

\*EnergyPlus\* SPARK\*DOE-2\* EnergyPlus\*VisualSPARK\*EnergyPlus\*DOE-2\*GenOpt\*EnergyPlus\*  
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## BUILDING ENERGY SIMULATION ★ USER NEWS

\*EnergyPlus\* SPARK\*DOE-2\* EnergyPlus\*VisualSPARK\*EnergyPlus\*DOE-2\*GenOpt\*EnergyPlus\*  
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### The Buzz

We would like to welcome two new **EnergyPlus** consultants (p. 4) and three new **DOE-2** consultants (p. 14).

*EnergyPlus* Training, p. 6

The Society of Building Simulation Educators (**SBSE**) will host its annual retreat in July at Pingree Park, Colorado (see p. 12). Go to [www.sbse.org](http://www.sbse.org) for all the details. While you're on the website, be sure to download their excellent newsletter, **SBSE News**.

The newest action-packed issue of the **IBPSA** news may be downloaded from: [www.ibpsa.org/newsletter/ibpsa\\_news-16-1.pdf](http://www.ibpsa.org/newsletter/ibpsa_news-16-1.pdf)

Check out the May/June 2006 issue of *Home Energy Magazine* ([www.homeenergy.org](http://www.homeenergy.org)); it features wireless building controls, energy management, new daylighting software and much more !!



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## Release of EnergyPlus 1.3.0

The tenth major version of EnergyPlus (1.3.0) was released on April 25, 2006 and is now available in versions for both the Windows and Linux operating systems. Download this newest release at no cost from the EnergyPlus web site: [www.energyplus.gov](http://www.energyplus.gov).

### New Features

- UFAD (Under Floor Air Distribution) room air model for exterior zones is now available.
- Completely reworked airflow modeling -- the new AirflowNetwork model replaces both COMIS and ADS and has the combined capabilities. Calculation of infiltration, ventilation, mixing and cross mixing moved to system time step for future feature development of hybrid (mixed mode) ventilation control. Differences in results are usually minor.
- Outside air temperature is now varied as a function of zone or surface height above ground. Wind profile options can be set separately for the weather station and the building site. Includes new zone and surface report variables for height dependent properties. There will be differences in results, particularly in files with Ventilation or Infiltration.
- Simple earth tube model for preconditioning (heating/cooling) outside air.
- Tempering valve (3-way valve emulation) for effective and safe use of stored thermal energy.
- Variable and constant speed headered pumps.
- Detailed ice storage.
- New Compact HVAC models for fan powered VAV, fan coil, night cycle controls, outside air heat recovery, supply air temperature reset, chilled/hot water temperature reset, VAV supply fan part-load options, VAV fan blow through or draw through option, and zone supply and return plenums.
- Energy end-use subcategories are now user-definable.
- New report variable for Zone Operative Temperature (Operative Temperature Control planned for V 1.4 in October).

**And many other enhancements and significant speed improvements throughout.**

**Free! Residential Lighting Design Guide (California)** -- Best practices and lighting designs for California's 2005 Title 24 energy code.  
<http://www.cltc.ucdavis.edu>

The latest edition of **Blueprint** – the State of California's Title 24 On-Line Newsletter – is now available. Issue # 83 is all about Cool Roofs. <http://www.energy.ca.gov/efficiency/blueprint/>

## Ask an EnergyPlus Expert

### HUMAN INTERVENTION IN ZONAL MIXING

Are there any objects in EnergyPlus that account for the human intervention of closing/opening doors when temperatures in a room are too hot/cold? I have a situation in a simulation that I would like to emulate.

I'm modeling several atrium spaces that contain hot air which could be circulated around the open corridor spaces. If the spaces connected to these corridors are too cold, the occupants often open these doors until the temperatures have risen within the space. For instance, the corridor will be 25C while the room may only be 16C.

Are there any objects in EnergyPlus to cover this situation?

#### Answer

The Mixing object might be usable in this context. It has to be used judiciously, though, since there is no overall air balance being performed. However, in your case if the ultimate source of air is a large zone (atrium) this could work adequately. But you won't see lowered temperatures in the corridor and atrium, just higher temperatures in the offices. There's a delta T trigger that could mimic the opening/closing of doors. You'd have to estimate the flow rate.

### BUILDING ORIENTATION

I want to simulate a building with a long axis rotated for 349 degrees from the north axis. I gave this value to the field 'North Axis' in 'Simulation Parameters: Building'. If I open the .dxf, no rotation occurred and I always get the following warning:

```
** Warning ** World Coordinate System selected. Any non-zero
Building/Zone North Axes or non-zero Zone Origins are ignored.
**      ~~~      ** These will be used in Daylighting:Detailed calculations
but not in normal geometry inputs.
```

(The same warning appears for every rotation angle.)

#### Answer

You need to switch your "SurfaceGeometry" from WorldCoordinates to RelativeCoordinates to have it take the origins, etc into account. Since you were originally in WorldCoordinates, you are probably okay to just do that but you should check Zone Origins and make sure they are all "0". In relative coordinate systems, windows and doors are relative to the zone origins.

