DISCLAIMER

PUB-432

NEWSLETTER

Lawrence Berkeley Laboratory
Energy and Environment Division
January-February-March 1982

BREAKTHROUGH

The Energy Efficient Buildings Sky Simulator

The new sky simulator developed by the Daylighting project, led by Steve Selkowitz of the Energy Efficient Buildings Program, has a combination of capabilities never before achieved in such a facility.

The simulator (located in Wurster Hall in the U.C. College of Environmental Design) allows scale models to be evaluated under simulated skies of uniform luminance, overcast skies, and under clear sky conditions. In addition, the facility, run by Moji Navvab, can simulate the effect of ground reflected light independent of sky conditions and will shortly have a sun simulator to reproduce the effects of direct sunlight. Electronic control of the electric light sources in the sky simulator allow this wide range of sky luminance conditions to be reproduced.

The information acquired in this facility is essential if one desires to accurately predict potential lighting energy savings. The use of physical models for analysis and prediction of daylight distribution in a building is well established as a research tool. Increasingly sophisticated computer models have replaced physical modeling techniques over the last two decades. However, even the most powerful computer models cannot adequately evaluate geometrically complex architectural solutions incorporating surfaces that are other than ideal diffusers. Thus, there has been an increased interest in high accuracy physical model studies. Testing models indoors under a "sky simulator" solves reproducibility problems, but generally at the expense of the ability to model a wide range of complex sky luminance conditions. Thus the importance of this new sky simulator facility.

Initial studies in the facility will assist in validating newly developed computer models that predict interior daylight illuminance. Future studies will examine the performance of daylight control devices and architectural solutions which maximize the useful role of daylight in buildings while minimizing adverse effects such as glare and excessive solar heat gain.

These performance data, with appropriate field validation, will enable us to more accurately determine not only electric lighting energy savings, but also the impact of these energy conservation strategies on peak electrical loads in buildings.

PUB-432 3-82/355 This work was supported by the U.S. Department of Energy under Contract DE-AC03-76SF00098. Lawrence Berkeley Laboratory is an Equal Opportunity Employer.

Because the sky simulator provides unique modeling capabilities, we expect to make the facility available to other researchers. International collaboration on daylighting research projects has already begun with three researchers from foreign countries currently working at LBL.

A VOTRE SERVICE

AN INTERVIEW WITH JANET SMITH DIVISION PERSONNEL ADMINISTRATOR

E&E: Janet, as our Division's Personnel Administrator, what is your part in the administrative branch of the Division?

JS: Primarily, I handle matters concerning hiring, layoffs, performance appraisal, reclassification, salaries, employee training and development, and employee-supervisor conflicts.

E&E: Your position involves a lot of direct contact with Division employees and a broad range of personnel activities. What sort of background do you bring to the position?

JS: In college I studied conservation of natural resources, counseling and sociology. After school I was hired as the business manager of a county-funded Health Sciences Outreach Program in Sacramento. I worked directly with local residents to set up a clinic and run health education projects. Following this work, I was an admissions officer at UC Davis School of Law.

E&E: What did your job at UC Davis involve?

JS: My work involved developing criteria and procedures for screening 200 successful candidates from an application pool of 2400. Moreover, we were interested in finding a way to enroll students whose educational background was not directly related to law. The non-traditional students were given credit for work or other experience which was applicable to the area of law they wished to pursue. This selection procedure, similar to the one used by Harvard Law School, did not group applicants by race or sex, thus making it possible to consider non-traditional students without using the controversial quota system. It was a very challenging and rewarding job. Many of the candidates who I helped admit have become my life-long friends.

E&E: Did you come to LBL after your work at UC Davis?

JS: No. I left UC Davis to return to school for further studies in counseling, after which I worked for a year as a Personnel/Contracts and Grants Administrator at UC Berkeley. Then I came to LBL.

E&E: What do you enjoy most about your current work?

JS: I enjoy playing a part in helping the Lab to accomplish its goals. I enjoy hiring employees and helping them with training and reclassification. I also feel good when I can help solve problems between employees and their supervisors. I try to resolve these at a grassroots level, without involving too many other people. I like having the opportunity to promote positive employee relations and morale.

E&E: In what ways do you help to promote employee morale?

JS: In part, by referring employees to some of the services available at the Lab. For example, the Lab has a confidential program which assists employees in finding professional counseling for problems related to their job and/or personal life. Anyone interested in more specific information about this service can contact Kathleen Handron. The Lab also supports a wide range of classes, workshops, seminars and other programs for employee development. The Lab pays some tuition and allows time off from work with pay for some classes. For more information about this, employees should contact me.

E&E: Joining the Division in June last year, you arrived at a difficult time for our division and the Laboratory.

