

**Summary and Reflections:  
2<sup>nd</sup> International Symposium  
on  
Combined Heat and Power  
Amsterdam, Netherlands  
May 9-10, 2001**

**INTRODUCTION AND GENERAL OBSERVATIONS**

The 2<sup>nd</sup> International Symposium on Combined Heat and Power, held on May 9-10, 2001, in Amsterdam, Netherlands, was sponsored by the International Cogeneration Alliance (ICA), with support from the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA). The symposium was designed to bring together senior government and industry representatives from around the world to discuss combined heat and power (CHP) issues, including its benefits for the environment, the economy and international development, and its potential for developing into a robust market in both developed and developing nations. The symposium organized planned in conjunction with **Sustain 2001**, a conference focusing on sustainability issues and opportunities throughout the world.

The 2<sup>nd</sup> CHP symposium provided more technical information on CHP, as well as added emphasis on CHP as a climate change strategy, CHP and distributed generation alternatives, and greater participation from developing nations around the globe. A complete agenda and list of participants and speakers is provided in Appendices A and B. Approximately 135 participants from 25 nations attended the symposium.

Among the most important observations from the conference was that while CHP appears to be in ascendancy in the U.S. and some transitional economies such as China and India, the industry is struggling in many European countries and Latin America. Motivations for supporting CHP vary as well. In Europe climate change policy appears a dominant issue, while in the U.S. a combination of economic and local air quality motivations appear to be driving the support. In China local air quality appears to dominate while in India the motivation is economic development.

In Europe, the current problems facing CHP appear to result from increases in natural gas prices, which are tied to petroleum prices that have surged in the past year, while electricity prices have fallen. The opening of wholesale electricity markets in the European Union have resulted in a decrease in electricity prices because of an infusion of new power from Central Europe which has created an over supply situation. Similarly, the United Kingdom the supply of electricity has increased beyond demand due to creation of an independent power market coupled with a slowdown in economic activity. These situations are likely to correct in coming years as markets adjust to liberalization, though the CHP industry is likely to experience significant near-term market dislocations.

It was also noted that in spite of federal opposition to the Kyoto process, support for CHP has increased with the new administration. The emerging support for CHP by government in the

U.S. contrast with Europe in that local air quality and efficiency of fuel utilization are the driving factors. While the pace of barrier removal in Europe has slowed, progress appears to be accelerating in the U.S. Though current fuel prices have increased in the U.S., the increase has been more symmetric with all energy prices increasing together, so CHP is less disadvantaged by the prices. As a result, the U.S. appears one of the most promising global markets for CHP.

China has embraced cogeneration to address an environmental crisis that is facing its eastern urban areas. The vestiges of the command and control economy have allowed the government to mandate the replacement of all coal-fired electric power plants less than 50 MW with natural gas fired CHP systems where ever practical. This mandate will likely propel China into an international leadership position on CHP.

India has turned to CHP, largely fueled by biomass by-products to address chronic electricity shortages throughout the country. In that environment CHP represents an important new source of power.

In Latin America, privatization of electric utilities and the economic slowdown have hampered the development of CHP markets, with the market in leading CHP state in the region, Brazil, evaporating.

Overall, while the market is experiencing near-term dislocations, a sense of optimism existed for the CHP globally. It was felt that the strength in U.S., Indian and Chinese markets would carry the global CHP market until the European markets recover.

## **SUMMARY OF PRESENTATIONS**

**WEDNESDAY, MAY 9, 2001**

### ***Combined Heat and Power - Benefits for the Environment, the Economy, and for International Development***

Keynote presentations were given by

- ◆ **Ferd Crone, Member, Dutch Parliament**
- ◆ **Ludo van Halderen, Executive for Northern and Central Europe, Tractebel EGE, CEO of Electrabel Netherlands**
- ◆ **Professor Klaus Traube, Vice-President, Bundesverband Kraft-Warme-Kopplung (German CHP Association)**

Their presentations focused on the benefits of CHP for the environment, the economy, and international development. CHP is seen as part of an integrated approach to energy supply, providing a positive investment in climate change. Industry's strategy for CHP is to generate electricity, provide a strong market for buying and selling electricity and natural gas, and to build, manage, and maintain energy networks. Although the market for CHP is not as strong in Europe as it has been, all speakers see moderate growth for the industry in the Netherlands. CHP has a future in a competitive market, when well supported by appropriate, market-based policies.

