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Author
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Publication Date
2018-01-04

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Lawrence Berkeley Laboratory
Energy and Environment Division

NEWSLETTER

March 1980
Editor: Jeffrey Kessel
(90-3026, ext. 5297)

* DIVISION NEWS *

- The annual Division Review will be held March 20 and 21. Presentations of the Chemical Process R&D Program and Combustion Research, the two areas being reviewed this year, will be made in the third floor conference room of Building 90. Interested members of the Energy & Environment Division are invited to attend the research presentations.

- *Craig Hollowell* has been appointed to the Committee on Indoor Pollutants of the National Academy of Sciences. The U.S. EPA has asked the National Academy of Sciences to evaluate the state of knowledge on the sources of the various hazardous pollutants found in public buildings and individual residences. In response to this request, a Committee on Indoor Pollutants has been established to identify and characterize some of the more hazardous problems of indoor air pollution.

- *Art Rosenfeld,* Acting Program Leader of the Energy Efficient Buildings Program, has been hyper-shuttling to Washington, D.C. and Golden, Colorado. Art suggests flying by night, in order to find three adjacent seats (unoccupied) to use as a fine bed. What is the reason for this sudden burst of travel? Art is Chairman of the Buildings Panel of a new non-governmental group formed in response to a request by DOE Under-secretary John Sawhill. The panel is to propose a new national Conservation Plan. The study is being run by Denis Hayes and Henry Kelly of SERI. Art has also recently testified before the subcommittee on Energy Development and Applications of the House Committee on Energy and Technology, and has participated in a new study by the Rockefeller Foundation on Energy Efficiency.

- The Division has a training budget which is available to provide skills development, interpersonal effectiveness, management training, etc., for Energy & Environment employees. The Division has recently sponsored seminars in Assertiveness, and Technical Report Writing and is currently planning programs in secretarial skills development (files system management, Unix training, time management, grammar/business english, introduction to supervision, and telephone communications), technical program management, health and safety, and another session on technical report writing.

  If you would like to enroll in any of the above seminars, or if you have a subject you would like added to the program, please contact Dottie Bottini (X5270). Requests for enrollment in a class offering additional training on the UNIX system, which will probably begin in about one month, should also be directed to Dottie.

- Congratulations to *Dr. Mark Clemenson* on completion of his Ph.D. with the Chemistry Department and the Atmospheric Aerosol Research Group. Mark worked

with *Sam Markowitz* and *Tica Novakov* and is now off to work in his home state--Texas. Mark's Thesis is titled "Determination of Low-Z Elements in Atmospheric Aerosols by Charged-Particle-Induced Nuclear Reactions."

- Some time in mid-March, the Division will sponsor a "Thank God the Task Proposal Season is Over" party. It will be an hors d'oeuvres and wine sort of affair on the third floor of Building 90. *Dottie Bottini* will arrange the date and time and get in touch with each of the groups.

  Barbara West warns that the centerpiece for the party will be the last investigator to turn in his/her Task Proposal.

- *Nabil Amer* was awarded a patent (U.S. and Foreign) for a novel and simple mass spectrometer based on the optoacoustic effect. The patent also describes methods for increasing the versatility of optoacoustic detection schemes.

- A consultant from the Computer Center will hold office hours in the Building 90 Computer Room as follows:

Tuesday	10 am - 12 pm
Thursday	2-4 pm

  Bring all your BKY (and any other) questions.

- A Rose by any other name . . .

From mail recently received by *Ralph McLaughlin:*

ENVIROTECH

NATIONAL SONICS 250 Marcus Boulevard
Hauppauge, New York 11787

- NATIONAL SONICS PRODUCTS
- DELTA SCIENTIFIC PRODUCTS

UNIVERSITY OF CALIFORNIA
FLORENCE BERKLEY LABORATORY
BERKLEY, CA 94720

ATTN: MR. RALPH McLAUGHLIN

* FORTY-ONE YEARS AGO *

"There was at Columbia University some equipment which was very suitable for these experiments. This equipment was built by Dr. Walter Zinn, who was doing experiments with it. All we needed to do was to get a gram of radium, get a block of beryllium, expose a piece of uranium to the neutrons which come from beryllium, and then see by means of the ionization chamber which Zinn had built whether fast neutrons were emitted in the process. Such an experiment need not take more than an hour or two to perform, once the equipment has been built and if you have the neutron source.

