BUILDING ENERGY SIMULATION

For Users of EnergyPlus, VisualSPARK, DOE-2, BLAST, ENERGY-10, GenOpt and their Derivatives

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EnergyPlus Version 1.2.1

To download a free copy of the program go to

http://www.energyplus.gov/

• • *Features of the New Release* • •

Datasets
- **Default fluid properties for water, ethylene glycol, and propylene glycol**
- **Example input files for all new features (more than 180 example files available)**
- **More than 100 new international weather locations in the EnergyPlus/ESP-r weather format (more than 680 locations worldwide).**

Geometry/Windows/Walls/Shading
- **Multi-sided polygons**

Daylighting
- **Skylight light wells**
- **Daylighting through interior windows**
- **Translucent Glass**

Zone Model
- **Improved displacement ventilation interaction with thermal mass**

COMIS Air Flow Calculation
- **Significant decrease in execution time**

Output
- **Ventilation load report**
- **Each zone defined as layer in DXF**
- **Advanced runtime variables can be requested**

HVAC
- **Plate heat exchanger component added to facilitate realistic configuration of hydronic systems**
- **Two- and four-pipe induction units**
- **Variable-speed fan-powered VAV reheat terminal units**
- **DOE-2.1E electric chiller model**
- **Dual setpoint controls for plant loop for water loop heat pump**
- **New water cooling coil (replaces simple coil) that is completely autosizable, options for wet/dry coil evaluation using cross- or counter-flow heat exchanger configurations**
- **Glycol concentrations can be specified**

Economics
- **Utility rate calculations**
- **Project construction cost estimating**

Utilities
- **Major updates to the IDFEditor including the ability to open multiple IDF files and copy/paste objects between files**
- **Major updates to EP-Launch including ability to select a group of simulations to run and maintain a history of simulations.**

Documentation
- **Input/Output Reference and Engineering Reference updated and extended for all new features and updates.**
- **More than 2,000 pages of documentation**

• • **And speed improvements throughout** • •

Ask An EnergyPlus Expert

RADIANT SYSTEM FLOW MISMATCH

I defined the Volumetric Flow Rate {m^3/s} to the PLANT LOOP, and the LOW TEMP RADIANT SYSTEM:CONSTANT FLOW, but have autosized both COILs for the central air handler. Here is the error message I received:

```
Flow mismatch in radiant system
--result will be an energy imbalance
-- should not get this error
WaterInjectionRate=-1.15E-005, in Radiant System=Z1SW RADIANT PANEL
```

Answer
Check the autosized flow rate for the cooling coils. Does the sum of those water flow rates equal or exceed the specified flow rate for the plant loop? Mixing hard sizes with autosizing does not always behave as expected. The autosizing algorithms do not have full knowledge of other system component inputs.

TEMPERATURE STRIATION IN A ZONE

I want to specify a report that lists indoor temperatures of different vertical levels of a zone, i.e., from floor to ceiling. This could be useful, for example, in double facades, to determine stack effect, etc.

Answer
The standard zone model is well-mixed (ROOMAIR MODEL, "Mixing") which means that the zone air temperature is uniform throughout the zone. There are alternate multi-node room air models available, but these are not applicable to double facades. Stack effect modeling for double facades is calculated by looking at the boundary conditions of the zone, not by modeling a temperature gradient within the zone.

INSIDE TEMPERATURE FLUCTUATION

Is it possible to obtain the fluctuation of inside temperature in a time period without specifying an active system? I'm trying to determine if a passive system is maintaining the inside temperature under the comfort level. However, EnergyPlus asks for a constant inside temperature.

Answer
EnergyPlus does a good job of modeling floating temperatures. You should request the report variable "Zone/Sys Air Temp".

Here is a set of report objects that is useful with annual runs. This produces the ABUPS report with extra tables showing a summary of average zone air temperatures, humidity, and Fanger comfort for only those times when people are present.

```
Report:Table:Style,  HTML;
Report:Table:Predefined,     Annual Building Utility Performance Summary;
Report:Table:Monthly,        Occupant Comfort Data Summary, !- Name 3,
                             !- DigitsAfterDecimal People-Number of Occupants,
                             !- VariableOrMeterName01 HoursNonZero,
                             !- AggregationType01 Zone/Sys Air Temp,
                             !- VariableOrMeterName02 SumOrAverageDuringHoursShown,
                             !- AggregationType02 Zone Air Relative Humidity,
                             !- VariableOrMeterName03 SumOrAverageDuringHoursShown,
                             !- AggregationType03 FANGERPMV,
                             !- VariableOrMeterName04 SumOrAverageDuringHoursShown;
                             !- AggregationType04
```

Ask An EnergyPlus Expert

CONDENSATION WARNINGS

Can you tell me more about these two warnings? What does the "count = 100" mean? Changing the schedules seems to get rid of them.

```
 ** Warning ** Constant flow radiant system condensation shut-off
occurred: count = 100.

 ** Warning ** Surface temperature below dew-point temperature--
potential for condensation exists
 ** ~~~ ** Flow to the following radiant system will be shut-
off to avoid condensation
 ** ~~~ ** Constant Flow Radiant System Name = Z32INT RADIANT
PANEL
 ** ~~~ ** Predicted radiant system surface temperature = 25.52
 ** ~~~ ** Zone dew-point temperature= 25.44
 ** ~~~ ** Occurrence info=COOLING DESIGN CONDITIONS - VGH
AACC RFP, 07/21 03:40 - 03:45
```

Answer

The second warning message indicates that the radiant cooling system you are trying to use is resulting in conditioned surface temperatures that are below the dewpoint temperature of the space. This can either be the result of low surface temperatures or high moisture levels within the space. If the surface temperature drops below the dewpoint temperature, condensation on that surface will result. The current radiant system model is configured to shut the system down to avoid this undesirable situation.

The first warning message indicates that this problem is happening multiple times--in this case at least 100 times. This is used to avoid a huge error file or having the base error message repeated 100+ times.

Changing the schedule (for example, control temperatures) is one way to eliminate these warning messages. We recommend running one of the thermal comfort models to investigate the impact of changed control temperatures on occupant comfort.

INPUT AND OUTPUT WEATHER DATA DIFFERENCES

Why is it that the output weather data called from simulation differs slightly from the input values? Does the weather data (outdoor drybulb, relative humidity, dew point temperature, direct/diffuse radiation, wind speed) change during the simulation process?

Answer

The standard EnergyPlus weather files (epw) contain hourly data. For state variables, such as temperature and humidity, the values in the epw file are the instantaneous measurements at 1:00 am, 2:00 am, and so on. Because EnergyPlus uses zone timesteps of less than one hour, these values are linearly interpolated for each timestep. Weather data values reported from EnergyPlus at the Timestep frequency will match the weather file one timestep per hour on the hour. Values reported at the Hourly frequency represent the average value over the hour, so they will not match the instantaneous value in the weather file. The solar radiation values in the weather file are integrated total values for the hour, so the interpolation must be done differently. The total radiation in [Wh/m^2] is used as an average rate for the hour in [W/m^2], and this average rate is assumed to be the value at the midpoint of the hour. Again, linear interpolation is used to determine the value for each timestep. The reported solar values in the output will match the value in the weather file on the half hour.

Ask An EnergyPlus Expert

FORCING SYSTEM BEHAVIOR

I'm modeling a single zone with a VAV system and a radiant panel. I control the mixed air temperature, HC water inlet and CC water inlet with the AIR LOOP OUTLET node, which is controlled by a SETPOINT MANAGER to a setpoint of 12.2C. What happens at peak cooling load is that both the radiant panel and the VAV box go to full flow, and EnergyPlus allows the AIR LOOP OUTLET temperature to modulate.