### *Cogeneration and the Challenge of Climate Change*

This panel discussed a number of cogeneration and CHP issues in light of climate change, emission reductions, and worldwide interest in greenhouse gas mitigation. Speakers included:

- ◆ **Yvo de Boer, Director of International Environmental Affairs, Netherlands Ministry of the Environment**
- ◆ **Jayme de Hollanda, Director General, National Institute for Energy Efficiency, Brazil**
- ◆ **Stephan Singer, Head of European Climate and Energy Policy Unit, Worldwide Fund for Nature, Europe**
- ◆ **Egbert Liese, Deputy Programme Manager ERUPT, Netherlands Carbon Credit Programme**

*Mr. deBoer* provided an update on the *U.N. Climate Change Negotiations – Prospects for Implementation of the Kyoto Protocol*. *Mr. deHollanda* spoke on *CHP, Emissions Reductions, and National Development*. *Mr. Singer* addressed *The Environmental NGO Perspective*, and *Mr. Liese* spoke about *Joint Implementation and the CDM – The Opportunity for CHP*.

The moderator of the session was **Peter Horrocks, Directorate-General for the Environment, European Commission**.

Panel presentations focussed primarily on the Climate Change negotiations and the U.S. position not to support the Kyoto Protocol. Panelists discussed environmental barriers to CHP development, including air and water pollution, and the responsibility that both government and the private sector have to mitigate these barriers and improve the cost and environmental effectiveness of CHP. Speakers addressed the four “pillars” of climate change, as they affect cogeneration and CHP:

- ◆ Compliance and liability
- ◆ Environmentally sound monitoring
- ◆ Public participation in decision-making
- ◆ Environmental integrity through carbon sequestration “sinks”

Panelists agreed that the Kyoto process must continue, as a major driver for clean power. As CO<sub>2</sub> levels are rising, energy policies must support energy efficiency, a switch to natural gas and cogeneration, and long-term support for renewables.

### *CHP and Distributed Generation Around the World – The Present State of Development*

This panel featured the following speakers, chaired by **Simon Minett, Director of COGEN Europe**:

- ◆ **Gunther Hanreich, Director of Demand Side Management and Renewable Energy, European Commission, DG Energy and Transport, Belgium**
- ◆ **Wang Zhenming, Secretary General, Cogeneration Study Committee of Chinese Society, China**
- ◆ **John Jimison, Executive Director, U.S. Combined Heat & Power Association, USA**

*Mr. Hanreich* discussed the European Commission's aggressive CHP strategy, to double CHP capacity by 18% by 2010. The commission is looking at possible new initiatives to reach this goal, including enhanced use of CHP in buildings as well as industry. In addition, liberalization of energy markets is key to increased use of CHP, waste heat, and renewables. A number of country, or national, level initiatives are being considered, including setting targets for CHP, providing financial incentives, and promoting biomass and small scale CHP. At the EU level, key agenda items include dissemination of best practices information, promotion of CHP in internal energy markets, and improved liberalization, and internalization of external costs. One of the key barriers to an enhanced market for CHP in Europe is access to grids, which similarly faces U.S. CHP developers and those in other nations.

*Dr. Zhenming* provided an overview of China's CHP program, perhaps the most developed in the world. The country supports cogeneration and CHP with both policy and market incentives. Because China is growing economically, requiring increasing amounts of primary energy, development of natural gas, specifically to power CHP facilities, is on the increase. Barriers to CHP in China include access to state-of-the-art technology and lack of private investment capital.