### To Access EnergyPlus Documentation

<http://www.eere.energy.gov/buildings/energyplus/documentation.html>

## Ask an EnergyPlus Expert

### OVERSIZING IN A HEATING COIL

I have a problem with a system. I have three zones which are supplied with fresh air (heated to 20C) and three electric heaters. The electric heaters take priority and, as a result, the heated fresh air picks up any additional heat. The problem is with an autosized system which manages the temperatures in the zones fine, the problem is in the plant loop.

The AHU consists of full FA setup with a supply fan and a heating coil. The heating coil is connected to a constant volume system (with bypass pipes) and a boiler. When I autosize the system, it is set to an overly large level. The heating coil never requires these flowrates so the vast majority of hot water flows through the bypass pipes (less than 1% flows through the heating coil). This means that the pump adds all the heat and the boiler is never required.

Can anyone point out why the flowrate through the heating coil would be so hugely oversized leading to zero input from a boiler.

My sizing parameters are 1,4;

#### Answer

The problem is due to autosizing a system which is providing neutral fresh air in a zone where the heating is to be met by baseboard heat. Both the air handler and the baseboard are being sized to meet the entire heating load.

In this case, the ZONE SIZING heating supply temp is specified as 20C and the zone heating setpoint is 20C, so the heating supply air flow rate for the air loop is being calculated as 2258.9 m<sup>3</sup>/s(!) (See component sizing reports in the eio output file).

In the ZONE SIZING objects, make these changes, and I think you will get a more reasonable result:

```
flow/zone,                !- heating design air flow method
<same value as outside air flow>; !- heating design air flow rate
{m3/s}
```

## New EnergyPlus Consultant

in Massachusetts

Charlie Curcija, Ph.D. and Mahabir Bhandari, Ph.D.

[DesignBuilder Software](#)

18 Tanglewood Rd, Amherst, MA 01002

Tel: 413-256-4647, fax: 413-256-4348

**Free!!!** Subscribe to the ASHRAE newsletters

<http://www.ashrae.org/template/enewsletterlanding>

## Ask an EnergyPlus Expert

### HUMIDITY CONTROL

I have a single zone, single duct, constant volume, reheat system with a cooling coil, followed by a fan, followed by a humidifier on the air loop and a reheat coil just before the zone. In winter the temperature and RH are at their set levels but in the summer the RH levels are too high. (I need the RH to be 50%  $\pm$  5% year round as the zone is a gallery storage area). I have SET POINT MANAGER:SINGLE ZONE MAX HUM with the control node set to the fan outlet and SET POINT MANAGER:SINGLE ZONE MIN HUM with the control node set to the humidifier outlet. I also have SINGLE ZONE COOLING with the control node set to the fan outlet node.

#### Answer

Your cooling coil may not have sufficient capacity to meet the dehumidification load. If the coil was autosized, it was sized to meet the thermostat set point. A future release of EnergyPlus will allow the coil to be autosized to meet both the thermostat and humidistat set points. You may need to manually increase the cooling coil capacity.

If you are using a Controller:Simple object to control the cooling coil, the control variable should be set to TEMPandHUMRAT.

Report the set point at the fan outlet node and compare this value with the fan outlet node temperature.

```
Report Variable,  
  Fan Outlet Node Name,      !- Key_Value  
  System Node Setpoint Temp, !- Variable_Name  
  Timestep;                  !- Reporting_Frequency
```

```
Report Variable,  
  Fan Outlet Node Name,      !- Key_Value  
  System Node Temp,         !- Variable_Name  
  Timestep;                  !- Reporting_Frequency
```

When the actual temperature is above the set point, if the coil is at its maximum capacity you will need to add a report variable for your specific coil's capacity; you can find this report variable in the rdd file.

When the humidity is above the humidistat set point, the set point temperature calculated by the Set Point Manager:Single Zone Max Hum object will overwrite the set point temperature placed on the node by the Set Point Manager:Single Zone Cooling object.

An alternative method would be to add a Set Point Manager:Mixed Air object and use the cooling coil outlet node as the set point node and the fan outlet node as the reference set point node (leave the Set Point Manager:Single Zone Cooling object set point node name as the fan outlet node). Then move the name of the set point node for the existing Set Point Manager:Single Zone Max Hum object to the cooling coil outlet node. The same guidance given above also applies to this configuration (except you would add report variables for the System Node Setpoint Temp and System Node Temp using the cooling coil outlet node as the key value to help you debug this).

## Ask an EnergyPlus Expert

### CONDENSER LOOP FLOW RATE

I have three variable flow chillers and a bypass branch in parallel between the condenser demand side splitter and mixer, staged with cooling load range based operation. On the supply side, I have a single variable-speed intermittent condenser water pump and single two-speed cooling tower on the supply side with a bypass in parallel.