1. Is there any way to lock in the AIR LOOP OUTLET temperature to allow the supply volume to vary?

2. Can the supply temperature and volume both be locked at specific values, so that the radiant panel modulates more fully? Can you suggest appropriate radiant panel schedules for this?

3. In our models we've seen the FANGER PMV produce PPD values of between 6-10% when zone mean air temperatures are relatively high (77F to 79F, the PPD formula is from the Engineering Manual). Does this make sense? The comfort band seems too wide; in most buildings complaints start flowing whenever zone DB temperatures exceed 75F.

4. When we get UNMET DEMAND on our plant loops in these simulations, the values are very high, much more than the total zone loads would ever be. We can't explain the values.

5. With this model the total zone load is the radiant panel cooling rate plus the CC rate, but the Zone/System Cooling Rate values are all over the place (but usually quite low). Why should this be?

Answer
1. If the air loop outlet setpoint is not being met, then the coil capacity or chilled water flow rate or chiller capacity is not adequate. Which cooling coil model are you using? Use of COIL:Water:Cooling or COIL:Water:DetailedFlatCooling. COIL:Water:SimpleCooling does not always deliver adequate capacity under certain conditions (this model will not be available in the next release).

2. It is very difficult to get a hybrid forced air/radiant system to behave as desired with current EnergyPlus control options. In your case, if you want the radiant system to modulate, then perhaps a constant volume system would be better than the VAV. Also, you should set the air system to run as the first cooling priority, so the radiant system can pick up the remaining load. Alternatively, perhaps the VAV system is oversized. If it is sized smaller so that it cannot meet the entire cooling load, then it will open to full flow, thus supplying a constant volume of air.

3. With cool surfaces for radiant slabs, it would be expected that comfort be maintained at higher drybulb temperatures. Check all of the comfort inputs to make sure they are appropriate (clothing, activity level, air velocity).

4. These unmet demands are why #1 is happening. The chiller plant is not able to meet the load, so the chilled water supply temperature rises, and then the coil cannot meet the supply air setpoint. Everything is simultaneous in EnergyPlus, so unmet demands result in unmet setpoints.

5. Zone/System Sensible Heating (and Cooling) do not include radiant slab system loads. (We need to clarify the definition or change the way it is reported.) Also, if there is outside air, that will place a load on the cooling coil that is not included in the load delivered to the zone.

Man can cure disease but he cannot cure fate

Ask An EnergyPlus Expert

ZONE TEMPERATURES AND UNMET DEMAND

If the unmet demand is zero, then I should have enough capacity in the plant loop. I have a fixed zone cooling setpoint of 23C, but in some of our simulations we see zone air temperatures that are several degrees above our setpoint. If the capacity is there, why would my zone air temperature be off the setpoint?

Answer
If the unmet demand is zero, then the plant has enough capacity to meet the request from the chilled water coil. If the zone setpoint is still not met, then the chilled water coil is not delivering enough cooling. Either the airflow rate is too low, or the supply air temperature is too warm. This could be a control problem, an airflow sizing problem, or a coil sizing problem.

EXTERIOR RADIATIVE HEAT TRANSFER COEFFICIENTS

I was reviewing some of the inputs for output variables and there are three outputs that confuse me:
1. Surface Ext Rad to Air Coeff
2. Surface Ext Rad to Sky Coeff
3. Surface Ext Ground Coeff

The Engineering Manual explains the calculation method thoroughly, but not the coefficients. Are these coefficients used to calculate the impact of radiation in a form similar to the exterior convective heat transfer coefficient? Is it reasonable to define the radiative component of heat transfer as the sum of these values and make the following calculation?:

$$qrad=h\_rad*surface\_area(T\_outside\_temp-T\_exterior\_surface\_temp)$$

Or are the coefficients defined in a different way?

Answer
You're *almost* right. These are indeed linearized coefficients for calculating the radiative heat transfer components; however, they each use a different ΔT. The sky temperature is used with the "Rad to Sky" coefficient, outdoor dry bulb is used as an assumption for the ground temperature with the "Rad to Ground" coefficient, and the "Rad to Air" coefficient also uses outdoor dry bulb unless Other Side Coefficients are being used. I presume that you saw the (rather brief) definitions of these variables in the Input Output Reference (p. 128, pdf p. 158).

In the Engineering Manual, the equations that use these variables are shown in the section "Heat Balance Cases" beginning on p. 53 (pdf p. 91). These variables translate as follows:

Surface Ext Rad To Air Coeff = HA = HExtSurf   (which includes both convective HO and radiative HA)

Surface Ext Rad To Sky Coeff = HS = HSky

Surface Ext Rad To Ground Coeff = HG = HGround

The algorithm samples are a bit out of date, because the current code keeps HO and HA separate now instead of combining them first.

Ask An EnergyPlus Expert

HUMIDITY RATIO

In my simulation model, the Zone heating design supply air humidity ratio doesn't need to be controlled. I set the Field:Zone heating design supply air humidity ratio as blank, but the following error message was given:

```
** Severe  ** Error detected in Object=ZONE SIZING, name=SP1
**   ~~~   ** Field [Zone heating design supply air humidity ratio] is required but was
blank
```

In my model, there is no preheat coil, so I didn't control the preheat design set temperature, and I set this field as blank. The error message was:

```
** Severe  ** Error detected in Object=SYSTEM SIZING, name=VAV SYS 1
**   ~~~   ** Field [Preheat design set temperature] is required but was blank
```

For these two fields, they both can't be set as blank, but they don't need to be controlled in my model, so how do I set them?

Answer
1. The system sizing calculations need some sort of humidity ratio to work with, so the "Central heating design supply air humidity ratio {kg-H$_2$O/kg-air}" is required. Enter a reasonable value consistent with the specified supply air temperature. Changing this value will have only a minor impact on the sizing results.

2. If there is no preheat coil, the "Preheat design set temperature {C}" field in SYSTEM SIZING is ignored.

BUILDING GEOMETRY

I don't understand this warning in the error file.

```
Program Version,EnergyPlus 1.2.1.022, 2005-1-4 22:20,IDD_Version 1.2.1.022
   ** Warning ** InterZone Surface Azimuths do not match as expected.
   **   ~~~   **   Azimuth=270.0 in Surface=ZN003:WALL003, Zone=EPZONE
   **   ~~~   **   Azimuth=270.0 in Surface=ZN002:WALL003, Zone=WPZONE
   ************* Testing Individual Branch Integrity
   ************* All Branches passed integrity testing
   ************* Testing Individual Supply Air Path Integrity
   ************* All Supply Air Paths passed integrity testing
   ************* Testing Individual Return Air Path Integrity
   ************* All Return Air Paths passed integrity testing
   ************* No node connection errors were found.
```

Answer
Surfaces should face out from a zone and the vertices are entered when looking at the surface from the outside.
For help in checking geometry inputs, see "report, surfaces, details"; a listing of all surfaces with azimuth, tilt, area, etc., is produced in the eio output file.

Ask An EnergyPlus Expert

AIR-TO-AIR HEAT RECOVERY WITH ECONOMIZER

I have an air-to-air total heat recovery in the system. I set it up that the system could go into economizer mode when the outdoor condition is within a certain limit. When I ran the simulation using EnergyPlus, an error message was generated; it said: HEAT EXCHANGER:AIR TO AIR:GENERIC "ERV" -- the average air volume flow rate was <50% or >130% of the nominal HX supply air volume flow rate. To my understanding it is because the outside air flow rate is getting higher than the minimum outside air flow rate, which is the same as nominal air flow rate of the ERV, when the system is in economizer mode. Am I right?