By contrast, the CHP industry in the United States is still under-developed. Mr. Jimison presented information on the status of CHP in the U.S. About 50.4 MW of CHP has been installed in the country, the majority of it in industrial applications. Two thirds of existing industrial CHP is in three industries - paper, chemicals, and petroleum refining. About 70% of the nation's CHP facilities are fueled by natural gas, with coal and wood/wood waste fueling about 30%. Three obstacles currently hinder enhanced CHP use in the U.S. - resistance from electric utilities; the failure of government to credit CHP with its environmental advantages; and institutional inertia and structural market problems. However, the market opportunity for CHP in the U.S. is good, a result of the growth of the electronic economy, which requires consistent, reliable power, not available from the grid, and environmental constraints of siting new transmission lines.

Achieving the potential for CHP in the United States will require:

- ◆ Continued reform of electric utility structures and relationships with CHP owners and operators
- ◆ Improved recognition of the environmental benefits of CHP, especially at the state and local levels
- ◆ Education and change of habits throughout the economy.

***Parallel Session: Cogeneration Projects Around the World***

This session, chaired by **Ton van der Does, Chairman of COGEN Europe**, featured

- ◆ **Alexander Luchinger, Factor Consulting, Switzerland**
- ◆ **Mark Spurr, IEA Implementing Agreement on DHC/CHP, Netherlands/USA**

**Mr. Luchinger** discussed the *Swiss-Romanian District Heating Project* in Pascani and Buzau. Building rehabilitation requirements for over 6,000 Romanian residents formed the basis for this project. In each building, the following actions were taken: construction of new boiler houses (low NO<sub>x</sub> burner-boiler systems, cogeneration units, gas engines, and automated systems); a new heat distribution system; a substation for heat and sanitary water; and new piping to conserve water. CO<sub>2</sub> emissions are projected to drop dramatically, and the project is expected to be completed in May 2001.

**Mr. Spurr** discussed the role of district heating and cooling (DHC) and emissions trading in expanding the use of CHP. He presented information on DHC as a CHP heat sink, as well as a climate change strategy, described sample DHC/CHP projects, reviewed an International Energy Agency (IEA) project on DHC/CHP and emissions trading, and raised issues related to emission trading programs. District heating and cooling enhances power grid reliability by generating power at load centers through CHP, shifting demand to off-peak periods, and delivering cooling energy through district cooling rather than the power grid. District cooling helps position buildings for a competitive power market by reducing peak power demand and flattening the load profile. Projects discussed in this session illustrated these positive impacts of DHC when used with CHP.

***Parallel Session: Emerging Technology Markets***

This session featured three speakers:

- ◆ **Lew Milford, Clean Energy Group, USA**
- ◆ **Nick Lensen, Distributed Energy, Primen, USA**
- ◆ **Jeremy Harrison, EA Technology, UK**

The session was moderated by **Gert-Jan Bakker, Director of COGEN Nederland**.

**Mr. Milford** discussed the *Harvard Medical School Fuel Cell Project*, coordinated by the Clean Energy Group, a U.S. non-profit organization that is developing non-profit/business partnerships to assess and develop clean energy projects. The Harvard project is utilizing fuel cells because of the need for uninterrupted, high quality power. Fuel cells provide consistent, high quality power for computer-driven and health care oriented facilities, has low emissions, and can be cost effective in the appropriate environment. The ultimate goal is to create a model fuel cell system for health care environments. Although the Harvard fuel cell system is operational in a campus computer facility, the system is not yet cost-effective for meeting Harvard's total energy load.

High first costs, and technology and environmental siting issues remain. Nevertheless, this project may have applicability in Europe, as the shift from central station generation to onsite generation grows.