The problem is that the cooling tower and pump operate at 100% design flow (therefore high energy usage) as though all three chillers were operating, even when only one chiller operates.

I tried removing the bypass branch on the demand side but this generated an error. What is the correct arrangement of bypass branches to simulate the cooling tower and condenser pump flow, varying as the chillers are switched on and off (to model an arrangement where each chiller has its own condenser water pump)?

#### Answer

The problem lies with having a single cooling tower on the condenser loop. Once the tower is active, it is requesting its full flow rate. Try making the tower a PASSIVE component on its branch. If that does not work, then you will need to model multiple cooling towers in parallel. When load controls correspond to the chiller load controls, then the towers should come on in sequence as the chillers do, and the condenser loop flow rate should follow.

### UNIT VENTILATOR

I get this warning when I use a unit ventilator in one of my simulations:

```
** Severe ** Error in Node="NODE 14066 IN", ZoneInlet node did not  
find an outlet node.  
** ~~~ ** Reference Object=CONTROLLED ZONE EQUIP CONFIGURATION,  
Name=14066
```

The unit ventilator seems to be working properly but I would prefer to know exactly why this error is appearing.

#### Answer

This error messages means that "NODE 14066 IN" is listed as a Zone Inlet node, but there is no component that has the same node name as an outlet node. Thus, this inlet node will have no flow. Perhaps this is an extra zone inlet node and is not intended to be connected to anything?

## 2006 EnergyPlus Training - go to [www.gard.com](http://www.gard.com)

**June 15-16 in Atlanta, GA – sign up for either 1- or 2-day workshops.**

Day 1 covers basics and Day 2 goes into more depth.

**August 01 in Cambridge, Massachusetts (at MIT)**

Immediately before the IBPSA-USA SimBuild Conference at MIT

Early registration deadline is June 28, 2006; Registration closes after July 24

## Ask an EnergyPlus Expert

### IFCtoIDF AND IFC HVAC INTERFACE QUESTIONS

I am interested in the IFC to IDF file conversion capabilities mentioned on the DOE website. I've downloaded the IFCtoIDF utility and installed the BPro COM server. I also have Autodesk Revit installed on the machine and am trying to convert simple buildings over to Energy Plus.

1. Am I correct in understanding that the IFCtoIDF utility is one directional?
2. And you cannot convert back to IFC from IDF?
3. Has anyone had success moving information from Revit to EnergyPlus?
4. If not Revit are there other CAD style or IFC editors anyone has had luck using?
5. Does IFCtoIDF only deal with building geometry?
6. The rest of the questions are about the utility "IFC HVAC interface."
  - 6a. Has anyone used this software?
  - 6b. Does anyone know how/where to get this software?
  - 6c. Does it work as described (Convert IFC mechanical information into and back out of IDF format)?

Answers (from Rob Hitchcock, LBNL)

IFCtoIDF is a utility that imports building geometry from an IFC data file and exports an EnergyPlus IDF with an energy simulation view (i.e., thermal view) of that geometry. IFCtoIDF has been developed using the BPro middleware for IFC import. We are currently working with the developer of BPro to iron out problems in IFCtoIDF in using the latest update of BPro.

Support for IFCs is currently provided in Autodesk Architectural Desktop through G.E.M. Team Solutions GbR and their partner Inopso (see <http://www.inopso.com/>).

Since IFCtoIDF is designed to work with the IFC data format, independent from the CAD environment that generates an IFC data file, it is intended to work with any IFC data file from any CAD vendor. In reality, this is problematic since different CAD vendors implement their IFC export in different ways. This issue becomes important when you also have to transform what might be called the "architectural view" created in the CAD environment, into a "thermal view" necessary for energy simulation (e.g., subdividing a floor/ceiling slab covering the entire building footprint into surfaces bounding thermal zones above and below the slab).

With this background in mind, I have appended responses from a colleague to your specific questions below.

Answers (from Dr. Vladimir Bazjanac, LBNL)

Q 1: Am I correct in understanding that the IFCtoIDF utility is one directional?

A: Yes.

Q 2: And you cannot convert back to IFC from IDF??

A: Correct - you cannot rewrite building geometry without an appropriate CAD tool.

***Answers continued on the next page***

## Ask an EnergyPlus Expert

### IFCtoIDF AND IFC HVAC INTERFACE QUESTIONS

--- continued ---

Q 3: Has anyone had success moving information from Revit to EnergyPlus?

A: Yes, but only on an experimental basis.

Q 4: If not Revit are there other CAD style or IFC editors anyone has had luck using?

A: You need to use a model based CAD tool that can output a valid IFC2x2 file. ArchiCAD 9 is one such example.

Q 5: Does IFCtoIDF only deal with building geometry?

A: Yes. Another tool is under development that will do more (e.g. import construction material layers defined in CAD).

Q 6: The rest of the questions are about the utility "IFC HVAC interface" to EnergyPlus.

Q 6a: Has anyone used this software?