Answer
Economizer choice for Controller:Outside Air object should be set to "Bypass" when heat recovery is used.
See Heat Exchanger:Air To Air:Generic in the InputOutput Reference for further details.

SOLAR HEATING SYSTEM

I'm modeling a solar collector heating system with a low temperature radiant floor. I'm using a water heater object to exchange heat from the collector loop to the radiant floor water loop and I'd like to run with both solar energy and gas (as backup energy source). The gas burner should start when the temperature on the second loop (radiant floor) goes below 30C. If I set the water heater setpoint to 30C the temperature inside the water heater tank (collector loop) does not go above 30C! I'd like the water heater storage temperature to go as high as possible, in order to store as much solar energy as possible. I would like to use a water heater and a boiler object in series but I can't make this work.

Answer
The current water heater model can be a bit difficult to work with. I would suggest putting the boiler in parallel with the water heater rather than in series. I know the real system would put them in series, but for the simulation the energy use, this configuration should be equivalent. This way the mass flow does not have to be the same in both components (which may be why you are having trouble with them).

SOLAR COLLECTOR LOOP

I was reviewing the solar collector example file and noticed that Column H of the output file (WATER HEATER SOURCE OUTLET NODE:System Node Temp) is not the same as Column J (COLLECTOR LOOP INLET NODE:System Node Temp); does that make sense? I thought they were the same node.

Answer
The "Water Heater Source Outlet Node" and "Collector Loop Inlet Node" are technically different nodes, one on the source side of the loop and the other on the demand side of the loop. The two nodes, however, are directly connected by the interface between the two sides of the loop, so it's natural to expect that they should have the same temperature at all times. The reason that they do not have the same temperature is because it is necessary to simulate the loop with some thermal capacitance in order to achieve stability of the solution. In a real system, this thermal capacitance is the mass of the water in the pipes. This can be input using the "volume of the plant loop" field in the PLANT LOOP object, but most times we autosize that number, which calculates the minimum volume necessary for a stable solution. The jump from "source loop side outlet node" to "demand loop side inlet node" is where we calculate the effects of the thermal capacitance, which results in a temperature difference. If you look closely at any plant loop, you'll see that there is always a temperature difference between the "source loop side outlet node" and the "demand loop side inlet node."

Ask An EnergyPlus Expert

DUAL SETPOINT EXPLAINED

Will you explain how zone control works if I select a dual setpoint with deadband and both cooling and heating schedules are set.

Answer
Dual setpoint with deadband operates as follows:

Heating
   If the zone temperature is predicted to fall below the heating setpoint for the current timestep, then heating is requested from the HVAC system to maintain the zone at the heating setpoint.

Cooling
   If the zone temperature is predicted to rise above the cooling setpoint, then cooling is requested from the HVAC system to maintain the cooling setpoint.

Deadband
   If the zone temperature is predicted to remain in the deadband between the heating and cooling setpoints, no heating or cooling is requested from the HVAC system. Depending on the system type, the sytem may continue to provide air flow which causes some heating or cooling even when the temperature is in the deadband. For example, a furnace with DX cooling with continuous supply fan operation. The furnace and cooling coil will remain off, but unconditioned mixed air will be supplied to the zone.

Note that the "Zone/Sys Heating/Cooling" report variables indicate the actual impact of the HVAC system on the zone, not the load requested.

LOOPS AND EQUIPMENT IN SERIES

1. Can I use EnergyPlus to simulate a loop with two boilers (or a water heater and a boiler) in series?

2. When I have many single component branches connected in series, where does EnergyPlus actually *see* the order in which the branches are connected? Does the order come from the branch list order? And in the branch list I might also have parallel connected branches (with splitter and mixer); does their position in the branch list count?

Answer
1. Yes, components may be in series on a branch.

2. For complex plant loops, each subloop (supply side or demand side) has an inlet branch (with one or more components in series), then a splitter with one or more branches in parallel (each branch my have one or more components in series), then a mixed and an exit branch. Branches are never in series with each other. Branches are simulated in the order listed in the branch list, so the order must be inlet branch, then parallel branches, then exit branch. The order of the parallel branches should not make any difference.

Love All ✖ Trust A Few

Ask An EnergyPlus Expert

CHILLER:ELECTRIC INPUT

My question is about the Chiller:electric Object (on page no. 383 of Input/Output Reference Manual), the capacity ratio curve. How do I determine the value of "Ratio of Available Capacity to Nominal Capacity"? Is the value of nominal capacity obtained from manufacturer's data (like the Carrier catalogue)? Also, how do I determine the values of "Temperature entering the condenser" and "Temperature leaving the evaporator"? Are these values in the catalogues too? And what is the difference between these values and those of "TempCondInDesign" and "TempEvapOutDesign"?

Answer

The six "design" values represent the chiller performance at one operating point, usually the published rating point for the chiller. As the water temperatures and part-load change, then the capacity and COP (1/EIR) will change. To define your own performance curves, you will need the manufacturer to provide a set of capacity and COP data for a range of condenser and chilled water temperatures. If you do not have access to such data, then use one of the sets of curves provided in DataSets\PerfCurves.idf

DISPLACEMENT VENTILATION

1. EnergyPlus develops the UCSD Displacement Ventilation Model for the existence of room air temperature difference. However, it requires that the main heat sources be located in the occupied zone, right?

2. Can I model an underfloor air distribution (UFAD) system with EnergyPlus?

Answer

1. No. The user can control how much of the internal gains are added to the occupied zone vs. the upper zone. (See "Gain Distribution Schedule" field in UCSD DISPLACEMENT VENTILATION MODEL CONTROLS).

2. EnergyPlus can model underfloor supply plenums and VAV terminal units with variable-speed fan and reheat coil, which are major components of UFAD systems. Search the Input Output Reference for "UFAD", and see example files 5ZoneSupRetPlen and 5ZoneSupRetPlenVSATU). One major limitation of the EnergyPlus plenum model is that the air temperature is uniform from one end of the plenum to the other. This limitation can be partially overcome by using multiple supply plenums in series, but each sequential plenum air temperature lags by one time zone timestep.

QuickLinks to EnergyPlus Documents

Input/Output Reference (PDF 4.2 MB)

Output Details and Examples (PDF 493 KB)

Engineering Document (PDF 4.5 MB)

Module Developer's Guide (PDF 539 KB)

Interface Developer's Guide (PDF 200 KB)

Programming Standard (PDF 168 KB)

Weather Data and EnergyPlus

Over the last few years, a number of users have needed weather data to use with EnergyPlus but cannot find measured data on the EnergyPlus web site. When possible, we have created weather data using the Meteonorm software. Meteonorm extrapolates hourly data from statistical data for a location. Where statistical data aren't available, Meteonorm interpolates from other nearby sites. Generally a statistical approach is a last resort--weather files generated from statistics will not demonstrate the normal hour-to-hour and day-to-day variability seen in measured data.