*Mr. Lenssen* gave an update on California's energy situation and remaining barriers to emerging distributed generation technologies. He discussed barriers to distributed energy technologies, including utility-related and energy user issues, such as siting, and technology issues. He used the electricity and utility deregulation problems in the state of California to illustrate these barriers. Energy users and municipal utilities are putting diesel-fired reciprocating engines on line to address availability and price concerns; they are generating high NO<sub>x</sub> and particulate pollutants. Photovoltaic (PV) solar systems are being built in large numbers, and cogeneration is being put on line with the help of new subsidies. Other distributed generation projects are being hastily developed, including wind, digester and landfill gas; existing diesel and gas systems with low-NO<sub>x</sub> technologies are quickly coming on line.

Barriers remain to emerging DG technologies, including interconnection, unfair tariffs, emissions, the cost of competing fuels (gas), and a number of technology issues, such as warranties for new energy generation products and systems.

*Mr. Harrison* discussed the stirling engine micro-CHP unit, which is an individual CHP unit built for residential use. It replaces a gas boiler in a home, and generates enough energy to supply hot water and electricity, while giving off a small amount of hot air for space heating. EA Technology estimates that the potential impact on the European market could be greater than 60 GW of installed capacity, serving up to 40 million homes. Driving this potential market are technology barriers standing in the way of other DG options, environmental benefits, and market liberalization in Europe and the UK.

Successfully marketing the technologies discussed in this session will rest on the results of research that improves their energy efficiency and environmental cleanliness, and resolves the political, institutional, and regulatory barriers that still stand in the way of widespread use.

## **SUMMARY OF PRESENTATIONS**

**THURSDAY, MAY 10, 2001**

### ***Opening Plenary Session***

The plenary session opened with remarks from the co-chairs, Mr. Brown and Mr. Hall. They pointed out differences between public and private sector support for distributed generation, and the opportunities they see for aggressive technology development and use. A number of issues divide Europe, America, and the developing world, in particular the lack of agreement on climate change. Europe and the European Commission appear committed to Kyoto, while the U.S. is maintaining its position to seek voluntary measures for remediation of global warming. This lack of agreement underscores a number of countries' ability to move forward on CHP and other DG technologies. Climate change is a major driver for CHP; without agreement on climate change, CHP will not move forward.

Three keynote presentations were featured on the second day of the symposium:

- ◆ **Merrill Smith, CHP Program Manager, U.S. Department of Energy, Office of Power Technologies, USA**
- ◆ **Thomas Casten, Chairman and CEO, Private Power, USA**
- ◆ **Dana Younger, IFC GEF Coordinator/Principal Project Officer, Environmental Protects Unit, International Finance Corporation of the World Bank Group**

*Ms. Smith* discussed the U.S. Department of Energy's Perspectives on Distributed Energy and CHP. She explained DOE's \$300 million program in research, development, and demonstration on renewable energy, distributed generation, and combined heat and power. She reviewed DG technologies receiving programmatic support at the Department, and the legislative, policy, and market based support provided for public-private partnerships. Questions from the audience concerned environmental and regulatory constraints to CHP, including the U.S. position on climate change. Ms. Smith reiterated U.S. support for CHP, and the administration's support for continued efforts toward meeting the CHP Challenge of doubling CHP capacity by 2010. The U.S. is working to remove barriers to CHP, including supporting standard interconnection requirements and development of output based standards that will level the playing field for CHP in comparison with other energy resources.

Through its support for the U.S. Combined Heat and Power Association, and other public and private/non-profit activities related to improving CHP use throughout the economy, the Department of Energy hopes to see the CHP Challenge Goal met in 2010.

*Mr. Thomas Casten*, Chairman and CEO, Private Power, spoke on the topic *Power Failure*. He provided his insights into the use and opportunities for CHP in our current and future power market. He spoke on the current power situation in the U.S. as well as the environmental issues surrounding distributed power both in the U.S. and abroad. He supports shutting down inefficient power plants and searching for ways to create more efficient, cost-effective power generation opportunities. As one of the leaders of the CHP community in the world, Mr. Casten provided thought-provoking ideas for breaking down barriers to the more widespread use of this technology, including charging true costs for power and establishing time-of-use rates that reflect its true cost.

