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Lawrence Berkeley Laboratory

Applied Science Division

Newsletter

March 1989

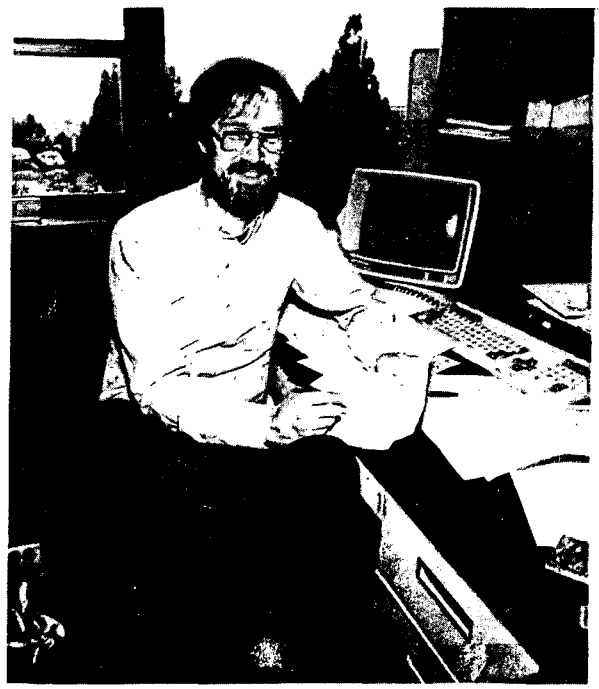
Staff Profile

Steven Stoft: An Energetic Economist Plots our Energy Future

As many as five nuclear power plants could be rendered unnecessary if the highest existing standard for appliance efficiency were adopted nationwide.

—Energy Conservation Policy Group, ASD

Impressive conclusions like this one originate from ASD research on varied aspects of energy use. One scientist doing such research is **Steve Stoft**, who works mainly with the Utility Planning and Policy Group (led by Ed Kahn) within ASD's Energy Analysis Program. For the past year, and previously as a consultant, this Staff Scientist has been using his PhD in Economics to analyze federal standards for the energy efficiency of household appliances—particularly refrigerators, freezers, televisions, and small gas furnaces. Steve also helps analyze federal standards for appliance efficiency. In particular, Steve has been evaluating the economic impact of such efficiency standards on appliance manufacturers, i.e., to what extent companies producing energy-efficient products can be profitable and competitive in the world marketplace.



Economist Steven Stoft works with others in ASD's Energy Analysis Program to analyze the current and predicted costs of various common energy technologies

Steve's work on federal standards for appliance efficiency is part of LBL's response to the 1987 National Appliance Energy Conservation Act, which established efficiency standards for household appliances and provided for periodic DOE updates of the standards. Research supporting these updates involves assessing impacts on consumers, manufacturers, electric utilities, and the nation as a whole. Increasingly, LBL's work serves as a major resource (both directly and indirectly) for many kinds of decision-makers—legislators, manufacturers, retailers, and consumers.

Dr. Stoft's work in the Energy Analysis Program reflects the strong economic component of the Program's research. By integrating engineering costs and efficiency estimates with economic and financial data, Steve and others in the Program are able to estimate such elements as retail appliance prices, manufacturer's profit, shipments, revenues, and net income from the product, as well as the energy and dollar savings of appliance efficiency standards.

In collaboration with Ed Kahn, Steve recently completed research on competitive bidding for electric power. He will soon begin work on projecting energy demand by Less-Developed Countries (LDC's) and on use of price structures to allocate energy use in China. ☼

Inside

LBL Heat Island Workshop

Breaking New Ground—and Cooling It, Too

Heat Island Workshop organizers and members of ASD's Heat Island Project (HIP). Standing, from left: Joe Huang, Phil Martien, Haider Taha, Art Rosenfeld, Hashem Akbari. Seated, from left: Leo Rainer, Ron Ritschard

To those who do not study the relation between man-made structures—such as buildings and streets—and climatic change, a *heat island* may sound like a great place for a winter vacation. As used by building scientists and urban planners, however, the term represents a phenomenon to be avoided.

A heat island is a city area whose outdoor temperature exceeds that of its less urbanized neighboring areas. Explanations for summer heat islands include dark-colored pavement (streets and sidewalks), reduced evaporation and plant transpiration, the large heat capacities of buildings, and reduced windspeed in cities. Summer heat islands lead to increased energy use (i.e., for air conditioning), which in turn combines with the higher outdoor temperatures to worsen urban air pollution. Thorough study of summer heat islands and how to mitigate them requires expertise in diverse disciplines such as meteorology, landscape architecture, forestry, pollution control, and building sciences.