To help users create a Meteonorm weather file for EnergyPlus, we developed these guidelines:

Step	Directions
1	Start Meteonorm.
2	Click the Site button.
3	Next click the WMO/OMM button and select the continent. (WMO usually means there's a weather station recording hourly data.)
4	In the search site box, enter the first one or two characters of the desired location name and a '*' and click on the >> button.
5	Select the site (if available) from the list and click OK. If there isn't a WMO site available, go to step A.
6	If the location is there, click on the name and Meteonorm will give any warnings about the data. Write down the warnings (in a text file) and note that you used WMO, Station or City data, and the version of Meteonorm used.
7	Click the Format button, select TMY2, and click OK.
8	Click the Hourly Values button, then click the Save button and gave the TMY2 a name when prompted. (Use the ISO 3-letter country abbreviation followed by the city and the format. For example, for Kathmandu, Nepal, this would be: NPL_Kathmandu_MN5.tm2)
9	Convert to EPW using the EnergyPlus WeatherConverter.
10	Post a .ZIP on the EnergyPlus_Support YahooGroup under Files/Meteonorm_Weather_files. The .ZIP should include the .EPW, .DDY, .STAT, and the warnings text file you created (give it a .INFO extension). Save the TMY2 source and the .AUDIT in a separate .ZIP but do not post it to the YahooGroup.

Each .ZIP includes these
- .STAT (EnergyPlus weather data statistics)
- .EPW (EnergyPlus weather file), and
- .INFO (Information about the source data and limitations from Meteonorm).

In all cases, you should review the .stat file for the location before using any of these files to ensure that it represents the climate of the location as you understand it. In many cases, a nearby location with measured data will be more appropriate than one derived from statistics. Use these files at your own risk.

If no WMO data are available, try this:

A.	Click the Station button and select the continent again.
B.	In the search site box, enter the first one or two characters of the desired location name and a '*' and click on the >> button.
C.	Select the site (if available) from the list and click OK. If there isn't a site available, go to step Z. If there is a site, go back to step 6.

Finally as a last resort, try this:

Z.	Click the Cities button and select the continent again.
Y.	In the search site box, enter the first one or two characters of the desired location name and a '*' and click on the >> button.
X.	Select the site (if available) from the list and click OK. If there isn't a site available, you are out of luck. If there is a site, go back to step 6.

NOTE: Quality of data declines exponentially if no WMO or Station data is available. Steps Z-X should be used if when no other data are available.

Please note that Meteotest significantly updated the wind and other calculations [hourly wind direction in TMY2, which we use, was constant ... the update makes them variable]. If you received a file from the EnergyPlus team before early December 2004, we strongly recommend that you download the new file. We are working on getting data for another 200 locations over the next few months; targets include Italy (60+ files), Brazil, Ghana, Kenya, Ethiopia, Nepal, Bangladesh, and China. All except Italy are from the UNEP SWERA project (so we're waiting on the data to become available on the SWERA web site **swera.unep.net/swera/**). As always, if you know of sources of weather data that we might be able to share with the EnergyPlus community, please contact **Dru Crawley.**

EnergyPlus Version 1.2.1

To download a free copy of the program go to

http://www.energyplus.gov/

EnergyPlus is an R&D 100 Award Winner, named one of the 100 most technologically significant new products of the year.

EnergyPlus Support Tools

Support software is listed on our website (http://SimulationResearch.lbl.gov/EP/ep_tools.html) and in Section 2 of this newsletter.

EnergyPlus Weather Data from http://www.eere.energy.gov/buildings/energyplus/weatherdata.html

Weather data for more than 800 locations are now available in EnergyPlus weather format — 295 locations in the USA, 55 locations in Canada, and more than 450 locations in 93 other countries throughout the world.

Ask an EnergyPlus Expert

Questions from EnergyPlus users are answered promptly via email by program developers. To submit questions, join the EnergyPlus User Group at http://groups.yahoo.com/group/EnergyPlus_Support/.
A selection of questions/answers are compiled (yearly) into a downloadable PDF document:
Q and A for 2002, Q and A for 2003, Q and A for 2004.

EnergyPlus Testing and Validation http://www.eere.energy.gov/buildings/energyplus/testing.html

Are you an EnergyPlus Consultant ?

If you are engaged in EnergyPlus consulting, and would like to be listed in the *Building Energy Simulation User News* and on our website (http://SimulationResearch.lbl.gov), please send details to klellington@lbl.gov.

Join the EnergyPlus User Group

The developers of EnergyPlus have formed a support group to foster discussion and maintain an archive of information for program Users. We invite questions about program usage and suggestions for improvement to the code. Go to http://groups.yahoo.com/group/EnergyPlus_Support/

Translate EnergyPlus Web Pages

A new link on the main EnergyPlus web page (www.energyplus.gov/) allows you to view the pages in any of eight languages. Unfortunately, the translator doesn't work with PDF files. Look for the fish at the bottom of the web page. Pages may be translated into Chinese, French, German, Italian, Japanese, Korean, Portuguese and Spanish.

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*see also page 32

If you would like to be listed as an EnergyPlus consultant in the newsletter and on our website, please send email to klellington@lbl.gov

The "Plus" in DrawBDL⁺ 3.1 refers to EnergyPlus . . .

DrawBDL+ 3.1

Joe Huang and Associates has both added a "Plus" (+) to the program name, as well as increased the version number to 3.1 to publicize *DrawBDL⁺*'s new ability to read and display *EnergyPlus* IDF files, as well as to convert the building surface descriptions from *DOE-2* BDL to *EnergyPlus* IDF. For Version 3.0, completed in March 2003, we completely rewrote *DrawBDL* using C++ to run in a native 32-bit environment such as Windows 95/2000/NT. In addition to a different "look and feel" from Version 2. Version 3.1 has the following improvements:

1. New user interface with a hierarchical tree showing all building surfaces.
2. No limit on the number of building surfaces.
3. For building surfaces, the expanded data window shows not only the input values, but also their locations in the global coordinate system; for spaces, the data window shows the gross and net areas of walls, windows, doors, roofs, and skylights.
4. Displays surfaces input as two-dimensional or three-dimensional polygons.
5. Ability to change the sort order of building surfaces used in the display; this allows users to "touch up" the shaded drawings for use in presentations.
6. Interprets both *EnergyPlus* IDF files as well as *DOE-2.1* BDL files.
7. Surface data is output as an *EnergyPlus* IDF file. This allows *DrawBDL⁺* users to convert their *DOE-2* building descriptions to *EnergyPlus* with a single click of the mouse. Alas, since *DrawBDL⁺* processes only building geometry data, the converted IDF file is a partial file containing only the inputs for building surfaces.

The price for *DrawBDL⁺ 3.1* remains $125 plus shipping (shipping charge is levied only on mailed diskette copies). Updates from previous *DrawBDL* Versions 1.X or 2.X cost $62.50 plus shipping. Shipping costs are $5 US, $10 international. Shipping is free, of course, for electronic copies shipped via-email.
For more information about *DrawBDL 3.1⁺* or to order, please contact

Joe Huang and Associates
31 Sarah Lane
Moraga CA 94556-2563
Phone 925-247-9180

◆ **www.drawbdl.com** ◆ **www.drawbdl.com** ◆ **www.drawbdl.com** ◆
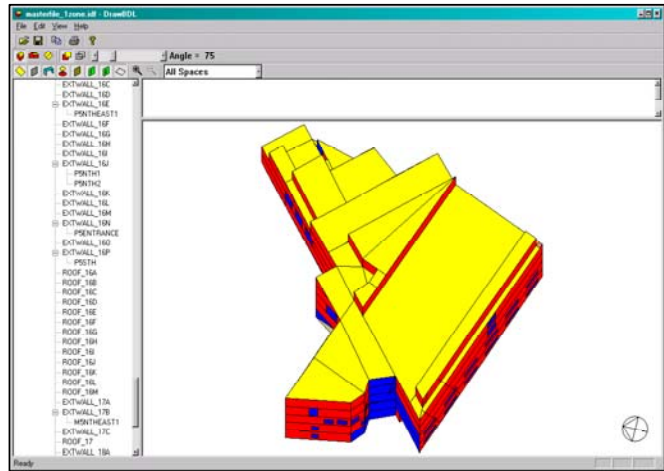
Example of the EnergyPlus input file for the Te Papa Tongarewa Museum (New Zealand)