*Dana Younger* provided his view of the opportunities for financing CHP and cogeneration in his presentation, *Financing Cogeneration in Developing Countries – A Perspective from the International Finance Corporation/World Bank Group*. The IFC has invested in three cogeneration projects, in Peru, Guatemala, and the Czech Republic. The IFC is pursuing cogeneration projects because "accelerating market acceptance of environmentally beneficial technologies, products and services offers one of the best ways to meet the IFC's mission of improving people's lives." He stressed local environmental and global environmental benefits, and economic and security enhancements through CHP. Mr. Younger discussed barriers to small scale cogeneration in emerging markets, including the cost of high transactions for small scale projects, the cost of pollution abatement, the lack of positive regulation that encourages

cogeneration, and the fall in network electricity prices. He also discussed the need for long-term financing for cogeneration projects, and the lack of experienced sponsors for such projects.

The IFC has developed a number of strategies to overcome these barriers, including information and technical assistance, use of simplified investment structures, and improvements in the regulatory environment. His presentation concluded with a call for high quality, private sector cogeneration projects throughout the world. He also supports “bundled” funding for CHP plants to improve project economics, and amending existing financing arrangements to encourage 3<sup>rd</sup> party financing.

***The Future Prospects for CHP & Distributed Generation – How Big Is the Global Market?***

The next three panelists presented their views on the future global market for CHP and distributed generation. The speakers included:

- ◆ **Michael Brown, Director, International Cogeneration Alliance, Belgium**
- ◆ **Bertrand Courcelle, General Manager Europe, Honeywell Power Systems, Netherlands**
- ◆ **Richard Brent, Director, Federal Government Relations and Government Sales, Solar Turbines, USA**

**Mr. Brown** discussed opportunities for CHP and DG in developing countries around the globe. Such technologies can provide reliable energy supplies today and into the future. He noted that China leads all developing nations in CHP development.

**Mr. Courcelle** discussed Honeywell’s involvement with the microturbine, which has been successfully marketed both in the U.S. and abroad. Honeywell is heavily invested in CHP projects using the microturbine.

**Mr. Brent** discussed Solar Turbines’ experience with CHP systems that range from 5 kW to 100 MW. Solar prides itself on selling “energy-solutions” not just products. He specifically mentioned legislation that has been introduced in the U.S. Congress that establishes standard interconnection policies throughout the country. He also discussed the request made by DOE for a \$236 million budget in 2002 for distributed energy resources (DER) research, development, and technology demonstrations.

The panelists discussed the need for reliable, efficient, environmentally safe, and low cost energy in poor countries, such as Mexico. Although a country might have sufficient natural resources, its ability to generate usable power may be restricted due to a lack of appropriate infrastructure. The panel agreed that it is the responsibility of countries to provide low cost electricity to serve its citizens and that as consumers look more to distributed, on-site power, central station developers will look elsewhere to develop their markets.

They debated whether CHP development should be driven by customer needs on-site or as a replacement for central station power. Mr. Brent noted that when the U.S. CHPA was founded,

CHP systems were at that time tailored to a particular end use. Today, CHP systems are being designed as multi-use, with a balance of combined cycle units and CHP. Mr. Courcelle further noted that these units are cogeneration—not electricity—driven, and used the development of CHP in the Netherlands as an example of this. “First generation” CHP systems were electricity driven; “second generation” systems, coming after the separation of electric utility production and distribution functions, focused on the combination of both electricity and thermal energy. In today’s marketplace, production of both electricity and thermal energy creates a more secure supply of power, while at the same time optimizes individual customer supply and demand requirements.

### ***Parallel Sessions: Cogeneration Projects Around the World***

This afternoon panel included the following speakers:

- ◆ **Sunil Natu, Mitcon, Ltd. India**
- ◆ **Mark Hall, Trigen Energy Corporation, USA**
- ◆ **Li Yuhong, Tsinghua University CHP Project, Beijing, China**

The panel was moderated by **Richard Brent** of Solar Turbines.