[On March 3, 1939] everything was ready and all we had to do was to turn a switch, lean back, and watch the screen of a television tube. If flashes of light appeared on the screen, that would mean that neutrons were emitted in the fission process of uranium and this in turn would mean that the large-scale liberation of atomic energy was just around the corner. We turned the switch and we saw the flashes. We watched them for a little while and then we switched everything off and went home. That night there was very little doubt in my mind that the world was headed for grief."

(From *Leo Szilard: His Version of the Facts*, Selected Recollections and Correspondence, Edited by S.R. Weart and G.W. Szilard, MIT Press. Available in LBL Building 50 Library.)

* THE LAST WPAS *

We reprint without comment the following memo, retrieved from the waste-basket of the Division Administrator. The author shall remain nameless.

RE: Redraft No. 19 of Proposal

In response to your thoughtful comments on our proposed WW-III Environmental Impacts Assessment, we are refocusing the aims of the study, resetting its objectives, and prioritizing its goals. We concur in your comment that the conceptual content of the current proposal could be counter-productive. It could delay implementation of WW-III and thereby adversely impact its cost effectiveness and timeliness to meet national needs.

In our latest draft, we propose:

- Phase I. Program management plan for HU/DUN/DAT guidance for a preliminary study to evaluate and prioritize the bottom line to mitigate institutional constraints to WW-III. Start Oct. 1, 1981; complete Oct. 1, 1980.

- Phase III. Characterize TITAS impacts of institutional barriers to OWTHOS penetration identified in Phase II. Develop backreach program.

- Phase IV. Technology demonstration. Start Jan. 1, 1981, 1:15:02 AM; complete Jan. 1, 1981, 1:15:04 AM.

- Phase V. Implement full-scale program. Start Jan. 1, 1981, 1:15:06 AM; complete Jan. 1, 1981, 1:30:06 AM; No progress report required.

- Phase VI. Instruct amoebae in the principle of evolution.

* TRIPS, CONFERENCES, AND PRESENTATIONS *

- *Metin Lokmanhekim* will be travelling to Kuwait in mid-March as a guest of the Institute for Scientific Research and the Kuwait University. Metin will be comparing results from the LBL DOE-2 Computer Program for Building Energy Analysis with recent research in Kuwait which correlates the amount of solar energy received as direct and as diffuse radiation.

- *Lee Schipper* will participate in an assessment of energy conservation data in the Republic of Korea. En route Lee will visit the East West Institute in Honolulu and the Institute for Energy Economics in Tokyo.

* RECENT LBL REPORTS *

- The following are listed in TID's *Reports Issued:*

November 1979

LBL-05966 Composition and Utilization of Cellulose for Chemicals from Agricultural Residues, Dec. 1977, 39 p., A.F. Sciamanna, R.P. Freitas, and C.R. Wilke.

LBL-08299 Overcoming Social and Institutional Barriers to Energy Conservation, Oct. 1979, 62 p., submitted to Energy, C. Blumstein, B. Krieg, L. Schipper, and C. York.

LBL-08772 Using DOE-2 at Lawrence Berkeley Laboratory, Sep. 1979, 51 p.

LBL-09162 The Low Pressure Leakage Function of a Building, Nov. 1979, 51 p., presented at the DOE/ASHRAE Conf. on Thermal Performance of the Exterior Envelopes of Buildings, Orlando, FL, December 3-6, 1979, M.H. Sherman, D.T. Grimsrud, and R.C. Sonderegger.

LBL-09235 The National Energy Conservation Policy Act--an Evaluation, May 1979, 40 p., submitted to Nat. Resour. J., L. Schipper, J.M. Hollander, M. Levine, and P.P. Craig (UC-Davis).

LBL-09412 Application of Circumsolar Measurements to Concentrating Collectors, Jun. 1979, 5 p., presented at the 1979 International Solar Energy Society, Atlanta, GA, June, 1979, D.F. Grether, D. Evans, A. Hunt, and M. Wahlig.

LBL-09630 Solar Energy Program--Chapter from the Energy & Environment Annual Report 1978, Aug. 1979, 40 p.

LBL-09642 Projects from Federal Region IX DOE Appropriate Energy Technology Pilot Program--Part I, Aug. 1979, 39 p., C.W. Case, F.B. Lucarelli, J. Morris, and H.R. Clark.

LBL-09715 The Energy Savings Potential of the Region IX Appropriate Energy Technology Grants Program--An Assessment of Twenty Projects, Oct. 1979, 174 p., F.B. Lucarelli, J. Morris, J.M. Kay, S. Rizer, C.W. Case, and H.R. Clark.

LBL-09809 Combustion Research--Chapter from the Energy and Environment Division Annual Report 1978, Oct. 1979, 42 p.