A: Only in testing.

Q 6b: Does anyone know how/where to get this software?

A: A beta version based on IDD versions 1.1.0 and 1.1.1 is available from LBNL upon request – contact this writer (Dr. Vladimir Bazjanac [v\\_bazjanac@lbl.gov](mailto:v_bazjanac@lbl.gov)).

Q 6c: Does it work as described (Convert IFC mechanical information into and back out of IDF format)?

A: It does in tests performed so far.

### SOLID ADSORBENTS

In the object Materialproperty:mositure:EMPD, there are four fields that need to be filled in. They look like fourth-order polynomial coefficients. I checked I/O and Engineering documentation and did not find any detailed information about these except as follows:

*Field: Constants to Define Equilibrium Equation*

*The next four fields describe the sorption isotherm curve used for building materials.*

*These four fields are dimensionless coefficients.*

Where do I find curves for the common Solid Adsorbents?

#### **Answer**

The four fields (dimensionless coefficients) that are used in the object Materialproperty:mositure:EMPD define a relationship between moisture content and relative humidity. Eq. (35) on page 30 in the Engineering Reference (v.1.3) provides the relationship. MositureMaterials.idf has several materials with EMPD properties. If you cannot find the materials you want to use, you may need to find measured sorption data and curve-fit them based on Eq. (35).



## EnergyPlus Version 1.3.0

Download a free copy of the program

<http://www.energyplus.gov/>

### Support Tools

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

### Weather Data from [http://www.eere.energy.gov/buildings/energyplus/cfm/weather\\_data.cfm](http://www.eere.energy.gov/buildings/energyplus/cfm/weather_data.cfm)

Weather data for more than 800 locations are now available in EnergyPlus weather format. See the write-up on how to [create Meteorom files for EnergyPlus](#).

### 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/](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](#), Q and A for [2005](#)

### 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](mailto: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/](http://groups.yahoo.com/group/EnergyPlus_Support/)

### Testing and Validation <http://www.eere.energy.gov/buildings/energyplus/testing.html>.

*EnergyPlus is being developed by University of Illinois and Lawrence Berkeley National Laboratory, with the assistance of DHL Consulting, C. O. Pedersen Associates, Florida Solar Energy Center, GARD Analytics, the National Renewable Energy Laboratory, Oklahoma State University and others. Development of EnergyPlus is supported by the U. S. Department of Energy, Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technologies Program (Program Manager, Dru Crawley).*

*The Forecast Looks Favorable for ...*

## **(Free!) Weather Data on Demand**

*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](http://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.*



## Spotlight on SPARK – Part 4 of 5

*Frequently Asked Questions about the Simulation Problem Analysis and Research Kernel Software*

Download VisualSPARK 2.01 (Free!) from [http://gundog.lbl.gov/VS/vs201\\_eula.html](http://gundog.lbl.gov/VS/vs201_eula.html)

This is a list of frequently asked questions (FAQ) for VisualSPARK users. If you need help for something that is not covered by the [SPARK Reference Manual](#), the [SPARK Atomic Class API](#), the [SPARK Problem Driver API](#), or this FAQ, please email [us](mailto:us).

This FAQ is intended to supplement, not replace, the SPARK documentation. Before emailing us a question, you should first check to see if the topic is covered in the various manuals.

- [SPARK Simulation Requests](#)
  - [What are internal and external requests?](#)
  - [How to request a time step?](#)
  - [How to request a stopping time?](#)
  - [How to request a meeting point?](#)
  - [How to request the simulation to be aborted?](#)
  - [How to request the simulation to be stopped?](#)
  - [How to request the simulation to be reinitialized?](#)

Requests are processed at runtime during the simulation of a problem, i.e. within the TProblem::Simulate() method. Requests can be sent from the callbacks in the various atomic classes or from the driver function or internally from within the SPARK solver.

### [What are internal and external requests?](#)

A request is referred to as an **internal** request if the "to" and "from" SPARK::TProblem addresses in the SPARK::THeader constructor are the same. In all other cases the requests are considered to be **external**. In general internal requests have to comply with further restrictions than external requests in order to prevent unwanted behavior at runtime. Consult the SPARK Atomic Class API for more information.

### [How to request a time step?](#)

A set\_time\_step can be sent to request the time step to use for the next dynamic step. The desired time step must be strictly larger than zero. The time step effectively used for the next dynamic step might be smaller than the requested one in case a request for a smaller time step was sent (e.g. to synchronize with the next meeting point internally), but it will never be larger. For example, the following code snippet a COMMIT callback shows how to request a new time step of 0.5.

```
COMMIT( my_commit_callback )
{
    ...
    SPARK_REQUEST__SET_TIME_STEP( "some text", 0.5);
}
```

### [How to request a stopping time?](#)

A set\_stop\_time request can be sent to request a stopping time ahead of the current time and earlier than the final time specified in the runtime control parameters. The stopping time is cleared when it is

hit by the simulation. So if you restore the simulation to an earlier state the stopping time will no longer be active. For example, the following code snippet of a COMMIT callback shows how to request the simulation to stop when the global time reaches 11.0 a stopping time step of 0.5.

```
COMMIT( my_commit_callback )
{
    ...
    REQUEST__SET_STOP_TIME( "some text", 11.0);
}
```

#### [How to request a meeting point?](#)

A `set_meeting_point` request can be sent to request a meeting point ahead of the current time. The meeting points are stored internally in the solver. They are used to synchronize the global time with the next event when the solver is operating in variable time stepping mode.

