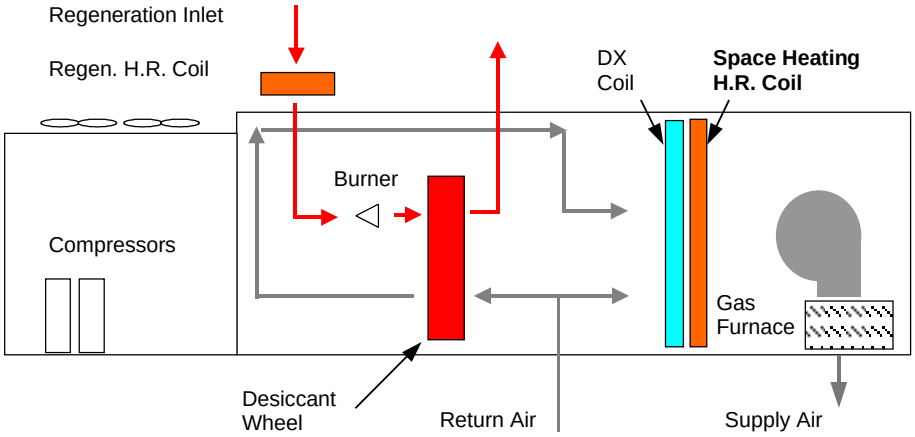

Figure 3. Schematic of air-handling unit

However, in spite of their benefits, TAT are not currently in vogue, primarily because of their relatively high installation costs. To capture a larger market share, development and implementation of innovative, cost-effective, and efficient TAT is imperative. Also important is the integration of these technologies with other constituents (i.e., buildings and other energy systems) for achieving an optimum compromise between the overall energy efficiency and cost.

In pursuit of these objectives, the National Renewable Energy Laboratory (NREL) has undertaken significant R&D efforts to promote TAT, with emphasis on desiccant cooling, in collaboration with industry. Recognizing the importance of system integration, NREL has also embraced a "whole-system" approach that takes under consideration the design synergies and conflicts among key components and/or subsystems of buildings and energy systems.

For more information on related research activities at NREL, visit *http://www.nrel.gov/buildings_thermal/*

Ali Jalalzadeh-Azar is a senior engineer with the National Renewable Energy Laboratory in Golden, Colorado. He is the 2005 recipient of the Crosby Field Award, which recognizes the best paper published by ASHRAE, for "A Comparison of Electrical and Thermal-Load Following CHP Systems." ❖

AESD DIVISION AWARDS AND KEYNOTE LECTURE

The AES Division recognizes the contributions of its members and researchers and educators in Advanced Energy Systems at the annual AESD Luncheon at the IMECE. The contributions of these individuals are truly outstanding and are one of the main reasons for the continued advancement of energy related technology. The Awards Luncheon also offers the opportunity for attendees to hear from a leading expert on issues at the forefront of such research and technology.

At the 2004 IMECE, Dr. Frank Kreith provided the featured presentation at the luncheon on "Fallacies of a Hydrogen Economy." Dr. Kreith is an ASME Distinguished Lecturer, Fellow, and Honorary Member. He has been an adviser to the White House, NATO, and the U.N. Dr. Kreith presented a very interesting talk on pathways for hydrogen production, storage, and utilization.

The Systems Analysis Technical Committee chose two papers from 2003 for their *Best Paper Award* and *Best Student Paper Award*, both of which were presented at the 2004 Luncheon. The *Best Paper Award* was presented to Na Zhang of Chinese Academy of Sciences and Noam Lior of University of Pennsylvania for "Configuration Analysis of a Novel Zero CO2 Emission Cycle with LNG Cryogenic Exergy Utilization." The *Best Student Paper Award* winner was S.M. Senn of the Swiss Federal Institute of Technology at Zurich for "Porous Materials as Fluid Distributors in Polymer Electrolyte Fuel Cells – A Computational Performance Analysis," which was co-authored by Dimos Poulikakos.