Night view of the completed building

Pacific Gas and Electric Company™
WE DELIVER ENERGY.℠

PG&E Educational Programs March-April 2005

To register call 415.973.7268 or go to www.pge.com/pec

ARCHITECTURE

Tue, Mar 1	EnergyPro Residential Building Energy Analysis
Fri, Mar 4	High Performance Residential Windows
Tue, Mar 8	Operable Windows: A Panel Discussion
Thu, Mar 24	Daylighting in Practice: Lessons from the Seattle Better Bricks Daylighting Lab
Tue, Mar 29	House as a System Overview
Wed, Mar 30	House as a System (3-day class)
Tue, Apr 5	See the Heat!
Wed, Apr 6	Daylighting Controls: An Overview for Architects
Thu, Apr 7	Exceeding Title 24 for Schools
Wed, Apr 13	Exceeding Title 24 for Offices
Thu, Apr 21	Understanding Financial Analysis Methods for Photovoltaic (PV) Systems
Mon, Apr 25	Biggest Energy Mistakes Made in Residential Construction
Tue, Apr 26	2005 Title 24 Nonresidential Building Envelope Requirements

BUILDING PERFORMANCE

Tue, Apr 12	Using the Cx+ Tool: A Web-based Resource for Commissioning Projects
Tue, Apr 19	Sustainable Design Concepts for Electrical and Lighting Systems
Thu, Apr 28	New Developments in Demand Response (DR)

HVAC

Thu, Mar 3	Underfloor Air Systems
Tue, Mar 8	Operable Windows: A Panel Discussion
Tue, Mar 29	House as a System Overview
Wed, Mar 30	House as a System (3-day class)
Thu, Mar 31	Direct Digital Control Sequences for Demand Reduction and Energy Savings
Tue, Apr 5	See the Heat!
Tue, Apr 5	Wireless Sensors for Building Controls Applications
Wed, Apr 13	Exceeding Title 24 for Offices
Mon, Apr 25	Biggest Energy Mistakes Made in Residential Construction

LIGHTING

Wed, Mar 2	Lighting Fundamentals
Thu, Mar 24	Daylighting in Practice: Lessons from the Seattle Better Bricks Daylighting Lab
Tue, Mar 29	How to Specify Environmentally Preferable Lighting Equipment
Wed, Apr 6	Daylighting Controls: An Overview for Architects

PG&E Educational Programs March-April 2005

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To register call 415.973.7268 or go to www.pge.com/pec

RENEWABLES

Wed, Mar 30	Advanced Photovoltaics (PV) for Grid-Tied Applications
Thu, Apr 21	Understanding Financial Analysis Methods for Photovoltaic (PV) Systems

SOFTWARE

Tue, Mar 1	EnergyPro Residential Building Energy Analysis
Tue, Apr 12	Using the Cx+ Tool: A Web-based Resource for Commissioning Projects

TITLE 24 (CALIFORNIA ENERGY STANDARDS)

Tue, Mar 1	EnergyPro Residential Building Energy Analysis
Thu, Apr 7	Exceeding Title 24 for Schools
Tue, Apr 26	2005 Title 24 Nonresidential Building Envelope Requirements

Southern California Gas Company

Educational Programs ➤◄ March through June, 2005

To register go to http://www.socalgas.com/business/resource_center/erc_seminar_info.shtml

March	Event	I.D. Number
Tue 15	IHACI - HVAC Maintenance / Selling Efficiency ERC (One night only)	13075
Tue 22	Cool Roofs	13006
Thu 24	Air Quality Regulations for Small Boilers	13068
April	**Event**	**I.D. Number**
Thu 21	Municipal Green Building Conf/Expo	12995
May	**Event**	**I.D. Number**
Tue 3	EnergyPro Training: Envelope/Lighting/Windows	12980
Wed 4	EnergyPro Training: Advanced	12982
Wed 4	IHACI Residential & Light Commercial Zoning (1 night class)	13547
Wed 4	EnergyPro Training: Mechanical	12981
Thu 5	2005 Non-Residential Title 24 Standards: Compliance & Beyond	12987
June	**Event**	**I.D. Number**
Tue 14	IHACI - Preventing Compressor Failures/Refrigeration Cycles	13550
Wed 22	New Source Review	13548
Thu 23	High Performance Schools: The CHPS Program	13589
Tue 28	High Performance Schools: The CHPS Program	13590
Thu 30	High Performance Schools: The CHPS Program	13591

The Gas Company's Energy Resource Center, 9240 Firestone Blvd., Downey, CA


The Forecast Looks Favorable for …

(Free!) Weather Data on Demand

You can access archived weather data from around the world through this U.S. DOE web interface:

www.eere.energy.gov/buildings/energyplus/cfm/weatherdata/weather_request.cfm

Hourly weather data is continuously collected and stored into a local database, available through this web interface. Most stations have information for dry bulb temperature, wet bulb temperature, wind speed/direction, atmospheric pressure, visibility, cloud conditions, and precipitation type.
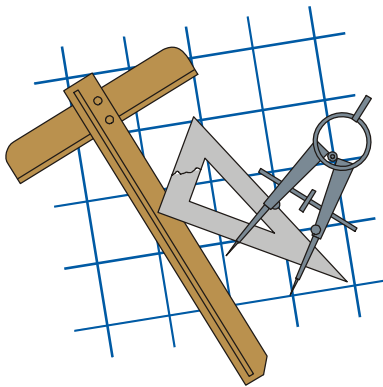

Building Energy Tools Directory

The web-based Building Energy Tools Directory contains information on more than 270 building-related software tools from around the world.

For each tool in the directory, a short description is provided, along with information about technical expertise required, users, audience, input, output, validation, computer platforms, programming language, strengths, weaknesses, technical contact, availability and cost. A link is also provided for directly translating the web pages into more than eight languages.

Know of a tool (yours?) that isn't in the directory? Visit http://www.eere.energy.gov/buildings/tools_directory/your_software_here.html or contact Dru Crawley at Drury.Crawley@ee.doe.gov.
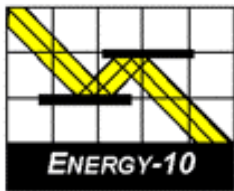
ENERGY-10, VERSION 1.6

ENERGY-10 is a design tool for smaller residential or commercial buildings that are less than 10,000 ft^2 or buildings that can be treated as 1- or 2-zone increments. It performs whole-building energy analysis for 8760 hours/year, including dynamic thermal and daylighting calculations. ENERGY-10 was specifically designed to facilitate the evaluation of energy-efficient building features in the very early stages of the design process.

Douglas K. Schroeder
1331 H Street N.W., #1000
Washington, DC 20004

Tel: 202.628.7400 ext 210
Fax: 202.383.5043
www.sbicouncil.org

Sustainable Buildings Industry Council (SBIC)

Recent Reports

Climate Impacts on Heating Seasonal Performance Factors (HSPF) and Seasonal Energy Efficiency (SEER)

Heat pumps use outside air as a heat source. FSEC has simulated the variation of performance in different climates.

http://fsec.ucf.edu/bldg/pubs/hspf/index.htm

Optimizing Manufactured Housing Energy Use

An energy-efficient optimized home shows a measured energy savings of 52% for the heating, cooling, and DHW energy use compared to the control unit.

http://www.fsec.ucf.edu/bldg/baihp/pubs/optimize/index.htm

http://www.energystar.gov/

WHAT IS ENERGY STAR?