Only the meeting points before the **final time** as specified in the \*.run file will be tracked. If the requested meeting point is after the final time, it will be discarded. In order to clear all the meeting points you should send a `clear_meeting_points` request.

For example, the following code snippet of a COMMIT callback shows how to request the simulation to synchronize its clock with the time stamp 7.0. Note that the last argument set to true essentially requests the simulator to be reinitialized with a static step upon reaching the requested meeting point. It might be useful to restart the simulation upon reaching some meeting point if the boundary conditions or the system formulation has changed.

```
COMMIT( my_commit_callback )
{
    ...
    REQUEST__SET_MEETING_POINT( "some text", 7.0, true);
}
```

#### [How to request the simulation to be aborted?](#)

An `abort_simulation` request can be sent from a callback function to request the simulation to be aborted now.

```
COMMIT( my_commit_callback )
{
    ...
    REQUEST__ABORT_SIMULATION( "some text" );
}
```

#### [How to request the simulation to be stopped?](#)

A `stop_simulation` request can be sent from a callback function to request the simulation to be stopped after the current step has been successfully computed.

```
COMMIT( my_commit_callback )
{
    ...
    REQUEST__STOP_SIMULATION( "some text" );
}
```

Please visit our website at <http://SimulationResearch.Ibl.gov>

### How to request the simulation to be reinitialized?

A `reinitialize_simulation` request can be sent from a callback function to request the simulation to be reinitialized with a static step at the next step.

```
COMMIT( my_commit_callback )
{
  ...
  REQUEST__REINITIALIZE_SIMULATION( "some text" );
}
```

**More Frequently Asked Questions in the next Newsletter !!**

**Here's a link to a recent SPARK report:**

### **Parametric Analysis of a Solar Dessicant Cooling System Using the SimSPARK Environment**

by

Etienne Wurtz, Chadi Maalouf, [cmaalouf@univ-lr.fr](mailto:cmaalouf@univ-lr.fr), Laurent Mora, Francis Allard, LEPTAB,  
University of La Rochelle, Av. M. Crepeau, 17042, La Rochelle, France

#### **Abstract**

A desiccant cooling unit powered by 14.8 m<sup>2</sup> of solar liquid collectors is implemented in a training room in Chambéry in Eastern France. The system uses a Lithium Chloride sorption wheel and is optimized to work without auxiliary heat regeneration source. Several parameters are studied in order to decrease primary energy consumption and increase system performance. The models are implemented in SimSPARK a simulation environment linked with EnergyPlus and able to solve complex problems. Simulations show that humidifiers efficiencies and rotating heat exchanger efficiency have major influences on the system performance. Besides it was shown that airflow rate during inoccupation period is a key component in the operation of the system. Our results suggest that an airflow rate of 2.8 AC/H during inoccupation decreases required regeneration hours by about 40%, decreases room required cooling factor about 62% while electricity consumption increases only about 8%.

Proc. Building Simulation 05 (IBPSA) Montreal, Canada August 16-18, 2005

**From the newsletter of the Society of Building Science Educators (SBSE)**

The Society of Building Science Educators ([www.sbse.org](http://www.sbse.org)) will hold its annual retreat on July 15-19 at Colorado State University's Pingree Park campus.

Theme of this year's retreat is Integral Sustainable Design. Just prior to the retreat, there will be a Tool Day July 13 at REI in Denver; participants will be introduced to



building performance analysis and to the "Vital Signs" (<http://arch.ced.berkeley.edu/vitalsigns/>) and "Agents of Change" (<http://aoc.uoregon.edu/>) projects.

Please go to the SBSE website for all the information on the July retreat and to take advantage of the wealth of information presented therein. Bruce Haglund ([bhaglund@uidaho.edu](mailto:bhaglund@uidaho.edu)) is the newsletter contact.



# DOE-2



DOE-2.1E (version 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) and (Part 2)

DOE-2 Engineers Manual (2.1A)

DOE-2 BDL Summary (2.1E)

DOE-2 Supplement to the Reference Manual (2.1E)

## 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](mailto:estsc@adonis.osti.gov)

## Purchase DOE-2 Documentation

DOE-2 Sample Run Book (2.1E) -- The Sample Run book is the only 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 2005](#) [for 2004](#) [for 2003](#) [for 2002](#)

A compilation of all the "how to" and "DOE-2 Puzzler" articles from the newsletter.