On February 23-24, representatives of these disciplines from varied academic, governmental, and private institutions flocked to Berkeley to attend a first-of-its-kind workshop on this topic,

One registrant came from Shanghai to attend the workshop

hosted by ASD's Heat Island Project (HIP). The event was chaired by **Hashem Akbari** of ASD's Energy Analysis Program; co-organizers included **Phil Martien, Joe Huang, Ralph McLaughlin, and Debbie Gial-lombardo.** The program was conducted at UC Berkeley's Clark Kerr campus and was jointly sponsored by LBL, DOE, the Environmental Protection Agency (EPA), the Electric Power Research Institute (EPRI), and UC's University-Wide Energy Research Group (UERG). Support was also given by the American Forestry Association and the U.S. Department of Housing and Urban Development.

The 80 registrants, one of whom visited Berkeley from as far away as Shanghai, represented four times as many attendees as originally anticipated. Large turnout notwithstanding, space limits had forced workshop organizers to deny admission to about as many people as were admitted. This high degree of expressed interest was remarkable, particularly because the *workshop was not advertised!*

The 26 papers presented at the workshop were grouped into five general areas: effects of microclimatic changes on building energy; characterization of heat islands; mitigation strategies for heat islands; global climate and the reduction of atmospheric CO_2 and NO_x emissions; and policy issues related to heat island mitigation strategies. Keynote addresses were given by ASD's Art Rosenfeld (on energy efficiency as the immediate solution to global warming) and Michael Totten, representative of Congresswoman Claudine Schneider (on global-warming bills pending in Congress).

ASD scientists presented papers on recent technical and policy developments in heat island studies (Hashem Akbari, Art Rosenfeld, and Haider Taha); saving energy and reducing atmospheric pollution by controlling summer heat islands (Hashem Akbari); energy efficiency investments and unit costs of carbon savings from urban and rural tree planting (Florentin Krause and Jon Koomey); using models of urban climate in building-energy simulation (Phil Martien, Hashem Akbari, and Art Rosenfeld); and measurement of summer residential microclimates in Sacramento (Leo Rainer, Phil Martien, and Haider Taha). In addition to the workshop's pro-

Since 1985, ASD's Heat Islands Project has led research in the energy and environmental impacts of heat islands

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Invited Talks & Foreign Travel

✈ ASD Division Director **Elton Cairns** gave two talks at the Electrochemical Society's Southern California-Nevada Local Section meeting: "Status of Advanced Rechargeable Batteries" and "The State of the Electrochemical Society."

At SRI International in Menlo Park, Elton spoke on "Photothermal Deflection Spectroscopy: A New Tool to Characterize Electrochemical Processes."

✈ **Antoni Oppenheim** of the Environmental Research Program's Combustion Group presented a paper, "Combustion by Pulsed Jet Plumes: Key to Controlled Combustion Engines," at the 1989 Society of Automotive Engineers International Congress & Exhibition. The meeting took place in Detroit.

✈ In two presentations to the Windows, Skylights, and Sunspaces section of the Cold Climate Conference (held in St. Paul, Minnesota), **Steve Selkowitz** spoke on "Advanced Glazing Systems" and "The WINDOW 3.1 Microcomputer Program."

In the first talk, Steve emphasized the potential energy savings accruing from the next generation of highly insulating windows. Among other topics, he reviewed the technical options for producing R6-R10 windows and discussed LBL's highly insulating, low-emissivity, krypton-filled window design, now being field-tested in Montana with utility co-support.

Steve's second talk described the development, validation, and use of WINDOW 3.1 as well as current research (with the American Society of Heating, Refrigerating, and Air-Conditioning Engineers and Canadian researchers) to extend and validate tools for computing the heat-transfer indices of windows.

At an annual review and trade show (the SOLTECH conference) featuring DOE-supported solar research, Steve spoke on "Energy and Environmental Impacts of Advanced Window Technologies." He also addressed the Energy and Environmental Study Institute, a bipartisan organization established by leaders of the Congressional Environmental and Energy Study Conference. The Institute's objective is to stimulate debate and develop policy solutions to environmental and energy problems.

This busy Leader of ASD's Windows and Lighting Program also spoke to the American Architectural Manufacturers Association on "Advanced Glazings for Curtain Wall Systems."

✈ **Rick Diamond** of the Indoor Environment Program moderated the Multifamily Weatherization Conference, held in Chicago. The event was sponsored by the Illinois Department of Commerce and Community Affairs.

✈ International Energy Studies Group Co-Leader **Lee Schipper** traveled to Oslo, Norway, for discussions with the Norwegian Ministry of Energy on energy trends and conservation opportunities in that country. ASD's International Energy Studies Group has been analyzing the long-term development of Norway's energy structure and fuel choices in the main sectors of energy use: homes, services, agriculture, heavy/light industry, and transportation. The ASD group has also been comparing their Norwegian results with those they obtained in analyses of other European countries and the United States.