The 2005 AESD luncheon will be held on Thursday, November 10, at the IMECE. Tickets to the luncheon are available for advance purchase with conference registration. More information can be found at *http://www.asme.org/congress/*.

At the 2005 IMECE, the Heat Pump Technical Committee will present its annual *Best Paper Award* and *Best Student Paper Award* to the authors of the paper judged as the best among those presented at the previous year's congress. For 2004, the paper by Timothy Wagner, Mark Marler, and Sung-Han Jung of the United Technologies Research Center entitled

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AESD DIVISION AWARDS AND KEYNOTE LECTURE – *Continued From Page Four*

"Performance Characteristics of a Microturbine-Double Effect Absorption Chiller CHP System" has been selected as the Best Paper. The award also carries a $500 cash award, and will be presented to the authors at the AESD Luncheon. In addition, the paper by Jesse Killion and Srinivas Garimella entitled "Simulation of Pendant Droplets and Falling Films in Horizontal Tube Absorbers" has been selected as the 2004 Best Student Paper Award. This paper was presented and authored by Mr. Jesse Killion (a graduate student at Georgia Tech). The award will also be presented at the AESD Luncheon.

Additionally, numerous members of the AESD were recognized by ASME at large over the past year. Sriram Somasundaram received an ASME Dedicated Service Award in 2005, and Abel Hernandez-Guerrero received that honor in 2004. Furthermore, the following members of the AESD were elected Fellows of ASME during the previous year: Dr. Srinivas Garimella of the Georgia Institute of Technology, Dr. Abel Hernandez-Guerrero of the Universidad de Guanajuato, Dr. Alberto Mirandola of the University of Padova, and Dr. Ryohei Yokoyama of Osaka Prefecture University.

Congratulations and a hearty thanks to all these awardees. ❖

NEW EXECUTIVE COMMITTEE MEMBERS

Dr. Abel Hernandez-Guerrero is one of the new Executive Committee members of the AESD. Dr. Hernandez-Guerrero is a Professor at the Universidad de Guanajuato, Mexico. He received his Ph.D. and M.S. degrees from Oregon State University, and his B.S. degree from the Universidad de Guanajuato. Within the AESD, Dr. Hernandez-Guerrero served as Chair of the Systems Analysis Technical Committee during 2003-2004, and he was chair for the 2001 (New York), and 2002 (New Orleans) Symposiums on Thermodynamics and the Design, Analysis, and Improvement of Energy Systems. Dr. Hernandez-Guerrero served as President of the Mexican Society of Mechanical Engineering from 2000 to 2002 and ASME Region X Assistant Vice-President-Mexico from 2003 to 2005. He received an ASME Dedicated Service Award in 2004, the ASME Region X Meritorious Service Award in 1998, the ASME Student Section Advisor Award in 2001, and served as a Senior Representative to the ASME Student Sections Committee from 1998-2006. Dr. Hernandez-Guerrero is an Associate Editor for the *ASME Journal of Fuel Cell Technology* and an Editorial Board Member of the *International Journal of Exergy*. He was named an ASME Fellow in 2004.

Dr. Hernandez-Guerrero has been a Member of the Mexican System of Researchers (a top honors society) since 1992. He has served as the Mechanical Engineering Department Head, the Graduate Programs Chair, and the Undergraduate Programs Chair, at the Universidad de Guanajuato, and he has worked at Texas A&M University, PEMEX (a Mexican Oil Company) and Instituto Tecnológico de Celaya. He has conducted research in fields such as fuel cells, heat transfer, energy system analyses, and refrigeration systems.

Dr. Abdi Zaltash is another new member of the AESD Executive Committee. He is a research staff member with the Cooling, Heating and Power Group in the Engineering Science and Technology Division of the Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee. He received a B.S. in Chemical Engineering, M.S. in Chemical and Petroleum Engineering, and a Ph.D. in Chemical Engineering from the University of Pittsburgh. He is a member of ASHRAE and ASME. Within the AESD, Dr. Zaltash has been active in the Heat Pump Technical Committee. He served as Chair of the HPTC during 2002-2004, and Vice-Chair during 2000-2002. He has also served as a Topical Organizer for the HPTC sessions at the IMECE, and has chaired and vice-chaired numerous technical sessions. Dr. Zaltash is currently serving as an Associate Editor for the *ASME Journal of Energy Resources Technology* and as the ASHRAE TC08.03 (Absorption and Heat Operated Machines) Program Subcommittee Chairman.