[Changes and Bug Fixes to DOE-2.1E \(txt file\)](#)

Description of all changes and bug fixes in a text document.

**Free!** The [2005 Buildings Energy Data Book](#) includes statistics on residential and commercial building energy consumption. Data tables contain statistics related to construction, building technologies, energy consumption, and building characteristics.

Download book from:

<http://buildingsdatabook.eere.energy.gov/>

Please visit our website at <http://SimulationResearch.lbl.gov>

New DOE-2 Consultants	
Kevin Luoma Environmental Systems Design 175 W. Jackson Blvd., #1400 Chicago, Illinois 60604 Ph: 312.372.1200 Fx: 312.372.1222 <a href="mailto:inquiries@esdesign.com">inquiries@esdesign.com</a>	David Gardner, General Manager SolArm -- <a href="http://www.solarm.com">www.solarm.com</a> 6617 Sky Road Joshua, TX 76058 Ph / Fx:(817)-309-2269 Cell: (817)-648-2413
Lung-Sing Wong, P.E. Servidyne Systems, LLC 1945 The Exchange, Suite 325 Atlanta, GA 30339-2029	Office: 770-933-4208 Main: 800-241-8996 x 242 Fax: 770-933-4209 <a href="mailto:lung-sing.wong@servidyne.com">lung-sing.wong@servidyne.com</a> <a href="http://www.servidyne.com">www.servidyne.com</a>

Free Building Energy Software from Lawrence Berkeley National Laboratory
<b>BDA 3.1</b> ( <i>Building Design Advisor</i> ) <a href="http://gaia.lbl.gov/BDA">gaia.lbl.gov/BDA</a> (building decision-making from design through completion)
<b>COMIS</b> <a href="http://www-epb.lbl.gov/comis">www-epb.lbl.gov/comis</a> (multi-zone air flow and contaminant transport model)
<b>EnergyPlus 1.3.0</b> <a href="http://www.energyplus.gov/">www.energyplus.gov/</a> (next-generation whole-building energy analysis program, based on BLAST and DOE-2)
<b>GenOpt<sup>®</sup> 2.0</b> <a href="http://SimulationResearch.lbl.gov">SimulationResearch.lbl.gov</a> (generic optimization program)
<b>Optics 5.2</b> <a href="http://windows.lbl.gov/materials/optics5/">windows.lbl.gov/materials/optics5/</a> (for analyzing optical properties of glazing systems)
<b>RADIANCE 3.5</b> <a href="http://radsite.lbl.gov/radiance/">radsite.lbl.gov/radiance/</a> (analysis and visualization of lighting in design)
<b>Desktop Radiance 2.0<math>\beta</math></b> <a href="http://radsite.lbl.gov/deskrad/">radsite.lbl.gov/deskrad/</a> (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14)
<b>Radiance Control Panel</b> <a href="http://www.squ1.com/site.html">www.squ1.com/site.html</a> (automates some Radiance tasks once the model has been created)
<b>THERM 5.2</b> <a href="http://windows.lbl.gov/software/therm/therm.html">windows.lbl.gov/software/therm/therm.html</a> (models two-dimensional heat-transfer effects in building components where thermal bridges are of concern)
<b>VisualSPARK 2.0</b> <a href="http://SimulationResearch.lbl.gov">SimulationResearch.lbl.gov</a> ( <i>Simulation Problem Analysis and Research Kernel</i> ) (connect component models to simulate innovative building envelope and HVAC systems)
<b>WINDOW 5.2</b> <a href="http://windows.lbl.gov/software/window/window.html">windows.lbl.gov/software/window/window.html</a> (thermal analysis of window products)
Free Software / Request by Fax from 510.486.4089
<b>RESFEN 3.1</b> <a href="http://windows.lbl.gov/software/resfen/resfen.html">windows.lbl.gov/software/resfen/resfen.html</a> (choose energy-efficient, cost-effective windows for a given residential application)
Web Based
<b>Home Energy Saver</b> <a href="http://hes.lbl.gov">hes.lbl.gov</a> (quickly computes home energy use)

Please visit our website at <http://SimulationResearch.Ibl.gov>

## IBPSA-USA -- SimBuild 2006 -- August 2-4, 2006

To be held at the Massachusetts Institute of Technology in Cambridge, MA, USA  
For details, access the website: <http://ceae.colorado.edu/ibpsa/SimBuild06/index.html>

IBPSA-USA will hold its second national conference, August 2-4, 2006 on the campus of the Massachusetts Institute of Technology. Technical sessions over two days will feature presentations on a wide range of topics related to the simulation of HVAC equipment, airflow in buildings, energy usage, and the visual and acoustic environment in buildings, as well as demonstrations of simulation software and of hardware and software needed to emulate or measure the performance of buildings. Friday will be a practitioner day, offering case studies, hands-on software demonstrations and other presentations aimed at giving practicing architects and engineers the information they need to be more informed collaborators with simulation experts. The practitioner day will be coordinated with local US Green Building Council chapters and affiliates.