ENERGY STAR is a government-backed program helping businesses and individuals protect the environment through superior energy efficiency.

Results are already adding up. Last year alone, Americans, with the help of ENERGY STAR, saved enough energy to power 20 million homes and avoid greenhouse gas emissions equivalent to those from 18 million cars - all while saving $8 billion.

For Business
Because a strategic approach to energy management can produce twice the savings - for the bottom line and the environment - as typical approaches, EPA's ENERGY STAR partnership offers a proven energy management strategy that helps in measuring current energy performance, setting goals, tracking savings, and rewarding improvements.
EPA provides an innovative energy performance rating system which businesses have already used for more than 19,000 buildings across the country. EPA also recognizes top performing buildings with the ENERGY STAR.

For Homes
Home Energy Yardstick
If you have 5 minutes and your energy bills are handy, find out if your energy use is above average. You will need to enter some common information about your home such as age, square footage, number of occupants and energy bill totals for a consecutive 12-month period (one year). If you don't keep your bills, contact your utility for a 12-month summary.
Home Energy Advisor
If you have more time (15 minutes) you'll be asked to enter additional information about your home, but you'll get a list of customized energy improvements and the estimated savings.

Building Energy Software

from the Environmental Energy Technologies Division of Lawrence Berkeley Laboratory

Free Downloads	
BDA 3.0 (Building Design Advisor) (building decision-making from design through completion)	**gaia.lbl.gov/BDA**
COMIS (multi-zone air flow and contaminant transport model)	**www-epb.lbl.gov/comis**
EnergyPlus 1.2.1 (new-generation whole-building energy analysis program, based on BLAST and DOE-2)	**www.energyplus.gov/**
GenOpt® 2.0 (generic optimization program)	**SimulationResearch.lbl.gov**
Optics 5.1.02 (for analyzing optical properties of glazing systems)	**windows.lbl.gov/materials/optics5/**
RADIANCE 3.5 (analysis and visualization of lighting in design)	**radsite.lbl.gov/radiance/**
Desktop Radiance 2.0β (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14)	**radsite.lbl.gov/deskrad/**
Radiance Control Panel (automates some Radiance tasks once the model has been created)	**www.squ1.com/site.html**
THERM 5.2 (models two-dimensional heat-transfer effects in building components where thermal bridges are of concern)	**windows.lbl.gov/software/therm/therm.html**
VisualSPARK 2.0 (Simulation Problem Analysis and Research Kernel) (connect component models to simulate innovative building envelope and HVAC systems)	**SimulationResearch.lbl.gov**
WINDOW 5.2 (thermal analysis of window products)	**windows.lbl.gov/software/window/window.html**
Free Software / Request by Fax from 510.486.4089	
RESFEN 3.1 (choose energy-efficient, cost-effective windows for a given residential application)	**windows.lbl.gov/software/resfen/resfen.html**
Web Based (free)	
Home Energy Saver (quickly computes home energy use) and **Home Improvement Tool** (simplified Home Energy Saver)	**hes.lbl.gov** and **hit.lbl.gov**

Honey is sweet but the bee stings!

DOE-2

DOE-2.1E (v. 121) 1,000-Zone version for Windows from ESTSC; other vendors of DOE-2 based programs are listed on our website: http://SimulationResearch.lbl.gov/.

Cost is as follows:
$ 300 U.S. Government/Non-Profits/Education
$ 575 U.S. Public, Mexico, Canada
$1129 to $1268 Other Foreign

DOE-2 Documentation on a CD from ESTSC - Cost US$100

What is included on the CD?

- DOE-2 Reference Manual (Part 1)
- DOE-2 Reference Manual (Part 2)
- DOE-2 Supplement to the Reference Manual (2.1E)
- DOE-2 BDL Summary (2.1E)
- DOE-2 Engineers Manual (2.1A)

Order Software and ESTSC Documentation

Ed Kidd or Kim Buckner
NCI Information Systems, Inc.
Energy Science and Technology Software Center (ESTSC)
P.O. Box 1020
Oak Ridge, TN 37831

Phone: 865/576-1037
Fax: 865/576-6436
Email: estsc@adonis.osti.gov

Purchase DOE-2 Documentation

DOE-2 Sample Run Book (2.1E) -- The Sample Run book is the only remaining DOE-2 manual not available electronically. It must be purchased separately from NTIS; ordering information may be found at http://SimulationResearch.lbl.gov > DOE-2 > Documentation

Free DOE-2 Documentation (http://simulationresearch.lbl.gov/> DOE-2 > Documentation)

DOE-2 Basics Manual (2.1E)

Update Packages: Update Packages are **not** cumulative; each one contains different information.
Download all four packages then print and insert the pages into your existing DOE-2 manuals.
- Update Package #1: DOE-2.1E Basics, the Supplement and BDL Summary
- Update Package #2: BDL Summary and Supplement.
- Update Package #3: Appendix A of the Supplement.
- Update Package #4: (1000-zone DOE-2.1E) BDL Summary.

DOE-2 Modeling Tips (pdf files)   for 2003   for 2002
A compilation of all the "how to" and "DOE-2 Puzzler" articles from the *Building Energy Simulation User News.*

Changes and Bug Fixes to DOE-2.1E (txt file)
Description of all changes and bug fixes in a text document.

DOE-2 listings are continued on the next page

DOE-2 (continued)

DOE-2 Training

Private or group DOE-2 courses for beginning and advanced users.
Contact Marlin Addison at (602) 968-2040, marlin.addison@doe2.com

DOE-2 Help Desk

Email (klellington@lbl.gov) or fax the Simulation Research Group with your questions. Fax: (510) 486-4089
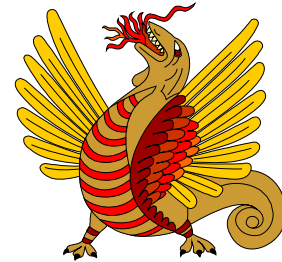
New DOE-2 Consultant

Harshad D. Padia, PE, LEED, Adam F. Spach, EI,
LEED, and Russell E. Little, EI
Padia Consulting, Inc.
51 Kilmayne Dr. Suite 300
Cary, NC 27511
Phone: (919) 481.1777, Fax: 460.8999

Run for safety, foolish pedestrians!

The DOE-2 Puzzler: Solar Radiation Data

The DOE-2 Puzzler

Question
I am working on a research project to evaluate the impact of solar radiation changes on building performance. When varying the solar radiation data, I always get the exact same results every time, which is not what I expected. So I started to explore this issue and have found there may be a serious problem with the DOE-2 weather processor. Whatever solar radiation data are in the original weather file, the weather processor always produces the same output of solar radiation without referemce to the solar data in weather file.

Answer
It sounds like DOE-2 is calculating solar internally rather than using the solar from the weather file. The weather file has a flag value to tell DOE-2 whether there is solar data on the weather file or not (this is a legacy from the days when many weather files such as TRY had no solar data).

To check whether a weather file has the flag set properly generate the ASCII version of the weather file (run wthfmt on the weather file). Look at the first line of the weather data output. The last value on the line should be 5 - this indicates a "solar" file. If this value is 3, it indicates a "normal" (no solar) file. If the file is flagged "normal" but actually has solar data on it, the solar data will be ignored by DOE-2 and the solar data will be calculated internally. In the past, this value was a multipurpose flag; currently, the only values it should ever have are 3 or 5.

If this is confusing, the DOE-2 weather documentation has a detailed explanation.
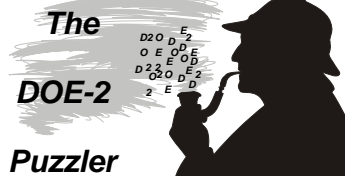
Daylight in Buildings
A Source Book on Daylighting Systems and Components

Free!!