LBL-09863 Patterns of Diffusibility of Lignin and Carbohydrate Degrading Systems in Wood-Rotting Fungi, Sep. 1979, 26 p., presented at the American Chemical Society Meeting, Washington, D.C., Sep. 9-14, 1979, S.L. Rosenberg.

LBL-09911 Identification of Soot in Urban Atmospheres by an Optical Absorption Technique, Oct. 1979, 12 p., submitted to Science, H. Rosen, A.D.A. Hansen, R.L. Dod, and T. Novakov.

LBL-09959 Utility Solar Finance--Economic and Institutional Analysis, Oct. 1979, 85 p., E. Kahn, L. Ross, P. Benenson, and J. Cherry.

LBL-09963 Oxydesulfurization of Coal by Acidic Iron Sulfate Solutions, Oct. 1979, 13 p., D.A. Mixon, and T. Vermeulen.

December 1979

LBL-09157 Infiltration and Air Leakage Comparisons--Conventional and Energy-Efficient Housing Designs, Oct. 1979, 22 p., presented at the International Conference on Energy Use Management, Los Angeles, CA, October 22-26, 1979, D.T. Grimsrud, M.H. Sherman, A.K. Blomsterberg, and A.H. Rosenfeld.

LBL-09321 Sensible Heat Storage for a Solar Thermal Power Plant, Jul. 1979, 183 p., T.F. Baldwin*, S. Lynn, and A.S. Foss (*Filed as M.S.).

LBL-09372 Coal Conversion Catalysis Using Zinc Chloride in Organic Media, Sep. 1979, 236 p., J.H. Shinn*, and T. Vermeulen (*Filed as a Ph.D.).

LBL-09385 Measuring Residential Energy Conservation, Oct. 1979, 7 p., presented at the Intl. Conference on Energy Use Management, Los Angeles, CA, October 22, 1979, A.K. Meier.

LBL-09636 Building a United States Data Base--Populations at Risk to Environmental Pollution, Oct. 1979, 18 p., presented at the Conf. on Demographic and Health Information for Aging Research--Resources and Needs, National Institute on Aging, National Institutes of Health, Bethesda, MD, June 25-27, 1979, S.T. Sacks, S. Selvin, and D.W. Merrill.

LBL-09667 United States Energy Alternatives to 2010 and Beyond--The Conaes Stuey, Ann. Rev. Energy 4, 1-70(1979), H. Brooks (Harvard Univ., Cambridge, MA) J.M. Hollander.

LBL-09743 Photoinactivation of Catalase by Visible Light, Oct. 1979, 22 p., submitted to J. Photochem. Photobiol., L. Cheng, E.W. Kellogg III, and L. Packer.

LBL-09854 Piezoelectric Photoacoustic Detection--Theory & Experiment, Oct. 1979, 45 p., submitted to J. Apply. Phys., W. Jackson, and N.M. Amer.

LBL-09915 Analysis of Low Energy Beta-Emitters, Oct. 1979, 15 p., presented at the 23rd ORNL Conference on Analytical Chemistry in Energy Technology, Gatlinburg, TN, October 9-11, 1979, --also to be published in the Proceedings of the ORNL Conference, D.L. Murphy.

LBL-09939 Basic Research Needs in Energy Conservation, Oct. 1979, 26 p., J.M. Hollander.

LBL-09960 Economie Energetique et Fonctionnement des Ballasts a Circuit Electronique/Energy Efficiency and Performance of Solid State Ballasts/Energiewirkungsgrad und Leistung Elektronischer Vorschaltgeraete, Sep. 1979, 35 p., presented at the Commission Internationale De L'Eclairage/International Commission on Illumination 19th Session/Kyoto '70/Internationale Beleuchtungskommission, J.E. Jewell (Pacific Gas & Elec. Co., San Francisco, S. Selkowitz, and R. Verderber.

LBL-09978 Relation Between Surface Charge Changes in Purple Membranes and the Photoreaction Cycle in Bacteriorhodopsin (Halobacteria, Bioenergetics, Surface Potentials), Oct. 1979, 24 p., submitted to Proc. Natl. Acad. Sci., C. Carmeli, A.T. Quintanilha, and L. Packer.

LBL-10113 Thermophoresis of Particles in a Heated Boundary Layer, Nov. 1979, 43 p., submitted to J. Fluid Mech., L. Talbot, R.K. Cheng, R.W. Schefer, and D.R. Willis.

* NEW EMPLOYEES *

- *Vincent Berg* joins the Energy Analysis Program where he will continue research undertaken while a student. Vincent will participate in research on the ecological consequences associated with various energy and land-use scenarios.