Dr. Zaltash has over seventeen years of research experience in the field of heat activated technologies. His research interests are in the areas of Cooling, Heating and Power (CHP), heat activated technologies, heat/mass transfer, and new working fluids. He is the engineer-in-charge of the ORNL Cooling, Heating and Power (CHP) Integration Laboratory and performance evaluation of heat-activated chillers/heat pumps in the ORNL environmental chambers. He has collaborated on several research and development programs including CHP program, DOE Industrial Heat Pump Program, Large Commercial Chiller Program, and Advanced Absorption Fluids Program, during which he was involved in the evaluation of corrosion inhibitors, heat/mass transfer additives, and new absorption fluids. Additionally, He has been also involved in simulating advanced absorption cycles through the use of ABsorption SIMulation model (ABSIM). ❖

Direct Thermal Power Conversion and Thermal Management

The Direct Thermal Power Conversion and Thermal Management committee promotes research and development in all areas of direct conversion of heat to electric power without any moving parts or thermal management of energy. Direct thermal energy conversion devices include thermionics, thermoelectrics, AMTEC (alkali metal thermal to electric converter), and TPV (thermophoto-voltaics). All areas of thermal management including aircraft and spacecraft, ground vehicles, electric components and power systems, and industrial energy systems are covered. The committee participates in IMECE and other special conferences related to advanced energy systems. The committee sponsored two technical sessions at the 2004 IMECE, and will sponsor two sessions with six papers at the 2005 IMECE in Orlando, Florida.

Heat Pumps

The Heat Pump Technical Committee (HPTC) has maintained an active role in disseminating the latest developments in all theoretical and applications aspects of heating and cooling technologies, which have been changing rapidly in recent years. The recent national and global emphasis on energy efficiency and the environmental impact of heating and cooling technologies has provided numerous exciting opportunities for heating and cooling research and development. New developments include advanced electric and heat-activated chiller and heat pump systems; cooling, heating, and power (CHP) technologies; novel and environmentally friendly refrigerants and working fluids including corrosion inhibitors; fundamental heat and mass transfer issues in heat pump components; novel heat exchanger materials and designs; system simulation; integration and implementation issues; and compressor design.

The HPTC strives to help move the development of heating and cooling technologies from theoretical concepts to viable applications, with a mix of contributions from industry, academia and government agencies. The HPTC organizes technical sessions at the IMECE to bring together researchers working on these technologies. During the 2004 IMECE, the HPTC committee sponsored six technical sessions and one panel session that were well attended and stimulated interesting discussions. At the 2005 IMECE in Orlando, Florida, four technical sessions and one panel session have been organized by the HPTC.

The HPTC meets once a year at the IMECE. The 2004 committee meeting was well attended, with many new visitors. New officers were installed at the 2004 meeting. Dr. Laura Schaefer became the Chair, Dr. Greg Nellis became the Vice-Chair, and Dr. Sanjay Vijayaraghavan was elected to the position of Secretary. The previous chair, Dr. Abdi Zaltash, was elected to the Executive Committee of the AESD. Committee members thanked Dr. Zaltash for his excellent and extensive service to the committee.

Researchers interested in the above-mentioned topics and other related issues are encouraged to attend and participate in the activities of this committee. Potential sessions for the 2006 IMECE will be discussed at the HPTC meeting on Thursday, November 10, 2005, and new ideas and participants are welcome.

Systems Analysis

Symposia on the "Thermodynamics and the Design, Analysis, and Improvement of Energy Systems" were organized and presented by the Systems Analysis Technical Committee at the 2004 IMECE. Twenty-eight presentations were given in seven technical sessions, and a panel was presented on *Promises and Realities of the Hydrogen Economy*. Chairs and co-chairs for these sessions originated from industry, government agencies, and academia.