This source book gives a comprehensive overview of innovative daylighting systems, the performance parameters by which they are judged, and an evaluation of their energy savings potential and user acceptance. The book has been written to overcome a lack of evidence of the advantages of daylighting in buildings and a lack of knowledge regarding the performance of innovative daylighting systems in buildings. The information presented here is intended to be used in the earliest stages of the building design process.

Innovative daylighting systems are designed to redirect sunlight or skylight to areas where it is required, without glare. These systems use optical devices that initiate reflection, refraction, and/or use the total internal reflection of sunlight and skylight. Advanced daylighting systems can be designed to actively track the sun or passively control the direction of sunlight and skylight. The systems included in this book have been generally limited to passive devices.

*Daylight in Buildings is available **FREE OF CHARGE** from the Building Technologies Department at Lawrence Berkeley National Laboratory. Send your request to Kathy Ellington (klellington@lbl.gov).*

FREE Membership in IBPSA-USA !!!

International Building Performance Simulation Association USA Affiliate

The IBPSA-USA Board of Directors has waived the annual membership fee for 2003 so joining IBPSA is easier than ever. If you want to become a member, send an email with your name, company, mailing and email address, and phone and fax numbers to Rick Strand to **r-strand@uiuc.edu.** You will receive a confirmation email to indicate that you have been accepted for membership.
Note: Free Membership for USA Affiliates only.

www.ibpsa.org
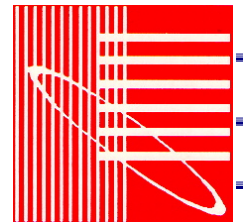
Positions Available at Steven Winter Associates

Steven Winter Associates, Inc., an internationally-recognized company located in Norwalk, CT, seeks HVAC Engineer, 3-5 years experience, some knowledge of DOE-2 (including SYSTEMS & PLANT). Will train. We also seek experienced DOE-2 modeler with significant knowledge of SYSTEMS & PLANT. The firm has major projects, ranging from LEED Certified to Platinum. Competitive salary, flexible hours, good benefits, excellent opportunity for advancement.
Please contact in confidence Adrian Tuluca, Principal,
(atuluca@swinter.com, 203-857-0200 x 238).
Steven Winter Associates, 50 Washington Street, Norwalk, CT 06854
Ph: (203) 857-0200 x 0 Fax: (203) 852-0741

Newsletter Roundup

Newsletters are a great way to keep up to date on news within the building energy efficiency community.
Here is our list of favorites.

Advanced Buildings   http://greenbuilding.ca/abc-abn.htm

   Newsletter of the Royal Architectural Institute of Canada. Building simulation activities in Canada..

The Blueprint   http://www.energy.ca.gov/efficiency/blueprint/index.html

   Newsletter of the California Energy Commission's Efficiency Standards Office.

Buildings Research Post   http://fsec.ucf.edu/bldg/resources/newsletter/index.htm

   Building news and publications at Florida Solar Energy Center

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CADDET InfoPoint   http://www.caddet.org/newsletter/index.php

   The International Energy Agency's newsletter on energy efficiency. Practical and innovative articles by international energy researchers and practitioners.

CARB-News   http://www.carb-swa.com/carbfax.html

   CARB, the Consortium for Advanced Residential Buildings, presents updates on the Building America program

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Conservation Update   http://www.www.eere.energy.gov/state_energy_programs/update/

   Energy conservation projects, broken down state-by-state for the United States.

EETD News   http://eetd.lbl.gov/newsletter/eetd_nl.html

   Reports on research conducted by Lawrence Berkeley National Laboratory's Environmental Energy Technologies Division.

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e-FFICIENCY NEWS   http://www.ase.org/section/_audience/eprofessionals/e_fficiency/

   The bi-monthly electronic newsletter from the Alliance to Save Energy.

E-nnouncements   www.greentie.org

   E-nnouncements is a free, monthly electronic news service for the energy and environmental community; it covers CADDET Annexes (energy efficiency and renewable energy) and GREENTIE (greenhouse gas mitigation technologies).

Energy Chronicle   http://www.fsec.ucf.edu/echronicle/archives/index.htm

   The Florida Solar Energy Center's (FSEC®) new online quarterly newsletter.

Energy User News   http://www.energyusernews.com/

   Trade publication covers energy efficiency in new and existing non-residential buildings.

EREN News   http://www.eren.doe.gov/news/

   Energy Efficiency and Renewable Energy Network of the U.S. Department of Energy. EREN Network News is a weekly electronic newsletter covering energy efficiency and renewable energy news.

Green Energy News   http://www.nrglink.com/index.html

   Weekly e-publication offers news about energy efficiency and "green" energy issues for non-residential buildings.

Home Energy Magazine   http://homeenergy.org/hewebsite/

   Not a newsletter, but the best resource for home energy.

IBPSA News   http://www.ibpsa.org/newslett.htm

   Newsletter of the International Building Performance Simulation Association (IBPSA). Technical articles about building simulation techniques, conference news.

Setting the Standard   http://www.energycodes.gov/news/

   Newsletter of the U.S. Department of Energy's Building Standards and Guidelines Program.

WinterGreen   http://www.swinter.com/Services/06Tech_Trans/co_wintergreen.html

   WinterGREEN is an excellent newsletter that reports on the energy-efficiency activities of Steven Winter Associates, Inc. Each issue presents reports from the field and presentations on sustainable building systems and concepts

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BLAST*news*

www.bso.uiuc.edu

Building Systems Laboratory
University of Illinois, 30 Mechanical Engineering Building,
1206 West Green Street, Urbana, IL 61801
Tel: (217) 333-3977 - Fax: (217) 244-6534
support@blast.bso.uiuc.edu

The **Building Loads Analysis and System Thermodynamics (BLAST** program predicts energy consumption, energy system performance and cost for new or existing (pre-retrofit) buildings.

BLAST contains three major sub-programs:

- **Space Load Prediction** computes hourly space loads in a building based on weather data and user inputs detailing the building construction and operation.

- **Air Distribution System Simulation** uses the computed space loads, weather data, and user inputs.

- **Central Plant Simulation** computes monthly and annual fuel and electrical power consumption.

Heat Balance Loads Calculator (HBLC)
The BLAST graphical interface (HBLC) is a Windows-based interactive program for producing

BLAST input files. You can download a demo version of HBLC (for MS Windows) from the BLAST web site (User manual included).

HBLC/BLAST Training Courses
Experience with the HBLC and the BLAST family of programs has shown that new users can benefit from a session of structured training with the software. The Building Systems Laboratory offers such training courses on an as needed basis typically at our offices in Urbana, Illinois.

WINLCCID 98
LCCID (Life Cycle Cost in Design) was developed to perform Life Cycle Cost Analyses (LCCA) for the Department of Defense and their contractors.

To order BLAST-related products, contact the Building Systems Laboratory at the address above.

Program Name	Order Number	Price
PC BLAST Includes: BLAST, HBLC, BTEXT, WIFE, CHILLER, Report Writer, Report Writer File Generator, Comfort Report program, Weather File Reporting Program, Control Profile Macros for Lotus or Symphony, and the Design Week Program. The single CD-ROM includes soft copies of the BLAST Manual, technical articles and theses related to BLAST, nearly 400 processed weather files with a browsing engine, and complete source code for BLAST, HBLC, etc.	3B486E3-0898	$1500
PC BLAST Package Upgrade from level 295+	4B486E3-0898	$450
WINLCCID 98: executable version for 386/486/Pentium	3LCC3-0898	$295
WINLCCID 98: update from WINLCCID 97	4LCC3-0898	$195
The last four digits of the catalog number indicate the month and year the item was released or published. This will enable you to see if you have the most recent version. All software will be shipped on 3.5" high density floppy disks unless noted otherwise.		