- *Peter Cleary* will be working with the Ventilation Group, where he will engage in program planning, development and analysis of projects, and presentations of research results to interested groups and organizations.

- *David Nawrocki* joins the Passive Solar Group where he will engage in research on computer modeling of passive solar buildings, as well as participate in program support and contract monitoring.

* AN INTERVIEW WITH MARK LEVINE *

E&E: Mark, you seem frantically busy. Nancy Schorn once remarked she was going to get you your own little telephone switchboard so you could handle your own calls and free up eighteen people. What project are you doing now?

M.L.: Smoking.

E&E: I mean what project are you working on?

M.L.: I'm Principal Investigator of a project called Building Energy Performance Analysis. BEPS, for short. I've been working along with Jim Mass and Dave Goldstein to combine LBL's DOE-2 computer model of building energy performance with economic analyses to set up an energy-saving building code for residences and commercial buildings that will be constructed after 1981.

E&E: Cities and states have been using building codes for a long time. Is BEPS simply a stricter version of existing codes, backed up by computer modeling?

M.L.: Not at all. BEPS is unlike most existing codes in that it is a performance code. It specifies how much energy a building should use--then it's up to the designer to find a way to meet the design energy budget.

E&E: BEPS sounds like the federal standards for automobiles. The desired mpg is specified, and the rest is up to the manufacturers.

M.L.: That's right. And another similarity is that just as the actual mpg obtained depends on your driving habits, so does the fuel use of your home depend on your habits and lifestyle. The most advanced and complete conservation features in a house can be bypassed and disabled by, for example, children and dogs leaving doors open. BEPS makes no guarantees about what will be the actual energy use in a building. We use computer models of buildings, with local weather conditions, to arrive at the minimum life cycle cost option package, using conventional building techniques and components. Any contractor who can build a conventional house can just as easily, with a small increase in first cost, build a house that is optimized by BEPS to save energy economically over the lifetime of the building. Unfortunately, many homebuilders seem frightened of BEPS. We're preparing booklets to assist them in understanding what BEPS requires and in choosing the energy saving options that will enable the dwelling to meet its energy budget.

E&E: You mentioned minimizing the life cycle cost of a building. What exactly does that mean?

M.L.: It means that we start with a typical 'bare' house and add on higher levels of insulation, double or triple glazing, redistributing window area in different directions, etc., until the computer finds a house plus conservation options where the total future fuel bill plus the cost of the conservation options is a minimum.

It's a tradeoff. You can build a house with ten feet of insulation that will use very little energy. But the cost of all that insulation will outweigh the additional fuel savings gained by such heavy insulating.

E&E: Suppose I'm just going to live in a house for five years. Will the extra cost be worth it to me?

M.L.: It's becoming more and more true that an investment in conservation enhances the value of a house. You wouldn't get your money's worth in fuel savings, but you could regain the extra cost of conservation measures through the enhanced selling price.

E&E: Mark, the newspapers are saying that the average selling price for a Bay Area home is around $90,000 today. Will implementing BEPS make this even worse?

M.L.: In the Bay Area, the house that meets BEPS standards will cost around $1000 more than a house designed to meet present standards. That's in today's dollars! Let me make a little table illustrating a BEPS house in Fresno. The analysis of a Bay Area house would be similar, though it would have a shorter payback period.

1500 Square Foot Fresno House, Gas Heat

Typical house, annual consumption:	440 therms
BEPS house, annual consumption:	240 therms
Annual fuel savings due to BEPS:	200 therms
Annual $ savings @ 35¢/therm:	$70
Additional cost of BEPS house:	$1100

Simple payback period = ($1100 additional cost) ÷
($70 savings per year) = 16 years

Note that this is a worst case as far as BEPS payback period, since Fresno has a fairly mild climate, and we're assuming that gas price remains constant. The quicker that fuel escalates in cost, the faster will additional conservation investments be regained. An electric house in Fresno could save $220/year by implementation of $1600 worth of BEPS measures. This is only a seven-year payback. But even for the gas house, the extra investment is regained in at the most 16 years, and society reaps a benefit of 200 therms/year of saved gas.

E&E: That sounds pretty good, but what would such a BEPS house look like?

M.L.: We calculate that any one of the following three options could meet the Fresno design energy budget:

1. Average window area and distribution; double glazing; R-38 celing and R-19 wall insultation.

2. Windows redistributed so that south facing window area increased by 90%, and east, west, and north facing window area decreased by 30%; double glazing; R-30 ceiling and R-11 wall insulation.