**Mr. Natu** discussed the *Status of Biomass CHP in India*, in particular its benefits in rural, decentralized counties around the world. Biomass from crop residues, agro-industrial residue, bagasse from sugarcane, and forest residue is being used to fuel CHP systems in a number of Indian states. The technology currently exists in India to generate electricity using biomass combustion/cogeneration systems with a Rankine cycle system. Policy initiatives have been established in India to encourage biomass CHP, including:

- ◆ low taxes
- ◆ accelerated depreciation and income tax holidays
- ◆ exemption from excise duty and sales tax
- ◆ development of demonstration projects
- ◆ development of a natural biomass resource assessment program
- ◆ an interest subsidy scheme
- ◆ grants in aid for research
- ◆ attractive lending terms
- ◆ almost uniform power purchase rates and policies.

Barriers to biomass CHP in India do exist, however, including a lack of mandatory requirement to purchase power from biomass CHP projects and uncertain financial commitments for CHP due to the deregulation of India’s retail electricity marketplace. A number of new initiatives are being developed, including legislation to require the purchase of renewable energy, to overcome these barriers.

**Mr. Hall** discussed the financing and administrative methodology used to develop the University of Maryland CHP project. The goals of this project are to provide sufficient quantities of reliable power; to realize the benefits of deregulation; to minimize financial risks; and to advance academic, environmental, and social interests. Trigen and its partner, Cinergy Solutions, were selected through a Request for Quote (RFQ)/Request for Proposal (RFP) process, to undertake \$71 million in utility improvements. Improvements have been designed to reduce energy use by 32%, provide \$120 million in utility savings with which to fund the improvements and provide debt service, and create a public/private partnership that has financed the project with low cost, tax exempt, off-balance-sheet financing. The university system uses gas or oil to generate electricity for campus buildings through combustion turbines; heat recovery boilers, generate steam which is run through a turbine to generate heat for the university's heating systems. Steam is also run through chillers to provide chilled water for campus buildings. Exhaust heat from the heat recovery boilers is also run through the combustion turbines to produce additional electric power.

This system is saving almost 33 billion BTUS of energy, equivalent to \$6 million/year, and is projected to eliminate 9,800 tons per year of regional NO<sub>x</sub> emissions, and 3.5 million tons of CO<sub>2</sub> over the course of the contract. The agreement is based on a 20-year energy services contract, with equipment efficiency, performance and payment guarantees, and shared risk/savings. A key component of the project is a \$100,000 academic internship program for student involvement. The project has won an award from the National Council for Public-Private Partnerships and has been cited for technological innovation in deploying a state-of-the-art CHP system.

**Ms. Yuhong** discussed natural-gas-fired CHP as an alternative to coal-fired heating in Beijing. The city has a high population density, and thus has high heating and cooling demand, most of it met by coal fired boilers. The city also suffers from severe air pollution due to this dependence on coal. Beijing is thus well-suited to "small-district independent" and on-site CHP; moreover, power availability, reliability, and security needs create an opportunity for generating power in a cost and energy efficient way through CHP. Tsinghua University is being retrofitted for CHP, using natural gas as a primary fuel, substituting for coal. Barriers to more widespread use of CHP include low buyback prices, high natural gas prices, and poor intervention policies. China is working to break-down these barriers throughout the country.

### ***Parallel Session: Emerging Technology Markets***

This session featured the following speakers:

- ◆ **Steve Gillette, Capstone Turbines, Europe**
- ◆ **Rich Sweetzer, Exergy Partners Corp., USA**

The session was moderated by **Simon Minett** of COGEN Europe.

**Mr. Gillette** discussed the drivers for distributed generation and presented details of Capstone's involvements in combined heat and power. Key drivers for DG include:

- ◆ electricity deregulation
- ◆ environmental/air quality concerns, including the Kyoto Protocol and plant siting issues
- ◆ the “digital revolution,” including load growth and power quality concerns

Capstone is a leading manufacturer of microturbines; over 1,300 turbine systems have been shipped since the company's inception in 1992. The Capstone microturbine combines power generation and control protection capabilities in an integrated system. The company is involved in hydrogen vehicles, oilfield and landfill/biogas resource recovery systems, and micro-cogeneration projects. CHP system applications range from municipal swimming pools to office buildings, nursing homes, greenhouses, and industrial applications.