For the IMECE 2005, the Systems Analysis Technical Committee is sponsoring 9 technical sessions on topics such as the fundamentals of energy systems analysis, hydrogen technologies, combined heat and power, and fuel cells. These sessions will be held during November 9-11. The TC wishes to thank Joel Martinez-Frias and Mike Ellis for all of their hard work in organizing the 2004 and 2005 sessions. Mr. William Hoffman is also thanked for his service this past year as the Systems Analysis TC Chair.

With the goal of encouraging the participation of young researchers, the Systems Analysis Technical Committee has presented a Best Paper Student Award over the last few years, for papers in which the first author and presenter is a full-time student. Two other awards are given by the Systems Analysis Technical Committee: one to the best paper presented at an IMECE symposium, and also the prestigious ASME Edward F. Obert Award for the best paper in Thermodynamics.

As described in greater detail elsewhere in this newsletter, our technical committee also sponsors the ECOS conferences. ECOS 2005 was held in Trondheim, Norway from June 20-23. The conference was well attended, and contained many interesting paper presentations and panel sessions.

Energy Systems Miniaturization

The primary objectives of this committee are to increase its membership (from academia, industry and government labs) and to sponsor sessions at the IMECE and IECEC. At the 2004 IMECE, the committee sponsored a technical session on *Meso/Micro/Nanoscale Energy Systems and Conversion Devices*, in which four papers and one technical presentation were given. The Energy Systems Miniaturization TC is sponsoring a similar session on Wednesday at the 2005 IMECE with five papers and two presentations.

Stirling Systems

Rapid action on environmentally sound Stirling cycle technology has led to significant commercial advances in the past year on both power-producing and cooling fronts. The core technology has not benefited from any major leaps in materials or methods, but rather its applications have advanced by persistent engineering pursuit of steady improvements that

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make the possible practical.

Leading the power side are two major contracts announced by Stirling Energy Systems of California, maker of dish-solar generating Stirling systems based on the engines of Kockums AB in Sweden. One contract is with Southern California Edison and the other, is with San Diego Gas & Electric. Together, these will be the largest commercial production of Stirling power units since their pre-modern heyday before rural electrification. The 1000 MW of Stirling solar power will save over 2 million tons of CO2 emissions each year.

Other power Stirlings are entering or approaching commercial use in an equally exciting application: micro co-generation or Combined Heat and Power (CHP). On-site CHP delivers heat and power together, using almost all the fuel heating value instead of the 30% typical of centralized power and 80% for heat-only combustion. Infinia of Washington state, ENATEC of the Netherlands, and Rinnia of Japan are pioneering mass production of these units. Other companies active in this application include Sunpower of Ohio and Whispertech of New Zealand.

Stirling cooling is also coming on line. In addition to the military and space-use cryogenic coolers from major corporations, commercial applications are beginning. Leading-edge products from CFIC-Odrive, Twinbird, Global Cooling, and AvXcel bring the clean, quiet and efficient cooling capacity of the Stirling cycle to consumers for the first time at prices measured in hundreds, not thousands, of dollars.

Government laboratories are involved with Stirling development as well, from the several NASA centers developing space power and cooling systems to NIST and Los Alamos with cryocoolers for multiple applications. Sandia National Laboratory's SunLab has supported the development of solar Stirling products.

Stirling technologies are both new and old: they date to the early 1800s but are only now finding a place in the environmentally-benign power and cooling markets of the 21st century. A practical Stirling machine embodies all of the disciplines of mechanical engineering: structures, dynamics, heat transfer, materials, and manufacturing. As these elegant but subtle devices mature into common products, ASME has the opportunity to accelerate the development and certify their performance and safety through sponsorship of conferences and promulgation of standards. Persons interested in contributing are encouraged to participate and contact John Corey, the Stirling TC Liaison.

Fuel Cells and Hydrogen Technologies

In recognition of their overlapping areas, the Fuel Cells Technical Committee and the Hydrogen Technologies Technical Committee have been combined into a single TC. Additional restructuring of the focus and mission of this TC will continue over the next year.