## Free Membership for 2006 -- IBPSA-USA

The [IBPSA-USA](#) Board of Directors has voted unanimously to extend our policy of free membership. Those interested in renewing their membership or becoming new members may do so by expressing their desire to be IBPSA-USA members and providing updated contact information (Affiliation, Mailing address, Phone number, Email address)

Establishing membership may be done on-site at any IBPSA-USA meeting or by sending an email to the IBPSA-USA Secretary, Peter Ellis, at [peter\\_ellis@nrel.gov](mailto:peter_ellis@nrel.gov).  
[P] 303.384.7443, [F] 303.384.7540



## Meetings, Conferences, Symposia and Workshops

2006		
June 4-8	Healthy Buildings 2006	<a href="http://www.hb2006.org">www.hb2006.org</a>
June 24-28	ASHRAE Annual Meeting	<a href="http://www.ashrae.org">www.ashrae.org</a>
July 08-13	SOLAR 2006	<a href="http://www.ases.org/">http://www.ases.org/</a>
August 2-4	SimBuild 2006 – IBPSA USA	<a href="http://www.ibpsa.us/">http://www.ibpsa.us/</a>
August 13-18	ACEEE Summer Study on Energy Efficiency in Buildings	<a href="http://www.aceee.org">www.aceee.org</a>
October 07	Start of National Solar Tour	<a href="http://www.ases.org/">http://www.ases.org/</a>
October 09-11	BauSIM 2006 (IBPSA-Germany) in Munich	<a href="http://www.ibpsa-germany.org/bausim2006">http://www.ibpsa-germany.org/bausim2006</a>

## Building Energy Software Tools Directory

This directory provides information on over 300 building software tools for evaluating energy efficiency, renewable energy, and sustainability in buildings. The energy tools listed in this directory include databases, spreadsheets, component and systems analyses, and whole-building energy performance simulation programs. Know of a tool (yours?) that isn't in the directory? Send email to Dru Crawley at [Drury.Crawley@ee.doe.gov](mailto:Drury.Crawley@ee.doe.gov).

Visit [http://www.eere.energy.gov/buildings/tools\\_directory/about.cfm](http://www.eere.energy.gov/buildings/tools_directory/about.cfm)



**Pacific Gas and Electric Company™**  
**WE DELIVER ENERGY.™**

## June 2006 Educational Programs

*For a complete listing of classes or to register call 415.973.7268 or go to [www.pge.com/pec](http://www.pge.com/pec)*

### ARCHITECTURE

Jun 7	EnergyPro Nonresidential Software for Beginners
Jun 8	EnergyPro Nonresidential Software for Experienced Users - Envelope and Lighting

### Building Performance (Cx)

Jun 6	Using DDC Control Systems to Commission VAV Boxes
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### H V A C

Jun 6	Using DDC Control Systems to Commission VAV Boxes
Jun 9	EnergyPro Nonresidential Software for Experienced Users – HVAC
Jun 7	EnergyPro Nonresidential Software for Beginners
Jun 8	EnergyPro Nonresidential Software for Experienced Users - Envelope and Lighting
Jun 14	Innovations in Evaporative Cooling and Water Treatment

### LIGHTING

Jun 8	EnergyPro Nonresidential Software for Experienced Users - Envelope and Lighting
Jun 22	Enhanced Lighting Automation in Commercial Buildings
Jun 7	EnergyPro Nonresidential Software for Beginners
Jun 8	EnergyPro Nonresidential Software for Experienced Users - Envelope and Lighting

### RENEWABLES

Jun 28	Photovoltaic (PV) Site Analysis and System Sizing
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### TITLE 24 (CALIFORNIA ENERGY CODE)

Jun 7	EnergyPro Nonresidential Software for Beginners
Jun 8	EnergyPro Nonresidential Software for Experienced Users -

A new issue of *Home Energy Magazine* (May/June 2006) has been published.  
Go to <http://www.homeenergy.org>.

*Calling All Infiltration Enthusiasts!!*

Lately we have received requests for an ancient (1980!) LBNL technical report that discussed the Sherman-Grimsrud air infiltration model. We tracked it down, scanned it and put it on our website. So here it is, the one, the only ...

*Measurement of Infiltration Using Fan Pressurization and Weather Data* by Max H. Sherman and David T. Grimsrud

go to: [http://qundoq.lbl.gov/dirpubs/10852\\_ShermanGrimsrud.pdf](http://qundoq.lbl.gov/dirpubs/10852_ShermanGrimsrud.pdf)



**ENERGY-10™** Version 1.8 is now available for purchase online through SBIC at:

[www.Energy-10.com](http://www.Energy-10.com).

- ✓ **Photovoltaic module** that provides the ability to model and simulate the performance of a PV system that is either stand-alone or integrated with the building.
- ✓ **Solar Domestic Hot Water module** provides a new solar domestic/service hot water modeling capability.
- ✓ **A new library** ("ASHRAELIB") is included with Version 1.8 defining constructions (wall, roof, window, etc.) as spelled out in ASHRAE 90.1-2004.