✈ Addressing a Rocky Mountain Electrical League architectural/engineering seminar on "Energy Conservation Challenges of the 1990's," **Fred Winkelmann** spoke about design simulation

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Congratulations

Mark Levine, Leader of ASD's Energy Analysis Program, has been nominated to membership on the Board of Directors of the Center for Clean Air Policy. An outgrowth of the National Governors' Conference, this non-profit Washington, DC institution includes state governors, state senators, and academics on its Board of Directors.

Mark has also been asked to join the Board of Advisors of the International Institute for Energy Conservation. Among the participants in this organization are Rep. Claudine Schneider, Co-Chair of the Congressional Competitiveness Caucus; Maxine Savitz, former DOE Deputy Assistant Secretary for Energy Conservation; and Thomas Stelson, former DOE Assistant Secretary for Conservation and Solar Energy.

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Visitors & Participating Guests

☞ On March 24, the Center for Building Science hosted **Yuri Tabunshikov**, Head of the Moscow Architectural Institute, U.S.S.R. While visiting LBL, Professor Tabunchikov lectured on "Energy Efficiency of Buildings and Computer-Aided Design of Control Systems for Building Thermo Supply."

☞ Until June, the Building Energy Systems Program will be hosting **Martin Halmann** of Israel's Weizmann Institute of Science. Dr. Halmann, who has been visiting LBL since last October, is studying microstructured materials as well as solar detoxification of groundwater.

☞ Working with Isaac Turiel and others in the Energy Analysis Program, **Benoit Lebot** is participating in the Appliance Standards Project until March of 1990. Dr. Lebot, a mechanical engineer, is visiting from France's École Nationale des Travaux Publics de L'État.

☞ **Sergio Alessandro** of Italy's Palermo University and the National Council of Research is working with the Windows and Lighting Program on building energy simulation. Visiting until June, Dr. Alessandro is integrating an Italian simulation model with window simulation programming developed at LBL.

Heat Islands *(cont'd from p. 2)*

ceedings—which will be published this summer—workshop participants agreed to collaborate to develop a *Manual on Summer Heat Island Reduction.* Production of the manual will be supported by EPA.

HIP was started at LBL in 1985 as a project of the SNAP program (Search for New Areas and Projects). Since then, it has led research on the energy and environmental impacts of heat islands. The HIP research team includes Hashem Akbari, Joe Huang, Art Rosenfeld, Haider Taha, Leo Rainer, Phil Martien, and Ron Ritschard, all of ASD's Center for Building Science. HIP has published several papers documenting the effects of summer heat islands on cooling-energy requirements, as well as the potentials of trees and light-colored surfaces to reduce these energy needs. The group's results have been quoted in numerous newspapers and are used by utility districts, civic organizations, and city governments. The American Forestry Association and cities such as San Jose and Los Angeles have asked LBL for technical assistance in developing tree-planting programs.

HIP recently proposed to DOE a multiyear, comprehensive program in research, modeling, and data gathering. In addition to compilation and analysis of existing U.S. and foreign data, the program's objectives include field measurement of summer microclimate variations in urban areas; development and refinement of numerical models; computer simulation of energy/load savings from microclimate modification; scale modeling in wind tunnels; full-scale, monitored field experiments at the building and neighborhood levels; and development of practical implementation strategies that consider related issues such as water use, urban design aesthetics, privacy, and solar access.

ASD People in Print

Refereed Publications

Benner WH, Biziak M. Pseudo first-order reaction rate constant for the formation of hydroxymethylhydroperoxide from formaldehyde and hydrogen peroxide. *Atmospheric Environment* 1988;22:2603.

Send news of awards, publications, visitors—and any other items you'd like announced—to the Editor, Lila Schwartz, at mailstop 90-3026, x4098 (or electronic mail address LNSchwartz @lbl) or stop by her office, 90-3027A. Suggestions for articles or for staff/visitor profiles are also most welcome.

Congratulations

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John Harte of the Environmental Research Program was made a Fellow of the American Physical Society "for contributions to the interface between physics and ecology, including development of understanding of climate modification due to nuclear winter, and to the impact of acid rain on aquatic ecosystems."

Joan Daisey, Leader of the Indoor Environment Program, has been appointed to the Editorial Advisory Boards of two journals: *Environmental Science and Technology* and *Aerosol Science and Technology.* Each appointment is for a three-year term.

Invited Talks *(cont'd from p. 3)*

such as that carried out in ASD's Simulation Research Group.

Art Rosenfeld gave the keynote speech, "Choosing a Future for the Arctic," at the Eighth Annual Conference of the Alaska Environmental Assembly. The meeting took place in Fairbanks, Alaska.

In addition, Art recently spoke on "Energy-Competitive Options for Communities" at the HUD/DOE Conference on Energy Competitiveness & the Environment.

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