JS: That's certainly true. The Lab's total funding has been cut by about 12%. The E&E Division was experiencing layoffs. However, funding seems fairly stable now for the 1982 fiscal year.

E&E: What does the Lab do for those employees who are laid off?

JS: For employees who have indefinite appointments, the Lab provides a number of services. These include giving information about unemployment insurance, severance pay (one week pay per year of continuous service, after five years of employment), job counseling, assistance with preparing resumes, up to a three-month extension of benefits, preferential rehire and the right to recall.

E&E: What is the difference between preferential rehire and the right to recall?

JS: Preferential rehire is a service which provides notification of LBL job openings in the same classification as that which was held by the employee before being laid off. This service is effective for up to three years. Right to recall refers to the right of the employee, for a period of up to three years, to be rehired in his/her old position should the funding be restored.

E&E: What does the Lab do for employees with term appointments who have been laid off?

JS: Not very much, I'm afraid. Job counseling is available at the Personnel Office. But I might add that the scientists in this division have been wonderfully creative in helping those term appointees whose projects are in financial trouble.

E&E: It's rumored that you're an avid 49er fan.

JS: Well, I haven't missed a 49er home game in three years. I guess that qualifies me as a fan. In fact, I'm leaving for Detroit tomorrow night.

E&E: Any predictions?

JS: We'll win, of course!

E&E: Do you have any other favorite teams you would make a prediction for?

JS: I think that Frank Robinson could do for the Giants what Bill Walsh did for the 49ers. I expect to see much more exciting baseball this year. I also like Cal. But perhaps a winning season for both the 49ers and Cal is asking too much.

★TRIPS, CONFERENCES AND PRESENTATIONS★

January

- *Art Rosenfeld* has returned from two trips to Europe. In October, he lectured on the SERI Solar/Conservation study in Paris, Stockholm, and Gothenberg. He also chaired a session and gave several talks at ICEUM III, Berlin—the International Conference on Energy Use Management. In January he spoke at a Paris forum on updating French Performance Standards for New Buildings, urging that the standards be accompanied by energy labels for all buildings, new and existing. Art also discussed labels with the European Economic Community in Brussels and the Building Research Establishment near London.

- *Tica Novakov* attended a conference sponsored by American Institute of Aeronautics and Astronautics in Orlando. At the invitation of the Institute, Tica gave a paper on "The Role of Soot in Aerosol Chemistry."

- *Lee Schipper* visited the Board of Industry in Stockholm to work on the final revision of the LBL study on Swedish conservation data. Lee also visited the Energy Ministry in Copenhagen to do an evaluation of Danish residential and conservation data.

- Participating in the workshop sponsored by Solar Thermal Test Facility Users Association, *Arlon Hunt* presented a paper on "High Temperature Heat Exchangers Using Transparent Windows." The workshop was held in Cocoa Beach, Florida.

- *Sam Berman* and *Bob Clear* were in Ottowa to attend on International Round Table Symposium on the Integration of Visual Performance Criteria into the Illumination Design Process. Both Sam and Bob presented position papers at the symposium.

- *William Fisk, Dave Grimsrud, Max Sherman* and *Robert Sonderegger* went to the ASHRAE semi-annual meeting held in Houston. Robert chaired the meeting, and Bill, Dave and Max presented the following papers, respectively: "Retrofits and Indoor Air Quality in Residential Housing," "A Predictive Air Infiltration Model Long-Term Test Validation," and "Determination of the Dynamic Performance of Walls."

- *Carlos Figueroa* was in Lake Buena Vista, Florida, for a meeting sponsored by the Institute of Gas Technology, where he gave a paper on "Biomass Liquefaction Continuous Bench-Scale Direct Liquefaction Studies of Douglas Fir Wood."

February

- *Antoni Oppenheim* attended the 1982 SAE International Congress and Exposition which was held in Detroit to present a paper on "A Rationale for Advances in the Technology of I.C. Engines."

- *Nabil Amer* gave a paper on "Photothermal Deflection Spectroscopy: an Ultrasensitive Remote Sensing Schema" at the International Workshop on Optical and Laser Remote Sensing held in Monterey.

March

- *Hal Rosen* delivered an invited talk on "Carbon Particles in the Arctic" at the annual meeting of the NOAA which was held in Boulder.

- *Greg Traynor* was in Louisville to attend an Air Pollution Control Association Specialty meeting at which he gave a paper on "Indoor Air Pollution from Portable Kerosene-Fired Space Heaters, Wood Stoves, and Wood Furnaces."

- Present at the American Physical Society meeting held in Dallas were *Nabil Amer, Doug Wake* and *Marjorie Olmstead*. Among some of the papers they presented were "A Time Resolved Study of the Effects of Defects on Excess Carrier Recombination in a-Si:H" and "Photothermal Spectroscopy in Vacuum."