3. Active solar domestic water heating system; double glazing; R-19 ceiling and R-11 wall insulation.

So you see that a BEPS house is not really so far out--the options use materials and designs that are available and already in use.

E&E: Getting back to a point I raised earlier, since building codes have been around for such a long time, how are the different organizations involved in the building industry reacting to this new type of code?

M.L.: Various groups are upset. ASHRAE, an organization that has developed its own standard 90-75 is upset. They say BEPS will prove to be unworkable. I think they feel left out of the process that developed BEPS. I hope in the future our efforts can be better coordinated.

Builders are upset. At a recent conference of the National Association of Home Builders (NAHB) I was constantly asked by builders: "So what do I do? How can I meet the BEPS standards?"

We're now producing some booklets and workbooks that should help explain BEPS to builders and others in the construction industry, like home appraisers, for instance.

Local building departments are concerned. They're afraid that they don't have the personnel to smoothly implement a new type of code.

And last but not least, the electric utilities are upset, since BEPS is hard on electric houses. Electric heating is just not economical in most locations.

At any rate, efforts are being made to explain BEPS to the diverse groups that comprise the construction industry. I'm confident it will prove to be a very workable standard, and will reduce average energy use by 30-40% from <u>current</u> building practice, and by 60-70% from <u>typical</u> residential building energy use. However, it will take time to iron out the wrinkles in the standard, to obtain acceptance by different groups, and to develop an infrastructure to effectively implement BEPS.

E&E: Mark, many people say that it's possible to use very little fuel in a dwelling by orienting a building toward the south, and by using large amounts of south glass, often coupled with storage for heat (like a concrete or tile floor). How does BEPS treat these passive solar measures?

M.L.: Here's some of the ways:

--A credit is given for a 1% reduction from uniform distribution of windows in glazing on the West, East, and North faces of a building. This reduction is relative to uniform distribution of windows with 25% on every face, and window area = 15% of floor area. We've found that in most climates such a 1% reduction will decrease annual energy consumption by about 1/2%.

--BEPS does not give any credit for insulating shutters that must be managed by the occupant. You may, however, be able to get a credit for an insulating device that operates automatically. All the options considered by BEPS require no lifestyle change; in other words you needn't remember to go around your house and close up insulating shutters in the evening. By the way, we did make some computer runs assuming insulating shutters closed from late in the evening until morning and we found that the shutters were not at all cost effective relative to other conservation options. This was for a building with 25% south glazing, both with and without thermal storage. Earlier closing of shutters would increase their cost-effectiveness. The main drawback is their expense.

We're developing analytical tools to evaluate passive design measures, such as increased south glazing and thermal storage. By the time of implementation, we should be able to do this. The DOE's Manual of Recommended Practice is trying to encourage passive design through illustrative examples. There will be a quick temporary certification procedure for novel designs. Unlike the present building code, the burden of proof will be shifted to the government. The innovator will not have to prove a novel concept works in order to get temporary certification. BEPS will fail if it doesn't encourage energy efficient building design.

* SEMINARS *

TUESDAYS, 4 P.M., BLDG. 90, ROOM 3148
(unless otherwise noted)

4 March	Henry Abarbanel, LBL "Atmospheric CO_2: the long-term impact on climate"
6 March (Thursday, 70A-3377)	Ken Smith, California Energy Commission "Residential wood heating"
11 March (70A-3377)	Scott Lynn, UCB "Chemical storage of thermal energy:

13 March (Thursday, 70A-3377)	Robert Cheng, LBL "Experimental study of combustion in a turbulent boundary layer"
18 March (70A-3377)	Florence Harrison, LLL "Determination and speciation of copper in power plant effluents for environmental impact assessment"
21 March (Friday, 2:30 p.m., Bldg. 50 Aud.)	Tom Bates, California State Assembly "Energy and environmental issues in the Legislature"
25 March	Jack Campbell, LLL "Advances in the chemistry of oil shale conversion"
8 April	Harold Johnson, UCB (TBA--subject: Stratospheric Ozone)
15 April	Janice Jacobson, Office of Appropriate Technology, Sacramento (TBA--subject: Solar Energy)
17 April (70-191)	John Truhan, LLL "Coal Conversion-Problems and Solutions"
22 April	Marshall Merriam, UCB "The Current Status of Large Scale Electricity Generation From the Wind"
24 April (Thursday, 70A-3377)	William Hoaglund, SERI "Energy From Biomass"
29 April	Sim van der Ryn, UCB TBA

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