GenOpt 2.0
Generic Optimization Program

GenOpt is an optimization program for the minimization of a cost function, such as annual energy use, that is evaluated by an external simulation program. GenOpt can be used with any simulation program -- such as EnergyPlus, SPARK or DOE-2 -- that has text-based input and output. It also offers an interface for adding custom optimization algorithms to its library.

GenOpt processes discrete independent variables, such as different window constructions, either for optimization problems with mixed discrete and continuous independent variables or for doing parametric studies. Some simulation programs, such as EnergyPlus, cannot pre-process the independent variables or post-process values that are computed during the simulation. For such situations, input function objects and output function objects can now be used without having to modify GenOpt's source code.

GenOpt 2.0 **(with documentation) may be downloaded free of charge from**

http://SimulationResearch.lbl.gov

National Research Council Canada   Conseil national de recherches Canada

Daysim 2.1 🍁 Daylighting Analysis Tool

The National Research Council Canada and the Fraunhofer Institute for Solar Energy Systems have released version 2.1 of the Daysim daylighting analysis tool. Daysim is based on LBNL's Radiance software and combines the Perez sky model with a daylight coefficient approach to effectively predict the annual daylight availability (daylight factor and daylight autonomy) in buildings for multiple sites worldwide (you can import EnergyPlus epw climate files). Daysim further features a user behavior model which allows to compare the electric lighting use for manual and automated controls (occupancy sensor, photocell control). The software runs under Windows and Linux OS and can be downloaded from www.daysim.com. The following new features have been added since version 2.0:

♦ **extended tutorial:** an extensive document to help newcomers to get started with daylight simulations
♦ step-by-step instructions of **how to import building scenes** from AutoCAD, SketchUp, and Ecotect into Daysim
♦ a list of **case studies** of how your colleagues have used Daysim in actual building projects
♦ improved simulation **output in html-format**
♦ improved **JAVA GUI** with an extensive help file system
♦ based on Radiance version 3R6P1(latest version)
♦ the new version allows to model **Radiance function file materials** (transdata, etc.)

Daysim 2.1 Runs under Windows 2000 and Linux/Unix operating systems.

Download site:
http://irc.nrc-cnrc.gc.ca/ie/light/daysim/daylightform.html

Canada

SPARK *is an equation-based simulation environment that allows you to build customized models of complex physical processes by connecting calculation objects that represent system components like walls, fans, heat exchangers, chillers, ducts, mixing boxes, controls, etc. It is aimed at the simulation of innovative and/or complex building systems that are beyond the scope of whole-building programs like DOE-2 and EnergyPlus. VisualSPARK adds a graphical user interface to SPARK to simplify its use.*

DOWNLOAD VISUALSPARK FREE OF CHARGE FROM

http://simulationresearch.lbl.gov/

Please go to our website to download new VisualSPARK documentation:

- **New Features, Bug Fixes, And Changes**
- **Frequently Asked Questions**
- **How To Port Atomic Classes To Spark 2.X**
- **Theoretical Speed-Up Using Spark**

SPARK was developed by the Simulation Research Group at Lawrence Berkeley National Laboratory and by Ayres Sowell Associates, with Support from the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technologies Program of the U.S. Department of Energy, Program Manager Dru Crawley.

Electric Cord
Here is a really complex maze, depicting a tangle of electrical extension cords, with paths that frequently cross each other. Where the cords cross, you must keep going straight.
You can only change direction at a plug.

↓ start here

↓ End here
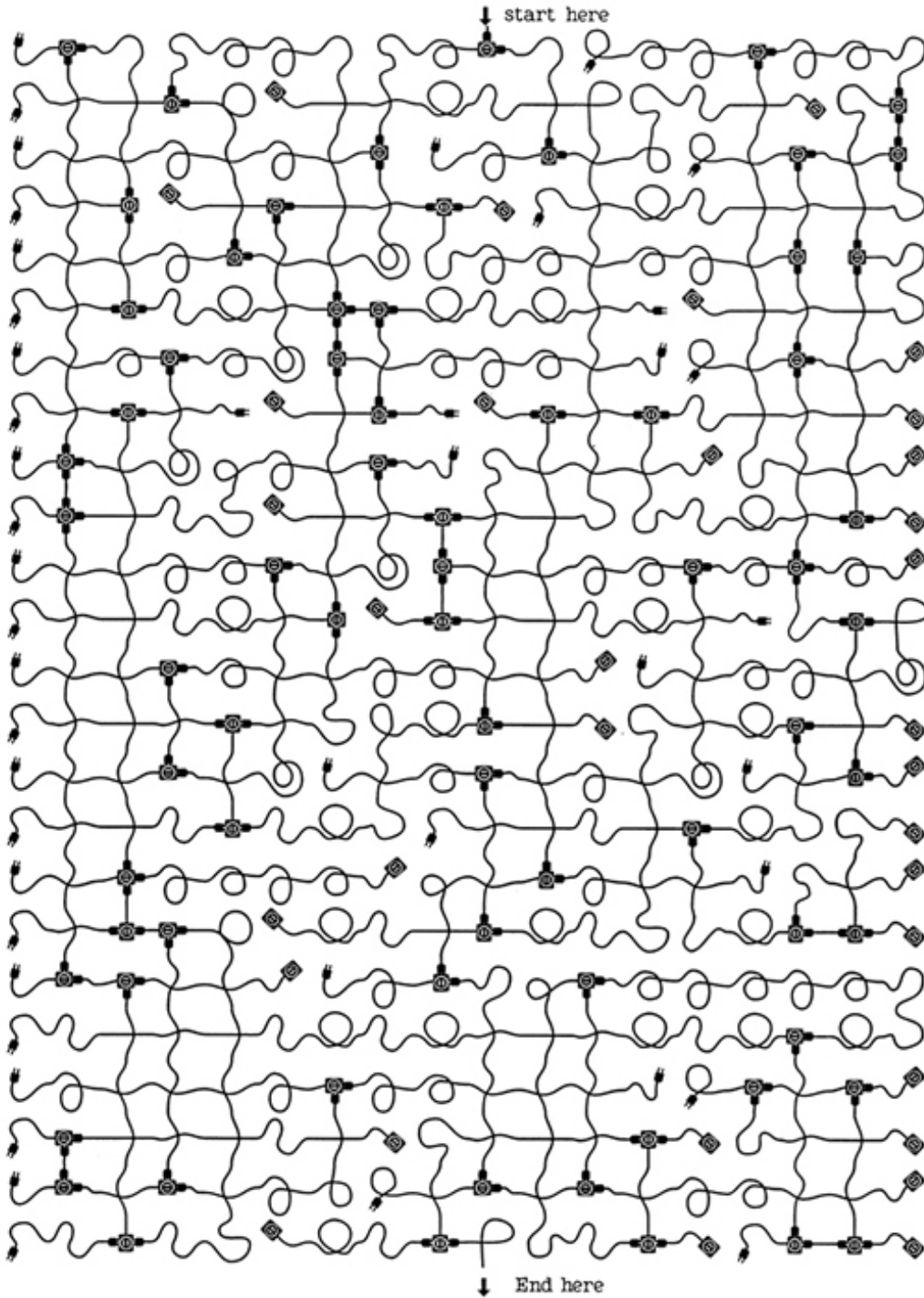
For the solution, see **Section 2** of this newsletter!