- *Ted Chang* and *David Littlejohn* were in Las Vegas to attend the American Chemical Society meeting. Ted delivered the paper he coauthored with David on "Aqueous Solution Kinetics of a Wet Flu Gas Scrubber System."

- The Third International Symposium of the International Council for Building Research Studies was held in Dublin, Ireland. *Richard Johnson* participated in the symposium with a presentation on "Glazing Optimization Study for Energy Efficiency in Commercial Office Buildings."

★FEATURED PUBLICATION★

Energy, Vol. 6, No. 9, pp. 945-970, 1981

"LIFE-CYCLE COST ANALYSIS OF MAJOR APPLIANCES"

Isaac Turiel, Henry Estrada, and Mark Levine

ABSTRACT—The Department of Energy has proposed energy efficiency standards for eight types of appliances. One of the criteria used to establish these standards is the economic impact of the standard on the consumers of the regulated products. A life-cycle cost analysis was performed for 32 classes of these eight appliances in order to gain a measure of the economic impact of equipment purchases on the consumer. Simple payback times were also computed to indicate how much time is required for the consumer to recapture his or her initial added investment in a more efficient product.

Following is a short discussion with Isaac Turiel:

E&E: Isaac, could you give us a little background to this paper.

Isaac: Several years ago Congress passed a law which mandated DOE to develop efficiency standards for 13 consumer products. These were divided into two groups. The group we studied was the eight that are the biggest energy consumers (they account for close to 20% of U.S. primary energy use): refrigerators and refrigerator-freezers, freezers, clothes dryers, water heaters, room air conditioners, ranges and ovens, central air conditioners, and furnaces. The law established three criteria for the standards: 1) that they were economically justified, 2) that they were technically feasible, and 3) that they did not impose "too great" an impact on the manufacturer. We were asked by DOE to handle the economic analysis. The second two criteria were investigated by ADL (Arthur D. Little) and SAI, respectively.

E&E: And your approach?

Isaac: From ADL and other sources we obtained information on the incremental cost of adding proposed energy-conserving features to the appliances. We then computed the life cycle costs of the appliances for a variety of energy-conserving measures, taking into account both the initial cost (higher for the more efficient appliance) and the operating costs (lower for the more efficient appliance) over the lifetime of the appliance. We also determined the payback period; that is, how long does it take the consumer to recover the extra first cost through the reduced energy costs?

E&E: And your findings?

Isaac: On a national average, the proposed standards for all eight appliances were cost effective. The life cycle costs were always lower for appliances meeting the proposed standards than for less efficient ones.

Payback periods ranged from a few months to a few years, depending on the appliance. I should point out that we also looked at regional effects, which are important for appliances like air conditioners where the use is very climate dependent. For example, efficiency improvements that would be very cost effective in the South turned out to be marginal in the North. Thus we recommended that regional standards be considered for air conditioners.

E&E: We hear a lot these days about the market's response to the rising cost of energy causing energy conservation to happen anyway, so that standards aren't necessary. Your article doesn't address this issue.

Isaac: No it doesn't. But Jim McMahon and others in the Energy Analysis program have looked at the national energy savings that would result from the standards, as compared to going strictly by consumer choice. They estimate that by the year 2005 the standards would save about 1.4 quads of energy per year, which is a significant fraction of our total energy consumption of roughly 70 quads per year. There are many reasons for an "imperfect market" for appliances. A major one is that about 40% of the appliances are not purchased by the ultimate user. For example, many are purchased by developers or apartment owners who will generally buy on the basis of first cost rather than life cycle cost. Also, the consumer may not have the necessary information to make the proper economic decision and will usually be influenced by such factors as the style or convenience of the appliance.

E&E: We're convinced. So what happened to the standards?

Isaac: Our results were given to DOE, and the standards appeared in the form of a "Notice of Proposed Rule Making" in June of 1980. The final standards had not been issued by the time the Reagan Administration took office, and the new administration put a hold on such activities.

E&E: But the law is still in effect.

Isaac: That's true. What we hear is that DOE is likely to issue "no standards" standards, probably on the grounds that one or more of the above criteria are not met. But we don't know what the standards will actually say.

E&E: Could all of this have any effect on the existing California appliance standards?

Isaac: Yes. Any federal standard, including a "no-standard" standard, would pre-empt state standards. However, California could petition DOE TO allow the state to maintain its standards. At this stage it's hard to say what might actually happen.

E&E: Have you done any work on appliances since this paper?