[From the Florida Solar Energy Center \(FSEC\)](#)

### **Buildings Research Post Newsletter (Winter 2006)**



**Newsletter:** <http://www.fsec.ucf.edu/bldg/resources/newsletter/winter2006/index.htm>

#### ***Evaluating Green Roof Energy Performance***

*Jeff Sonne, Senior Research Engineer  
Buildings Research Division -- Florida Solar Energy Center -- Cocoa FL*

#### **Abstract**

Summertime data indicate significantly lower peak roof surface temperatures and higher nighttime surface temperatures for the green roof. The maximum average day temperature seen for the conventional roof surface was 130°F (54°C) while the maximum average day green roof surface temperature was 91°F (33°C), or 39°F (22°C) lower than the conventional roof.

#### **Link to Report:**

[http://www.fsec.ucf.edu/bldg/resources/newsletter/winter2006/ASHRAE\\_JeffSonne.pdf](http://www.fsec.ucf.edu/bldg/resources/newsletter/winter2006/ASHRAE_JeffSonne.pdf)

### ***Update to the WINDOW Program: version 5.2.17a***

WINDOW 5.2 is a publicly available computer program for calculating total window thermal performance indices (i.e. U-values, solar heat gain coefficients, shading coefficients, and visible transmittances). WINDOW 5.2 provides a versatile heat transfer analysis method consistent with the updated rating procedure developed by the National Fenestration Rating Council (NFRC) that is consistent with the ISO 15099 standard. The program can be used to design and develop new products, to assist educators in teaching heat transfer through windows, and to help public officials in developing building energy codes.

The download contains **WINDOW 5.2.17a** (bug fixes for DOE-2 and EnergyPlus Files), plus **Version 14.0** of the International Glazing Database)

<http://windows.Ibl.gov/software/window/window.html>

# Recent Reports

Click on the link to download these (pdf) reports.  
If you run into problems, contact [kl Wellington@lbl.gov](mailto:kl Wellington@lbl.gov).

[Download paper \(PDF\)](#)

*The 9<sup>th</sup> International IBPSA Conference, Building Simulation 2005  
Held August 15-18, 2005 in Montreal, Canada*

## **DELIGHT2 DAYLIGHTING ANALYSIS IN ENERGYPLUS: INTEGRATION AND PRELIMINARY USER RESULTS**

William L. Carroll and [Robert J. Hitchcock](#)  
Environmental Energy Technologies Department  
Lawrence Berkeley National Laboratory  
University of California  
Berkeley, CA 94720 USA

### **ABSTRACT**

DElight is a simulation engine for daylight and electric lighting system analysis in buildings. DElight calculates interior illuminance levels from daylight, and the subsequent contribution required from electric lighting to meet a desired interior illuminance. DElight has been specifically designed to integrate with building thermal simulation tools. This paper updates the DElight capability set, the status of integration into the simulation tool EnergyPlus, and describes a sample analysis of a simple model from the user perspective.

[Download paper \(PDF\)](#)

*The 9<sup>th</sup> International IBPSA Conference, Building Simulation 2005  
Held August 15-18, 2005 in Montreal, Canada*

## **SIMULATING TALL BUILDINGS USING ENERGYPLUS**

Peter G. Ellis and Paul A. Torcellini  
National Renewable Energy Laboratory, Golden, CO, USA

### **ABSTRACT**

Tall buildings pose unique challenges for simulation software and modelers. Environmental factors such as air temperature and wind speed change with altitude. The urban environment imposes additional environmental factors because of shading and reflections from surrounding buildings. The large scale of tall buildings can result in excessive input data and prohibitive run times. EnergyPlus was used to compare the energy impacts of several environmental factors that vary with altitude. Results showed that environmental factors have a significant effect on the annual total building cooling and heating energy. The accuracy of using multipliers to reduce input data was also studied. Even simulating a single floor with a multiplier can give accurate results for an entire building, as long as the floor is near mid-height.

## **JOIN THE BLDG-SIM MAILING LIST**

BLDG-SIM is a mailing list for users of building energy simulation programs like EnergyPlus, SPARK, VisualSPARK, DOE-2, Trace-600, HAP, ESP, SERIRES, TRNSYS, TASE, ENERGY-10 and others. Because building simulation professionals are located worldwide, the BLDG-SIM list is an attempt to foster the development of a community of those users. Users of all levels of expertise are welcome and are encouraged to share their questions and insights about these programs. See <http://www.gard.com/ml/bldg-sim.htm>.

To subscribe, send a blank email message to [BLDG-SIM-SUBSCRIBE@GARD.COM](mailto:BLDG-SIM-SUBSCRIBE@GARD.COM)  
Jason Glazer, P.E., of GARD Analytics, Inc., is the list administrator ([jglazer@gard.com](mailto:jglazer@gard.com)).