**Mr. Sweetzer** discussed CHP for buildings in the United States, in particular the economic, reliability, and emission drivers that are creating a positive environment for building and industry use of CHP. He discussed both the economic and health impacts of grid reliability problems, in particular the load requirements of our increasingly technological society. The cost of down time is great, creating increasingly valuable opportunities for on-site generation. Integrated CHP systems are essential for improving reliability and reducing power installation and maintenance costs. With support from the U.S. Department of Energy, Oak Ridge National Laboratory, and a number of product manufacturers, an administrative building at the University of Maryland is being used to test cogeneration products and systems, including advanced turbines, reciprocating engines, microturbines, fuel cells, absorption chillers, humidification and dehumidification, and thermal storage. At the same time, DOE is financing research, development, and demonstration of packaged CHP systems; the goal of this effort is to develop systems that can be installed in buildings, minimizing the need for custom-designed applications.

Mr. Sweetzer discussed barriers to widespread use of CHP in the U.S., similar to those discussed by other speakers at the Symposium, e.g., utility tariffs, interconnection fees and requirements, etc. To break down these barriers, the U.S. Department of Energy, in partnership with the University of Illinois at Chicago, Energy Resources Center, and the Gas Technology Institute, has established a Midwest Regional CHP Application Center to:

- ◆ conduct baseline CHP assessment and characterization studies
- ◆ conduct case studies of CHP projects
- ◆ provide an information repository on CHP products and systems
- ◆ provide outreach and technical assistance (a “SWAT” team)

The Oak Ridge National Laboratory (ORNL) is providing program administration and support for the Midwest Center. The Department of Energy hopes to support other regional centers throughout the U.S. to further the development and use of CHP.

*Debate and Discussion: CHP As an Agent of Change in Transforming the Energy Market*

**Tom van der Does**, Chairman of COGEN Europe and **Thomas Casten**, Chairman and CEO of Private Power USA, engaged in a lively debate and discussion of CHP, with moderation provided by **Stewart Boyle**, Writer, Journalist and Energy Consultant.

The two CHP and energy experts expressed similar views about the market for CHP, both in today's economy as well as the economy of the future. As was stated by other symposium speakers and participants, electricity restructuring, fuel prices, the digital economy, and environmental concerns are having an impact on investment opportunities for CHP. They are the "agents of change" for CHP. Although they disagreed on the usefulness and appropriateness of the Kyoto Protocol on Global Climate Change, they agreed on the opportunity that CHP provides for reducing emissions from fossil fueled electricity generation.

Among the issues discussed were:

- ◆ the important alliance that natural gas utilities have with CHP developers and marketers
- ◆ the need for incentives, both financial and institutional, to foster distributed generation
- ◆ the need to enhance the new competitive environment for CHP through grid access, reasonable interconnection fees, and alliances with distribution companies.

These issues, as was illustrated throughout the Symposium, are important to countries around the globe.

*Closing Keynote Panel*

This panel featured a number of symposium speakers, (**Mssrs. Minett, Lensson, de Hollanda, and Gillette**) with the addition of **Prakash Naiknavare** of the Maharashtra Co-operative Sugar Federation, India, and **Neal Elliott**, USCHPA and the American Council for an Energy Efficient Economy (ACEEE).

All panelists agreed that in the last decade, cogeneration (CHP) has made significant inroads in the power supply business. Although many of the same barriers to its implementation exist throughout the world, the diverse CHP community of developers, financiers, marketers, producers, and purchasers, is seizing the opportunity that today's energy environment presents and enlarging the global CHP market. All panelists urged the assembled participants to continue their active roles in breaking down those barriers to CHP and leveraging the public's concerns about power reliability, affordability, supply and quality to improve the market for combined heat and power.