Isaac: I have personally been doing other things. But Jim McMahon, Henry Ruderman, and Jayant Sathaye are now working on an analysis of the other five appliances: heat pumps, dish washers, TV's, humidifiers, and dehumidifiers.

The Featured Publication was selected by Elton Cairns, Don Grether, and Rollie Otto from articles published in the referred, archival literature.

★PERSONNEL NEWS★

- *Charlie Case* was asked to join the National Academy of Science's Committee for Cooperative Program Relating Science and Technology to Navaho Development Goals.

- *Zenaida Yuson* will be approving petty cash transactions for the E&E Division. If Zenaida is away, you should see Sandy Mocco.

- *Professor Shu-Hsia Chen* of the National Chiao Tung University, Republic of China, will be spending her sabbatical year working with Nabil Amer's Applied Physics and Laser Spectroscopy Group on liquid crystals and their applications.

- *Paul Berdahl* was elected Chairman of the 1982 Solar Radiation Division Board for the American section of the International Solar Energy Society, Inc.

- *Rollie Otto* has agreed to serve on the Equal Employment Opportunity Council for 1982.

★SPORTS★

The E&E basketball team, the Up-the-Hill Gang, recently completed a winning season (4-3) in the UC intermurals. Team members were Mark Alper, Garth Burns, Bill Fisk, John Girman, Frank McLarnon, Bob Miksch, Bill Nazaroff, Bud Offermann, and Greg Traynor. Coach John Girman summarized the season: "We did really well for our first season playing together and considering most of us hadn't played for several years. Injuries and work-related absences hurt us late in the season, but we were always competitive, and we should improve our record next year."

★RECENT REFEREED JOURNAL ARTICLES★

"Building Energy Use Compilation and Analysis (BECA): An International Comparison and Critical Review. Part A: New Residential Buildings," A.H. Rosenfeld, W.G. Colborne*, C.D. Hollowell, S.P. Meyers, L.J. Schipper, Energy and Buildings, 3, pp. 315-332(1981).

"Indoor Radon Sources, Concentrations and Standards," A.V. Nero, Transactions of the American Nuclear Society, Vol. 39, p. 83 (1981).

"Potential Energy Savings in the Residential Sector of the United States," J. Ingersoll, Beyond the Energy Crisis, Opportunity and Challenge, R.A. Fazzolare and C.B. Smith,eds., Pergammon Press Oxford and New York, pp. 263-273 (1981).

*Department of Mechanical Engineering, University of Windsor, Windsor, Ontario, Canada.

"Kinetics of the Reaction between Hydroxylamine and Sodium Bisulfate," S. Gomiscek*, R. Clem, T. Novakov, and S.G. Chang, Journal of Physical Chemistry, 85, No. 17, pp. 2567-2569 (1981).

"Role of Fly Ash in Catalytic Oxidation of S(IV) Slurries," Sidney Cohen, Shih-Ger Chang, Samuel S. Markowitz and Tihomir Novakov, Environmental Science & Technology, Vol. 15, No. 12, pp. 1498-1502 (1981).

"Life-Cycle Cost Analysis of Major Appliances," Isaac Turiel, Henry Estrada, and Mark Levine, Energy, Vol. 6, No. 9, pp. 945-970 (1981).

"Detailed Loop Model (DLM) Analysis of Liquid Solar Thermosiphons with Heat Exchangers," A. Mertol, W. Place and T. Webster, Solar Energy, Vol. 27, No. 5, pp. 367-386 (1981).

"Modified Pararosaniline Method for the Determination of Formaldehyde in Air," Robert R. Miksch, Douglas W. Anthon, Leah Z. Fanning, Craig D. Hollowell, Kenneth Revzan, and Jacqueline Glanville, Anal. Chem., 53, pp. 2118-2123 (1981).

*University of Ljubljana, Yugoslavia.

Lawrence Berkeley Laboratory

Energy and Environment Division

WEEKLY SEMINAR SERIES
TUESDAYS, 4 PM, BUILDING 90, ROOM 3148
UNLESS OTHERWISE NOTED

April 13	DONALD OLANDER, Chairman, Nuclear Engineering Dept., UCB "Materials Problems in Nuclear Reactors"
April 27	HAROLD JOHNSTON, Chemistry Dept., UCB "Perturbations of Stratespheric Ozone"
May 11	ARNOLD FICKETT, Electric Power Research Institute (EPRI) "Prospects of Fuel Cells for Power Generation"
May 18	SIM VAN DER RYN, School of Architecture, UCB "Planning Energy Efficient Communities"

REFRESHMENT WILL BE SERVED AT 3:45 P.M.

For further information, please call Rolf Mehlhorn, 642-4445 or Maya Osowitt, 486-5297
UC faculty and students, LBL staff and invited guests are welcome