AESD members have been quite active in the fuel cell area, as is evidenced by the success of the ASME Conferences on Fuel Cell Science, Engineering, and Technology. After the highly successful first two conferences, the main objective of Third International Conference was to disseminate the latest advances in the subject area from the international community working in the field. A total of 16 Keynote lectures, 3 panel sessions, and 97 contributed papers were presented from 18 countries at this conference. About 200 participants attended the conference. The themes of Keynote Lectures were: Proton Exchange Membrane Fuel Cells; Solid Oxide Fuel Cells; Molten Carbonate Fuel Cells; Direct Methanol Fuel Cells; Sodium Borohydride Fuel Cells; Automotive Fuel Cells; and Controls and Power Conditioning.

We acknowledge the contributions by the Scientific Committee members and continued support and assistance provided by Raj Manchanda, Natasha Robertson, Cynthia Clark and Stacey Cooper of the ASME for the conference organization and Technical Publishing. The Fourth Fuel Cell Conference, supported by this committee, will be held in Irvine, California during June 19-21, 2006. We would also like to invite interested members to submit papers to the *Journal of Fuel Cell Science and Technology*.❖

PROPOSED ASME ENERGY INSTITUTE

The Energy Institute (EI) will be formed by six existing ASME divisions. It will represent six focus areas: Fossil Power, Nuclear Engineering, Renewable Technologies, Emerging Technologies, Internal Combustion Engines, and Crosscutting Basic Science and Technologies. It will be governed by a Board of Directors and supported by ASME staff. The institute will significantly broaden the role played by each of the divisions and strengthen the common goals. The identified roles include external relations with government, academia, industry, and energy committee; educational and publication activities via journal, newsletter, magazine, and professional development programs; and membership services such as membership development, honors and awards, and student scholarships.

The institute will provide a key leadership role in the area of energy management. A three-year exit clause is available to member divisions. After two years a division could elect to no longer be a part of the institute. After two years plus a one-year notice period they would revert to being under the auspices of ASME, as it is then structured after the Continuity and Change initiative. The society-wide restructuring plan is available at *http://www.asme.org/change*.❖

ADVANCED ENERGY SYSTEMS DIVISION 2005-2006

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Mark Your Calendars!

AES Division Active at the IMECE in Orlando, Florida (November 5-11, 2005)!

The AES Division has planned a very stimulating technical program at this year's IMECE in Orlando, Florida. A total of 16 technical sessions and one panel session on current topics will be held. The papers scheduled in these sessions include numerous contributions from outside the U.S. and from industry, demonstrating the wide-ranging and global appeal of the technical topics being addressed by the AES Division. A list of session titles is provided below. Please be sure to participate in these informative sessions and add your valuable input wherever possible, especially during the discussion period at the end of each paper or panel presentation. We hope to see you there.

Thermal Management and Direct Energy Conversion

Thermal Management Concepts and Systems
Direct Thermal Energy Conversion Devices and Systems

Topics in Heat Pumps, Coolers, Compressors, and CHP (Combined Cooling, Heating and Power)

Fluid Mechanics and Heat Transfer in Positive Displacement Compressors
Emerging Heat Pump/Cooling, Heating, and Power (CHP) Systems
Global Climate Change and Heat Pumps/Refrigeration Cycles
Emerging Technologies in Sorption and Desiccant Systems
CFD for Heat Pumps: Has/Can it Become a Design Tool? (Panel Session)

Thermodynamics and the Design, Analysis, and Improvement Of Energy Systems

Low Temperature Fuel Cell Technology
High Temperature Fuel Cell System Analysis
Transport Phenomena in Fuel Cells
Energy Systems and the Environment
Hydrogen Technology
Fundamentals of Energy Systems Analysis (2 Sessions)
Analysis and Design of Combined Heat and Power Systems
Energy Systems Analysis and Design

Meso/Micro/Nanoscale Energy Systems and Conversion Devices

Meso/Micro/Nanoscale Energy Systems

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